UEFISCDI INOVARE SI CREATIVITATE / MINISTERUL EDUCAŢIEI NAŢIONALE			Proiecte colaborative de cercetare aplicativă			
21	PN-II-PT-PCCA-2013-4-0262	SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR,BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE	Vasile Dan	Vamanu	INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA " HORIA HULUBEI " - IFIN - HH	SIVECO ROMANIA SA; UNIVERSITATEA POLITEHNICA DIN BUCURESTI

Domeniul 8: Spaţiu şi securitate
Direcţia de cercetare 8.5. Sisteme şi infrastructura de securitate
Tematica de cercetare 8.5.3. Sisteme pentru asigurarea unui management eficient al situaţiilor de criză şi al intervenţiilor în cazul dezastrelor, sisteme de detecţie, prevenire şi alertă.
Aprobat: Ordinul MEN nr. 298/23.06.2014
Contract Nr. 298

SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR, BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE

Etapa 4
01/01/2017 – 30/09/2017

Dezvoltarea, testarea si livrarea Modelului experimental N-WATCHDOG EM.

RAPORT STIINTIFIC SI TEHNIC

Nota editoriala

Acest document asambleaza Rapoartele tehnice ale partenerilor privind activitatile ce au condus la rezultatele Etapei a IV-a a proiectului, specificate conform Planului de realizare, astfel:

- Platforma N-WATCHDOG, Model Experimental, EM (SIVECO), PARTEA II - realizarea si integrarea in platforma a modulelor executabile ale aplicatiilor, testarea si finalizarea produsului.
- Scenarii de test pentru simularea situatiilor de criza (IFIN-HH, UPB).
- Raport cu privire la functionalitatile sistemului N-WATCHDOG si la potentialele beneficii ale implementarii unui astfel de sistem (Raport tehnic SIVECO)
- N-WATCHDOG e-book (IFIN-HH, UPB)

Institutul National de Cerecetare-Dezvoltare pentru Fizica si Inginerie Nucleara "Horia Hulubei"	SIVECO	Universitatea Politehnica din Bucuresti

Planul de realizare

Contract: 298/2014

Cod Depunere: PN-II-PT-PCCA-2013-4-0262

Etapa 4 30/09/2017	**Denumire Etapa:** **Dezvoltarea, testarea si livrarea Modelului experimental N-WATCHDOG EM.** **Rezultate Etapa:** 1. Platforma N-WATCHDOG, Model Experimental, EM (SIVECO), PARTEA II - realizarea si integrarea in platforma a modulelor executabile ale aplicatiilor, testarea si finalizarea produsului. 2. Scenarii de test pentru simularea situatiilor de criza (IFIN-HH, UPB). 3. Raport cu privire la functionalitatile sistemului N-WATCHDOG si la potentialele beneficii ale implementarii unui astfel de sistem (Raport tehnic SIVECO) 4. N-WATCHDOG e-book (IFIN-HH, UPB)
Act.4.1	**Denumire Activitate:** Integrarea feedbackului si finalizarea unei versiuni de referinta PoC pentru a servi la specificatiile produsului final EM si la dezvoltare, Partea a II-a
	Coordonator (CO) - INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA "HORIA HULUBEI " - IFIN-HH **Activitati partener:** Integrarea feedbackului si finalizarea unei versiuni de referinta PoC pentru a servi la specificatiile produsului final EM si la dezvoltare, Partea a II-a
	Partener (P1) – SIVECO ROMANIA SA **Activitati partener:** Integrarea feedbackului si finalizarea unei versiuni de referinta PoC pentru a servi la specificatiile produsului final EM si la dezvoltare, Partea a II-a
	Partener (P2) – UNIVERSITATEA POLITEHNICA DIN BUCURESTI **Activitati partener:** Integrarea feedbackului si finalizarea unei versiuni de referinta PoC pentru a servi la specificatiile produsului final EM si la dezvoltare Partea a II-a
Act.4.2	**Denumire Activitate:** Dezvoltarea si implementarea modelului experimental N-WATCHDOG, Partea a II-a
	Partener (P1) - SIVECO ROMANIA SA **Activitati partener:** Dezvoltarea si implementarea modelului experimental N-WATCHDOG, Partea a II-a
Act.4.3	**Denumire Activitate:** Definirea si testarea scenariilor de simulare a situatiilor de criza
	Coordonator (CO) - INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA "HORIA HULUBEI " - IFIN-HH **Activitati partener:** Definirea si testarea scenariilor de simulare a situatiilor de criza
	Partener (P2) - UNIVERSITATEA POLITEHNICA DIN BUCURESTI **Activitati partener:** Definirea si testarea scenariilor de simulare a situatiilor de criza
Act.4.4	**Denumire Activitate:** Importanta implementarii N-WATCHDOG pentru diverse entitati si potentiale beneficii
	Partener (P1) - SIVECO ROMANIA SA **Activitati partener:** Importanta implementarii N-WATCHDOG pentru diverse entitati si potentiale beneficii

Act.4.5	**Denumire Activitate:** Diseminarea rezultatelor N-WATCHDOG către comunitatea ştiinţifică şi către potenţialii beneficiari
	Coordonator (CO) - INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLARA "HORIA HULUBEI " - IFIN-HH **Activitati partener:** Diseminarea rezultatelor N-WATCHDOG către comunitatea ştiinţifică şi către potenţialii beneficiari
	Partener (P2) – UNIVERSITATEA POLITEHNICA DIN BUCURESTI **Activitati partener:** Diseminarea rezultatelor N-WATCHDOG către comunitatea ştiinţifică şi către potenţialii beneficiari

Pro Memoria

Proiectul N-WATCHDOG are ca obiectiv realizarea unui ansamblu multidisciplinar de soluţii practice, orientate spre nevoile utilizatorilor de monitorizare a vulnerabilităţilor induse de obiectivele nucleare în teritoriul înconjurător, starea populaţiei, mediu şi infrastructuri, având un pronunţat caracter preventiv bazat pe capacitate anticipativă şi de alertare timpurie.

În esenţă, sistemul prognozeaza cu o frecvenţă reglabilă (orară etc.), pe intervale de timp anticipate de 8 sau mai multe ore expunerea, impactul radiologic potenţial şi eventualele măsuri de reacţie necesare în zona apropiată de obiectivul nuclear (cca. 25 km) ca şi în zona depărtată (zeci sau sute kilometri), postulând emisii radioactive virtuale în atmosferă si calculand dispersia in teritoriu a acestora sub actiunea factorilor meteorologici, variabili pe intervalele de monitorizare; apoi articuleaza indicatorii obţinuţi în grade de expunere, impact si vulnerabilitate pe scale inteligibile pentru utilizatori si ofera rapoarte de sinteza partilor interesate. În acest scop s-a realizat o secventa logica de procese excutabile ce implementeaza modele analitice de evaluare radiologica si modele conceptuale de analiza cantitativa a riscului si vulnerabilitatii, integrate cu resursele relevante de date fizice, geografice (GIS) si de documentie stiintifica.

Sistemul se aliniaza stadiului actual al solutiilor dezvoltate de consortii tehnice de referinta, propunand, totodata, abordari inovative în materie de (a) *mentalitate*: acceptarea sistematica a posibilitatii reale a unor accidente severe dincolo de ‘baza de proiect', de evaluarea probabilista a riscului si de registrele de securitate operationala; (b) *ontologie*: accent pe dinamica rapida a vulnerabilitatilor în sincronie cu meteorologia zonala si alte variabile; (c) *acoperirea tematica*: o masina radiologica acomodand diferite modele de dispersie în mediu a poluantilor; o masina geografica ce poate adresa ad-hoc orice locatie de pe Planeta; o masina meteorologica obtinand în timp real prognozele relevante din surse Internet publice; (d) o combinatie de moduri de operare '*standalone*' si pe pagini-*web* ce confera sistemului siguranta operationala; si (e) o complexitate proiectata minimalist, cu observarea stricta a 'nivelului suficient de necesitate'.

In deplina cunostinta de legile, reglementarile si misiunea institutiilor nationale creditate în domeniul pregatirii pentru situatii de urgenta si raspunsului la crize, sistemul propune o augmentare a capacitatilor curente cu noi abordari si solutii consonante cu termenii de referinta si bunele practici internationale, pe baze stiintifice valide asigurate de Fizica si Dinamica Fluidelor, Stiintele Mediului, Geografie, Stiintele Formale si Ingineria Informatica.

Dedicat nevoilor si specificului tarii, sistemul acorda, totodata, o deosebita atentie implicatiilor trans-frontaliere ale proceselor analizate, cautand cai posibile de armonizare si inter-operare cu platformele europene cu vocatie similara, urmarind consecvent consistenta cu politicile UE în materie (Directiva Consiliului, 96/29/EURATOM cu deciziile si reglementarile ulterioare).

In cadrul unui consortiu alcatuit dintr-un institut national de cercetare-dezvoltare, o importanta universitate politehnica si o proeminenta companie privata in domeniul IT, proiectul a urmarit *dezvoltarea unui model experimental software denumit N-WATCHDOG* care, ulterior acestei intreprinderi, poate evolua intr-un produs comercializabil capabil sa ofere unei varietati de utilizatori – entitati de guvernanta si securitate, ONG, foruri media - facilitati customizate interactive precum si/sau servicii analitice si de alertare timpurie. Prin calitatile educationale intrinseci, derivand din capacitatile sale de simulare si vizualizare (‘*serious gaming*’), sistemul poate contribui si la cresterea nivelului de informare în materie al Societatii Civile, incurajand o viziune mai echilibrata asupra meritelor si riscurilor inerente ale Energiei Nucleare, în lumea de dupa Fukushima-2011.

Cuprins

ETAPA 4. ACTIVITATEA 4.1. INTEGRAREA FEEDBACKULUI SI FINALIZAREA UNEI VERSIUNI DE REFERINTA POC PENTRU A SERVI LA SPECIFICATIILE PRODUSULUI FINAL EM SI LA DEZVOLTARE, PARTEA A II-A. 8
1. Introducere 9
2. Reproiectarea dispecerului de sistem N-WATCHDOG 9
3. Asigurarea redundantei subsistemului "Prognoze meteorologice". 19
3.1. Construirea librariei de adrese URL 19
3.2. Dezvoltarea software-ului dedicat de achizitie si prelucrare a datelor. 19
3.3. Upgradarea capacitatii de achizitie anticipata de prognoze meteorologice 20
3.4. Chestiunea convergentei predictiilor 21
4. Consolidarea redundantei subsistemului 'Vizualizare'. 25
5. Asigurarea disponibilitatii documentarii in *run-time* atat in mod *online* cat si *offline*. 25
6. Noi solutii, in perspectiva post-Proiect 26
6.1. Time-leading processing vs. Puff-leading processing - o abordare duala a dispersiei atmosferice a emisiilor radioactive 26
6.2. Active X vs. Blobs 31
Referinte 31
ANEXA. N-WATCHDOG pB 2017 - Ilustratii din secventa de operare 32
Testarea demonstratorului de concept de catre partenerii SIVECO si UPB, Etapa a II-a, 2017 42
ETAPA 4. ACTIVITATEA 4.2. DEZVOLTAREA SI IMPLEMENTAREA MODELULUI EXPERIMENTAL N-WATCHDOG, PARTEA A II-A 124
1. Scopul documentului 125
2. Aria de acoperire a documentului 125
3. Termeni si definitii 125
4. Solutia tehnica 126
5. Modelul de interfata final al Modulului experimental N-WatchDog 128
6. Descrierea modulelor implementate in cadrul modulului experimental 130
6.1. Componente comune 131
6.1.1. Componenta de localizare 131
6.1.1.1. Afisare in harta a locatiei selectate 131
6.1.1.2. Navigarea in harta 132
6.1.1.3. Particularizare harta fundal 133
6.1.1.4. Afisare lista comunitati 134
6.1.1.5. Afisare lista facilitati nucleare 136
6.1.1.6. Cautare in cadrul unei liste 137
6.1.2. Componenta de achizitie a datelor meteo 137
6.1.2.1. Selectarea intervalului de timp pentru achizitia datelor in timp real; 137
6.1.2.2. Selectarea cazurilor de achizitie a datelor meteo 138
6.1.2.3. Afisare detalii generale date meteo 138
6.1.2.4. Achizitie date meteo in timp real 138
6.1.2.5. Listare date meteo stocate 139
6.1.2.6. Editare date meteo pentru simulare 139
6.1.3. Componenta de configurare a termenului sursa utilizat in cadrul simulariilor 140
6.1.3.1. Selectarea modului de configurare a termenului sursa 140
6.1.3.2. Selectarea parametrilor legati de aerosoli/ fractii nucleare 142
6.1.3.3. Configurarea scenariului 144
6.1.3.4. Alegerea unei posibile situatii de evolutie a simularii 146
6.1.3.5. Afisarea rezultatelor configurarii termenului sursa 147
6.1.3.6. Configurarea mixului pe baza recomandarilor unui operator experimentat 147
6.1.3.7. Selectarea unui termen sursa predefinit 148

6.1.4. Componenta de raportare a rezultatelor simularii ... 149
6.1.5. Realizarea matricii de vulnerabilitate ... 151
6.2. Modulul "My Plant" ... 153
6.2.1. Selectarea locatiei ... 153
6.2.2. Achizitia datelor meteo ... 154
6.2.3. Introducere parametri specifici ... 154
6.2.4. Selectarea termenului sursa ... 155
6.2.5. Generarea raportului ... 155
6.2.6. Generarea matricii de vulnerabilitate ... 158
6.3. Modulul "My Place" ... 161
6.3.1. Selectarea locatiei ... 161
6.3.2. Identificarea centralei nucleare din proximitate ... 162
6.3.3. Achizitia datelor meteo pentru locatia centralei nucleare din proximitate ... 162
6.3.4. Introducerea parametrilor specifici ... 164
6.3.5. Generarea raportului ... 164
6.3.6. Generarea matricii de vulnerabilitate ... 167
6.4. Modulul "Explosive radioactive dispersion devices" ... 169
6.4.1. Selectarea locatiei ... 169
6.4.2. Achizitia datelor meteo pentru locatia aleasa ... 170
6.4.3. Selectarea incarcaturii radioactive ... 170
6.4.4. Selectarea parametrilor referitori la locatie ... 171
6.4.5. Selectarea modelului ... 172
6.4.6. Introducere parametri specifici ... 172
6.4.7. Generarea raportului ... 173
6.4.8. Generarea matricii de vulnerabilitate ... 175
6.5. Modulul "Incendiary radioactive dispersion devices" ... 177
6.5.1. Selectarea locatiei ... 177
6.5.2. Achizitia datelor meteo pentru locatia aleasa ... 178
6.5.3. Selectarea termenului sursa ... 178
6.5.4. Selectarea parametrilor legati de incendiu ... 178
6.5.5. Generarea raportului ... 179
6.5.6. Generarea matricii de vulnerabilitate ... 179
6.6. Modulul "Improvised nuclear devices" ... 181
6.6.1. Selectarea locatiei ... 181
6.6.2. Achizitia datelor meteo ... 182
6.6.3. Selectarea parametrilor simularii ... 182
6.6.4. Generarea raportului ... 183
6.7. Modulul "Improvised explosive devices" ... 185
6.7.1. Selectarea locatiei ... 185
6.7.2. Achizitia datelor meteo ... 186
6.7.3. Parametrii simularii ... 186
6.7.4. Efectele exploziei ... 187
6.7.5. Generarea raportului ... 188
ETAPA 4. ACTIVITATEA 4.3. DEFINIREA SI TESTAREA SCENARIILOR DE SIMULARE A SITUATIILOR DE CRIZA ... 190
Activitatea 4.3.1. Scenarii de simulare a situatiilor de criza – o vedere 'top-down' – ... 191
1. Introducere ... 192
Activitatea 4.3.2. Scenarii de simulare a situatiilor de criza – o vedere 'bottom-up' – ... 206
1. Introducere ... 208
2. Definirea unui ansamblu de scenarii ... 209
2.1. Testarea bazata pe scenarii ... 209
2.1.1. Rolul scenariilor in etapele dezvoltarii ... 209

2.1.2. Legatura intre scenarii, modele si teste ... 209
2.1.3. Abordarea proiectului ... 210
2.2. Factori determinanti pentru scenariile situatiilor de urgenta nucleara si radiologica ... 210
2.2.1. Mărimi folosite in stabilirea criteriilor generice si operaționale ... 210
2.2.2. Procedeul aplicat înainte de eliberarea materialelor radioactive ... 211
2.2.3. Procedeul aplicat după eliberarea materialelor radioactive ... 213
2.2.4. Modelarea situatiilor de criza independent de tipul hazardului ... 215
2.2.5. Modelarea unor scenarii specifice N-WATCHDOG ... 221
2.3. Scenarii de test ... 224
3. Scenariu privind informarea populatiei asupra vulnerabilitatilor nucleare ... 225
3.1. Secventa de cazuri de test pentru scenariul SC1 ... 225
4. Scenariu privind preventia fata de vulnerabilitati nucleare cu risc scazut ... 226
4.1. Secventa de cazuri de test pentru scenariul SC2 ... 226
4.2. Secventa decizionala de preventie ... 227
4.3. Secventa de cazuri de test pentru scenariul SC3 ... 227
4.4. Secventa decizionala de protectie ... 229
4.5. Secventa de cazuri de test pentru scenariul SC4 ... 230
4.6. Secventa decizionala de raspuns in caz de urgenta ... 230
5. Modul N-WatchWiki de simulare a scenariilor ce includ suport decizional ... 233
5.1. Dezvoltare simulator scenarii decizionale ... 233
5.2. Testare modul suport decizional ... 237
5.2.1. CT.DEC.001 – Verificare secventa decizionala pentru preventia populatiei ... 237
5.2.2. CT.DEC.002 – Verificare secventa decizionala pentru protectia populatiei ... 238
5.2.3. CT.DEC.003 – Verificare secventa decizionala pentru raspuns in caz de urgenta ... 240
Bibliografie ... 241
Anexa 1. Exemplu de executie a scenariului privind informarea populatiei asupra vulnerabilitatilor nucleare ... 243
Anexa 2. Exemplu de executie a scenariului privind preventia si constientizarea populatiei fata de vulnerabilitati nucleare cu risc scazut cauzate de incendierea unui dispozitiv cu dispersie radiologica ... 246
Anexa 3. Exemplu de executie a scenariului privind preventia si constientizarea populatiei fata de vulnerabilitati nucleare cu risc scazut cauzate de explozia unui dispozitiv de dispersie radiologica 253
Anexa 4. Exemplu de executie a scenariului privind evolutia catre o situatie de criza si protectia populatiei in conditiile unui accident la o centrala nucleara ... 259
Anexa 5. Exemplu de executie a scenariului privind evolutia catre o situatie de criza si protectia populatiei in conditiile declansarii unui dispozitiv nuclear improvizat ... 266
Anexa 6. Exemplu de executie a scenariului privind raspunsul in caz de urgenta, in cazul receptionarii unor doze de radiatii ... 272
ETAPA 4. ACTIVITATEA 4.4. IMPORTANTA IMPLEMENTARII N-WATCHDOG PENTRU DIVERSE ENTITATI SI POTENTIALE BENEFICII ... 275
1. Introducere ... 276
2. Constientizarea de catre Societatea Civila a pericolului radiatiilor nucleare ... 276
3. Avantajele oferite in cadrul mediilor de cercetare si invatamantului superior in general ... 277
4. Identificarea potentialilor beneficiari in randul oficialitatilor cu caracter de foruri decizionale superioare ... 278
ETAPA 4. ACTIVITATEA 4.5. DISEMINAREA REZULTATELOR N-WATCHDOG CĂTRE COMUNITATEA ŞTIINŢIFICĂ ŞI CĂTRE POTENŢIALII BENEFICIARI ... 282
1. Introducere ... 283
2. Incheiere ... 338
Referinte ... 339

Etapa 4. Activitatea 4.1. Integrarea feedbackului si finalizarea unei versiuni de referinta PoC pentru a servi la specificatiile produsului final EM si la dezvoltare, Partea a II-a.

IFIN-HH

1. Introducere

Activitatea A.4.1. asupra careia se raporteaza in aceasta sectiune completeaza Activitatea 3.3 - *'Integrarea feedback-ului si finalizarea unei versiuni de referinta PoC pentru a servi la specificatiile produsului final EM si la dezvoltare, Partea I'*, consecutiva Activitatii 3.2 - *'Testarea PoC in cadrul partenerilor proiectului'*, din cadrul Epapei III, 2016 - *'Testarea in-house si evaluarea Demonstratorului N-WATCHDOG, Dezvoltarea Modelului experimental N-WATCHDOG (EM), Partea I'* [1].

Realizarea obiectivului - elaborarea unei versiuni consolidate a N-WATCHDOG in perspectiva incheierii proiectului a necesitat reproiectarea unor elemente software si dezvoltarea unor facilitati noi, urmarind in principal: (i) *simplificarea interfetei,* in special prin recurs la controale standard, uzuale si familiare utilizatorilor; (ii) *asigurarea redundantei in capcitatea de procurare si procesare a prognozelor meteorologice*, vitale pentru functionarea sistemului; (iii) *perfectionarea motoarelor de vizualizare*, pe linia asimilarii de noi tehnici si a diversificarii furnizorilor de imagistica geografica; si (iv) *unele dezvoltari* avand in vedere intentia dezvoltatorilor PoC - IFIN-HH, de continuare a perfectionarii produsului dupa incheierea Proiectului, in conformitate cu profilul si misiunea institutiei.

2. Reproiectarea dispecerului de sistem N-WATCHDOG

Noua interfata de intrare (pagina dispecer) a sistemului este reprezentativa pentru efortul de simplificare mentionat. In locul listelor cu ecou grafic la interfata, limitative in extindere pe afisaje de diferite dimensiuni si relativ greu de programat, s-a recurs la menu-uri standard ce ofera flexibilitatea asteptata de eventualele dezvoltari ulterioare, inclusiv *spin-off*, ale Demonstratorului de concept ca produs de casa al IFIN-HH.

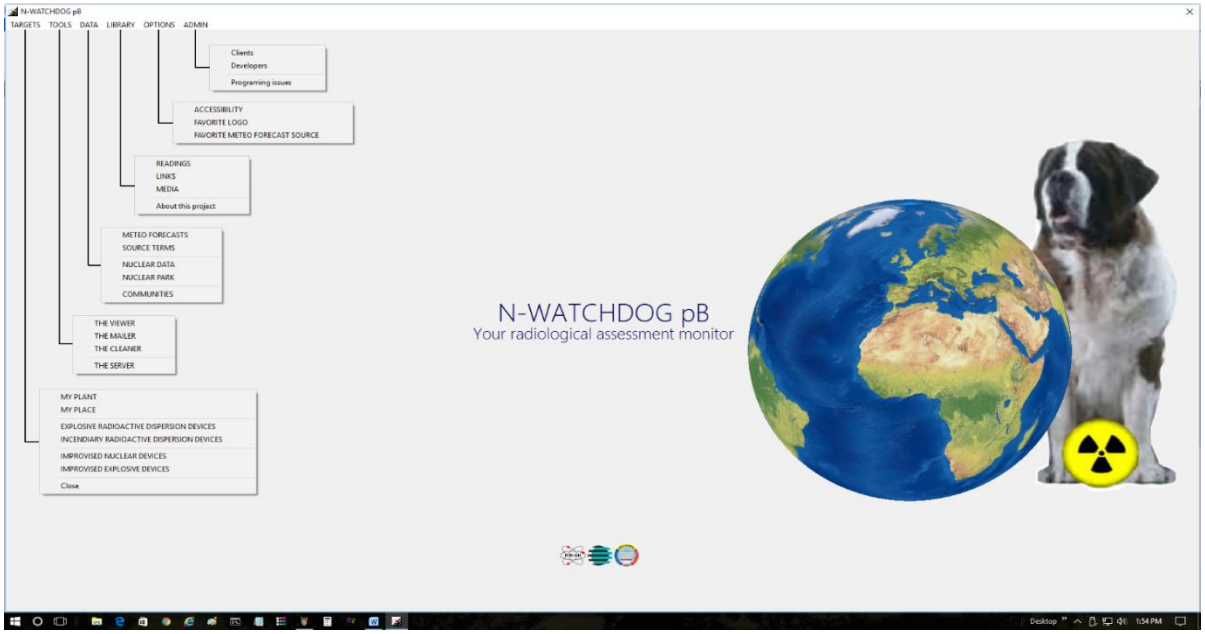


Fig.1. Pagina-dispecer a N-WATCHDOG; sinoptic al menu-ului.

Figura 2 prezinta diferite expresii ale paginii de deschidere a N-WATCHDOG, ce ofera acelasi menu de directionare a utilizatorului spre aplicatii si servicii insotit de diverse imagini-logo de fundal reflectand un simbolism sub-liminal, ce pot fi alese din sectiunea OPTIONS a menu-ului.

Fig.2. Expresii alternative ale N-WATCHDOG pB logos, la interfata de intrare.

Aplicatiile si serviciile se deschid direct din listele *drop-down* ale menu-ului (Figura.3). Fiecare deschidere este asistata de mesaje explicative si/sau instructiuni (Figura 4).

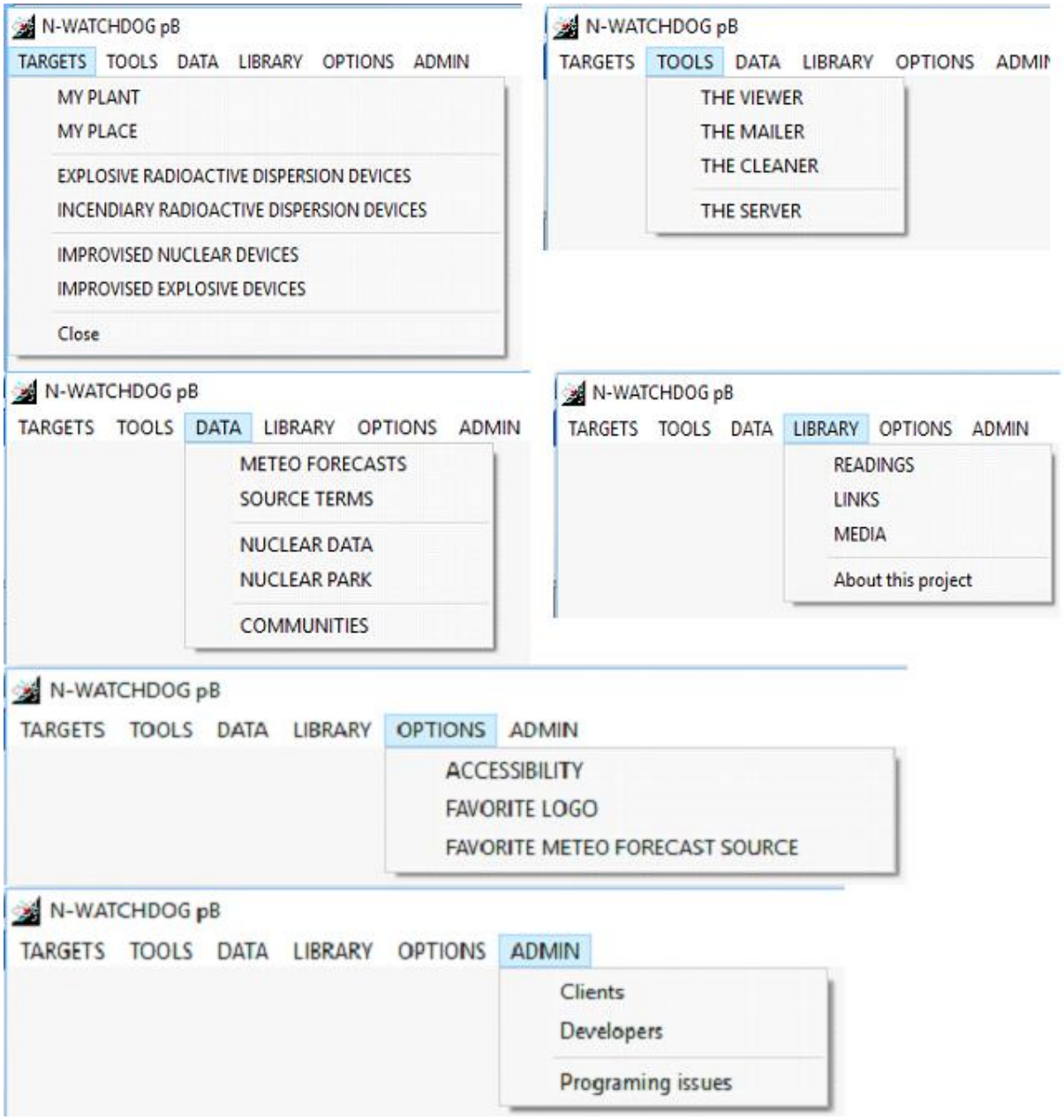


Fig.3. Menu-ul N-WATCHDOG pB 2017, detalii. Listele *drop-down*.

TARGETS

My Plant

MY PLANT commits Watchdog to look at the regular nuclear power safety issues from the perspective of the Nuclear Operators; the Regulators; the Emergency Responders; and the Governance, overall. These actors would seek to determine to what extent the risks posed and the vulnerabilities induced by nuclear facilities may affect their operational conduct; safety policies; consequent investments; and political stand. From a Watchdogging perspective, this is to look 24/7 at WHERE the radioactive emissions of the facilities go; forecast their area of influence; give a quantitative expression to the potential effects in terms of territory and people exposed; assess whether or not these are consequential and warrant alert and/or response.

Analysts may choose between:
- A SINGLE, USER-ASSISTED ASSESSMENT of the area of influence of a nuclear facility, selected from the 186 nuclear power plants worldwide covered by the code; or
- A 24/7 WATCH OF A PLANT's AREA OF INFLUENCE, cycling the assessment in an unassisted, automatic fashion, on an initial User input and timing.

My Place

MY PLACE commits Watchdog to look at the regular nuclear power safety issues from the perspective of the of the citizen. It addresses the 'Little Me' - the ordinary people who have lived through, or only heard about Three Mile Island, Chernobyl, Fukushima fearing for their lives, well-being and future.
For these, Watchdogging would be like KNOWING around the clock whether going with their lives and business at certain places make them vulnerable to the long arm of the nuclear facilities spotting a good share of the Globe. In other words, having available a Personal N-Watcher as a foretelling gadget, of sorts.

The code places its results in a comparative perspective: scalable exposure from nuclear facilities defaulted on normal operation vs. exposure from a normal daily life, leaving to everyone the interpretation of the findings.

RDDs*

INCLUDING 'BLACK SWANS', i.e. low-probability-high consequence disruptive events in the list of Nuclear Safety concerns is central to the new paradigm initiated in the aftermath of the Chernobyl accident (1986), further aggravated by the Fukushima event (2011); and highlighted by the prospects of nuclear terrorism looming ahead. On this line, the code addresses the explosive and incendiary Radioactive Dispersion Devices (RDD), deemed by the International Atomic Energy Agency as being, potentially, 'extremely harmful', so that 'the reduction of the threat of radiological weapon attack by terrorist groups (...) is one of the priority tasks of the IAEA.'

Both explosive and incendiary RDD events need special models warranting a separate treatment.

* Radioactive Dispersion Device

INDs*

THIS APPLICATION ADDRESSES AN ISSUE for a long time deemed on the verge of the unthinkable. It dwells on what became known as 'Improvised Nuclear Devices (IND)' - a euphemism for a backyard-built atomic bomb. To quote a knowledgeable source, 'The unthinkable is probably inevitable. At some time in the future a terrorist group will detonate a nuclear explosive in a major metropolitan area.(...) Terrorist possession of a nuclear weapon will result in its use against a 'highest-value' target –
most likely a large city with major economic value, cultural and/or religious significance, and a dense population
in which high casualties will result [Harney R.C.(2009)].

Drawing upon such references, the code offers a minimalistic abacus to assess effects on communities of nuclear blasts of, mainly, IND-grade.

* Improvised Nuclear Device

IEDs*

THE NOTION OF A WORLD AT THE MERCY OF TERRORISM - unimaginable before 9/11 - became an issue to contemplate ever since and jumped to the frontline of virtually all agendas after the fateful year 2015 booking carnages from Paris to Africa and the Far East.

According to the Interpol, 'Europe is currently facing the most significant terrorist threat in over 10 years. The Paris attacks on 13 November 2015 indicate a shift towards a clear international dimension of Islamic State to carry out special forces style attacks in the international environment. This and the growing number of foreign fighters are posing new challenges for EU Member States. The threat of further terrorist attacks in Europe remains high. Therefore there is a great need within the European Union to strengthen our response to terror, to suspected terrorist networks and foreign fighters, and have an improved strategic understanding of threats. [Europols European Counter Terrorism Centre, https://www.europol.europa.eu/].

Drawing upon such references, in mind with the relative similarity of the models involved, and looking at the current taxonomy of the terror hits targeting communities, the code offers a minimalistic abacus to assess effects on structures and people, of ordinary (chemical) blasts.

Listing this under 'OTHER' would also hint to authors' intention to look beyond the project of origin and keep a code section open to, perhaps, additional applications addressing the safety and security of the citizen, as the need may occur.

* Improvised Explosive Device

TOOLS

THE VIEWER offers a panoramic desktop perspective of the code application results currently in store - all executive modules considered. Every case is featured by all output expressions that the User encounters throughout the code runs. These include:

- Textual content reflective of numerical data an descriptive information;
- Desktop maps holding dose contours and grids overlayed on topographic maps generated from resident DEM resources and GIS librariries, rendered via MS Windows API GUI and the OpenGL technology. Always available because independent on the Internet;
- Browser-based dose contours and grids overlayed on canvases offered by web mapping services, such as OpenStreets, Thunderforest, ESRI, rendered via the Leaflet technology.
- 'World' 3D perspectives over output contours, grids and overlays, via Google Earth or ESRI's ArcGIS EARTH.

Consulting the archive is especially recommended for training introductory sessions and also for giving potential clients exploratory tours over the Watchdog capabilities and informative power.

THE MAILER is intended as a workaround for delivering N-Watchdog output to authorized Clients of the code services in case the networks and/or the Internet is not available.

When called, the code will zip in a single file the entire batch of files pertaining to a selected case of interest to the Client, deposit it in the OUTBOX folder of the platform and keep it ready for delivery by whatever means appropriate (media courier etc.). Of course, the zip file can also be e-mailed as soon as the web access is restored.

The OUTBOX folder may also be seen as a space for keeping a compressed archive for your work.

THE CLEANER offers to delete cases (i.e. the entire batch of files pertaining to them) from the platform, to ease the hard disk load. Once deleted, the cases (files) are irretrievable.

TO BE USED WITH CAUTION!

THE SERVER is your gateway to the remote authorized N-Watchdog Clients of the code services, not having the code on their desktops.

The platform-embedded facility conveys case Situation Reports only. The Clients will access the SitReps on their browsers via a specific URL tagged with server's IP, which would work as an equivalent of a password. On servers featuring dynamic IPs, the current URL will have to be made known to Clients whenever the serving system is switched on. Operators working on static IP systems will update Clients only in the event that the IP is changed.

Valid Client browser should support WEBGL. Currently convenient are MS Edge, IE 11, Chrome, Firefox, Opera.

DATA

THE METEO FORECASTS MANAGER governs the relationship and file traffic between the three forecast repositories of the code: (1) the Work Forecast Folder feeding the code assessment engines; (2) the Forecasts Store designed to timely amass a reserve of relevant forecasts while the code is idle in regard with its basic missions; and (3) the Forecasts Vault working as a backup for the Store.

Manager's chief function is to draw upon publicly-open web sites in order to obtain weather forecasts over time-windows spanning 8 to 72 hours of relevant data for the area of influence of nuclear power plants. In so doing, it demonstrates one basic conduct by the N-WATCHDOG system, which consists in building up a reserve of prognostic data at such times when Internet services are locally available, to have data ready for use as input for the system's apps even when the web is, for various reasons, unavailable, including and especially under emergency.

The Manager also provides for viewing forecast files; moving files between the work, store and vault folders; and clearing the folders at user's will.

THE SOURCE TERM UTILITY addresses the front end of a radiological assessment. The notion itself covers two issues: (a) the nuclide mix assumed to escape from the defense-in-depth barriers containing the radioactivity in a nuclear/radiological facility or device; and (b) data of critical importance featuring the radioactivity ejection out into the environment, generally boiling down to a 'plume, or cloud rise'.

Users should get acquainted with the subject matter (module's Help), then try their hand in devising source terms themselves.

NUCLEAR DATA

FOR ITS PURPOSES, N-WATCHDOG handles 157 nuclides, most of which fission products of nuclear reactors, each characterized by 62 features of relevance in assessing their health and environmental impact in either normal, or abnormal operation of a nuclear facility. The respective library holds also comprehensive knolwledge elements that are of prime consequence in a nuclear or radiological emergency, derived from authoritative sources resting with national regulatory bodies and the International Atomic Energy Agency.

While the nuclear data library is constantly called upon in different phases of an assessment, this utility allows an independent, off-session access to such material, a fact which is thought conducive to experts' memory refreshing on the one side; and the familiarization of 'laymen'-stackeholders with the stuff at the origin of Nuclear Safety concerns, on the other side. Visiting this section is recommended.

NUCLEAR PARK

THIS WIDGET provides factual and geographic information on 186 nuclear power plants - in operation, on cold halt, in decommissioning, or decommissioned already - covered by N-Watchdog. While the factual material is resident, thus being always available, the maps - to be obtained from widget's menu - will get in display only if you are online.

Try it - to assess a plant one should first know several things about it, among which the type of reactor and the power installed...

COMMUNITIES

THE STATIC VULNERABILITY ASSESSOR determines the slow-varying component of the vulnerability presented by a community falling in the area of influence of a nuclear facility, as determined on a running time basis by N-WATCHDOG.

An aggregated Static Vulnerability Index (SVI) is evaluated in relation with a number of variables reflective of the demography, infrastructure, economics, social and strategic aspects featuring the community, as well as of the local Administration's capability to limit/mitigate effects of an actual exposure to radiations.

In conjunction with the Dynamic Vulnerability Index (DVI) - a quantity derived from the radiological exposure of communities to the effects of radioactive releases, SVI articulates the Vulnerability Matrix of the case assessed. In its graphic expression, the matrix locates every community in the XY plane underlied by SVI in the abscissa and DVI on the coordinate axis - both conveniently normalized on a 0-100 adimensional scale. Such synthetic and synoptic information is believed to be of assistance in (a) dispatching repsonse resources in case of emergencies; and (b) building up statistics on the vulnerability of communities in the area of influence of nuclear facilities.

LIBRARY

READINGS

THIS WIDGET includes a body of information believed to be supportive in understanding the N-WATCHODOG philosophy; scope; history; and the Law and Science behid the code.

LINKS

THIS WIDGET directs the Users to a series of actors and contributors of relevance within the N-WATCHDOG scope.

MEDIA

THIS WIDGET is for Users' intellectual entertainment.
Find time to sit back, see and listen - it may help you to forge yourself a personal AND INFORMED opinion on the issues.

ABOUT THIS PROJECT

N-WATCHDOG is a cooperative R&D&I endeavor undertaken by Horia Hulubei National Institute of Physics and Nuclear Engineering IFIN-HH, Bucharest; SC SIVECO Romania SA; and the University Politehnica of Bucharest, within PNCDI-II (The Research, Development and Innovation National Plan II), Program PDP (Partnerships in Priority-Domains), Section PCCA-2013 (Collaborative Projects of Applied Research), under the monitoring and financing by UEFISCDI (The Executive Unit for Financing the Higher-Education, Research, Development and Innovation System) - Contract No.298/2014.

The goal of the project is to create a coherent, multidisciplinary, stakeholder-oriented and practical set of solutions for monitoring vulnerabilities induced in people, natural environment, infrastructure and assets by nuclear facilities and events, with a pronounced preoccupation for precautionary, anticipatory assessment and early warning.

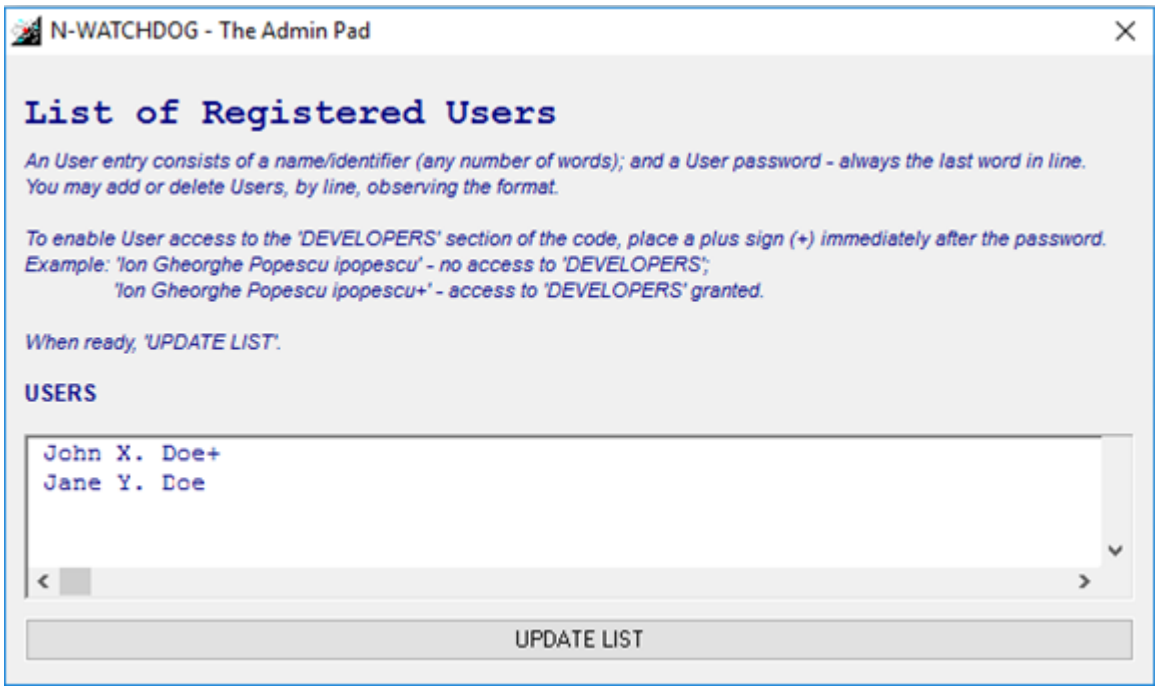
The present code stands for a research-grade Proof of Concept (PoC) intended to evolve into an Experimental Model (EM) seen as the final deliverable of the Project and feeding prospects of marketability beyond. It is tagged 'pB' - an acronym for 'perpetual Beta', designating in the IT parlance the product's life cycle condition adopted by the developers.

As such, N-WATCHDOG pB is limited to a controlled distribution to specifically authorized Parties agreeing to use the product at their own risk. Neither the developers nor any of the Project Partners will accept any liability as to the quality of user-obtained results, or the utilization thereof. Moreover, the current code version bears yet no formal endorsement on behalf of the competent national authorities, so that the code results should not be delivered as is to any third party; and their interpretation should never be construed as a formal and effective decision support information.

OPTIONS

ADMIN

CLIENTS



DEVELOPERS

N-WATCHDOG pB - Barebone

The simplest way to access the Dog's executables, via reusables.
The Executables (lefthand buttons) and the Source Codes involved (righthand buttons) in runtime sequence.

CORE APPLICATIONS

MY PLANT	1	2	3	4	5	6
MY PLACE	1	2	3	4		
EXPLOSIVE RDDs	1	2	3	4		
INCENDIARY RDDs	1	2	3	4	5	
INDs	1	2	3			
OTHER	1	2	3			
THE VIEWER	1					
THE SERVER	1					
THE MAILER	1					
THE CLEANER	1					

PUBLIC SERVICES, User-accesible from main page menu

MET FORECASTS	1
SOURCE TERMS	1
NUCLEAR DATA	1
NUCLEAR PARK	1
COMMUNITY	1
ESSENTIAL DOCS	1
READINGS	1
LINKS	1
MEDIA	1

PRIVATE SERVICES, called by viewer codes at runtime

THE BASE MAPS (GUI)	1
DESKTOP TABLE MAPS (OpenGL)	1
DESKTOP GLOBE MAPS (OpenGL)	1
WEB TABLE MAPS (Leaflet)	1
WEB GLOBE MAPS (Google Earth, ArcGIS Earth)	1
SITUATION REPORTS COMPILER (HTML5+JS)	1

PROGRAMING ISSUES

TO TRANSFER WEB DATA TO DESKTOP APPS
- CLICK 'Yes' TO USE AN Active X SOLUTION; OR
- CLICK 'No' TO USE A Blob SOLUTION.

Fig.4. Mesaje de deschidere a aplicatiilor si serviciilor, din menu-ul N-WATCHDOG.

3. Asigurarea redundantei subsistemului "Prognoze meteorologice".

Disponibilitatea datelor de prognoza meteorologica a fost semnalata, inca din primele faze ale proiectului, drept una dintre vulnerabilitatile preocupante ale solutiei de anticipare a ariilor de influenta ale emisiilor radioactive din instalatiile nucleare, lipsa accesului la asemenea date diminunad relevanta si gradul de incredere asupra rezultatelor [1]. Defectiunile in obtinerea in *runtime* a prognozelor pot fi provocate (a) de lipsa/pierderea conexiunii Internet (cauza triviala, mai frecventa), sau de (b) decizia furnizorului de date de a schimba formatul paginilor de web (eveniment, din fericire, mai rar, dar care creaza serioase dificultati, intre care necesitatea identificarii de noi solutii de parsing HTML – nu intotdeauna posibila – si a rescrierii software-ului de achizitie si prelucrare a datelor).

Sesiunile de stocare intensiva a prognozelor folosind facilitatea 'TOOLS – Meteo Forecast' atenueaza vulnerabilitatea mentionata, dar este limitata la a adresa doar prima dintre posibilele probleme – pierderea conexiunii. O solutie autentica de securizare a accesului la date meteo presupune *cresterea redundantei sistemului* prin crearea de solutii de a obtine prognoze de la cat mai multi furnizori cu putinta, contand pe faptul ca probabilitatea ca doi sau mai multi furnizori sa fie simultan indisponibili este foarte scazuta.

Cu aceasta motivatie, dezvoltatorul Demonstratorului de concept a ales sa dubleze furnizorii de prognoze, adaugand filierei

AccuWeather (http://www.accuweather.com/) , filiera

WorldWeatherOnline (https://www.worldweatheronline.com/).

3.1. Construirea librariei de adrese URL

Adresele URL ale statiilor meteo *WorldWeatherOnline* (*WWO*) au fost derivate din lista pre-existenta a statiilor *AccuWeather* – furnizor prin default de prognoze meteorologice al N-WATCHDOG pB, cu ajutorul unui snipet de editare. Operatiunea, partial automatizata, de ajustare a adreselor insotita de verificarea coordonatelor geografice s-a desfasurat intr-un ritm de cca. 100 adrese pe zi. Figura 5 ilustreaza interfata aplicatiei dedicate asimilarii resursei *WWO.*

3.2. Dezvoltarea software-ului dedicat de achizitie si prelucrare a datelor.

Extragerea datelor utile din paginile de web ale resursei WWO a necesitat dezvoltarea unei solutii noi de parsing HTML si customizarea acesteia pentru fiecare din aplicatiile N-WATCHDOG ce utilizeaza prognoze meteorologice. Astfel, fiecare din modulele de achizitie si prelucrare a datelor meteo de la serviciul web *AccuWeather* (default) are in prezent un omolog *WWO* (Tabelul 1), astfel incat, in conditiile indisponibilitatii unuia din furnizorii de date, utilizatorii codului vor putea comuta sistemul pe furnizorul alternativ, folosind comanda din menu 'OPTIONS/Favorite Meteo Forecast Source'.

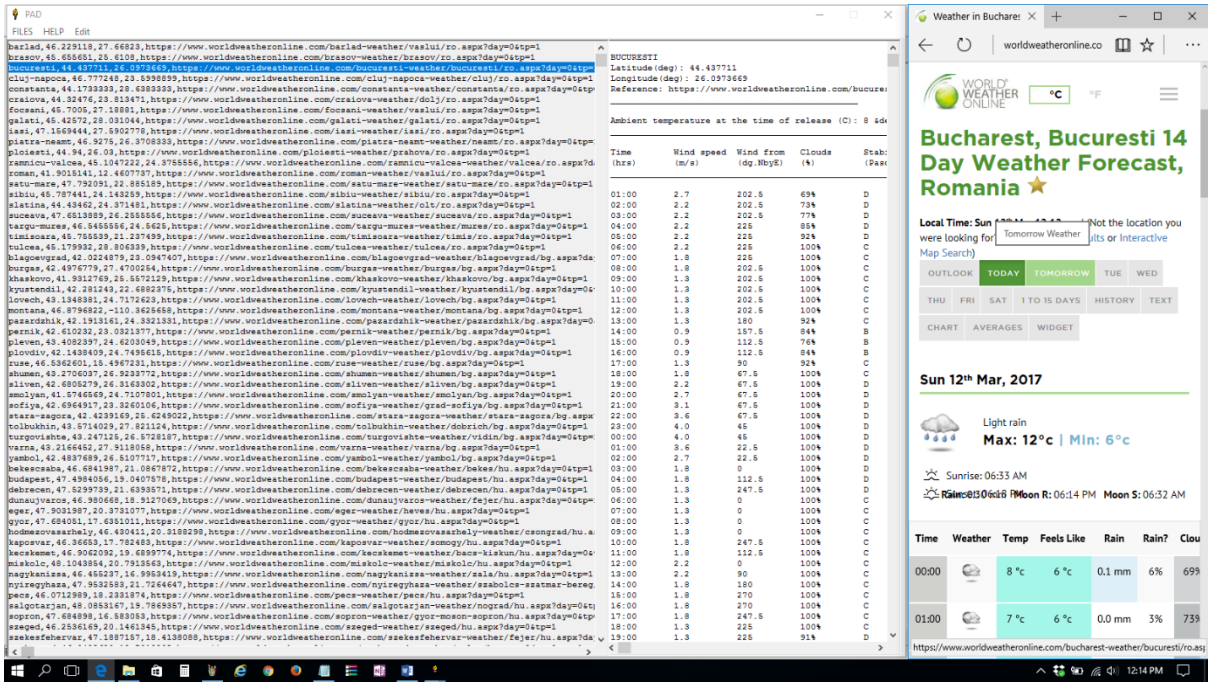


Fig.5. Aspect al facilitatii de achizitie a adreselor statiilor meteo *WorldWeatherOnline.*

Tabelul 1

AccuWeather http://www.accuweather.com/	WorldWeatherOnline https://www.worldweatheronline.com/
!EVENT-Meteo	!EVENT-Meteo-WWO
!EVENT-Meteo-Auto	!EVENT-Meteo-Auto-WWO
!EVENT-Meteo-MyPlace	!EVENT-Meteo-MyPlace-WWO
!EVENT-Meteo-RDD	!EVENT-Meteo-RDD-WWO
!EVENT-Meteo-Local	!EVENT-Meteo-Local-WWO

In contextul problemei, se reaminteste clauza contractuala conform careia, in timp ce prelevarea si folosirea in scopurile de cercetare-dezvoltare ale Proiectului a datelor postate pe Internet de furnizori publici este tolerata la nivelul Demonstratorului de concept, Modelul Experimental al N-WATCHDOG se va afla in situatia de a obtine asemenea date in regim comercial, in conditiile respectarii disciplinei de *copyright* practicate de furnizori.

3.3. Upgradarea capacitatii de achizitie anticipata de prognoze meteorologice

Un subiect aparte l-a constituit crearea omologului WWO pentru modulul AccuWeather de achizitie anticipata, preventiva de prognoze meteorologice in vederea realizarii unui stoc pentru situatia de urgenta in care furnizorii de date primare devin indisponibili prin pierderea conexiunii Internet.

Cu acest prilej, ambele module –

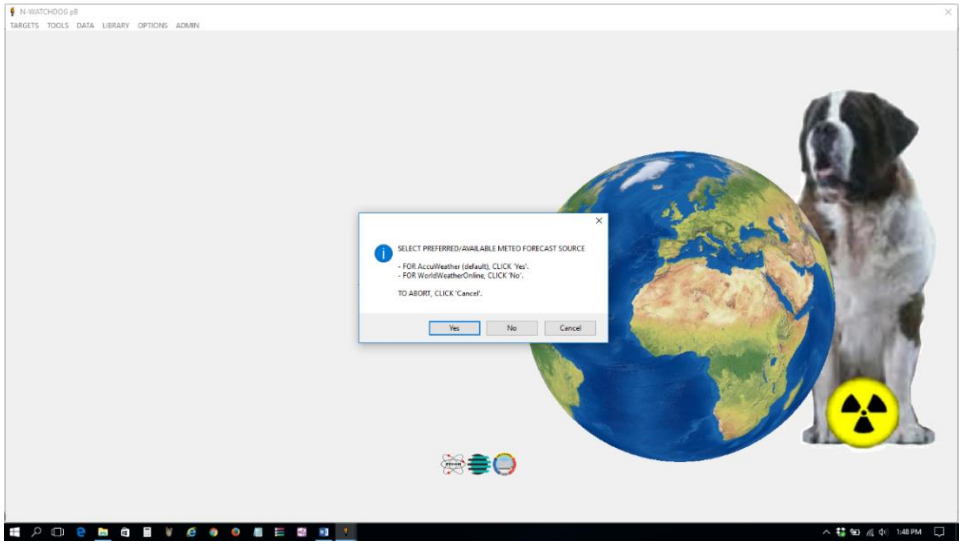
!EVENT-Meteo-Collector si !EVENT-Meteo-Collector-WWO

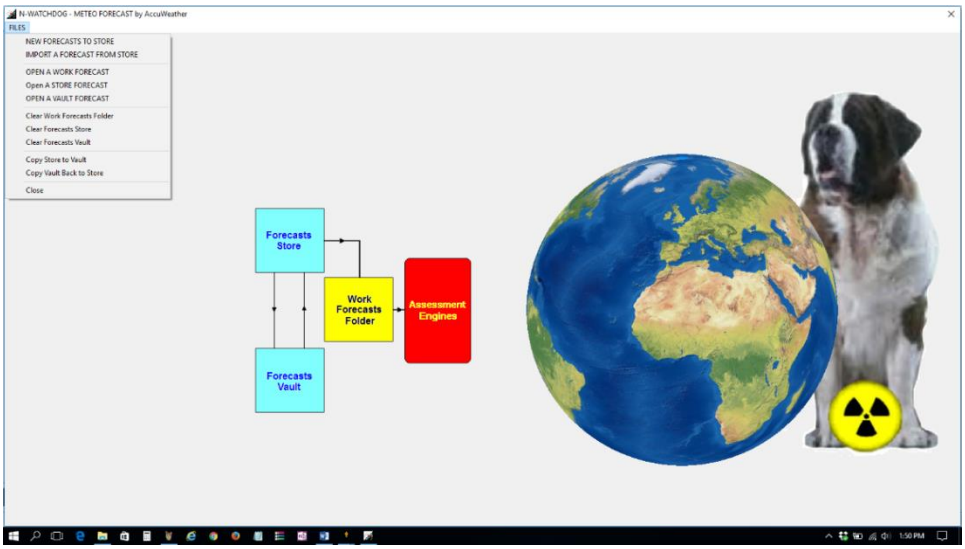
au fost reprogramate pentru lucrul in doua moduri posibile: (i) obtinerea de serii de timp de prognoze regionale pentru zona de influenta a unei anumite centrale nucleare; sau (ii) obtinerea de pachete de prognoze pentru seturi selectionate de centrale nucleare (*batch*), la un moment dat.

3.4. Chestiunea convergentei predictiilor

Disponibilitatea accesului la doi furnizori de prognoze meteorologice ce recurg, in mod declarat, la surse diferite de date primare (retele de statii meteo) si algoritmi diferiti de prelucrare ridica in mod firesc chestiunea gradului de convergenta a rezultatelor N-WATCHDOG, obtinute pe aceleasi perioade orare si seturi de date input, pe cele doua filiere. Experimentele numerice conduse in acest sens indica ceea ce se apreciaza a fi un grad acceptabil de convergenta, atat in termeni calitativi tinand de extinderea si forma ariilor de influenta ale emisiilor radioactive ale obiectivelor nucleare, cat si in termeni cantitativi tinand de ordinul de marime al dozelor de referinta pentru eventuale contramasuri si efecte sanitare posibile. Figura 6 urmareste evaluarea marimilor indicate de catre codurile *!EVENT-Meteo-Collector* si *!EVENT-Meteo-Collector-WWO*, pentru acelasi obiectiv nuclear, aceleasi perioade orare, acelasi termen sursa si aceleasi date de intrare independente de meteorologie cerute de modelele de transport atmosferic si dozimetrice.

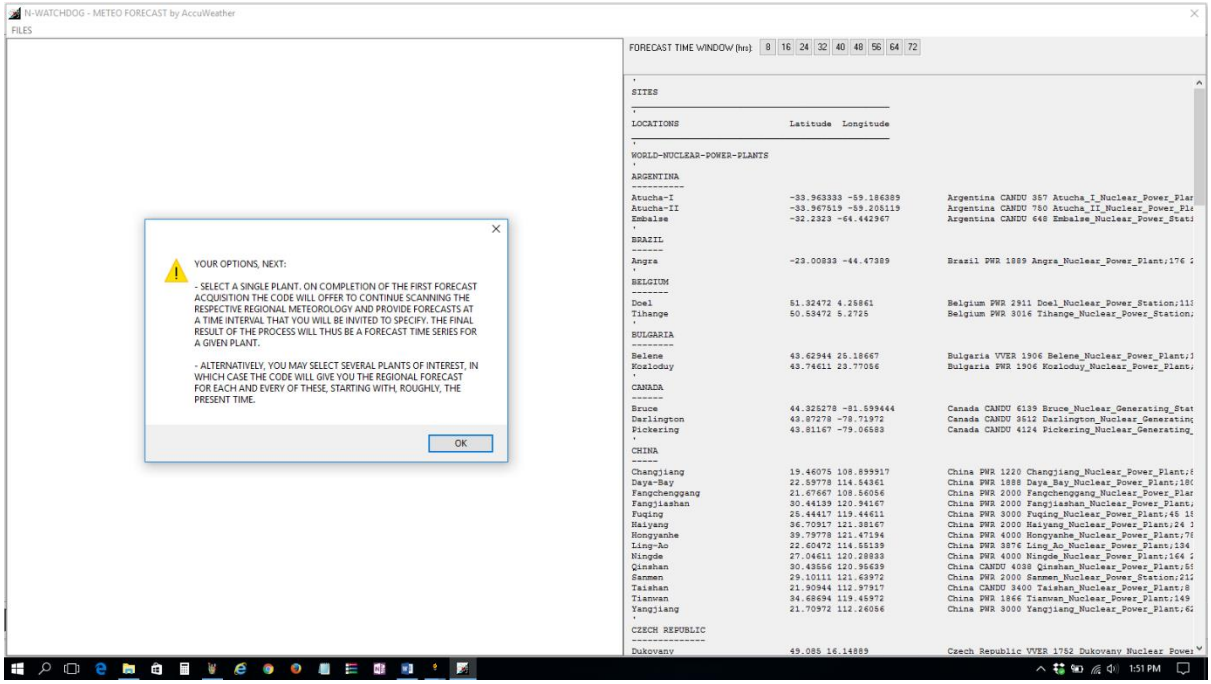
A. Deschiderea si setarea serviciilor





B. Achizitia prognozei meteo: B1 - pe filiera AccuWeather; si B2 – pe filiera WorldWeatherOnline

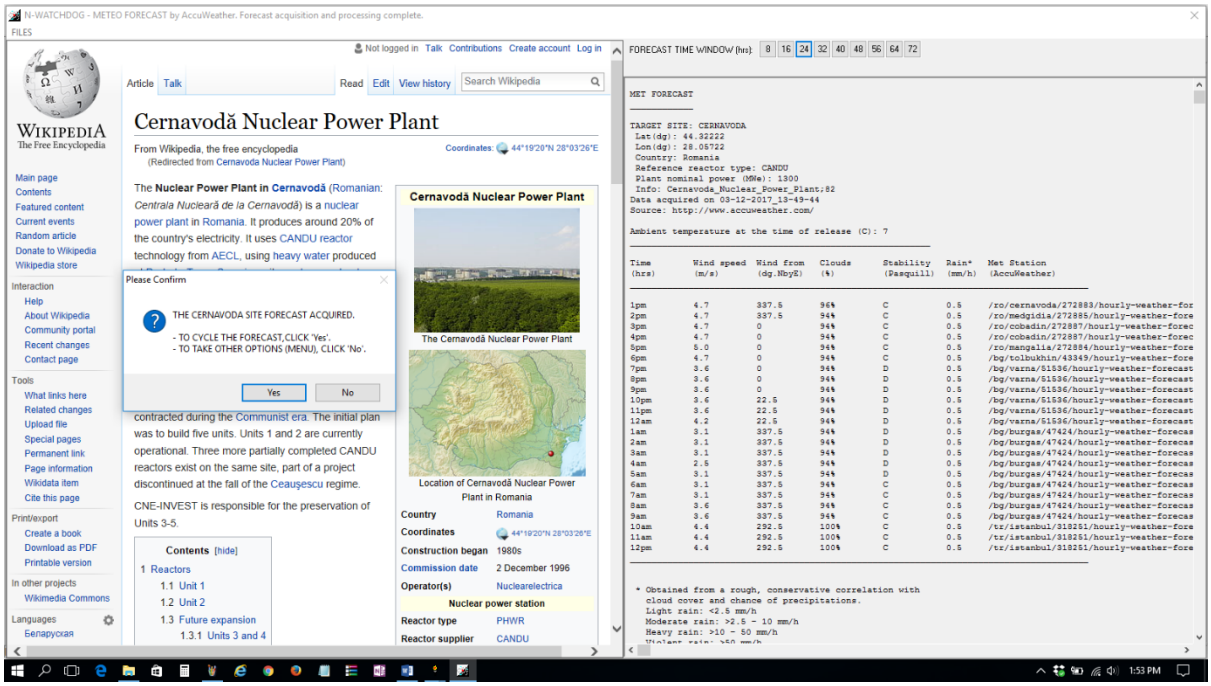
B1. AccuWeather



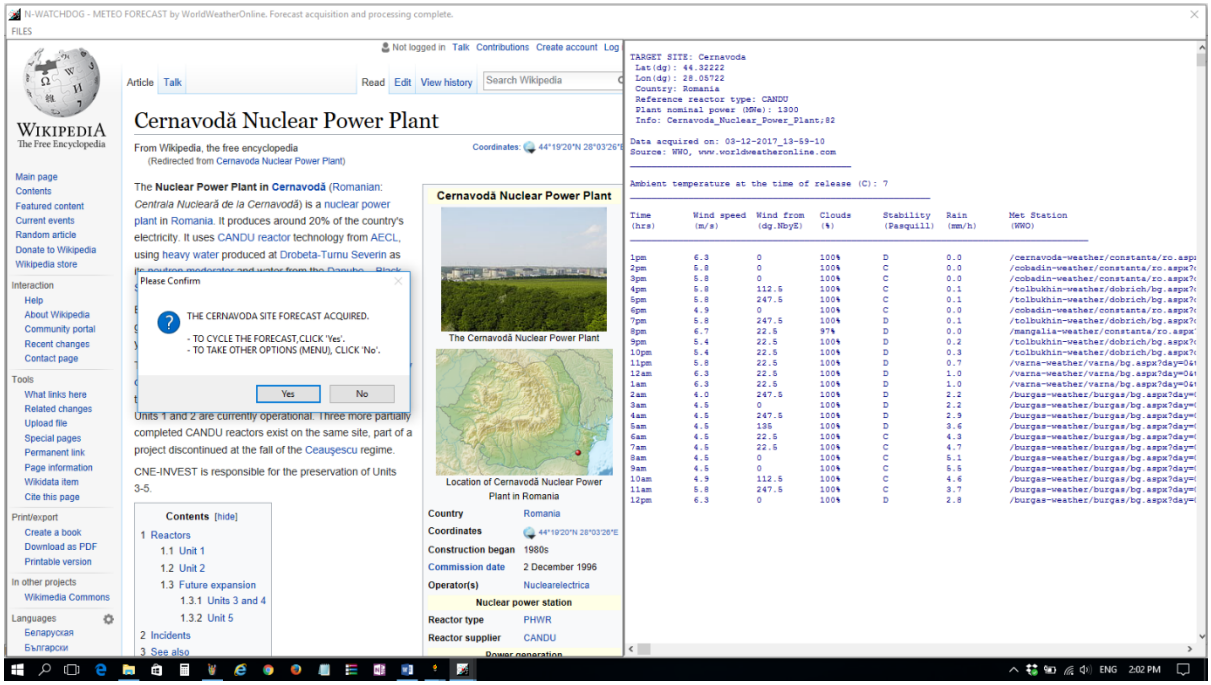
B2. WorldWeatherOnline

C. Prognoza meteo: C1 - pe filiera AccuWeather; si C2 – pe filiera WorldWeatherOnline

C1. AccuWeather

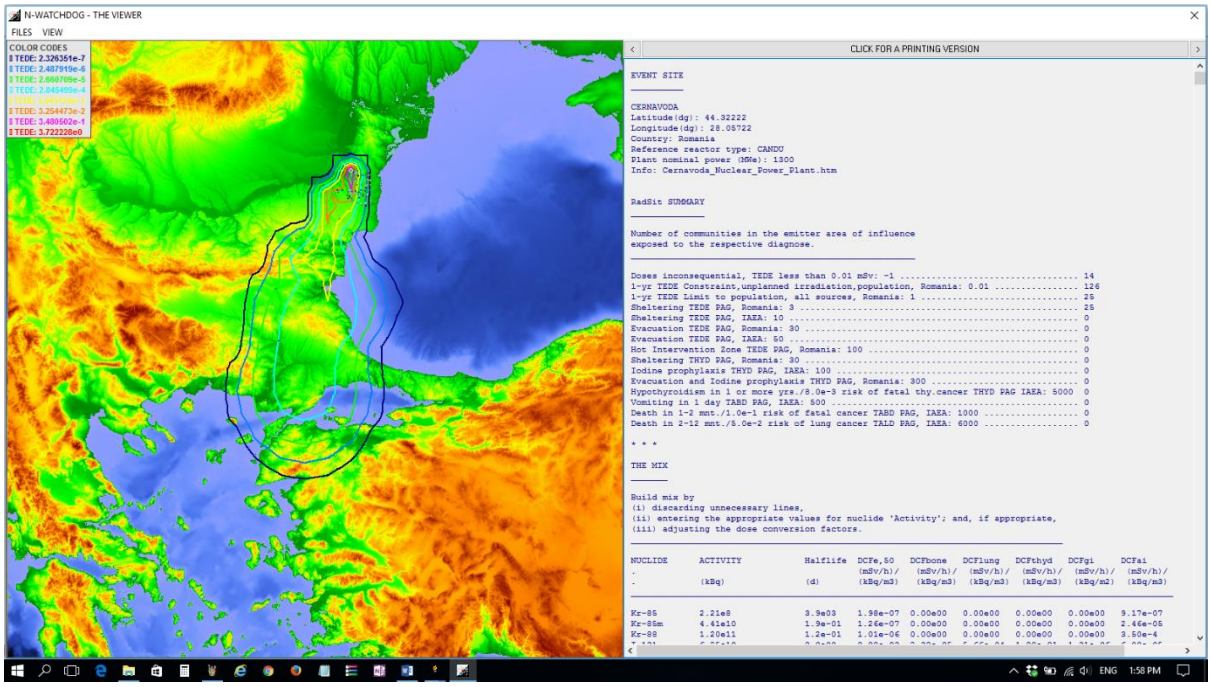


C2. WorldWeatherOnline

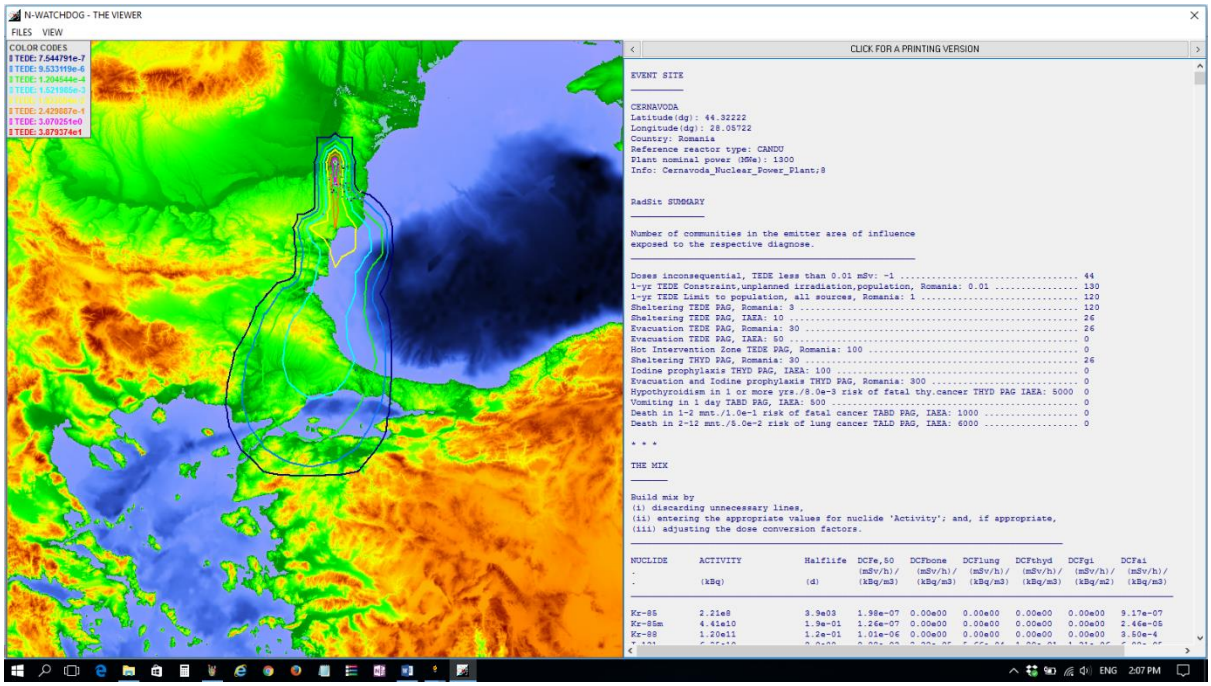


D. Predictii: D1 - pe filiera AccuWeather; si
D2 – pe filiera WorldWeatherOnline

D1. AccuWeather



D2. WoldWeatherOnline



4. Consolidarea redundantei subsistemului 'Vizualizare'.

Eventualitatea pierderii conexiunii Internet, ca si deciziile arbitrare practicate in tratamentul utilizatorilor de catre producatori majori, ca *Google*, de software de vizualizare a datelor spatiale – imagistica geografica si GIS – au fost, de asemenea, semnalate inca din primele etape ale executiei Proiectului ca surse de vulnerabilitate [1]. De la episoadele retragerii din circulatie a tehnologiei *Google Earth Plugin* si restrictiei prin cheie de utilizator a accesului la *Google Maps API*, dezvoltatorii Demonstratorului de concept N-WATCHDOG s-au orientat spre solutii pe care competitorii companiei din Mountain View, California nu au intarziat sa le ofere dependentilor de viewere 2-D si 3-D. Acestea sunt:

Leaflet – (Vladimir Agafonkin, *Mapbox*, http://leafletjs.com/), facilitate *client-side* pentru vizualizare de harti 2-D;

Cesium – Patrick Cozzi, *Cesium Consortium – Analytical Graphics & Bentley Systems*, https//cesiumjs.org/), facilitate *server-side* pentru vizualizare de harti 2-D sau scene geografice 3-D ('worlds'); si

ArcGIS Earth – (ESRI, http://www.esri.com/software/arcgis-earth), facilitate *client-side* pentru vizualizare de scene geografice 3-D, disponibila in versiune stabila din 2016.

In vederea consolidarii redundantei subsistemului 'Vizualizare' al N-WATCHDOG, in cadrul Etapei 4 a Proiectului s-a procedat la diversificarea tehnologiilor de *rendering*, a serviciilor de *web-map imagery* si de topometrie (*Digital Elevation Maps*, DEM). S-au realizat astfel updatarea la ultimele versiuni demonstrate ca stabile, a motoarelor de vizualizare *Leaflet, Cesium si ArcGIS Earth* ale modulelor N-WATCHDOG, astfel incat rezultatele aplicatiilor se pot vizualiza, in prezent, in urmatoarele expresii cartografice:

- *Desktop, GUI*: 2-D topography, color raster and iso-elevations + GIS;
  3-D OpenGL, color raster and iso-elevations + GIS;
  3-D Google Earth Client.

- *Web, Leaflet* client: ESRI World Imagery; ESRI World Street Map; ESRI Delorme;
  OpenStreetMaps; OpenMapSurfer Roads; Thunderforest Landscape;
  Thunderforest Outdoors; Opentopomap; Stamen Land; Hydda full.

- *Web, ArcGIS Earth* client: ESRI Imagery, Imagery with labels, Streets; Topographic;
  Dark grey canvas ; Light gray canvas; National Geographic; Oceans;
  Terrain with labels; OpenStreetMaps.

- *Web, Cesium* server: ESRI Imagery, Streets, Topo, Delorme.

- *Web, Google Earth*: Google Earth tiles system.

Anexa sectiunii curente a Raportului ofera o secventa de ilustratii servind drept exemplificare.

5. Asigurarea disponibilitatii documentarii in *run-time* atat in mod *online* cat si *offline*.

In acelasi spirit - al reducerii, in mod rational si in masura posibilitatilor, a dependentei serviciilor N-WATCHDOG de disponibilitatea Internet - s-au realizat, de asemenea:

- Asigurarea accesului la documentia Wikipedia privind centralele nucleare: Wikipedia live - in conditii *online*, oferind date actualizate; dar si Wikipedia resident, in conditii *offline* - utilizand fisiere .pdf obtinute prin download de la sursa, fara avantajul actualizarii, dar oferind totusi date generice de referinta.
- Asigurarea accesului la documentarele video din sectiunea LIBRARY/Media (*YouTube*), prin descarcare de pe web si crearea unui set rezident de filme.

* * *

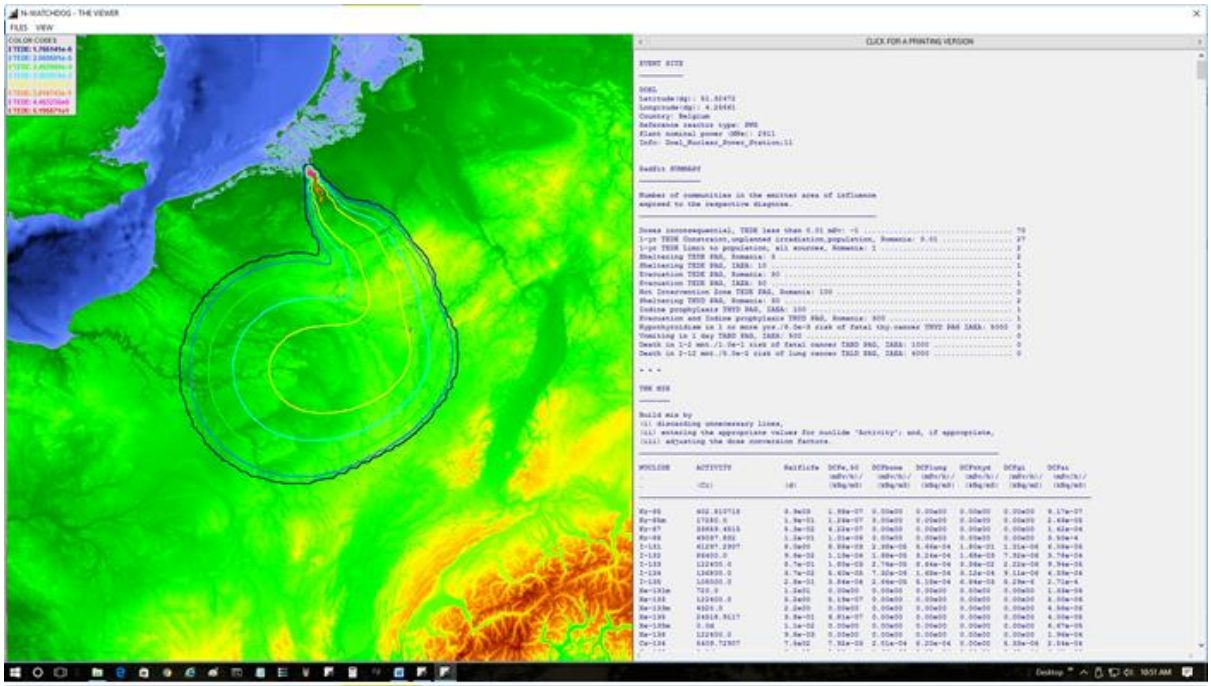
6. Noi solutii, in perspectiva post-Proiect

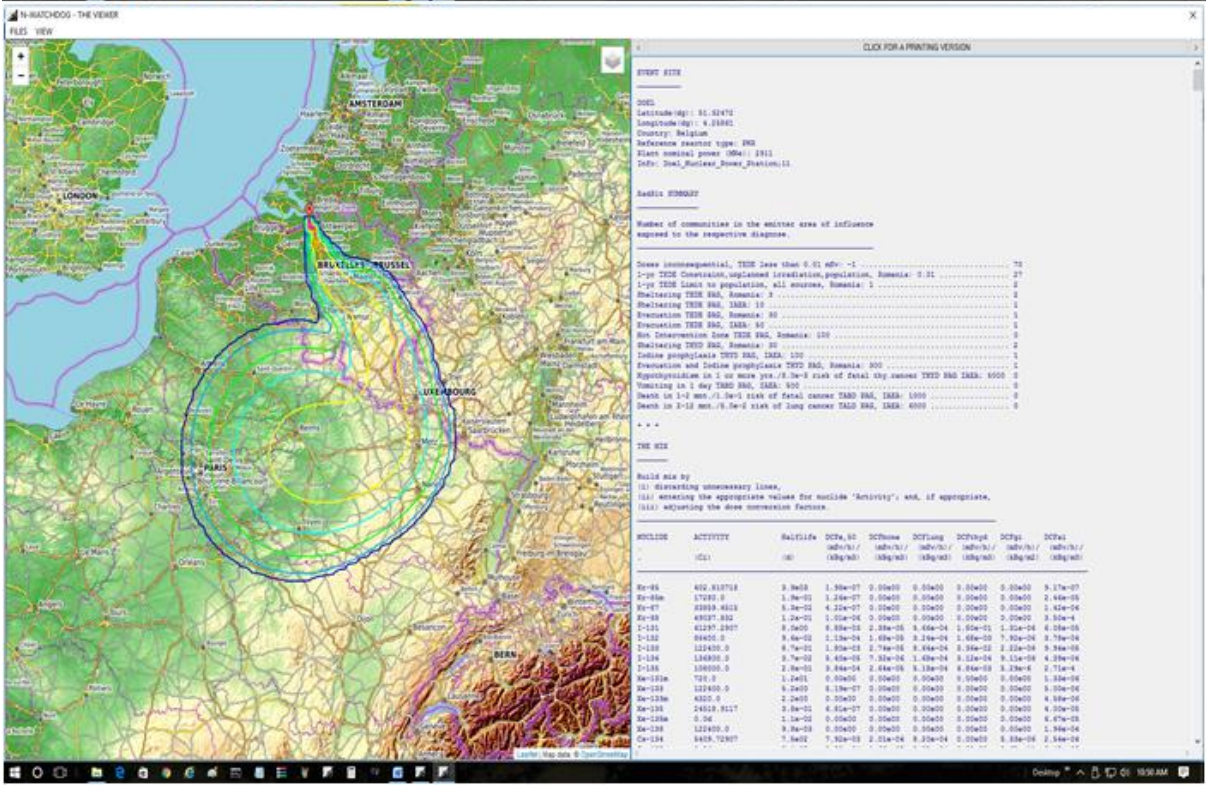
Pastrand permanent in centrul atentiei rolul subservient, de tester al fezabilitatii si furnizor al termenilor de referinta, al Demonstratorului de concept in realizarea obiectivului final al Proiectului, dezvoltatorii PoC nu au neglijat faptul ca acest instrument, consolidat prin programele de testare [1] ce au oferit o bogata resursa de *feedback*, va constitui nivelul urmator (*'the next level'*) al solutiei rezidente a IFIN-HH, de analiza a impactului ecologic si sanitar al activitatilor nucleare, de raspuns la situatii de accident nuclear si urgenta radiologica, de prognoza in timp real (*'live'*) a riscului si vulnerabilitatilor rezultate din expunerea teritoriului, populatiei, infrastructurilor, activitatilor economice, segmentelor sociale, obiectivelor strategice la efectele radiatiilor nucleare. Din aceasta perspectiva, in cadrul Activitatii 4.1. s-a initiat si o directie de lucru ce va transcende Proiectul - tinut a se incheia in luna septembrie curent (2017) - ce are in vedere noi solutii de a raspunde nevoilor exprimate, cu diferite prilejuri, de beneficiarii potentiali ai serviciilor N-NWATCHDOG. In timpul disponibil s-au elaborat (i) un algoritm alternativ pentru prognoza in timp real a zonelor de influenta ale obiectivelor nucleare cu emisii radioactive in atmosfera; si (ii) o solutie alternativa pentru importul de date web, de pe browsere pe fisiere ale aplicatiilor desktop ale platformei software.

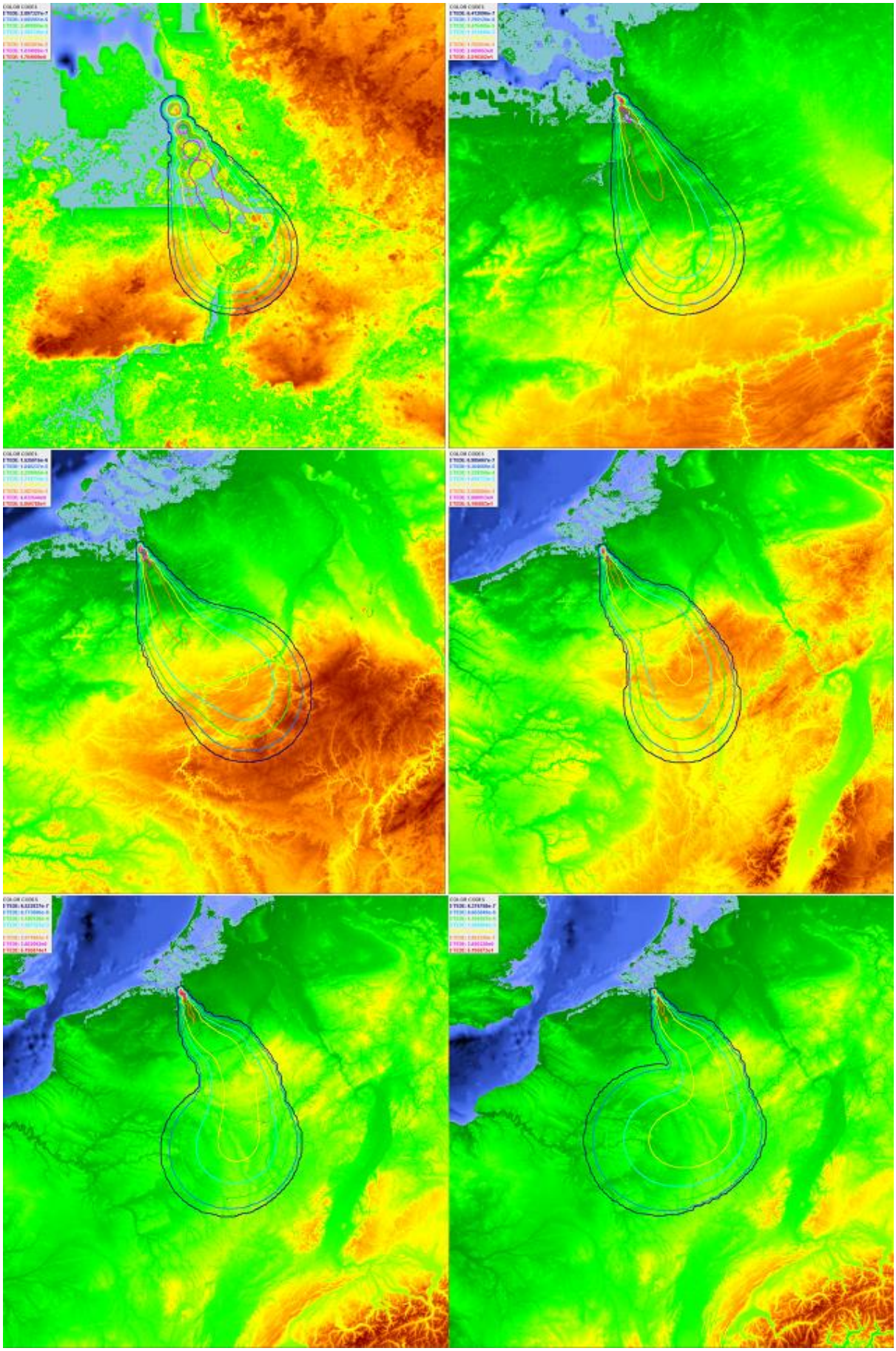
6.1. Time-leading processing vs. Puff-leading processing - o abordare duala a dispersiei atmosferice a emisiilor radioactive

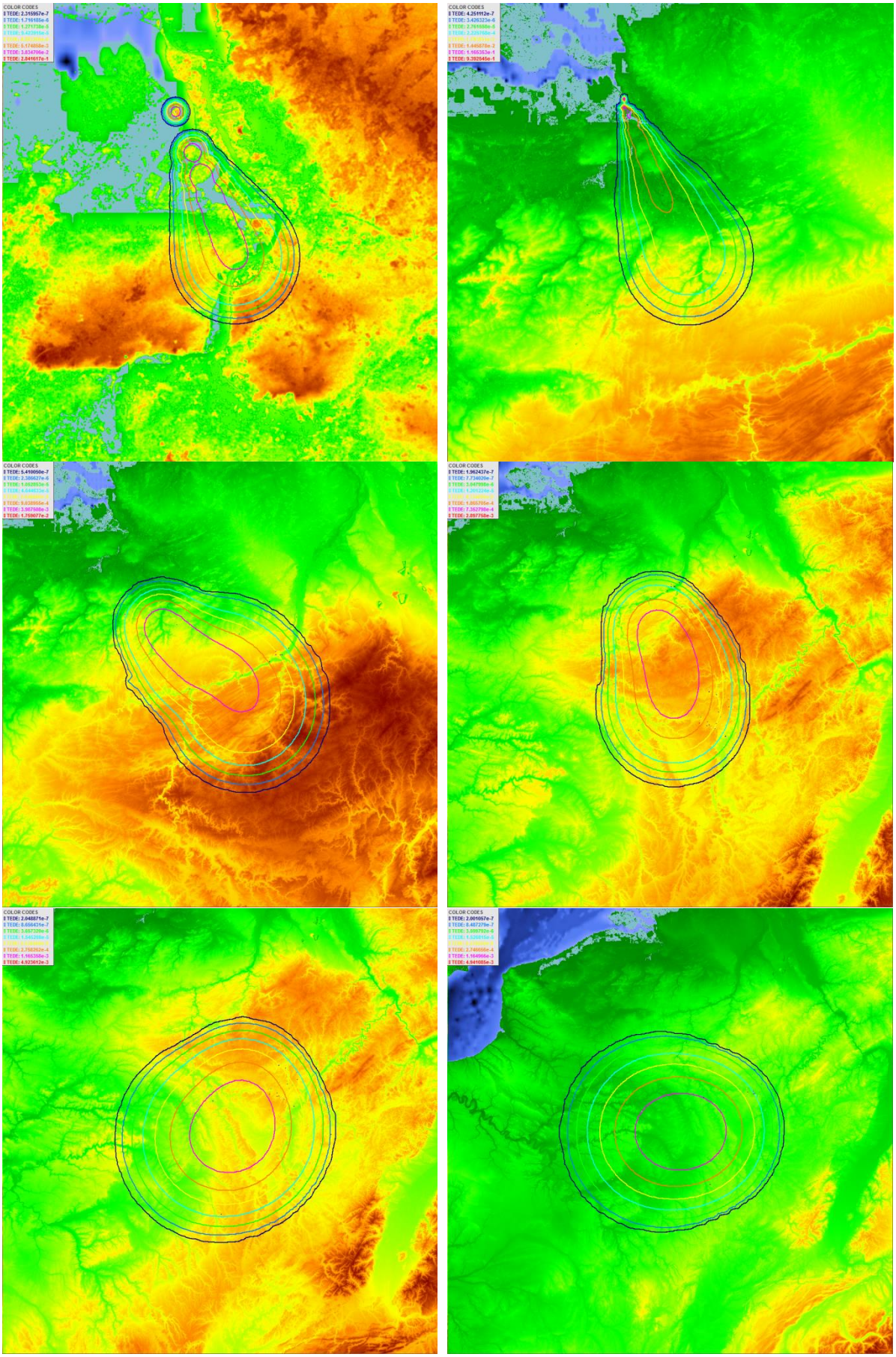
In procesul de training al operatorilor platformei N-WATCHDOG s-a subliniat necesitatea intelegerii faptului ca diagnosticul/prognosticul unei situatii radiologice create de o emisie in mediu de efluent radioactiv - inclusiv si in special recomandarile de masuri de protectie si aprecierea eventualitatii efectelor sanitare - depind in mod esential ***de integrala in raport cu timpul a expunerii subiectilor iradiati***, pasajul in sine al norului radioactiv fiind relevant doar in subsidiar, in privinta informarii asupra asa-numitului 'timp de sosire' (*arrival time*) a norului in zonele de interes. Altfel spus, in timp ce 'norul instantaneu' poate determina doar momentele de declansare/incetare a alarmei radiologice in diferitele locatii survolate de nor, 'integrala norului' este cea care masoara *doza de radiatii* rezultata din expunere si, prin consecinta - contramasurile necesare si eventualele efecte sanitare asteptate. In pofida acestui adevar de baza, s-a constatat ca publicul larg si mijloacele de informare continua sa fie atasate de 'filme' ale evenimentelor - simulari ale miscarii norului instantaneu in teritoriu, ce ocupa spatiile de *breaking news* ale televiziunilor. Explicatia pare sa tina de faptul ca 'integrala norului' ramane un concept abstract si, prin urmare, arid, in vreme ce 'norul in miscare' raspunde nevoii de perceptie imediata si comunicare atragatoare a rezultatelor.

Intelegand ca ignorarea acestui aspect se poate dovedi contraproductiva in educarea unui public constient si cooperant in administrarea raspunsului la urgente radiologice, versiunea 2017 a Demonstratorului de concept include un algoritm alternativ de monitorizare a advectiei-difuziei norilor radioactivi, in care bucla de iteratie pe variabila *timp* conduce procesul, iar bucla de iteratie pe segmentele de emisie (*release puffs*) devine subordonata. Rezultate ale utilizarii noului algoritm se prezinta in Figura 6.


N-WATCHDOG - THE VIEWER
FILES VIEW
CLICK FOR A PRINTING VERSION


N-WATCHDOG - THE VIEWER
FILES VIEW
CLICK FOR A PRINTING VERSION
AMSTERDAM
LONDON
BRUXELLES - BRUSSEL
LUXEMBOURG
PARIS
BERN




COLOR CODES
‡ TEDE: 2.315957e-7
‡ TEDE: 1.716105e-6
‡ TEDE: 1.271713e-5
‡ TEDE: 3.427815e-5
‡ TEDE: 5.174056e-3
‡ TEDE: 3.034706e-2
‡ TEDE: 2.841617e-1
COLOR CODES
‡ TEDE: 4.251112e-7
‡ TEDE: 3.428323e-6
‡ TEDE: 2.761558e-5
‡ TEDE: 2.235105e-4
‡ TEDE: 1.445627e-2
‡ TEDE: 1.165353e-1
‡ TEDE: 9.392545e-1
COLOR CODES
‡ TEDE: 5.410050e-7
‡ TEDE: 2.389627e-6
‡ TEDE: 1.052853e-5
‡ TEDE: 4.644433e-5
‡ TEDE: 9.938955e-4
‡ TEDE: 3.907560e-3
‡ TEDE: 1.750077e-2
COLOR CODES
‡ TEDE: 1.962437e-7
‡ TEDE: 7.734020e-7
‡ TEDE: 3.047095e-6
‡ TEDE: 1.201224e-5
‡ TEDE: 1.865795e-4
‡ TEDE: 7.352790e-4
‡ TEDE: 2.897758e-3
COLOR CODES
‡ TEDE: 2.848621e-7
‡ TEDE: 8.656431e-7
‡ TEDE: 3.667320e-6
‡ TEDE: 1.642389e-5
‡ TEDE: 2.158283e-4
‡ TEDE: 1.165350e-3
‡ TEDE: 4.923642e-3
COLOR CODES
‡ TEDE: 2.001057e-7
‡ TEDE: 6.487277e-7
‡ TEDE: 3.099793e-6
‡ TEDE: 1.528015e-5
‡ TEDE: 2.748550e-4
‡ TEDE: 1.164966e-3
‡ TEDE: 4.941055e-3

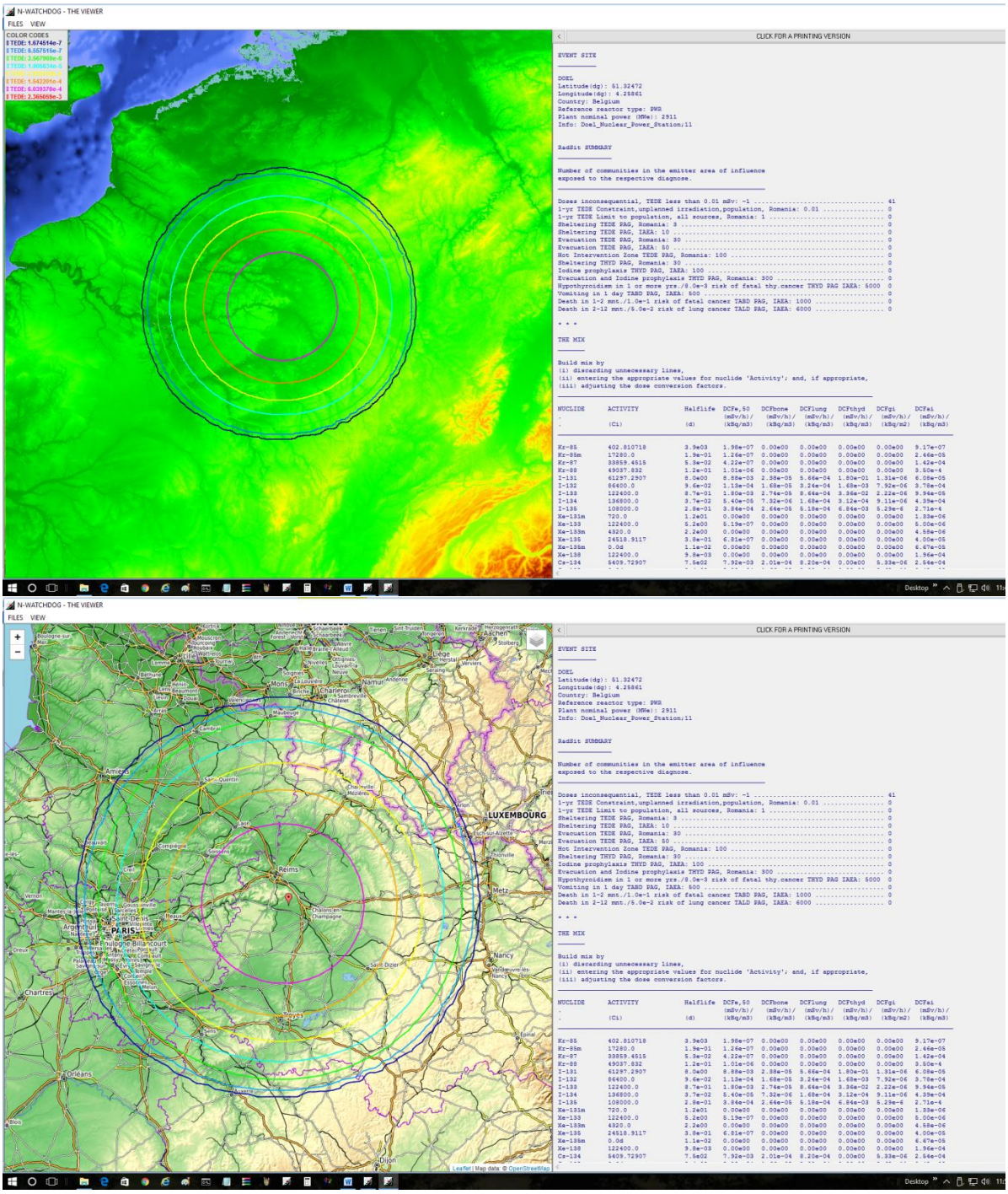


Fig.6. Harti de baza si web ale 'integralei norului radioactiv' - determinanta in diagnoza / prognoza de situatie radiologica, pentru o emisie accidentala virtuala la un reactor PWR de 1350 MWe. In continuare, evolutia *integralei norului*, la 1, 4, 8, 12, 16 si 20 de ore de la momentul initial al emisiei; apoi, evolutia *norului instantaneu* surprins la aceleasi momente.

Pentru a mentine concentrarea utilizatorului pe problemele centrale - ale diagnozei de situatie, recomandarii de contramasuri si evaluarii efectelor sanitare posibile, solutia-default ramane algoritmul condus de bucla de iteratie pe segmente de emisie (puffs), adoptata initial si practicata in decursul proiectului, comutarea din menu pe noul algoritm fiind accesibila doar Administratorului platformei, la cererea operatorilor (Figura 7).

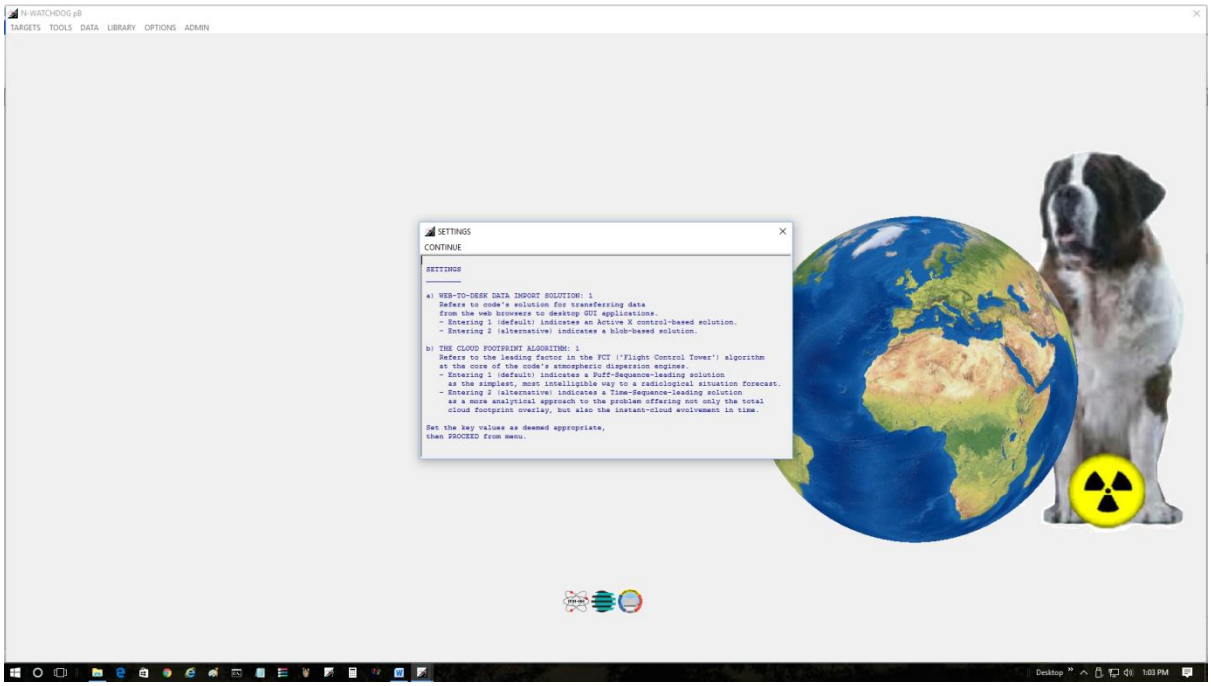


Fig.7. Widget controlat de Administrator, permitand comutarea modurilor de lucru in (a) localizarea surselor de emisie; si (b) calculul dispersiei atmosferice.

6.2. Active X vs. Blobs

O alternativa a fost oferita si in problema transferului in *runtime* de coordonate geografice ale surselor de emisie, obtinute interactiv de pe browserele ruland servicii cartografice web, pe fisierele aplicatiilor desktop GUI ale platformei. Realizata in versiunile 2014-2016 exclusiv cu controale ATL, operatiunea a fost semnalata ca o vulnerabilitate in conditiile in care se prefigureaza abandonarea controalelor Active X in software-ul profesional *mainstream*. Noua solutie aplica facilitatea *Blob* oferita initial de standardul HTML 5. Dat fiind caracterul specios al chestiunii, si optarea Active X /Blobs a fost plasata sub controlul strict al Administratorului platformei N-WATCHDOG (v. Figura 6).

Din pacate, si aceasta cale s-a dovedit, recent, a fi pusa in suspensie de creatorii browserelor majore, astfel incat aprecierea solutiei - ce asigura, fara indoiala, o anumita redundanta - va depinde de evolutiile (imprevizibile) ale standardului HTML5, sub presiunea dezvoltatorilor de browsere si a exigentelor de securitate mereu sporite, ale pietei IT.

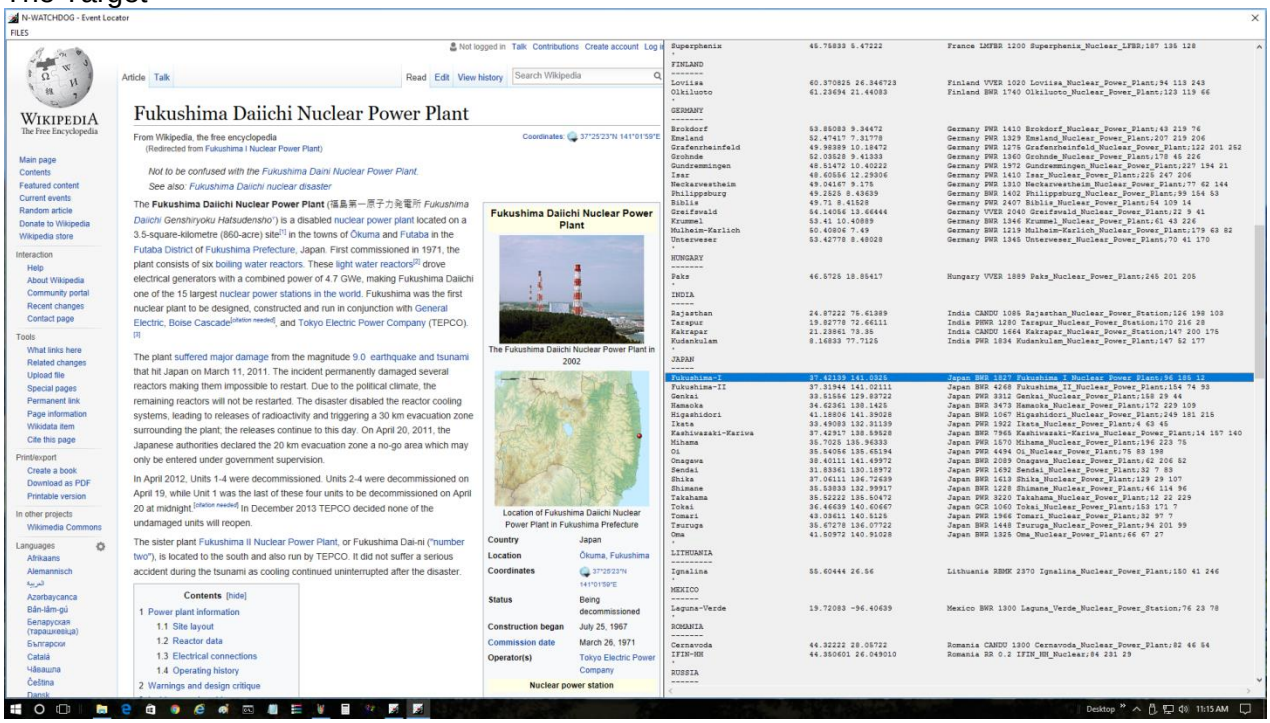
Referinte

1. IFIN-HH, SIVECO Romania S.A., UPB (2016). *Sistem de alertare timpurie si asistare computerizata a deciziilor, bazat pe evaluarea anticipativa a dinamicii rapide a vulnerabilitatilor induse in teritoriu de obiectivele nucleare*'. Etapa 3 01/01/2016 – 31/12/2016. *Testarea in-house si evaluarea Demonstratorului N-WATCHDOG. Dezvoltarea Modelului experimental N-WATCHDOG (EM), Partea I. Raport stiintific si tehnic*.' http://proiecte.nipne.ro/pn2/n-watchdog/rezultate/N-WATCHDOG_Annual-Report-2016.pdf.

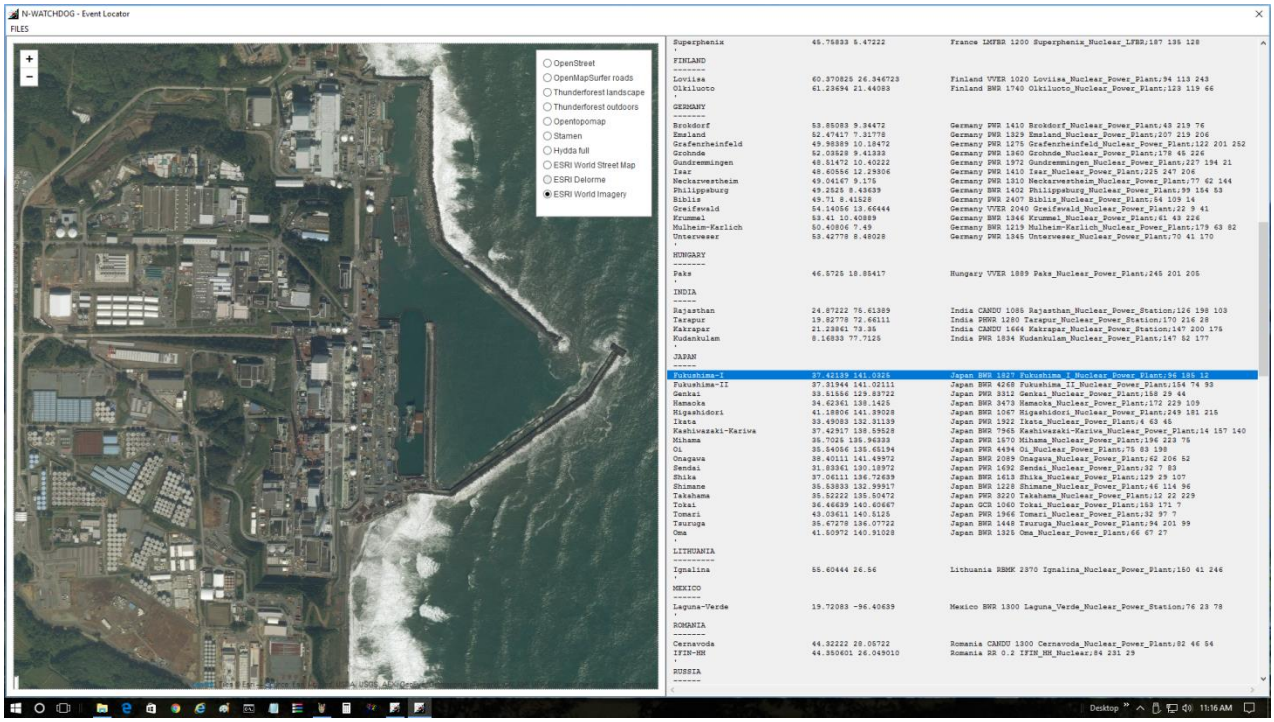
ANEXA. N-WATCHDOG pB 2017 - Ilustratii din secventa de operare

Application: MY PLANT
Assessing a Fukushima Daiichi scenario, on March 13, 2017

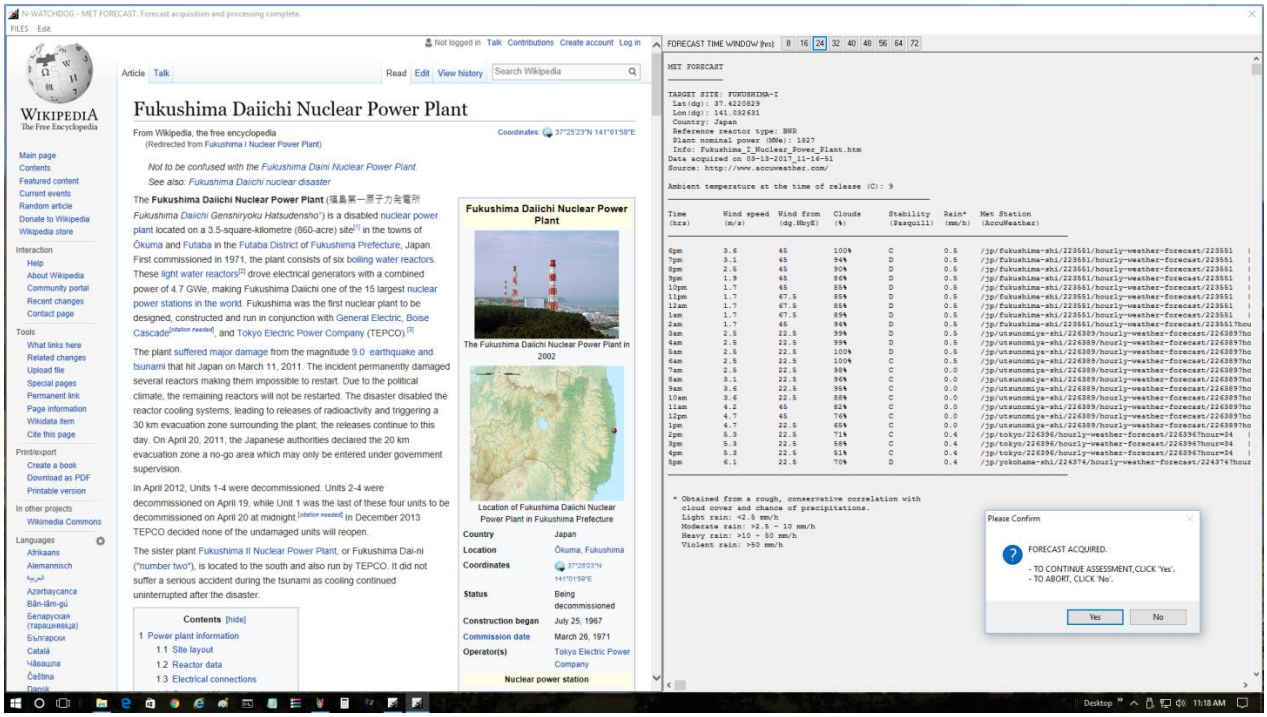
The Target



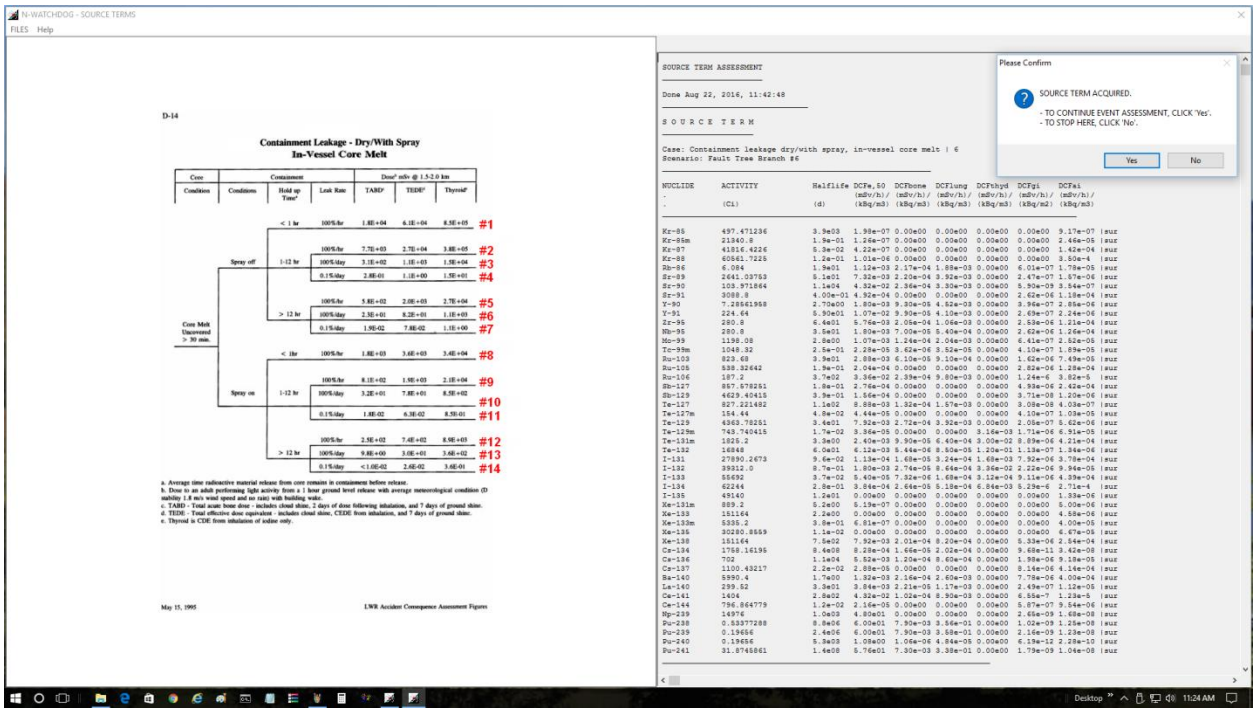
Locate Release Mouth



Get the Meteo Forecast, AccuWeather providing

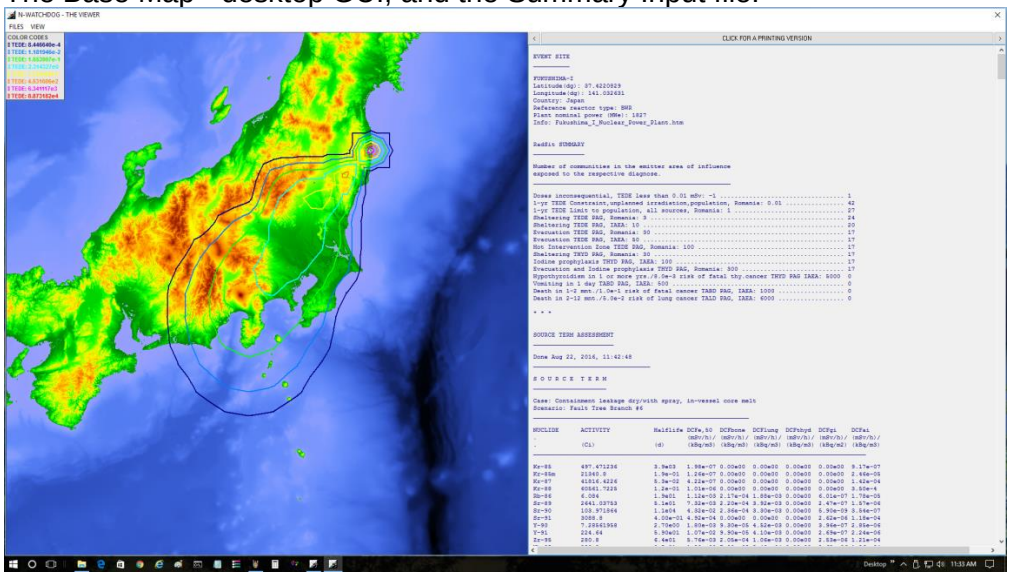


Select the Assumed Source Term

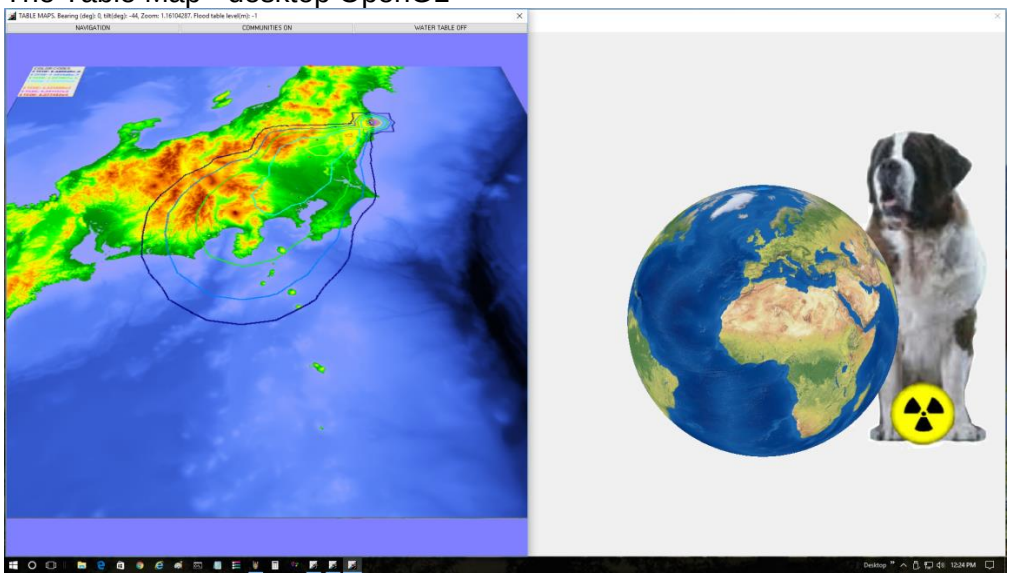


- Coming up next: Output Maps, in their various expressions -

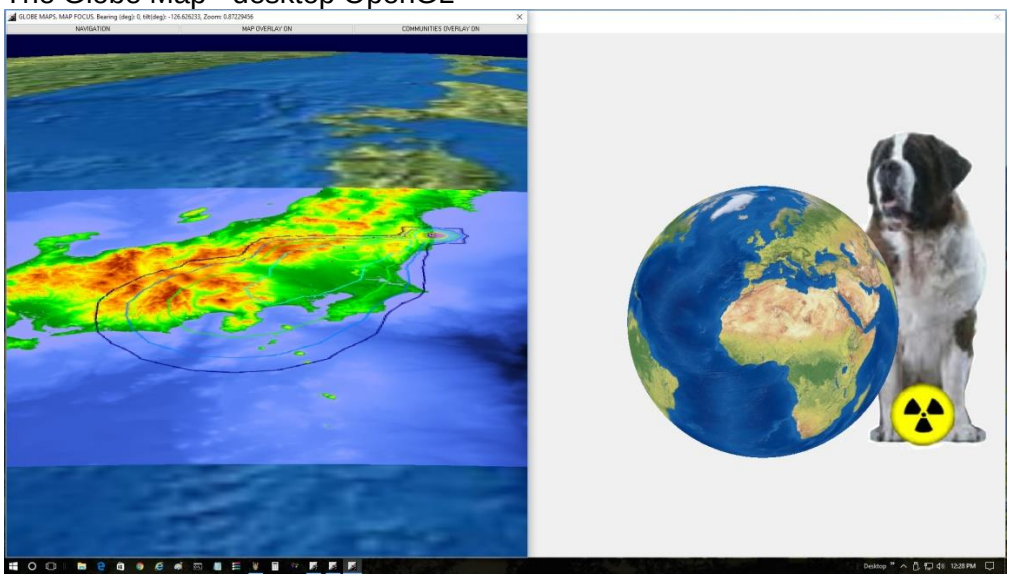
The Base Map - desktop GUI, and the Summary Input file.



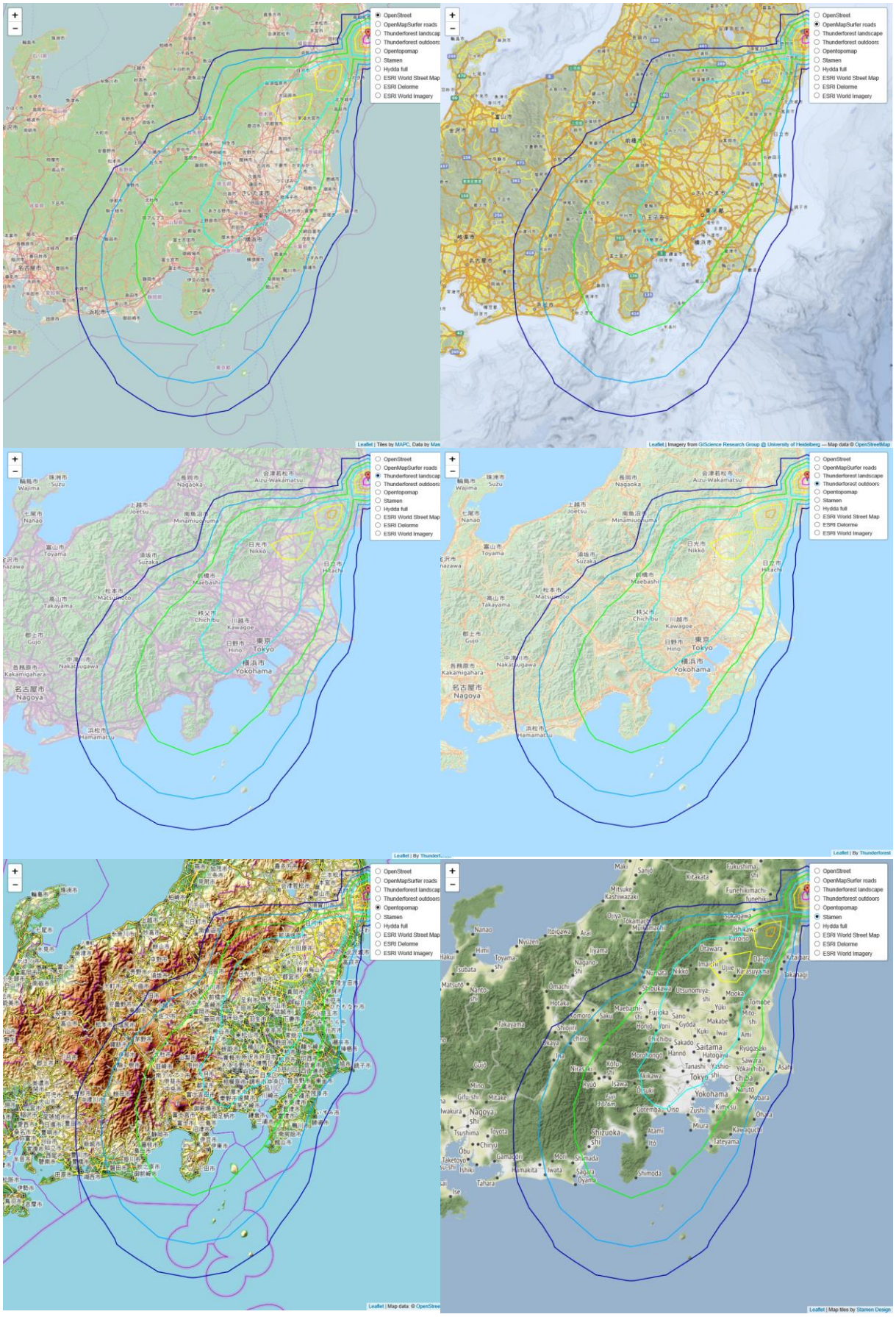
The Table Map - desktop OpenGL

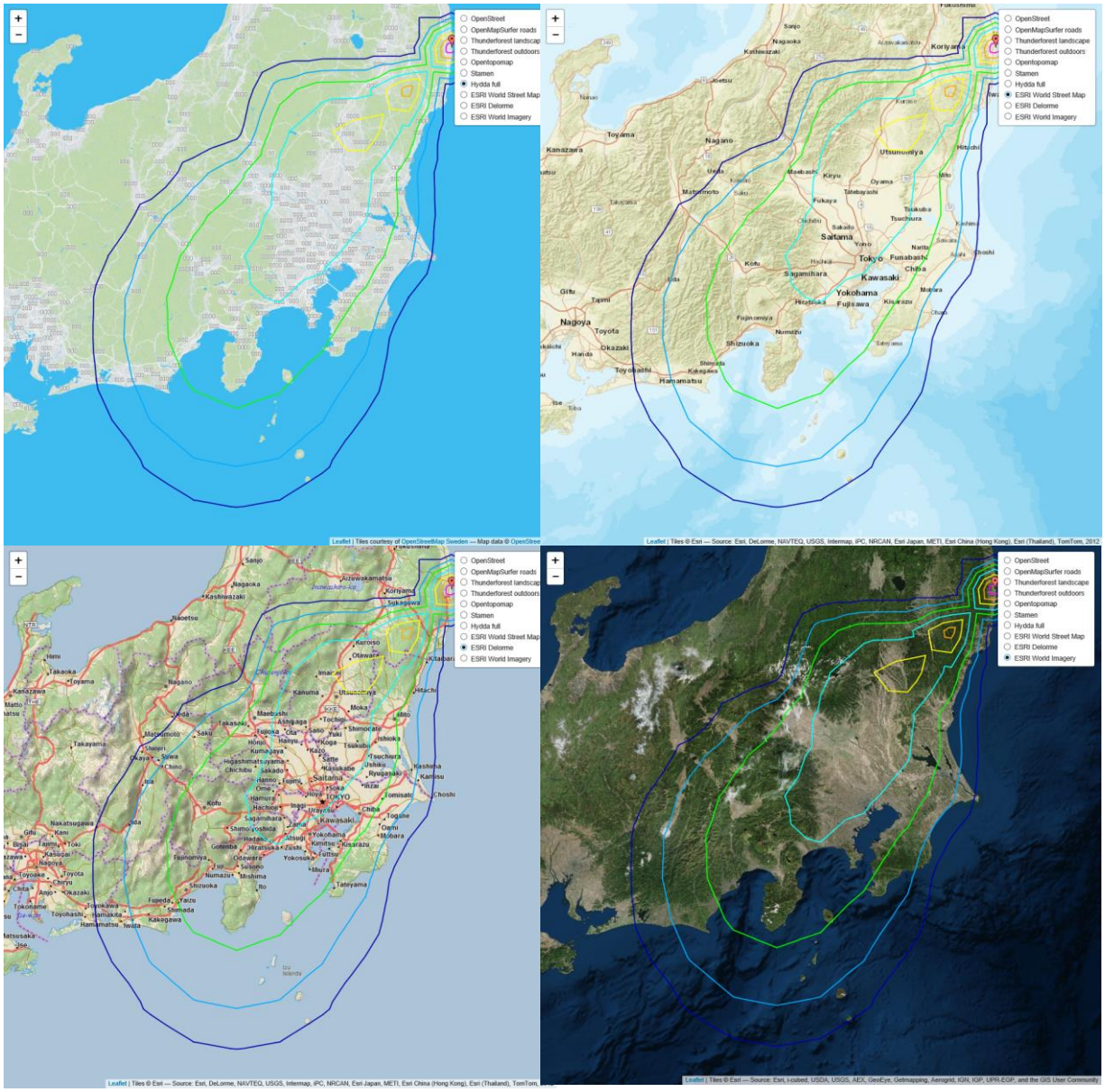


The Globe Map - desktop OpenGL

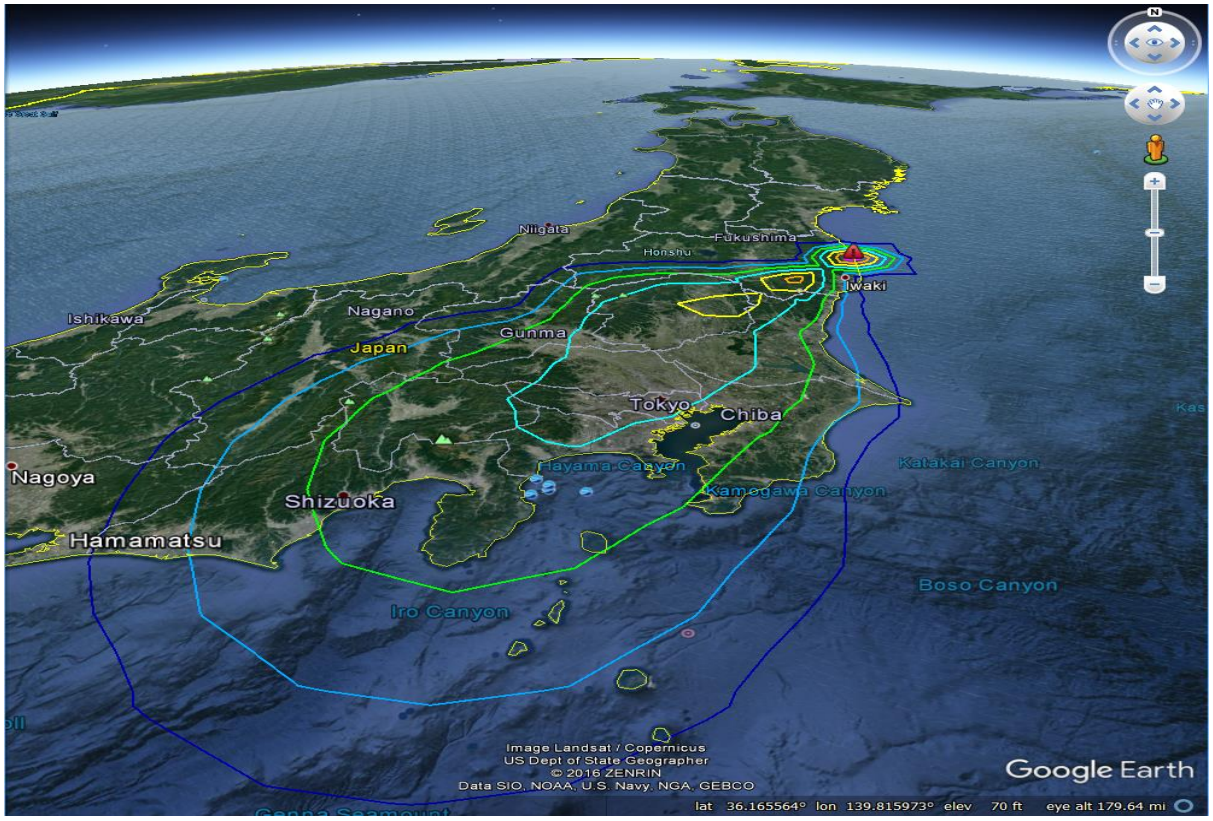


2-D maps: *Leaflet,* drawing upon various web services

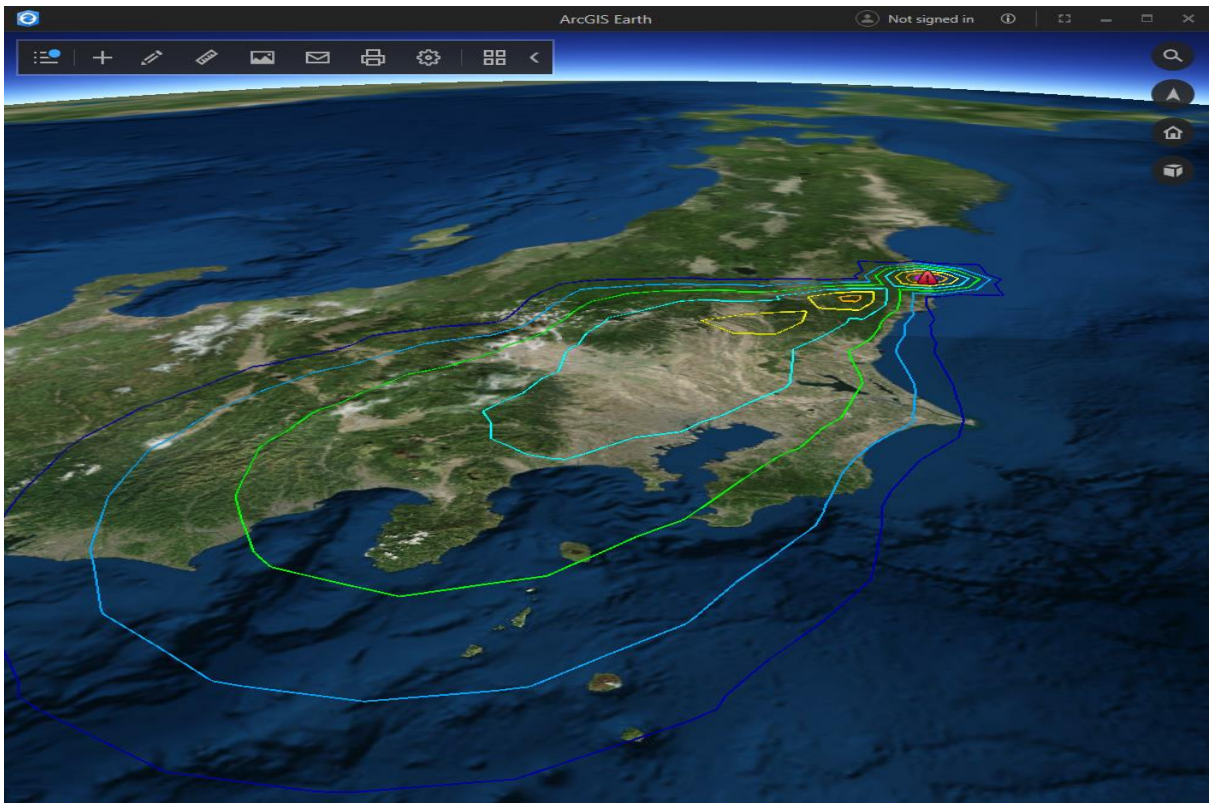



OpenStreet
OpenMapSurfer roads
Thunderforest landscape
Thunderforest outdoors
Opentopomap
Stamen
Hydda full
ESRI World Street Map
ESRI Delorme
ESRI World Imagery
Nagano
Kanazawa
Toyama
Saitama
Tokyo
Kawasaki
Yokohama
Nagoya
Toyota
Okazaki
Shizuoka
Hamamatsu
Utsunomiya
Koriyama

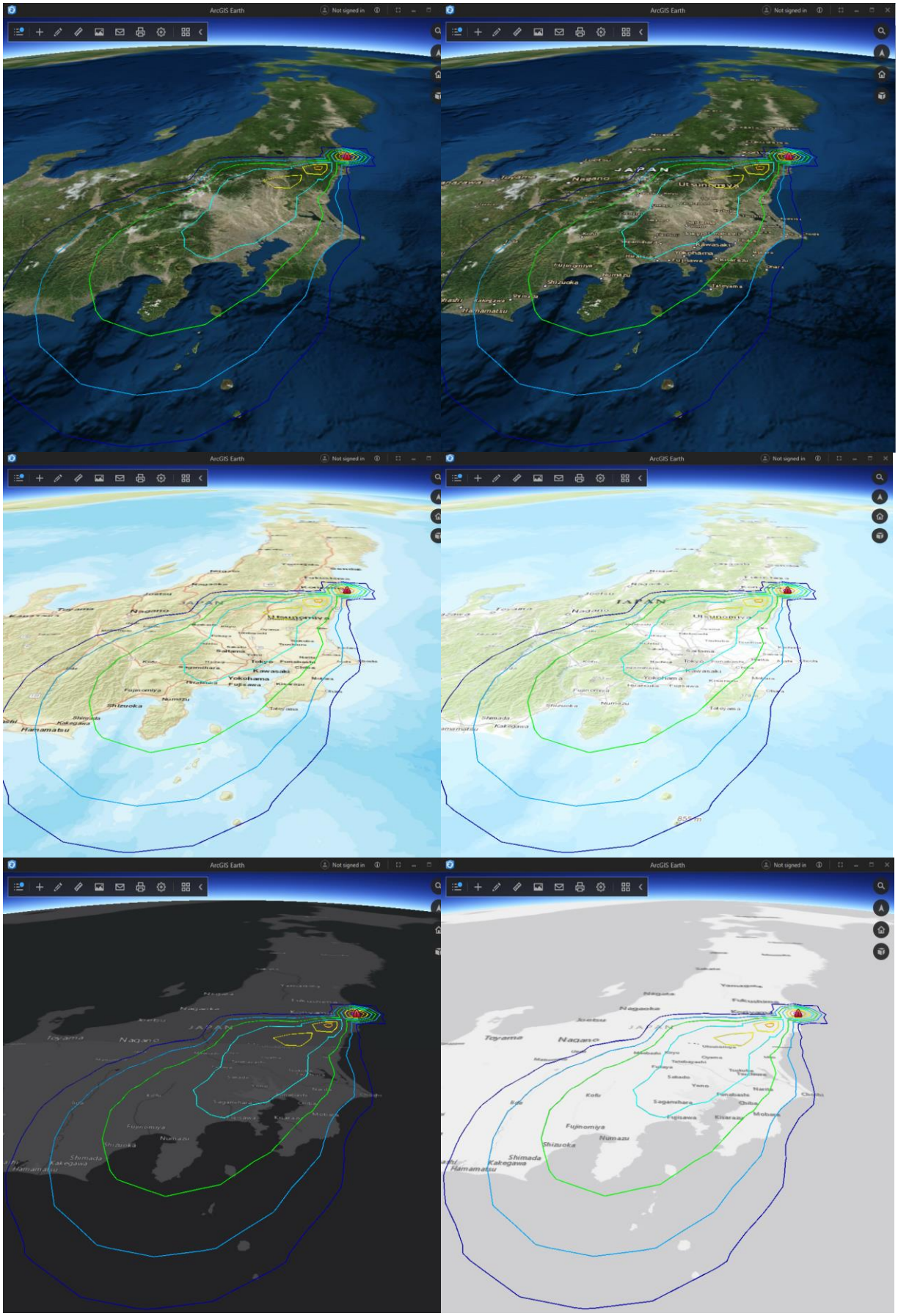
3-D maps: Google Earth client

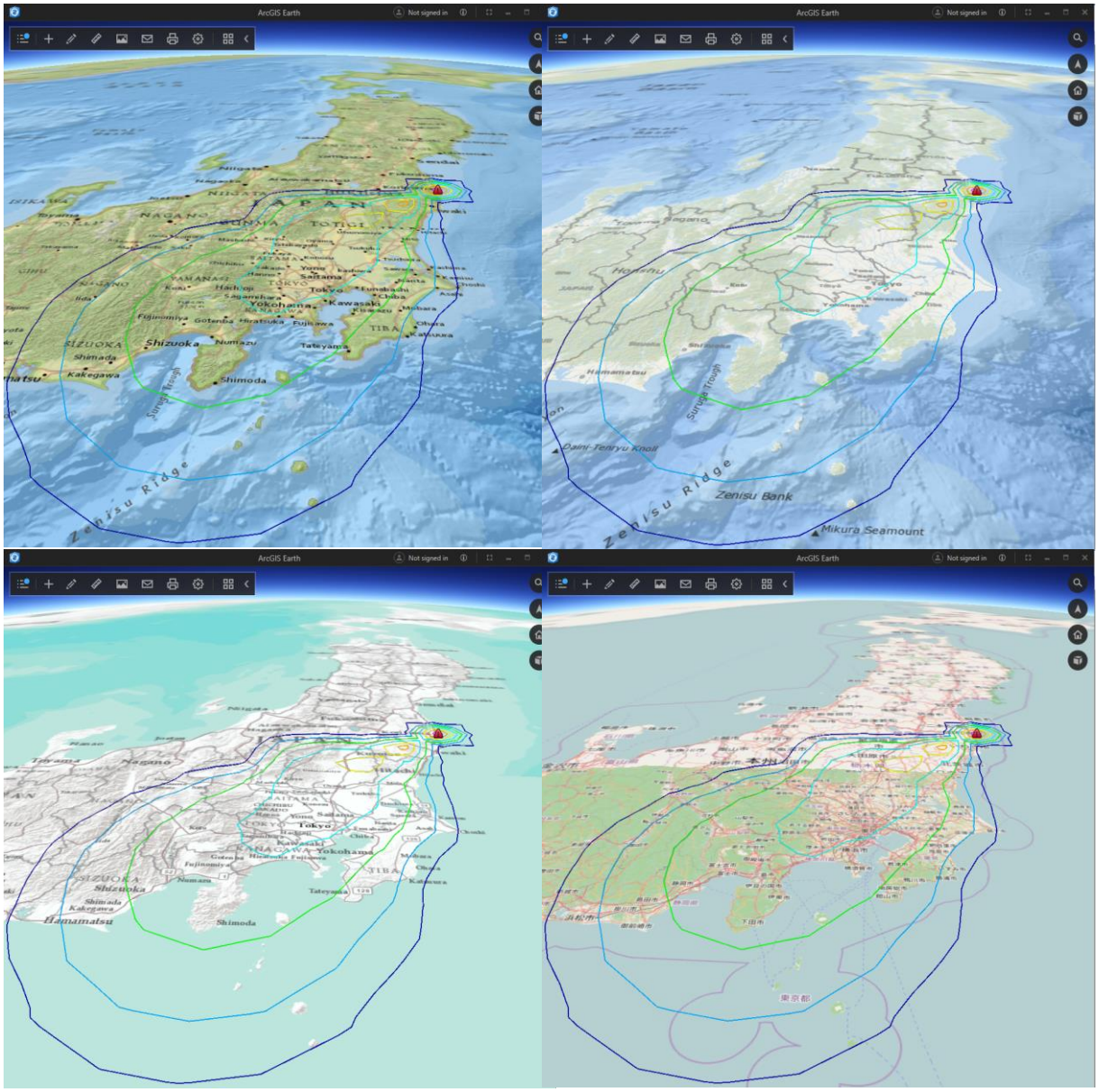


3-D ArcGIS Earth client (ESRI)

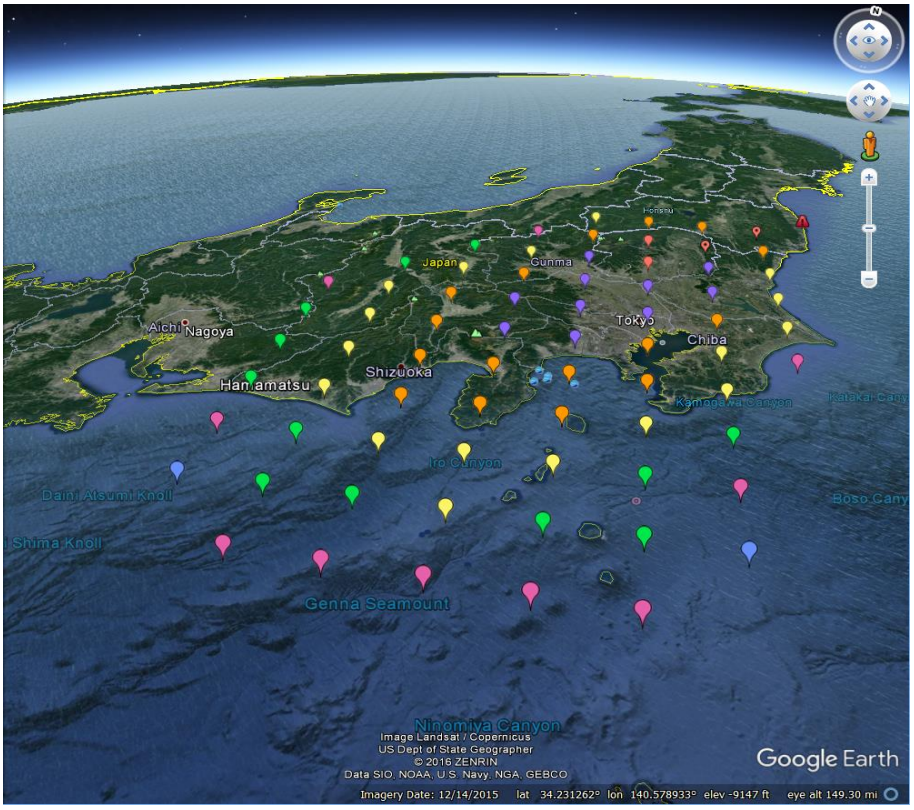


- Coming up next: ArcGIS Earth imagery services -

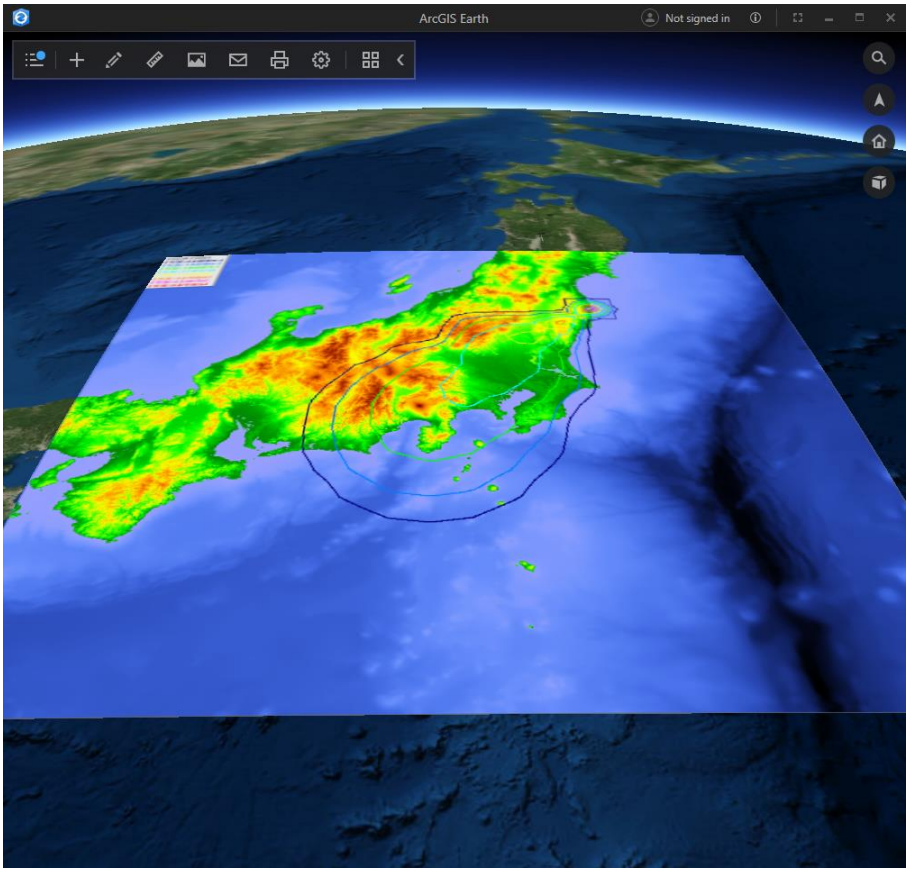

ArcGIS Earth
Not signed in
JAPAN
Nagano
Utsunomiya
Kawasaki
Yokohama
Fujisawa
Fujinomiya
Numazu
Shizuoka
Hamamatsu
Toyama
Niigata
Nagaoka
Fukushima
Koriyama
Kofu
Sagamihara
Chiba
Kisarazu
Mobara
Shimada
Kakegawa


ArcGIS Earth
Not signed in
Zenisu Ridge
Shizuoka
Shimoda
Kakegawa
Numazu
Tateyama
Yokohama
Kawasaki
Tokyo
Sagamihara
Fujisawa
Fujinomiya
Gotenba
Hiratsuka
Fujikawa
Shimada
Sunga Trough
Hamamatsu
Daini-Tenryu Knoll
Zenisu Bank
Mikura Seamount

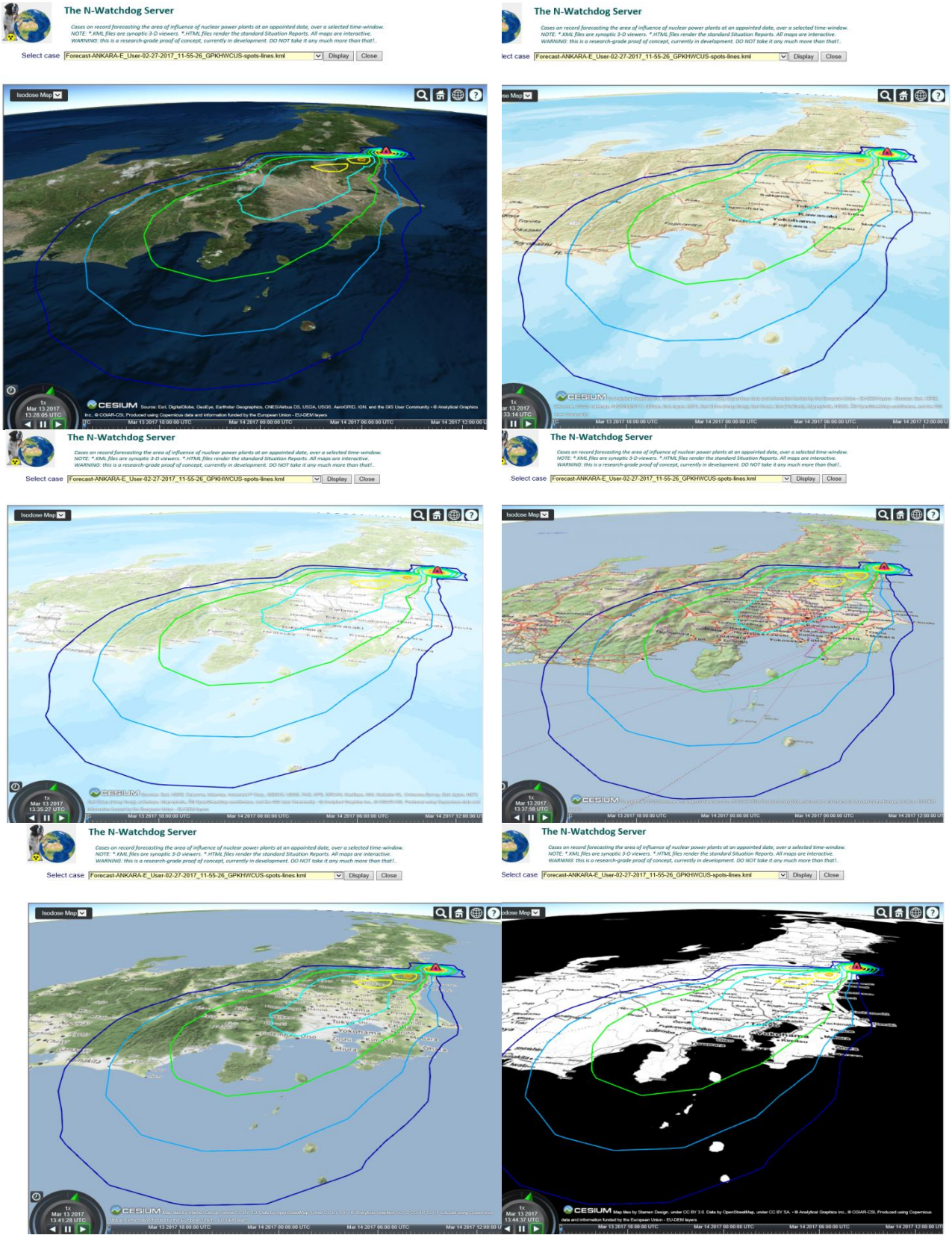
Interactive Grids (here - Google Earth)



Overlays (here - ArcGIS Earth)



Cesium server maps (here - isolines)



Testarea demonstratorului de concept de catre partenerii SIVECO si UPB, Etapa a II-a, 2017

Integrarea feedback-ului rezultat din testarea Demonstratorului de concept (PoC) in prima faza, desfasurata in cadrul Etapei a III-a, 2016, a Proiectului - operatiune asupra careia s-a raportat in sectiunea precedenta, a fost in continuare sprijinita de catre partenerii SIVECO si UPB ai dezvoltatorului prin campanii de testare ale versiunii emergente a PoC in decursul anului 2017.

Activitatea echipei Universitatii Politehnica din Bucuresti in aceasta directie s-a inscris in mod natural in procesul, condus simultan, de elaborare a scenariilor situatiilor de urgenta de referinta, asupra caruia se raporteaza in sectiunea A.4.3.2. '*Definirea si testarea scenariilor de simulare a situatiilor de criza*', a Raportului de fata.

Paralel, partenerul SIVECO a realizat o testare independenta, pocedurata conform normelor interne ale Companiei. Raportul de testare rezultat se prezinta in continuare. Statistica scorurilor obtinute permite aprecierea ca N-WATCHDOG pB constituie un produs ce raspunde obiectivelor stabilite prin termenii de referinta ai Proiectului, cu perspective de dezvoltare autonoma in coninuare.

Raport de testare
ETAPA 4

Act 4.1 Integrarea feedbackului si finalizarea unei versiuni de referinta PoC pentru a servi la specificatiile produsului final EM si la dezvoltare, Partea a II-a

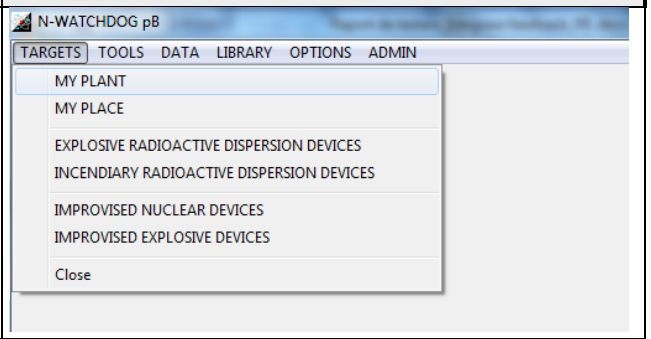
Nume Parteneri:	Institutul National de Cercetare-Dezvoltare pentru Fizica si Inginerie Nucleara „Horia Hulubei” – IFIN-HH Universitatea Politehnica din Bucuresti SIVECO Romania SA
Nume Proiect:	Sistem de alertare timpurie si asistare computerizata a deciziilor, bazat pe evaluarea anticipatia a dinamicii rapide a vulnerabilitatilor induse in teritoriu de obiectivele nucleare
Aplicatie:	N-Watchdog pB

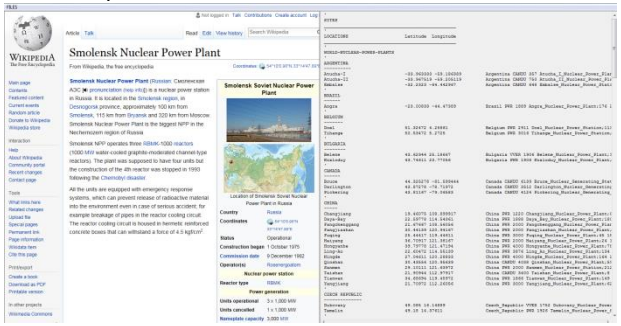
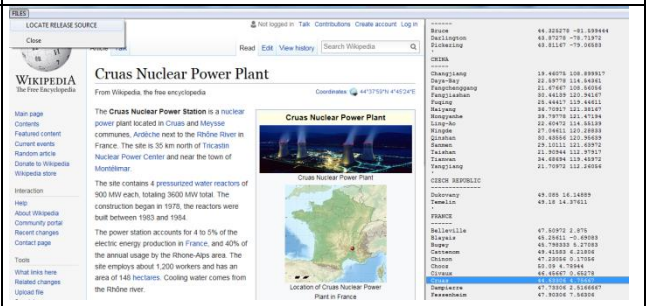
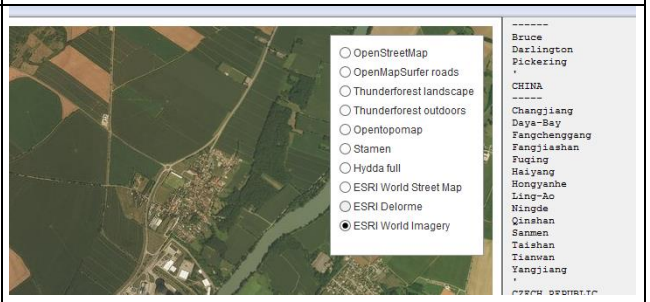
Categoria Targets

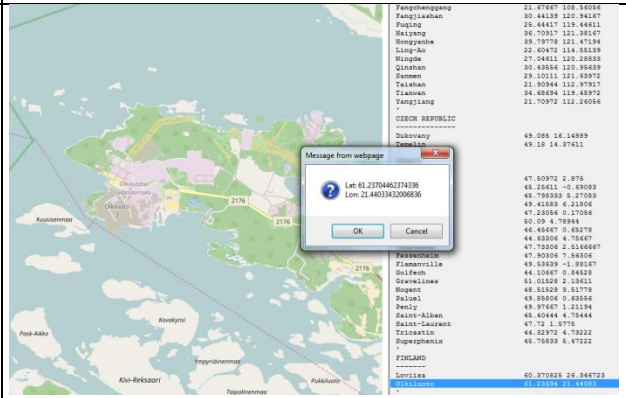
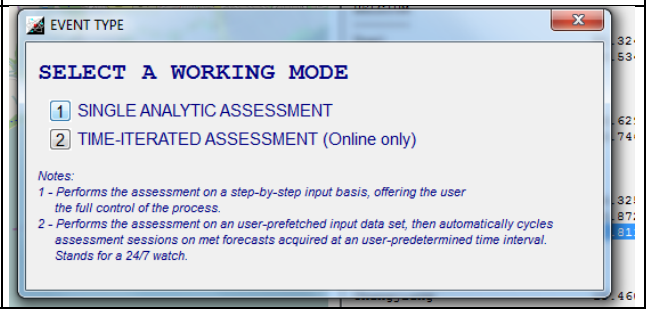
SIVECO ROMANIA *Soft care contează*	**R A P O R T D E T E S T A R E**

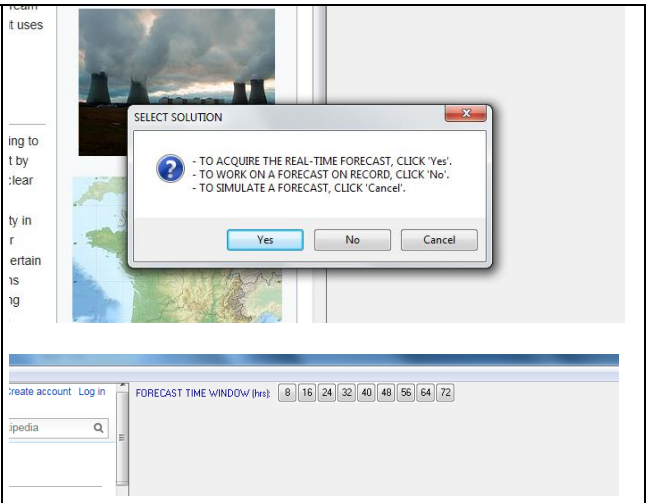
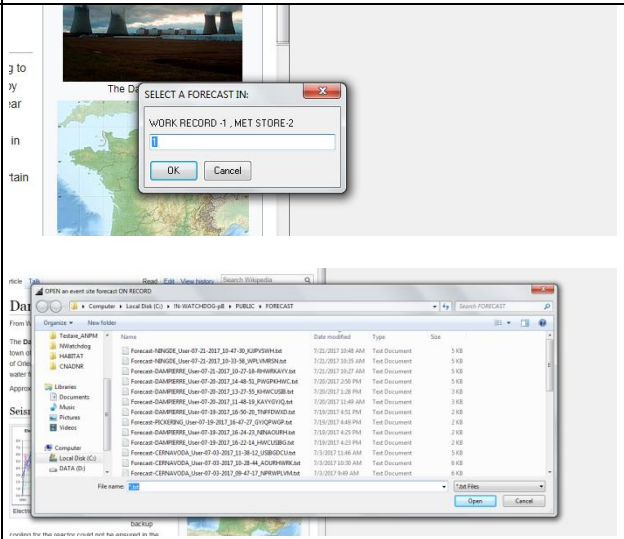
Cod: 1 **Proiect : N-Watchdog**

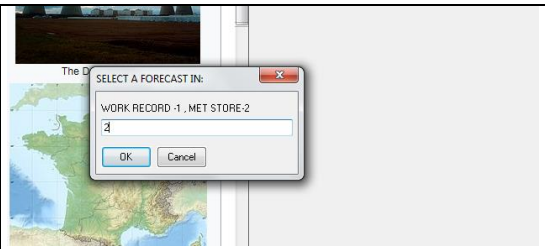
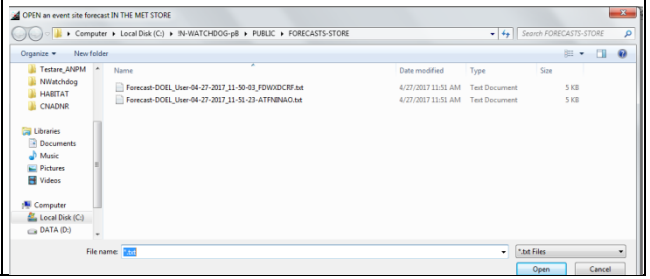
Descriere :Rulare modul My Plant, cazul **"Single Analytic Assessment", optiunea Generate a source term on plant status assumptions**

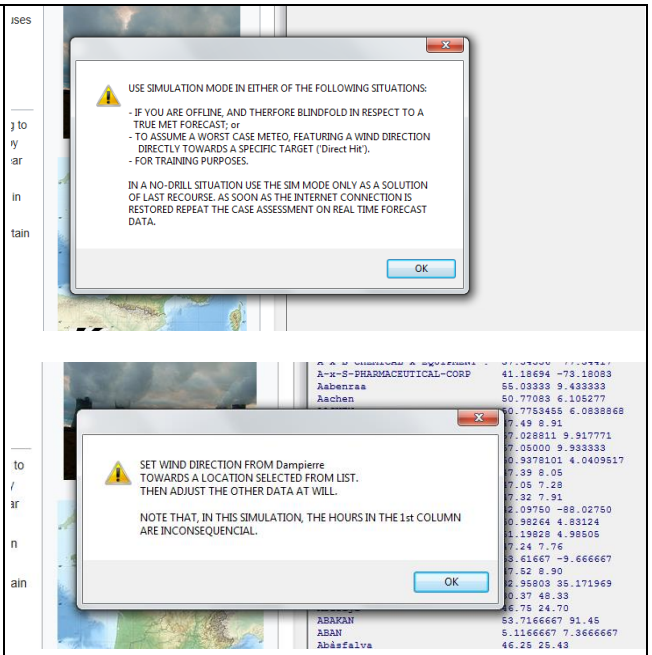
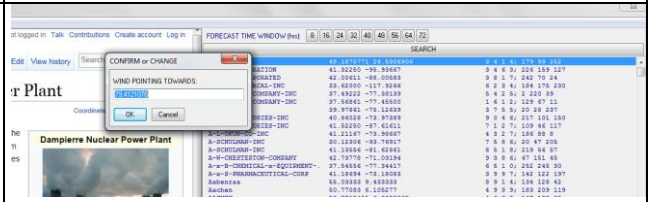
Nr.	Modul aplicatiei	Versiune aplicatie	Functionalitate	Grad severitate *	Stare**	Comentarii/Observatii
1.	My Plant	N-Watchdog pB	Accesare modul My Plant	Scazut	Trecut	
2.			Afisare si navigare in nomenclatorul de centrale nucleare si selectare sursa radioactiva	Scazut	Trecut	A fost implementata functia de navigare in nomenclatorul de centrale nucleare prin scroll

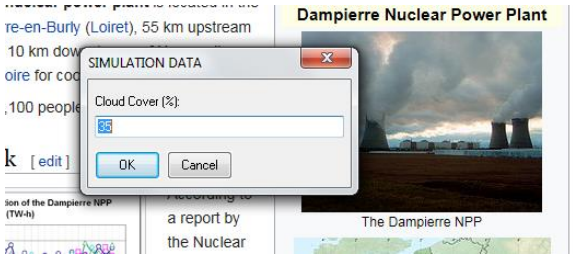
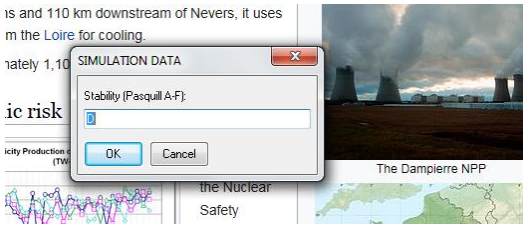
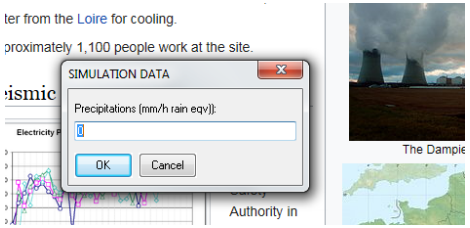
3.			**Afisare pagina informativa Wikipedia**	**Scazut**	**Trecut**	A fost redimensionata fereastra in care sunt afisate informatiile despre statia aleasa pentru a se incadra alaturi de fereastra nomenclatorului de centrale nucleare in frame-ul aplicatiei. 
4.			**Accesare functie de localizare a sursei de emisie radioactiva pe harta**	**Scazut**	**Trecut**	
5.			**Afisare harta de fundal**	**Scazut**	**Trecut**	

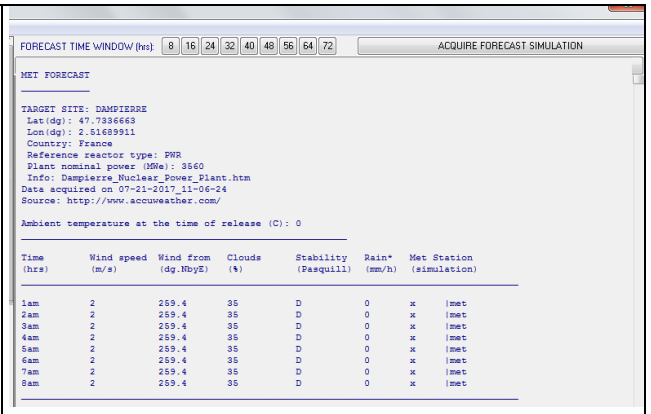
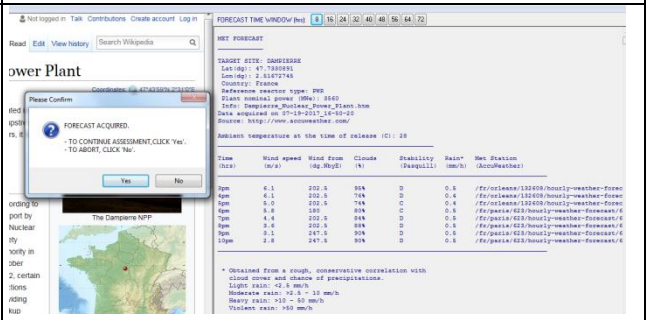
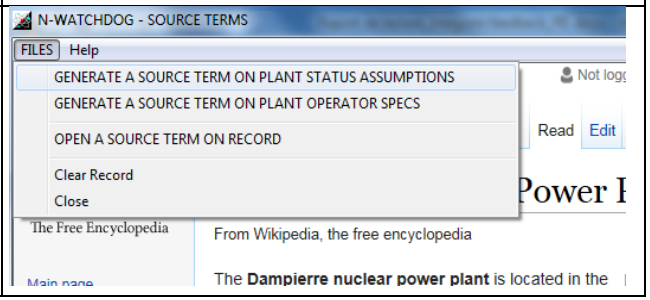
6.			**Navigare in harta si selectarea sursei si memorarea coordonatelor geografice (pan/zoom/selectare)**	**Scazut**	**Trecut**	Utilizatorul are la dispozitie posibilitatea de a naviga in interfata de harta. Exista riscul ca locatia aleasa de utilizator sa nu corespunda cu locatia unei statii reale, ceea ce poate duce la evaluarea unui scenariu pe baza unei locatii eronate.
7.			**Afisarea coordonatelor geografice a selectiei**	**Scazut**	**Trecut**	
8.			**Afisare tip de eveniment si selectare "Single Analytic Assessment"**	**Scazut**	**Trecut**	

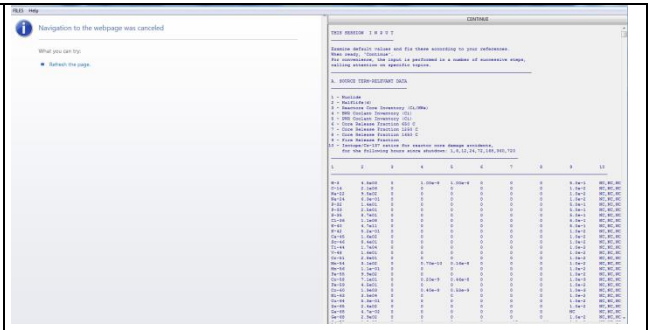
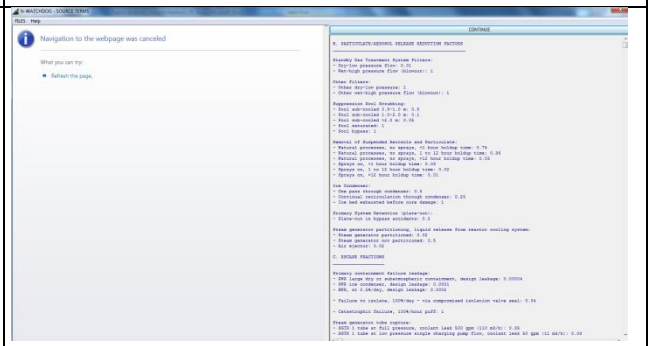
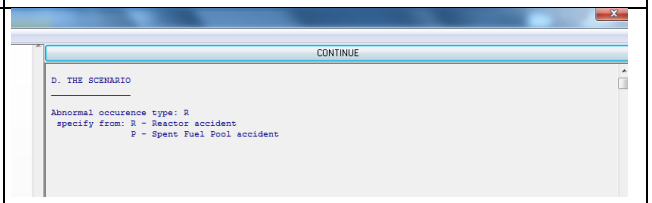
9.			**Selectare modalitate de introducere date meteo - Colectare date meteo in timp real pentru intervalul ales**	**Scazut**	**Trecut**	
10.			**Selectare modalitate de introducere date meteo - Incarcare date meteo din fisier salvat anterior**	**Scazut**	**Trecut**	

11.			**Selectare modalitate de introducere date meteo – Procurare date meteo**	**Scazut**	**Netrecut**	 

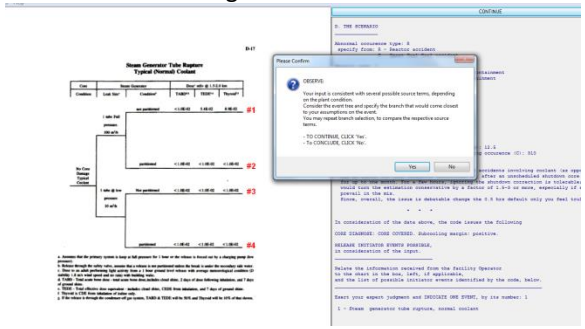
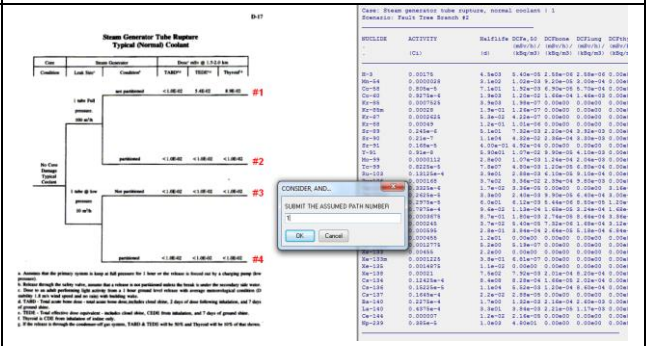
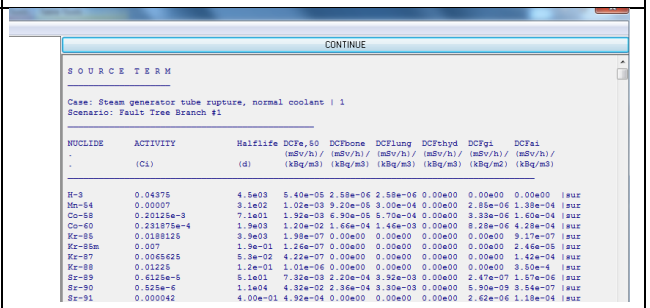
12.			**Selectare modalitate de introducere date meteo – Simulare date meteo**	**Scazut**	**Trecut**	
13.			**Simulare date meteo – Introducerea unei locatii pentru stabilirea directia vantului**	**Scazut**	**Trecut**	

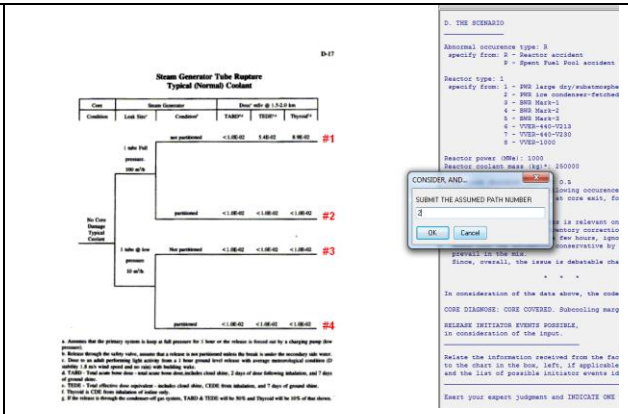
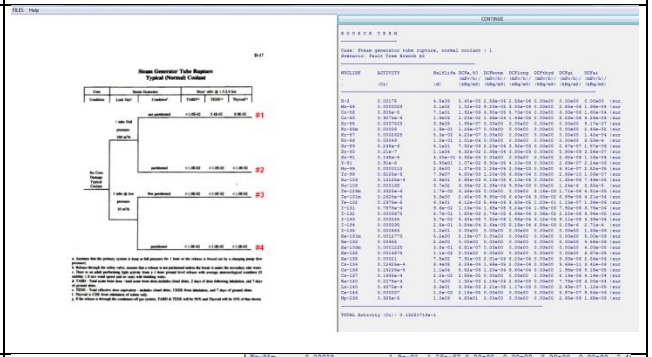
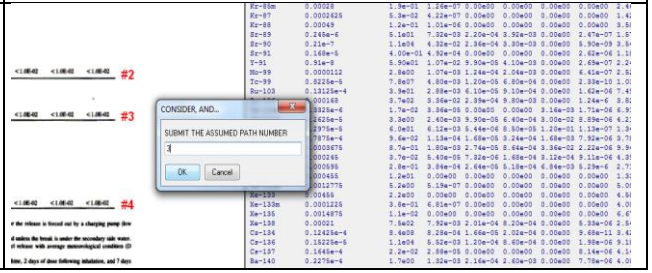
14.			**Introducere parametri - Simulare date meteo**	**Scazut**	**Trecut**	   

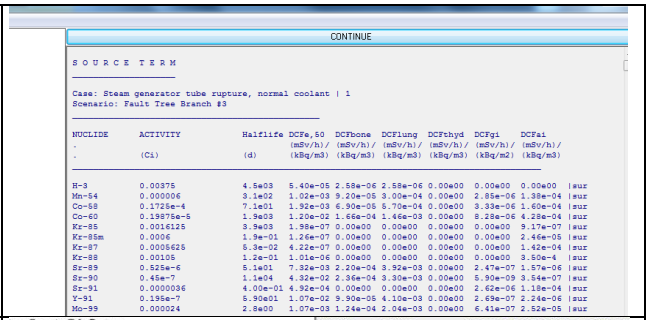
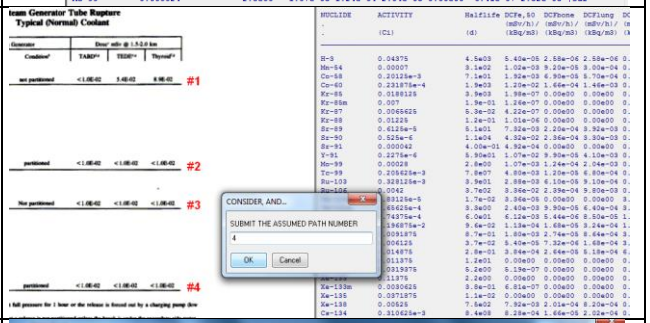
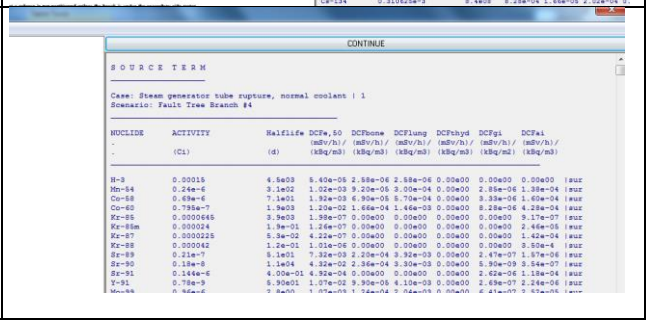
15.			**Aprobare parametri - Simulare date meteo**	**Scazut**	**Trecut**	
16.			**Afisare informatii date meteo colectate**	**Scazut**	**Trecut**	
17.			**Accesare functionalitate generare termen sursa pe baza tipului de reactor al centralei nucleare**	**Scazut**	**Trecut**	

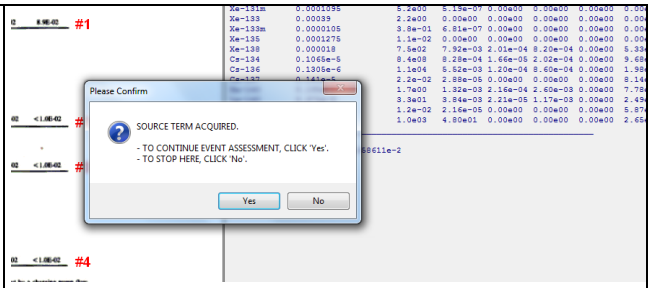
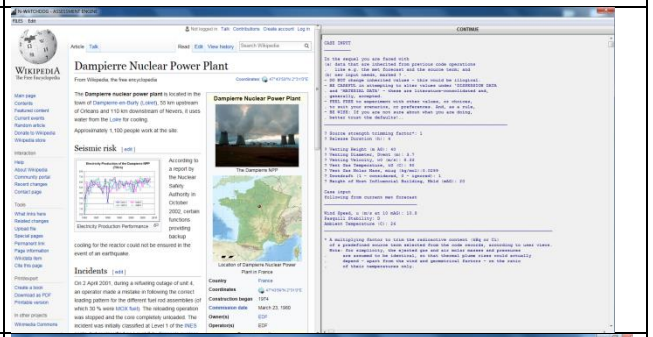
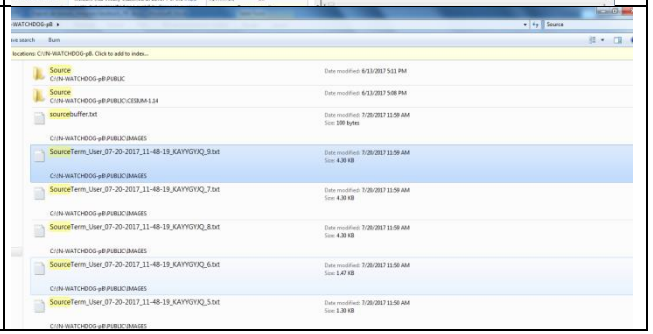
18.			**Afisare date de input termen sursa in fereastra informativa**	**Scazut**	**Trecut**	
19.		**N-Watchdog pB**	**Afisarea datelor de input pentru "Aerosol release reduction factors" si "Escape fraction". Se vor prelua valorile setate implicit.**	**Scazut**	**Trecut**	
20.			**Setarea tipului de accident "R" – reactor accident**	**Scazut**	**Trecut**	

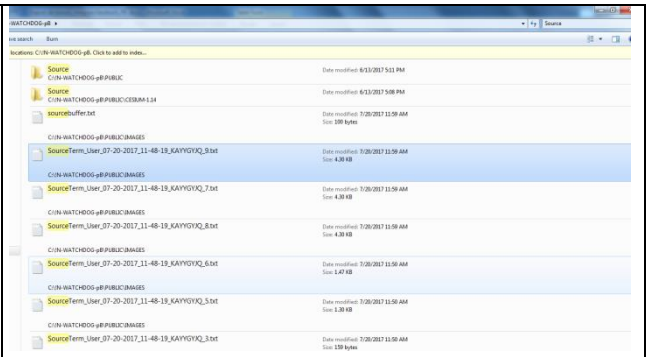
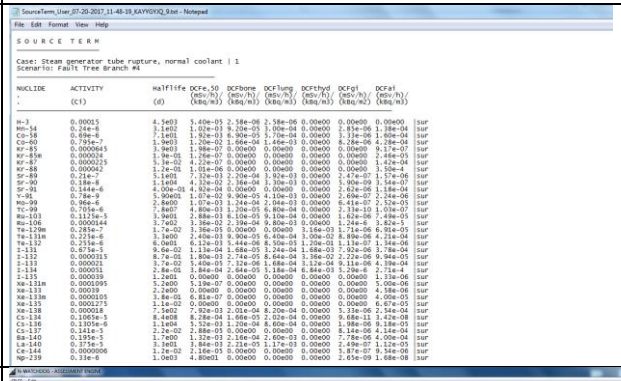
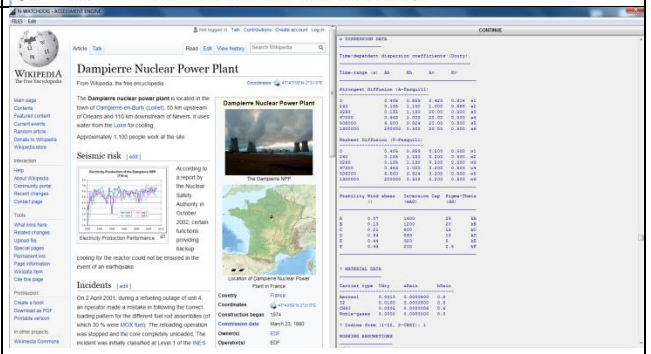
21.			**Setarea tipului de reactor. Pastrare valoare implicita “1”**	**Scazut**	**Trecut**	CONTINUE D. THE SCENARIO Abnormal occurence type: R specify from: R - Reactor accident P - Spent Fuel Pool accident Reactor type: 1 specify from: 1 - PWR large dry/subatmospheric containment 2 - PWR ice condenser-fetched containment 3 - BWR Mark-1 4 - BWR Mark-2 5 - BWR Mark-3 6 - VVER-440-V213 7 - VVER-440-V230 8 - VVER-1000
22.			**Setare caracteristici Putere reactor, masa de racire reactor, timp de incetare a emisiei, presiune sistem si temperatura de racier la iesire. Se pastreaza valorile implicite**	**Scazut**	**Trecut**	Reactor power (MWe): 1000 Reactor coolant mass (kg)*: 250000 Time since shutdown (hrs)**: 0.5 Primary system pressure, following occurence (MPa): 12.5 Primary coolant temperature at core exit, following occurence (C): 310 * In the sequel, coolant mass is relevant only in accidents involving coolant (as opposed to core) inventor ** May be useful for core inventory corrections if, after an unscheduled shutdown core integrity is however for up to one month. For a few hours, ignoring the shutdown correction is tolerable; otherwise the neglec would turn the estimation conservative by a factor of 1.5-3 or more, especially if short-lived isotopes prevail in the mix. Since, overall, the issue is debatable change the 0.5 hrs default only you feel truly compelled to.
23.			**Afisare Diagnostic: Core diagnose: Core Covered.** **Subcooling margin: positive**	**Scazut**	**Trecut**	* * * In consideration of the data above, the code issues the following CORE DIAGNOSE: CORE COVERED. Subcooling margin: positive.
24.			**Functionalitate de indicare eveniment. Pastrare valoare implicita “1”**	**Scazut**	**Trecut**	RELEASE INITIATOR EVENTS POSSIBLE, in consideration of the input. Relate the information received from the facility Operator to the chart in the box, left, if applicable, and the list of possible initiator events identified by the code, below. Exert your expert judgment and INDICATE ONE EVENT, by its number: 1 1 - Steam generator tube rupture, normal coolant

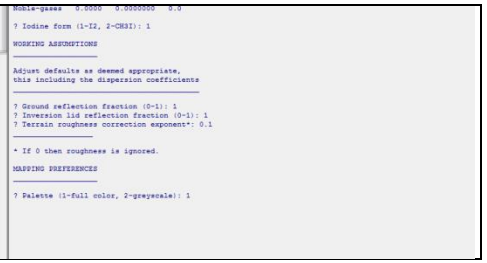
25.			**Afisare mesaj de avertizare privind selectia “Steam Generator Tube Rupture” . Au fost depistate mai multe termene sursa functie de conditia centralei nucleare. Se va lua in considerare lantul de evenimente si se va selecta numarul specific ramurei de eveniment.**	**Scazut**	**Trecut**	Ar fi de utilizat o imagine cu o rezolutie mai buna. 
26.			**Functionalitate de introducere de la tastatura a numarului corespunzator cazului rulat: “1”**	**Scazut**	**Trecut**	
27.			**Afisare rezultate date input pentru setarile efectuate: Caz, Scenariu, Activitate totala radionuclizi, corespunzator cazului rulat: “1”**			

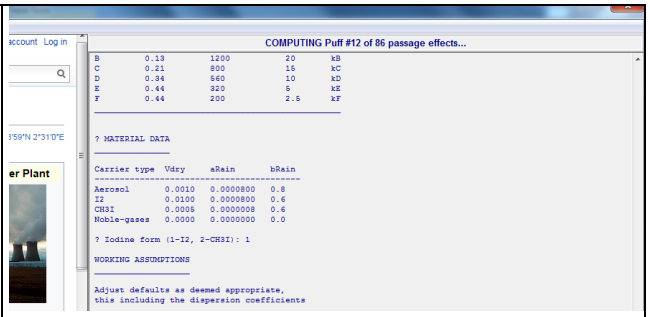
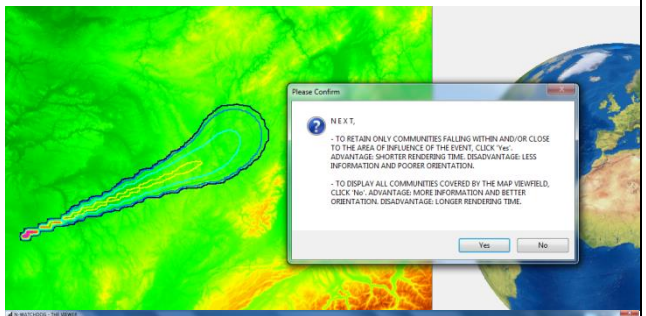
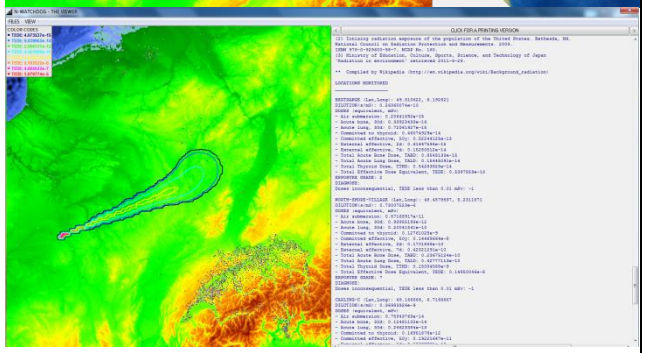
28.			**Functionalitate de introducere de la tastatura a numarului corespunzator cazului rulat: “2”**	**Scazut**	**Trecut**	
29.			**Afisare rezultate date input pentru setarile efectuate: Caz, Scenariu, Activitate totala radionuclizi, corespunzator cazului rulat: “2”**	**Scazut**	**Trecut**	
30.			**Functionalitate de introducere de la tastatura a numarului corespunzator cazului rulat: “3”**	**Scazut**	**Trecut**	

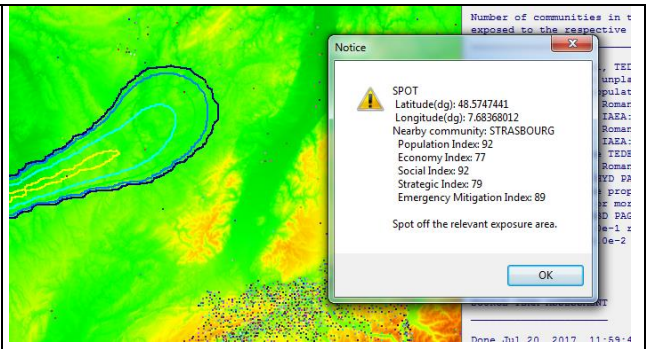
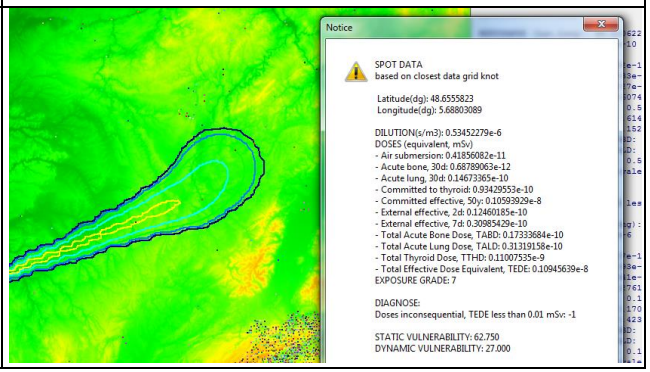
31.			**Afisare rezultate date input pentru setarile efectuate: Caz, Scenariu, Activitate totala radionuclizi, corespunzator cazului rulat: “3”**	**Scazut**	**Trecut**	
32.			**Functionalitate de introducere de la tastatura a numarului corespunzator cazului rulat: “4”**	**Scazut**	**Trecut**	
33.			**Afisare rezultate date input pentru setarile efectuate: Caz, Scenariu, Activitate totala radionuclizi, corespunzator cazului rulat: “4”**	**Scazut**	**Trecut**	

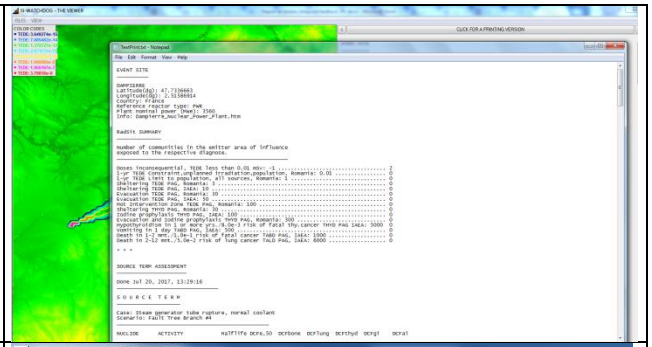
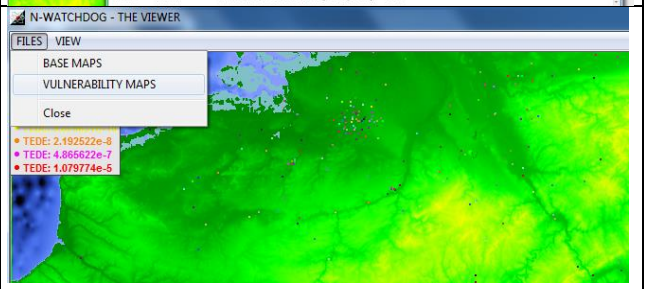
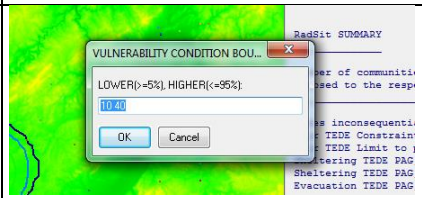
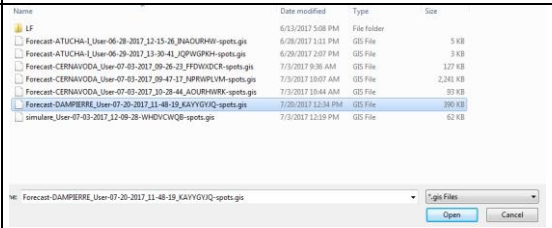
34.			**Generarea unui termen sursa pe baza specificatiilor operatorului despre central nucleara**	**Scazut**	**Trecut**	
35.			**Afisarea rezultatului termenului sursa generat**	**Scazut**	**Trecut**	
36.			**Salvarea termenului sursa in locatia nomenclatoarelor de termeni sursa : "SourceTerm_User_07-20-2017_11-48-19_KAYYGYJQ_9"**	**Scazut**	**Trecut**	

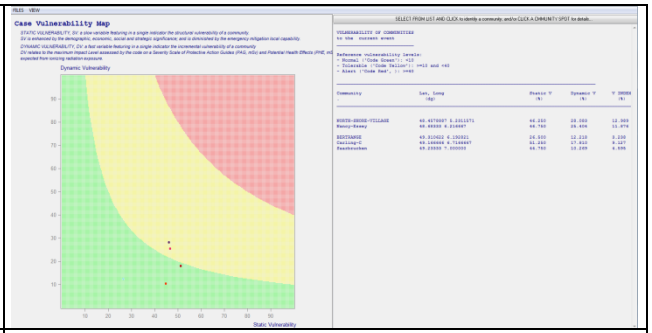
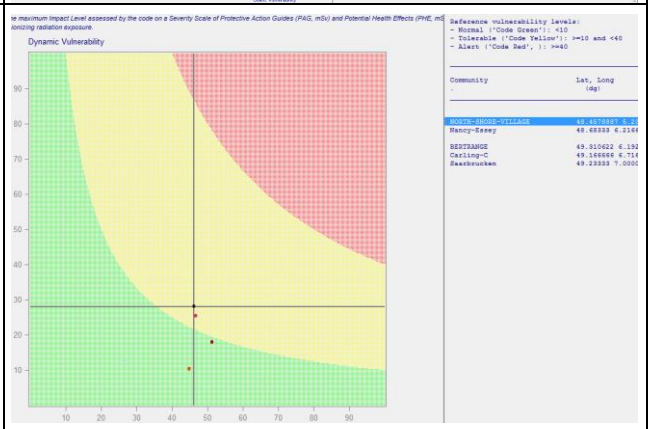
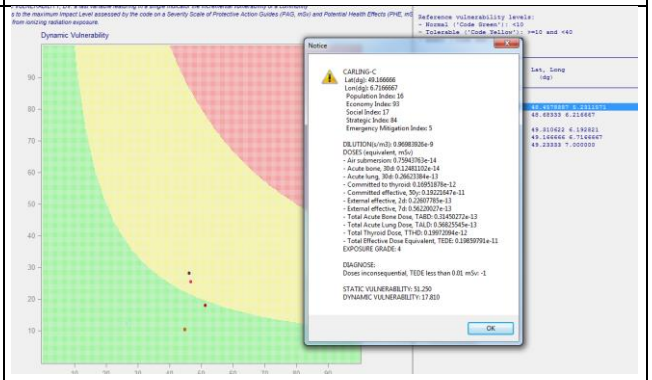
37.			**Accesare meniu de selectare a termenului sursa si navigare in Windows Explorer pentru identificarea termenului sursa creat.**	**Scazut**	**Trecut**	
38.			**Afisarea continutului termenului sursa selectat.**	**Scazut**	**Trecut**	
39.			**Afisarea rezultatelor obtinute pentru calculul dispersiei datelor si a materialului datelor**	**Scazut**	**Trecut**	

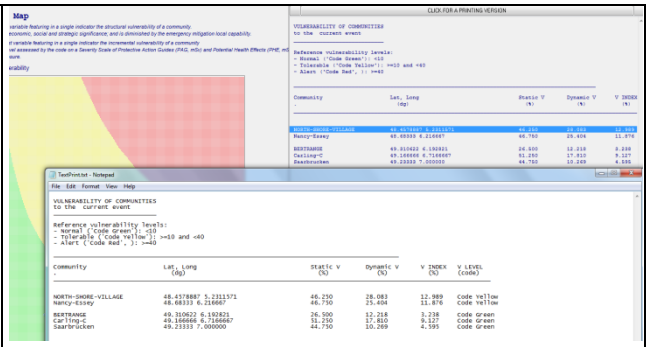
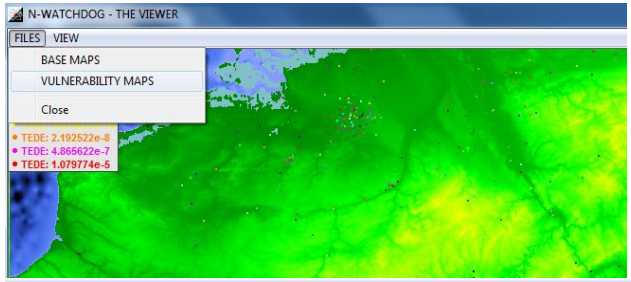
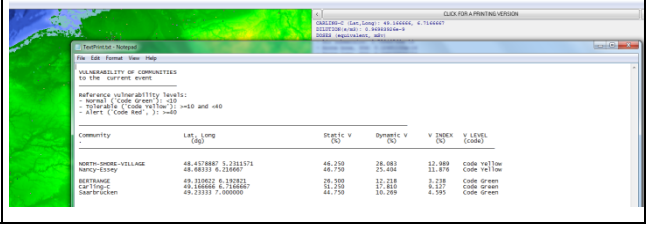
40.			**Completare valori "Working assumptions". Pastrarea valorilor implicite din aplicatiei.**	**Scazut**	**Trecut**	

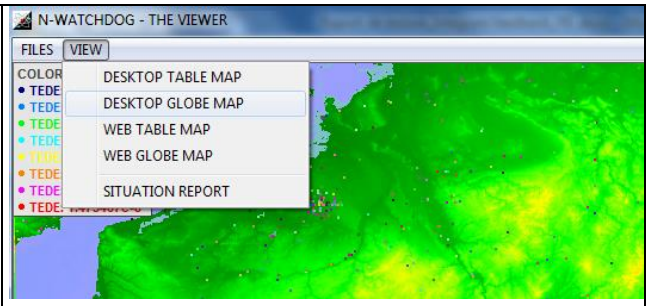
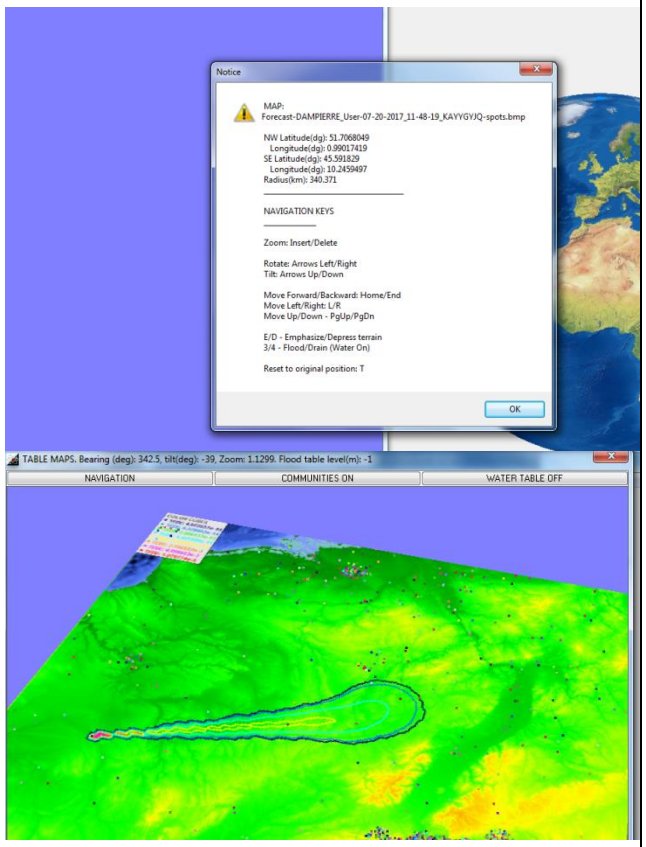
41.			**Generare si afisare puff-uri pe baza datelor de input completate.** **Afisare harta de fundal DEM, traiectoria norului radioactiv si a comunitatilor afectate de nor precum si cele aflate in vecinateta lui. Afisarea unui sumar al raportului de situatie radioactive pe baza datelor de input prelucrate.**	**Scazut**	**Trecut**	  
42.			**Selectare comunitatea in afara ariei de acoperire al norului radioactiv**	**Scazut**	**Trecut**	-

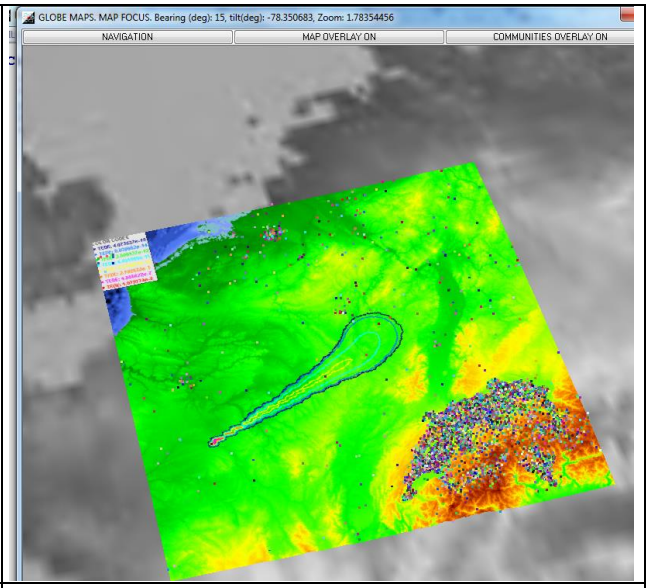
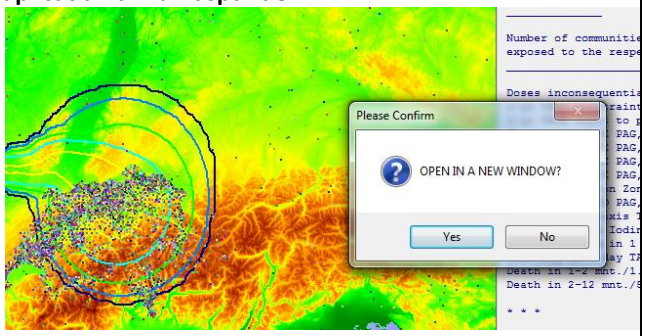
43.			**Afisare pop-up informativ despre comunitate cu mesajul ca punctul de interes se afla in afara zonei expuse.**	**Scazut**	**Trecut**	
44.			**Selectare comunitate in aria de acoperire al norului radioactiv**	**Scazut**	**Trecut**	**-**
45.			**Afisare pop-up informativ despre comunitate cu informatii despre gradul de expunere**	**Scazut**	**Trecut**	

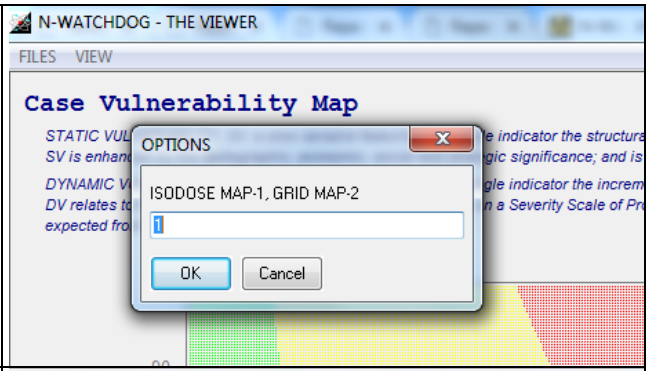
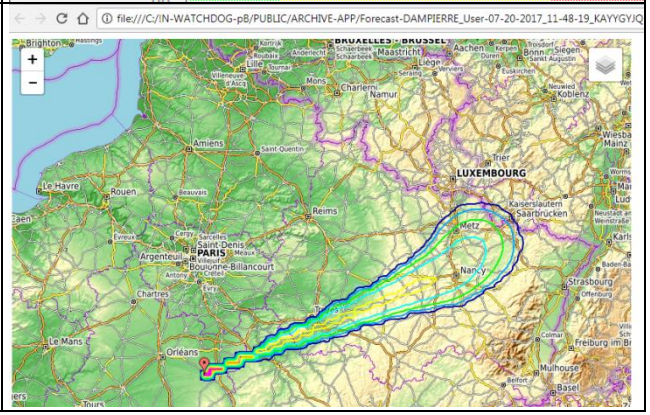
46.			**Afisare Raport in forma pentru Printare**	**Scazut**	**Trecut**	
47.			**Accesare meniu matrice de vulnerabilitate**	**Scazut**	**Trecut**	
48.			**Setarea valorilor pentru limitele Plow si PHigh. Se pastreaza valorile setate implicit.**	**Scazut**	**Trecut**	
49.			**Accesare arhiva meteo pentru selectarea prognezei aferenta cazului rulat.**	**Scazut**	**Trecut**	

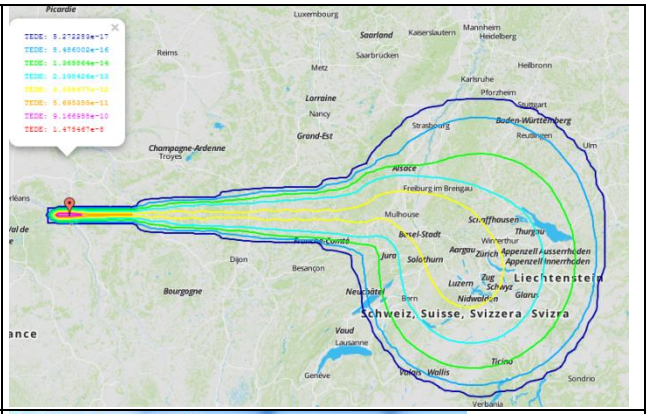
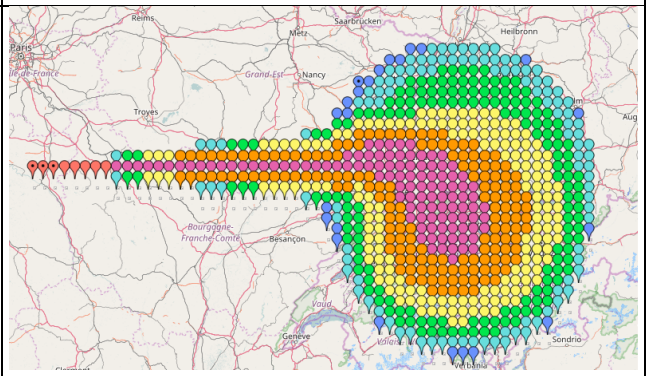
50.			**Generare matrice de vulnerabilitate si afisare nivelurile de vulnerabilitate ale comunitatilor din evenimentul curent**	**Scazut**	**Trecut**	
51.			**Selectare comunitate din lista si evidentierea ei pe matrice**	**Scazut**	**Trecut**	
52.			**Selectare comunitate din matricea de vulnerabilitate si afisarea unei ferestre pop-up cu informatii despre acestea: indecsi, dozele, dilutia si diagnosticul.**	**Scazut**	**Trecut**	

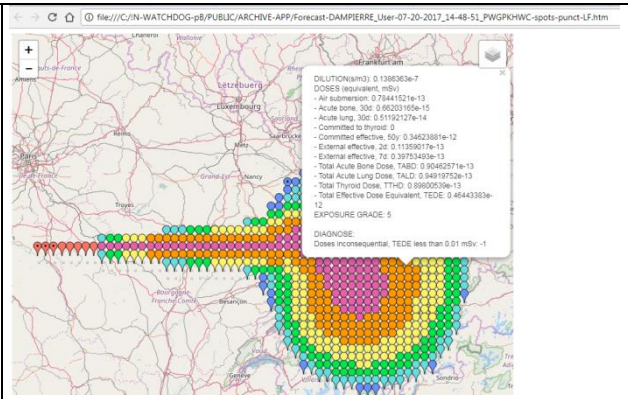
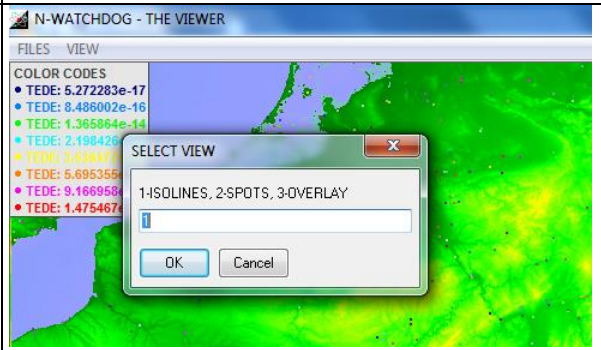
53.			**Export RAPORT asupra vulnerabilitatea comunitatilor**	**Scazut**	**Trecut**	 **La revenirea in modul BaseMap si la initierea unui export pentru print a intregului raport afisat se preia pentru print informatiile asociate matricei de vulnerabilitate.**  

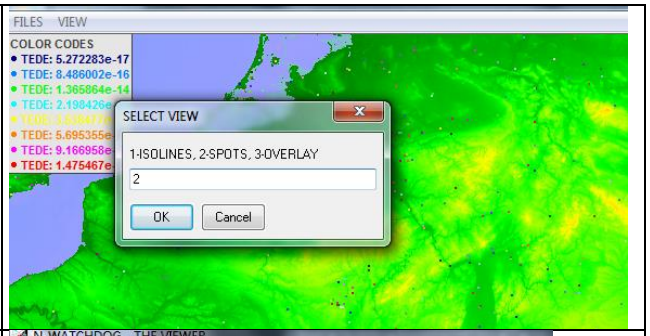
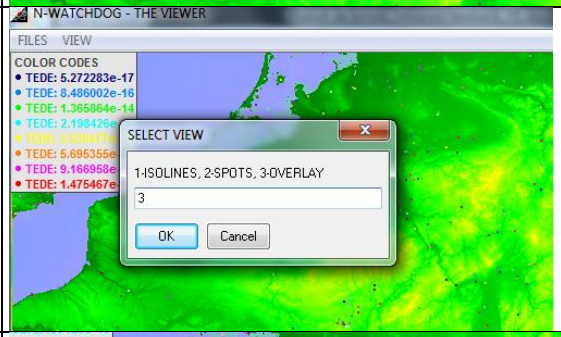
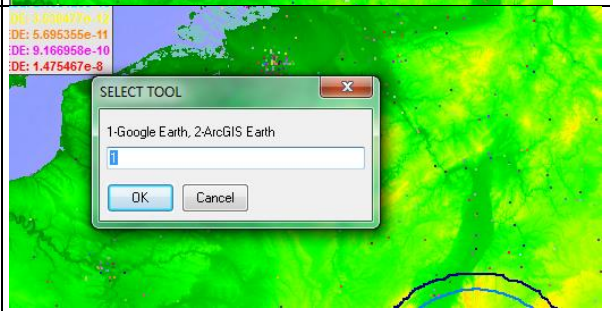
54.			**Apelare meniu View → View as Desktop Table map**	**Ridicat**	**Trecut**	 

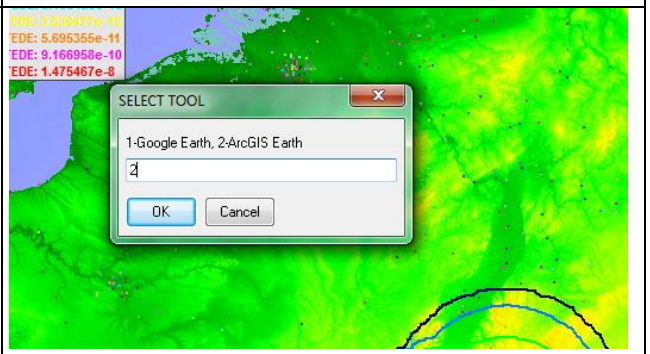
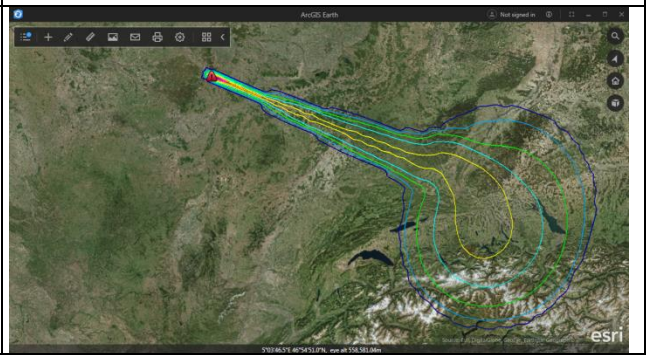
55.			**Apelare meniu View → View as Desktop Globe map**	**Ridicat**	**Trecut**	
56.			**Apelare meniu View → View as WEB Table map**	**Ridicat**	**Trecut**	**Mesaj de avertizare asupra afisarii hartii alese in cadrul unei ferestre separate. In cazul alegerii optiunii "NO" aplicatia nu mai raspunde.** 

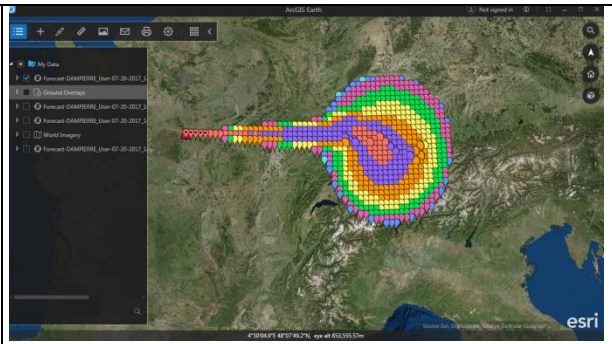
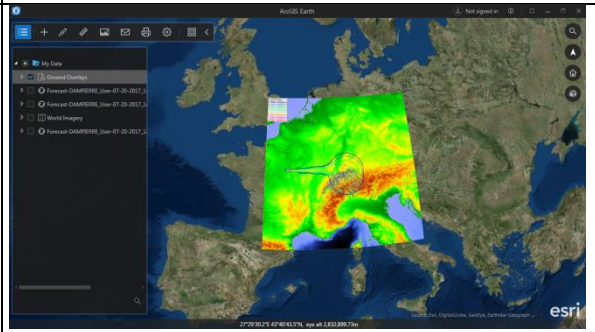
57.			**Apelare afisare harta Isodose, “1”.**	**Scazut**	**Trecut**	
58.			**Afisare harta Isodose. Efectuare functii Zoom in/Zoom out, schimbare harti de fundal.**	**Scazut**	**Trecut**	

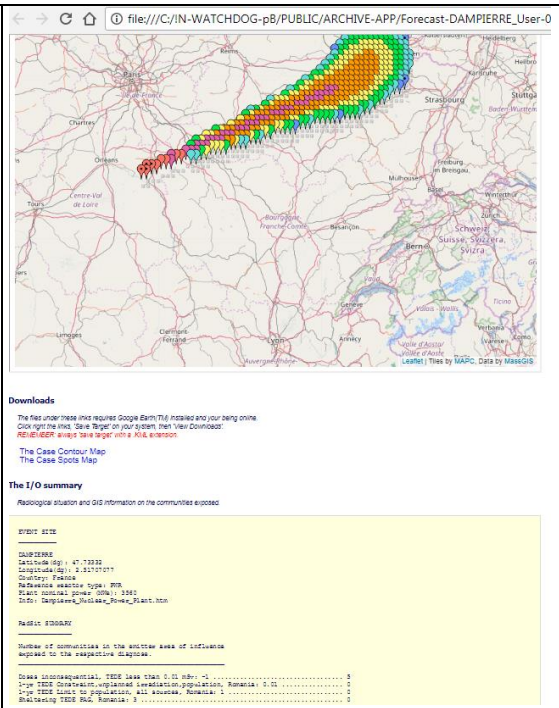
59.			**Afisare pop-up cu informatii despre valorile izoliniilor**	**Scazut**	**Trecut**	
60.			**Apelare afisare harta “Grid”, “2”.**	**Scazut**	**Trecut**	
61.			**Afisare harta “Grid”. Efectuare functii Zoom IN/Zoom out/ Pan, schimbare harti de fundal.**	**Scazut**	**Trecut**	

62.			**Selectare grid din harta si afisare pop-up cu informatii despre Dilutie, dose, grad de expunere si diagnostic.**	**Scazut**	**Trecut**	
63.			**Apelare meniu View → View as WEB Globe map**	**Ridicat**	**Trecut**	**-**
64.			**Apelare afisare harta Isodose, "1".**	**Ridicat**	**Trecut**	

65.			**Apelare afisare harta Puncte, “2”.**	**Ridicat**	**Trecut**	
66.			**Apelare afisare harta tip “Overlay - 3”.**	**Ridicat**	**Trecut**	
67.			**Selectare mediu de afisare pentru fisier .kml rezultat “1- Google Earth”**	**Ridicat**	**Trecut**	

68.			**Afisare harta Isodode in Google Earth**	**Ridicat**	**Trecut**	**Pentru toate cazurile(izolinii, puncte, overaly) nu se afiseaza harta ci se deschide fisierul generat .kml.**
69.			**Selectare mediu de afisare pentru fisier .kml rezultat "2- ArcGISEarth"**	**Ridicat**	**Trecut**	
70.			**Afisare harta Isodose in ArcGISEarth**	**Ridicat**	**Trecut**	

71.			**Afisare harta Puncte in ArcGISEarth**	**Ridicat**	**Trecut**	
72.			**Afisare harta optiune 3- Overlay in ArcGISEarth**	**Ridicat**	**Trecut**	

73.			**Accesare meniu View →Situation Report. Afisarea si consultarea raportului html**	**Scazut**	**Trecut**	

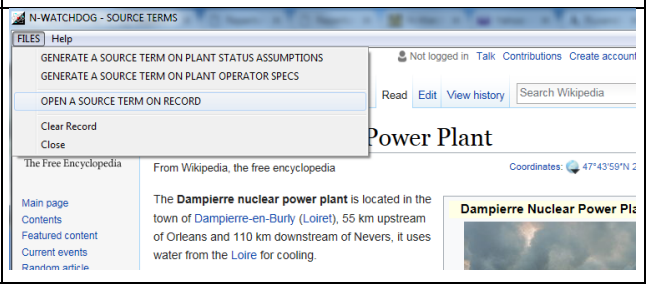
*Grad severitate: Scazut, Mediu, Ridicat
**Stare: Trecut/Netrecut;

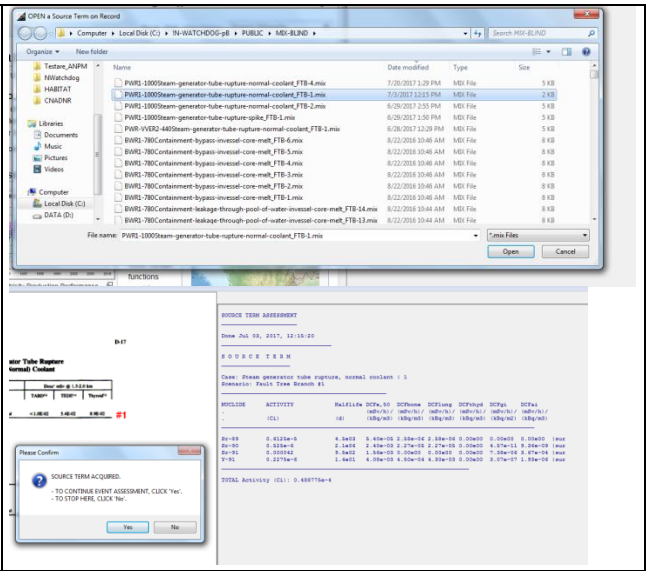
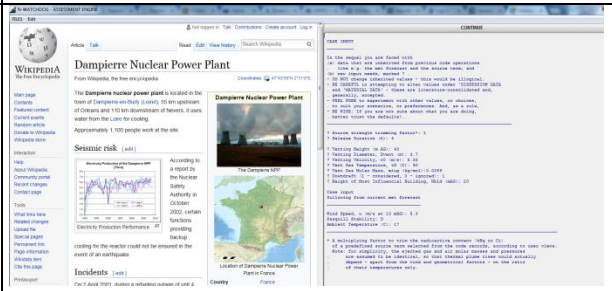
SIVECO Project Progress	RAPORT DE TESTARE

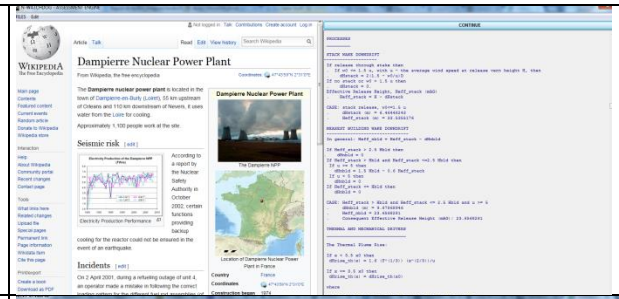
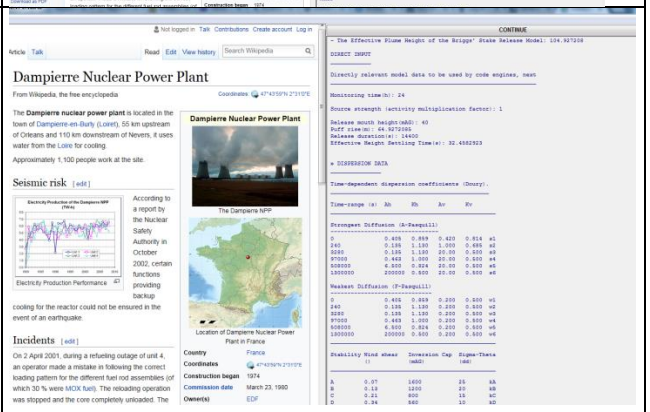
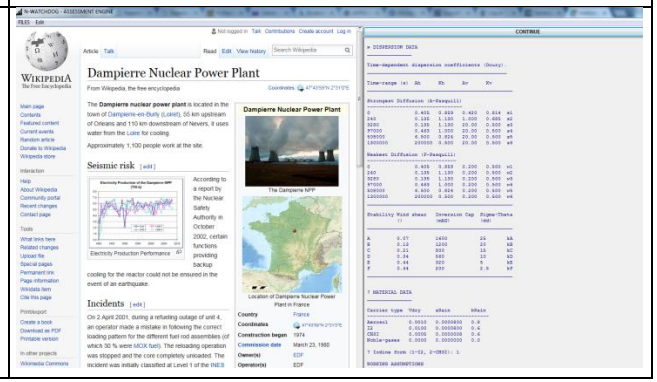
Cod: 2 **Proiect : N-Watchdog**

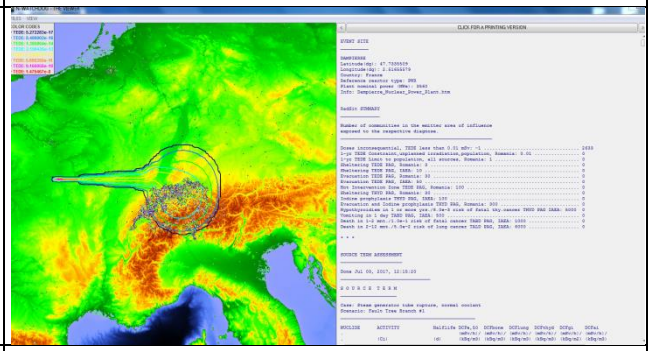
Descriere :Rulare modul My Plant, cazul **"Single Analytic Assessment", optiunea Open a source term on record**

Nr.	Modul aplicatiei	Versiune aplicatie	Functionalitate	Grad severitate *	Stare**	Comentarii
1.	My Plant	N-Watchdog pB	Accesare modul My Plant	Scazut	Trecut	-
2.			Afisare si navigare in nomenclatorul de centrale nucleare si selectare sursa radioactiva	Scazut	Trecut	-
3.			Afisare pagina informativa Wikipedia	Scazut	Trecut	-
4.			Accesare functie de localizare pe harta a sursei de emisie radioactiva pe harta	Scazut	Trecut	-

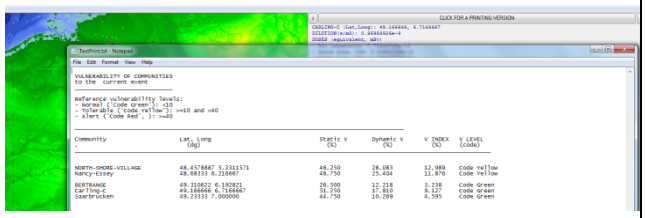
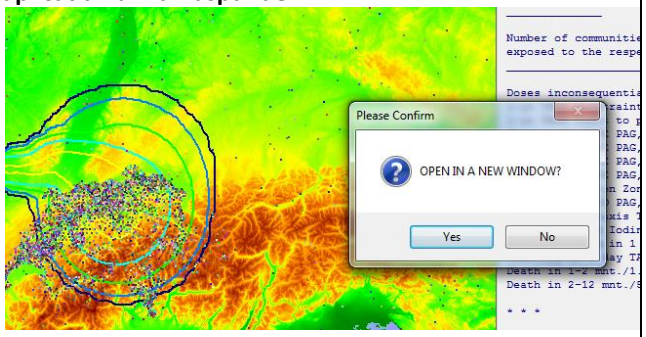
5.			**Afisare harta de fundal**	**Scazut**	**Trecut**	**-**
6.			**Navigare in harta si selectarea sursei si memorarea coordonatelor geografice (pan/zoom/selectare)**	**Scazut**	**Trecut**	**-**
7.			**Afisarea coordonatelor geografice a selectiei**	**Scazut**	**Trecut**	**-**
8.			**Afisare tip de eveniment si selectare "Single Analytic Assessment"**	**Scazut**	**Trecut**	**-**
9.			**Colectare date meteo in timp real pentru intervalul de 24 ore**	**Scazut**	**Trecut**	**-**
10.			**Afisare informatii date meteo colectate**	**Scazut**	**Trecut**	**-**
11.			**Accesare meniu pentru deschiderea nomenclatorului de termeni sursa. Selectarea termenului sursa corespunzator tipului de reactor a centralei monitorizate.**	**Scazut**	**Trecut**	

12.			**Afisare date de input termen sursa in fereastra informativa.**	**Scazut**	**Trecut**	
13.			**Completare date de input "Case input". Se pastreaza valorile setate implicit in aplicatie.**	**Scazut**	**Trecut**	

14.			**Afisare rezultate si actiuni pentru etapa de procesare.**	**Scazut**	**Trecut**	
15.			**Afisare si completare informatii "Direct Input". Se pastreaza valorile setate implicit in aplicatie.**	**Scazut**	**Trecut**	
16.			**Afisarea rezultatelor obtinute pentru calculul dispersiei datelor si a materialului datelor**	**Scazut**	**Trecut**	

17.			**Completare valori "Working assumptions". Pastrarea valorilor implicite din aplicatiei.**	**Scazut**	**Trecut**	
18.			**Generare si afisare puff-uri pe baza datelor de input completate.** **Afisare harta de fundal DEM, traiectoria norului radioactiv si a comunitatilor afectate de nor precum si cele aflate in vecinateta lui. Afisarea unui sumar al raportului de situatie radioactiva pe baza datelor de input prelucrate.**			
19.			**Selectare comunitatea in afara ariei de acoperire al norului radioactiv**	**Scazut**	**Trecut**	**-**
20.			**Afisare pop-up informativ despre comunitate cu mesajul ca punctul de interes se afla in afara zonei expuse.**	**Scazut**	**Trecut**	**-**
21.			**Selectare comunitate in aria de acoperire al norului radioactiv**	**Scazut**	**Trecut**	**-**

22.			**Afisare pop-up informativ despre comunitate cu informatii despre gradul de expunere**	**Scazut**	**Trecut**	**-**
23.			**Afisare Raport in forma pentru Printare**	**Scazut**	**Trecut**	**-**
24.			**Accesare meniu matrice de vulnerabilitate**	**Scazut**	**Trecut**	**-**
25.			**Setarea valorilor pentru limitele Plow si PHigh. Se pastreaza valorile setate implicit.**	**Scazut**	**Trecut**	**-**
26.			**Accesare arhiva meteo pentru selectarea prognezei aferenta cazului rulat.**	**Scazut**	**Trecut**	**-**
27.			**Generare matrice de vulnerabilitate si afisare nivelurile de vulnerabilitate ale comunitatilor din evenimentul curent**	**Scazut**	**Trecut**	**-**
28.			**Selectare comunitate din lista si evidentierea ei pe matrice**	**Scazut**	**Trecut**	**-**
29.			**Selectare comunitate din matricea de vulnerabilitate si afisarea unei ferestre pop-up cu informatii despre acestea: indecsi, dozele,**	**Scazut**	**Trecut**	**-**

30.			**Export RAPORT asupra vulnerabilitatea comunitatilor**	**Scazut**	**Trecut**	**La revenirea in modul BaseMap si la initierea unui export pentru print a intregului raport afisat se preia pentru print informatiile asociate matricei de vulnerabilitate.** 
31.			**Apelare meniu View → View as Desktop Table map**	**Ridicat**	**Trecut**	**-**
32.			**Apelare meniu View → View as Desktop Globe map**	**Ridicat**	**Trecut**	**-**
33.			**Apelare meniu View → View as WEB Table map**	**Ridicat**	**Trecut**	**Mesaj de avertizare asupra afisarii hartii alese in cadrul unei ferestre separate. In cazul alegerii optiunii "NO" aplicatia nu mai raspunde.** 
34.			**Apelare afisare harta Isodose, "1".**	**Scazut**	**Trecut**	**-**
35.			**Afisare harta Isodose. Efectuare functii Zoom in/Zoom out, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**

36.			**Afisare pop-up cu informatii despre valorile izoliniilor**	**Scazut**	**Trecut**	**-**
37.			**Apelare afisare harta "Grid", "2".**	**Scazut**	**Trecut**	**-**
38.			**Afisare harta "Grid". Efectuare functii Zoom IN/Zoom out/ Pan, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**
39.			**Selectare grid din harta si afisare pop-up cu informatii despre Dilutie, dose, grad de expunere si diagnostic.**	**Scazut**	**Trecut**	**-**
40.			**Apelare meniu View → View as WEB Globe map**	**Ridicat**	**Trecut**	**-**
41.			**Apelare afisare harta Isodose, "1".**	**Ridicat**	**Trecut**	**-**
42.			**Apelare afisare harta Puncte, "2".**	**Ridicat**	**Trecut**	**-**
43.			**Apelare afisare harta tip "Overlay - 3".**	**Ridicat**	**Trecut**	**-**
44.			**Selectare mediu de afisare pentru fisier .kml rezultat "1- Google Earth"**	**Ridicat**	**Trecut**	**-**

45.			**Afisare harta Isodode in Google Earth**	**Ridicat**	**Trecut**	**Pentru toate cazurile(izolinii, puncte, overaly) nu se afiseaza harta ci se deschide fisierul generat .kml.**
46.			**Selectare mediu de afisare pentru fisier .kml rezultat "2- ArcGISEarth"**	**Ridicat**	**Trecut**	**-**
47.			**Afisare harta Isodose in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
48.			**Afisare harta Puncte in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
49.			**Afisare harta optiune 3- Overlay in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
50.			**Accesare meniu View →Situation Report. Afisarea si consultarea raportului html**	**Scazut**	**Trecut**	**-**

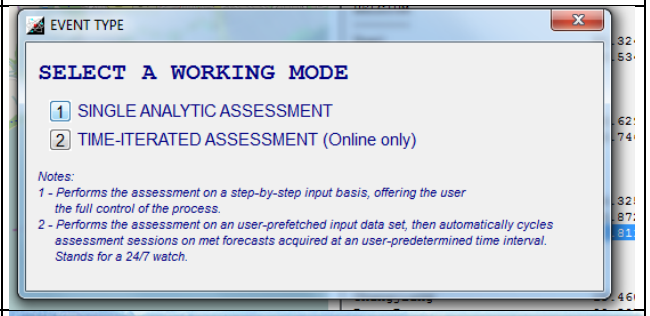
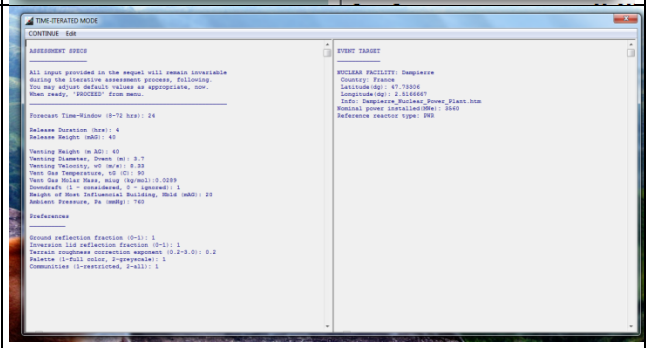
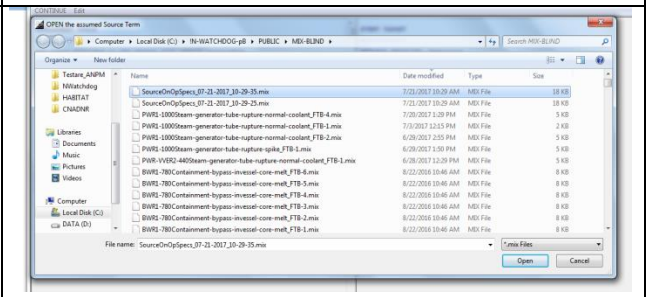
*Grad severitate: Scazut, Mediu, Ridicat
**Stare: Trecut/Netrecut;

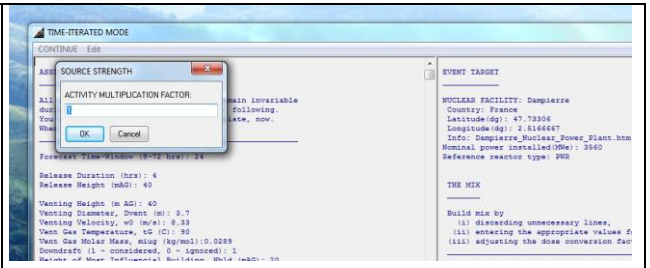
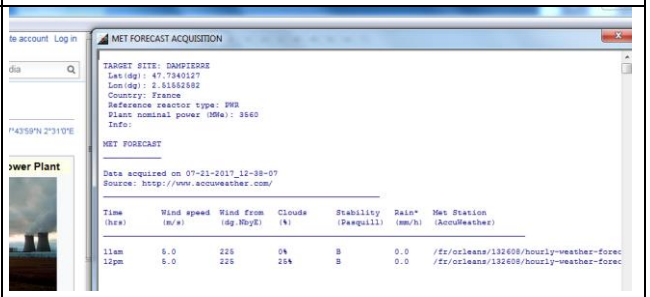
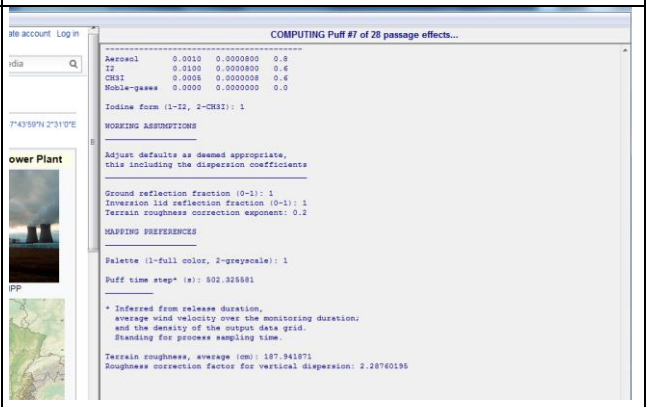
SIVECO Project Progress	RAPORT DE TESTARE

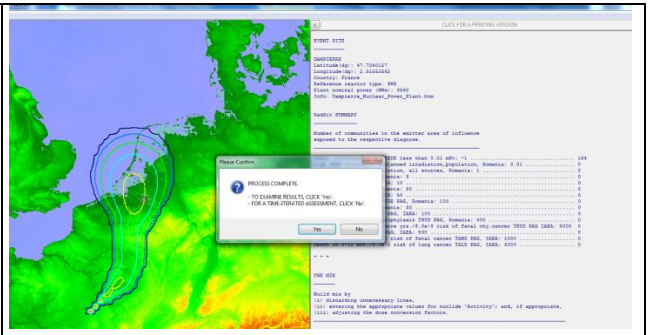
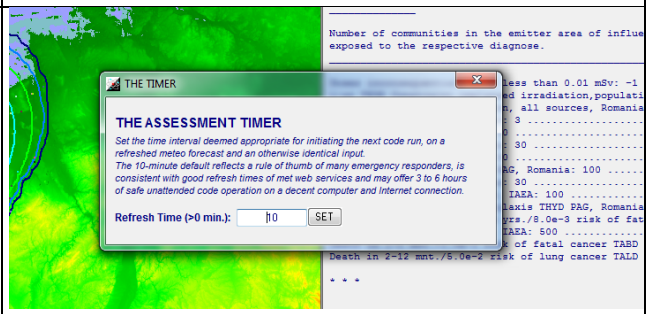
Cod: 3 **Proiect : N-Watchdog**

Descriere :Rulare modul My Plant, cazul **"Time-Iterated Assessment (Online only)", optiunea Generate a source term on plant status assumptions**

Nr.	Modul aplicatiei	Versiune aplicatie	Functionalitate	Grad severitate *	Stare**	Comentarii
1	My Plant	N-Watchdog pB	Accesare modul My Plant	Scazut	Trecut	-
2			Afisare si navigare in nomenclatorul de centrale nucleare si selectare sursa radioactiva	Scazut	Trecut	-
3			Afisare pagina informativa Wikipedia	Scazut	Trecut	-
4			Accesare functie de localizare pe harta a sursei de emisie radioactiva pe harta	Scazut	Trecut	-
5			Afisare harta de fundal Google Maps	Scazut	Trecut	-
6			Navigare in harta si selectarea sursei si memorarea coordonatelor geografice (pan/zoom/selectare)	Scazut	Trecut	-

7			Afisarea coordonatelor geografice a selectiei	Scazut	Trecut	-
8			Afisare tip de eveniment si selectare "Time-Iterated Assessment (Online only)"	Scazut	Trecut	
9			Afisare fereastra Time-Iteraded Mode pentru setarea datelor de input "Assessment Specs". Se pastreaza valorile setate implicit.	Scazut	Trecut	
10			Selectare termen sursa din folder-ul "Mix-Blind"	Scazut	Trecut	

11			**Completare valoare factor de multiplicare al activitatii. Se pastreaza valoarea implicita 1.**	**Scazut**	**Trecut**	
12			**Colectare date meteo pe baza datelor de input**	**Scazut**	**Trecut**	
13	**My Plant**	**N-Watchdog pB**	**Afisarea datelor de input participante la determinare evenimentului**	**Scazut**	**Trecut**	

14			Generarea traiectoriei nor radioactiv. Selectare optiune analiza iterativa	Scazut	Trecut	
15			Setare interval analiza iterativa	Scazut	Trecut	
16			Selectare comunitatea in afara ariei de acoperire al norului radioactiv	Scazut	Trecut	-
17			Afisare pop-up informativ despre comunitate cu mesajul ca punctul de interes se afla in afara zonei expuse.	Scazut	Trecut	-
18			Selectare comunitate in aria de acoperire al norului radioactiv	Scazut	Trecut	-

19			**Afisare pop-up informativ despre comunitate cu informatii despre gradul de expunere**	**Scazut**	**Trecut**	**-**
20			**Afisare Raport in forma pentru Printare**	**Scazut**	**Trecut**	**-**
21			**Accesare meniu matrice de vulnerabilitate**	**Scazut**	**Trecut**	**-**
22			**Setarea valorilor pentru limitele Plow si PHigh. Se pastreaza valorile setate implicit.**	**Scazut**	**Trecut**	**-**
23			**Accesare arhiva meteo pentru selectarea prognezei aferenta cazului rulat.**	**Scazut**	**Trecut**	**-**
24			**Generare matrice de vulnerabilitate si afisare nivelurile de vulnerabilitate ale comunitatilor**	**Scazut**	**Trecut**	**-**
25			**Selectare comunitate din lista si evidentierea ei pe matrice**	**Scazut**	**Trecut**	**-**
26			**Selectare comunitate din matricea de vulnerabilitate si afisarea unei ferestre pop-up cu informatii despre acestea: indecsi, dozele**	**Scazut**	**Trecut**	**-**
27			**Export RAPORT asupra vulnerabilitatea comunitatilor**	**Scazut**	**Trecut**	**-**
28			**Apelare meniu View → View as Desktop Table map**	**Ridicat**	**Trecut**	**-**

29			**Apelare meniu View → View as Desktop Globe map**	**Ridicat**	**Trecut**	**-**
30			**Apelare meniu View → View as WEB Table map**	**Ridicat**	**Trecut**	**-**
31			**Apelare afisare harta Isodose, "1".**	**Scazut**	**Trecut**	**-**
32			**Afisare harta Isodose. Efectuare functii Zoom in/Zoom out, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**
33			**Afisare pop-up cu informatii despre valorile izoliniilor**	**Scazut**	**Trecut**	**-**
34			**Apelare afisare harta "Grid", "2".**	**Scazut**	**Trecut**	**-**
35			**Afisare harta "Grid". Efectuare functii Zoom IN/Zoom out/ Pan, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**
36			**Selectare grid din harta si afisare pop-up cu informatii despre Dilutie, dose, grad de expunere si**	**Scazut**	**Trecut**	**-**
37			**Apelare meniu View → View as WEB Globe map**	**Ridicat**	**Trecut**	**-**
38			**Apelare afisare harta Isodose, "1".**	**Ridicat**	**Trecut**	**-**
39			**Apelare afisare harta Puncte, "2".**	**Ridicat**	**Trecut**	**-**
40			**Apelare afisare harta tip "Overlay - 3".**	**Ridicat**	**Trecut**	**-**

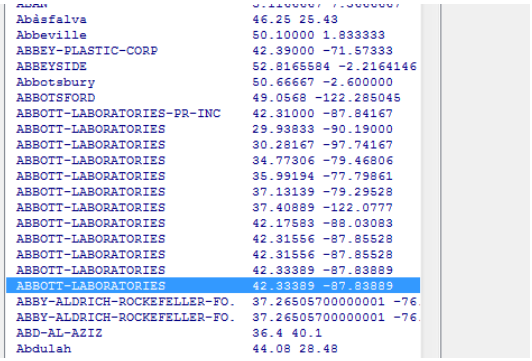
41			**Selectare mediu de afisare pentru fisier .kml rezultat "1- Google Earth"**	**Ridicat**	**Trecut**	**-**
42			**Afisare harta Isodode in Google Earth**	**Ridicat**	**Trecut**	**-**
43			**Selectare mediu de afisare pentru fisier .kml rezultat "2- ArcGISEarth"**	**Ridicat**	**Trecut**	**-**
44			**Afisare harta Isodose in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
45			**Afisare harta Puncte in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
46			**Afisare harta optiune 3- Overlay in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
47			**Accesare meniu View →Situation Report. Afisarea si consultarea raportului html**	**Scazut**	**Trecut**	**-**

*Grad severitate: Scazut, Mediu, Ridicat
**Stare: Trecut/Netrecut;

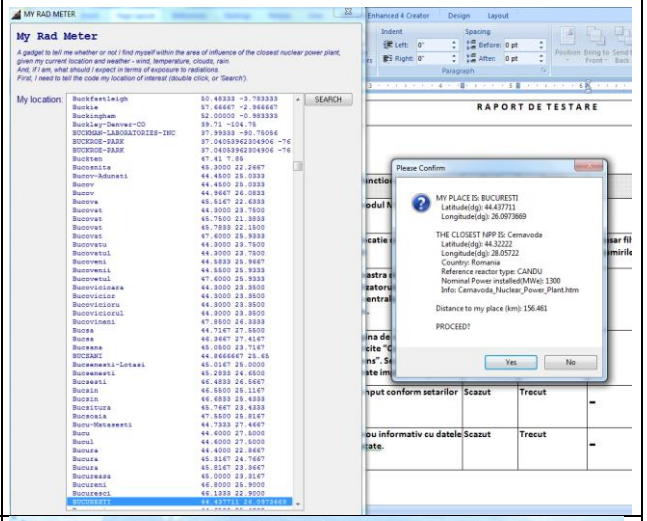
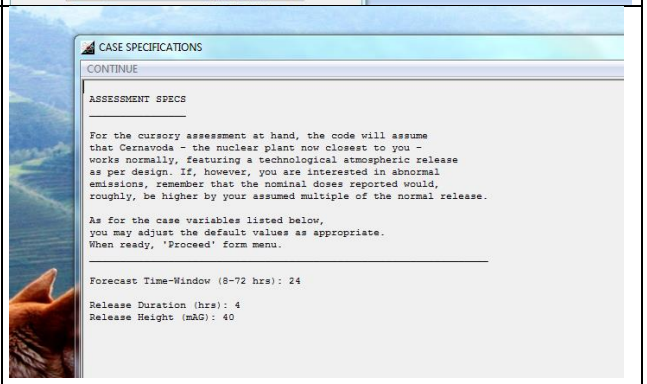
SIVECO Project Progress	RAPORT DE TESTARE

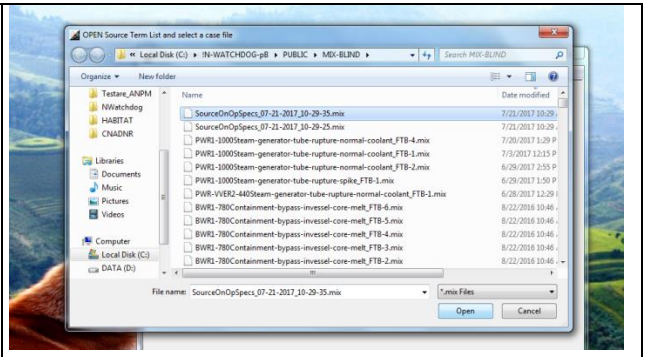
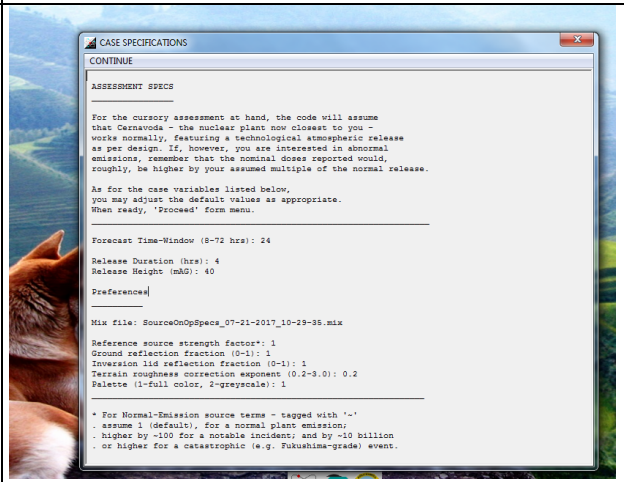
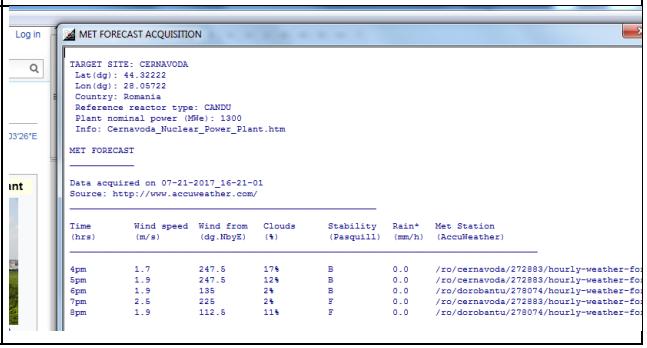
Cod: 4 **Proiect : N-Watchdog**

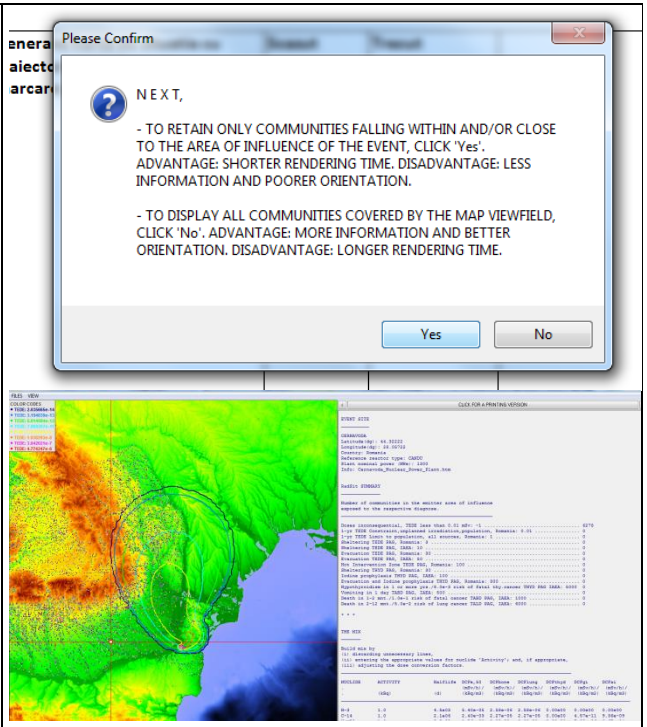
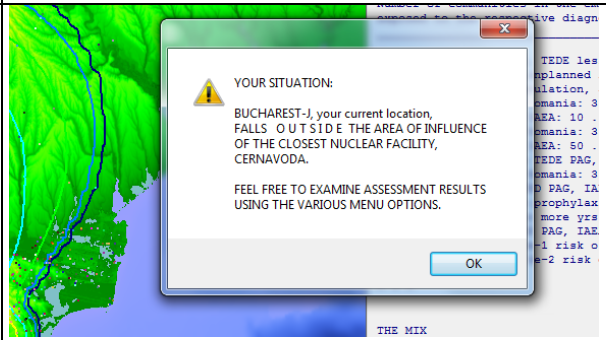
Descriere :Rulare modul My Place

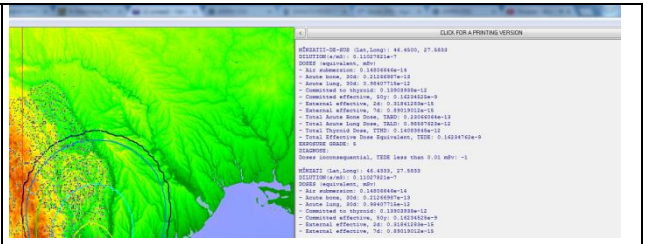
Nr.	Modul aplicatiei	Versiune aplicatie	Functionalitate	Grad severitate *	Stare**	Comentarii
1	My Place	N-Watchdog pB	Accesare modul My Place	Scazut	Trecut	-
2			Selectare locatie utilizator. (Bucharest)	Scazut	Trecut	Necesar filtrare lista locatii, au fost identificate dubluri in denumirile locatiilor. 

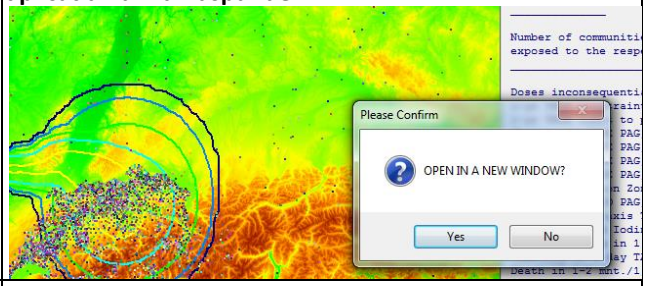
Abásfalva	46.25 25.43
Abbeville	50.10000 1.833333
ABBEY-PLASTIC-CORP	42.39000 -71.57333
ABBEYSIDE	52.8165584 -2.2164146
Abbotsbury	50.66667 -2.600000
ABBOTSFORD	49.0568 -122.285045
ABBOTT-LABORATORIES-PR-INC	42.31000 -87.84167
ABBOTT-LABORATORIES	29.93833 -90.19000
ABBOTT-LABORATORIES	30.28167 -97.74167
ABBOTT-LABORATORIES	34.77306 -79.46806
ABBOTT-LABORATORIES	35.99194 -77.79861
ABBOTT-LABORATORIES	37.13139 -79.29528
ABBOTT-LABORATORIES	37.40889 -122.0777
ABBOTT-LABORATORIES	42.17583 -88.03083
ABBOTT-LABORATORIES	42.31556 -87.85528
ABBOTT-LABORATORIES	42.31556 -87.85528
ABBOTT-LABORATORIES	42.33389 -87.83889
ABBOTT-LABORATORIES	42.33389 -87.83889
ABBY-ALDRICH-ROCKEFELLER-FO.	37.26505700000001 -76.
ABBY-ALDRICH-ROCKEFELLER-FO.	37.26505700000001 -76.
ABD-AL-AZIZ	36.4 40.1
Abdulah	44.08 28.48

3			**Afisare fereastra de informare cu locatia utilizatorului si cea mai apropiata centrala nucleara identificata.**	**Scazut**	**Trecut**	
4			**Afisare pagina de completare valori implicite "Case specifications". Se pastreaza valorile setate implicit in aplicatie.**	**Scazut**	**Trecut**	

5			**Procesare input conform setarilor efectuate.**	**Scazut**	**Trecut**	
6			**Afisare panou informativ cu datele de input setate.**	**Scazut**	**Trecut**	
			Achizitie date meteo si procesare scenariu	**Scazut**	**Trecut**	

7			**Generare harta de situatie cu traiectoria norului radioactiv si marcare pozitie utilizator pe harta.**	**Scazut**	**Trecut**	
8			**Afisare fereastra situatie curenta.**	**Scazut**	**Trecut**	

9			Selectare comunitate pe traiectoria norului radioactiv.	Scazut	Trecut	
10			Selectare comunitatea in afara ariei de acoperire al norului radioactiv	Scazut	Trecut	-
11			Afisare pop-up informativ despre comunitate cu mesajul ca punctul de interes se afla in afara zonei	Scazut	Trecut	-
12			Selectare comunitate in aria de acoperire al norului radioactiv	Scazut	Trecut	-
13			Afisare pop-up informativ despre comunitate cu informatii despre gradul de expunere	Scazut	Trecut	-
14			Afisare Raport in forma pentru Printare	Scazut	Trecut	-
15			Accesare meniu matrice de vulnerabilitate	Scazut	Trecut	-
16			Setarea valorilor pentru limitele Plow si PHigh. Se pastreaza valorile setate implicit.	Scazut	Trecut	-
17			Accesare arhiva meteo pentru selectarea prognezei aferenta cazului rulat.	Scazut	Trecut	-
18			Generare matrice de vulnerabilitate si afisare nivelurile de vulnerabilitate ale comunitatilor	Scazut	Trecut	-
19			Selectare comunitate din lista si evidentierea ei pe matrice	Scazut	Trecut	-

20			Selectare comunitate din matricea de vulnerabilitate si afisarea unei ferestre pop-up cu informatii	Scazut	Trecut	-
21			Export RAPORT asupra vulnerabilitatea comunitatilor	Scazut	Trecut	-
22			Apelare meniu View → View as Desktop Table map	Ridicat	Trecut	-
23			Apelare meniu View → View as Desktop Globe map	Ridicat	Trecut	-
24			Apelare meniu View → View as WEB Table map	Ridicat	Trecut	Mesaj de avertizare asupra afisarii hartii alese in cadrul unei ferestre separate. In cazul alegerii optiunii "NO" aplicatia nu mai raspunde. 
25			Apelare afisare harta Isodose, "1".	Scazut	Trecut	-
26			Afisare harta Isodose. Efectuare functii Zoom in/Zoom out, schimbare harti de fundal.	Scazut	Trecut	-
27			Afisare pop-up cu informatii despre valorile izoliniilor	Scazut	Trecut	-
28			Apelare afisare harta "Grid", "2".	Scazut	Trecut	-

29			**Afisare harta "Grid". Efectuare functii Zoom IN/Zoom out/ Pan, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**
30			**Selectare grid din harta si afisare pop-up cu informatii despre Dilutie, dose, grad de expunere si diagnostic.**	**Scazut**	**Trecut**	**-**
31			**Apelare meniu View → View as WEB Globe map**	**Ridicat**	**Trecut**	**-**
32			**Apelare afisare harta Isodose, "1".**	**Ridicat**	**Trecut**	**-**
33			**Apelare afisare harta Puncte, "2".**	**Ridicat**	**Trecut**	**-**
34			**Apelare afisare harta tip "Overlay - 3".**	**Ridicat**	**Trecut**	**-**
35			**Selectare mediu de afisare pentru fisier .kml rezultat "1- Google Earth"**	**Ridicat**	**Trecut**	**-**

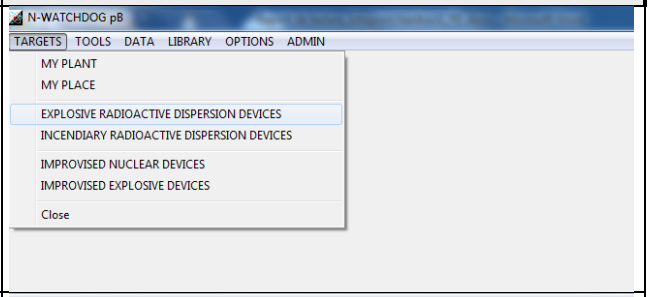
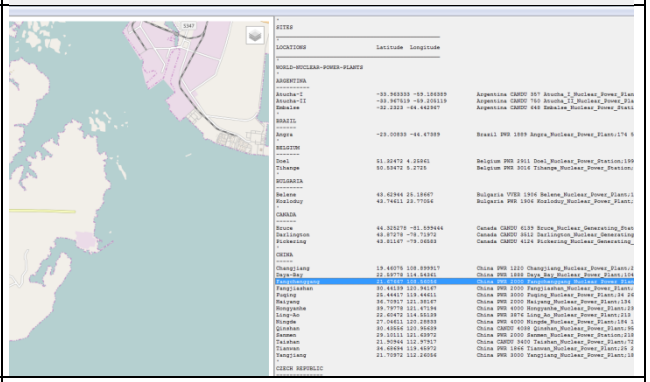
36			**Afisare harta Isodode in Google Earth**	**Ridicat**	**Trecut**	**Pentru toate cazurile(izolinii, puncte, overaly) nu se afiseaza harta ci se deschide fisierul generat .kml.**
37			**Selectare mediu de afisare pentru fisier .kml rezultat "2- ArcGISEarth"**	**Ridicat**	**Trecut**	**-**
38			**Afisare harta Isodose in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
39			**Afisare harta Puncte in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
40			**Afisare harta optiune 3- Overlay in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
41			**Accesare meniu View →Situation Report. Afisarea si consultarea raportului html**	**Scazut**	**Trecut**	**-**

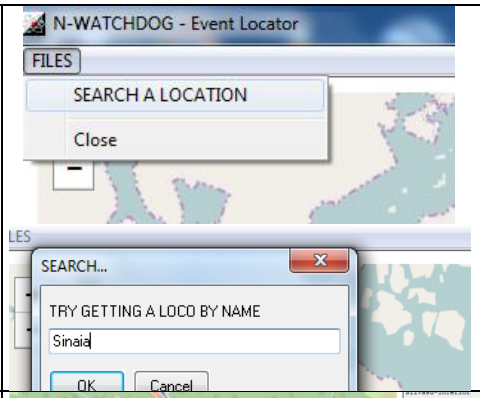
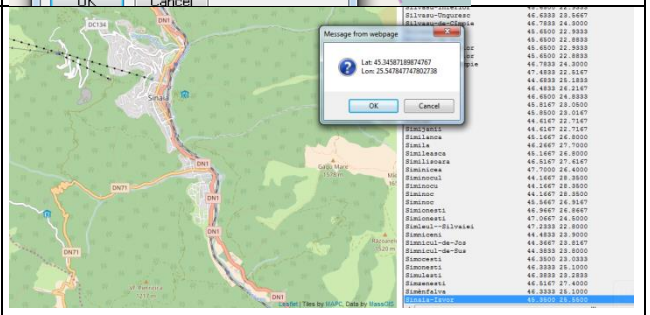
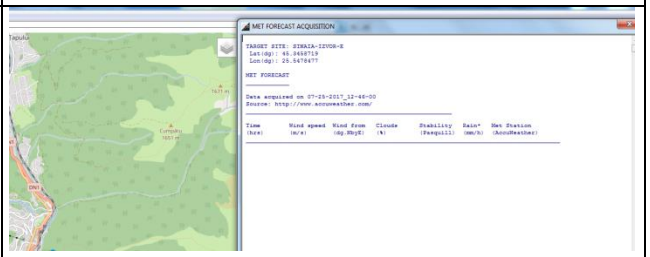
*Grad severitate: Scazut, Mediu, Ridicat
**Stare: Trecut/Netrecut

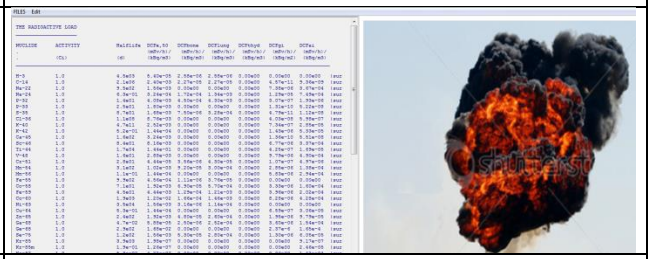
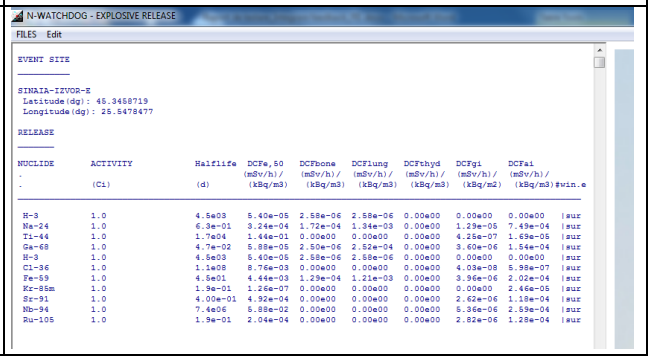
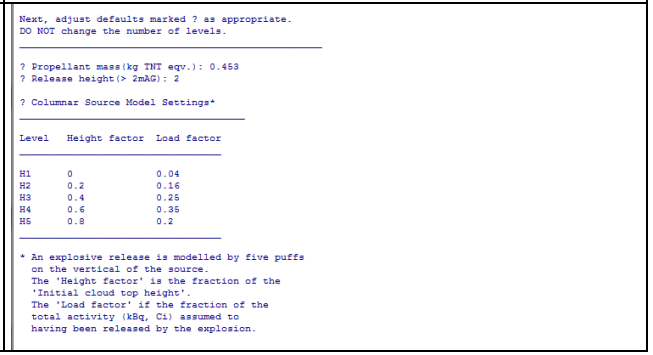
SIVECO Project Progress	RAPORT DE TESTARE

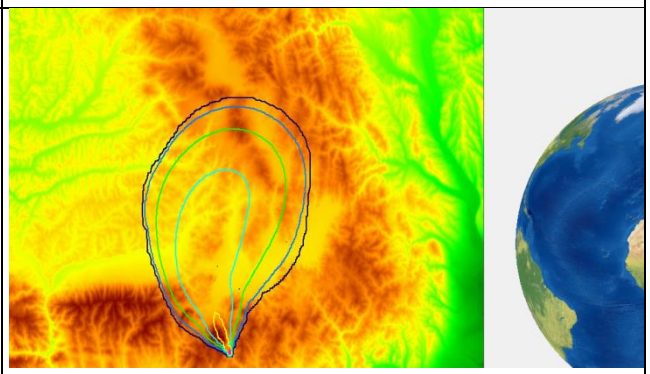
Cod: 5 **Proiect : N-Watchdog**

Descriere :Rulare Modul "Explosive Radioactive Dispersion Devices"

Nr.	Modul aplicatiei	Versiune aplicatie	Functionalitate	Grad severitate *	Stare**	Comentarii
1	Explosive RDDs	N-Watchdog pB	Accesare modul Explosive RDDs.	Scazut	Trecut	
2			Afisare nomenclator "Centrale nucleare" si "Comunitati".	Scazut	Trecut	
3			Selectare locatie din nomenclator	Scazut	Trecut	-

4			**Cautare locatie dupa denumire**	**Scazut**	**Trecut**	
5			**Navigare in harta si selectare punct de interes.**	**Scazut**	**Trecut**	
6			**Colectare date meteorologice real time**	**Scazut**	**Trecut**	
7			**Afisare panou informativ cu datele de input setate (coordonate, date meteo) si date obtinute (Clasa de stabilitate Pasquill).**	**Scazut**	**Trecut**	**-**

8			**Afisare rezultate in urma colectarii datelor.**	**Scazut**	**Trecut**	**-**
9			**Afisare nomenclator incarcatura radioactiva.**	**Scazut**	**Trecut**	
10			**Selectare nuclizi pentru stabilirea incarcaturii radioactive**	**Scazut**	**Trecut**	**-**
11			**Afisare fereastra date de input selectate (nuclizi si caracterisitici fizico-chimice).**	**Scazut**	**Trecut**	
12			**Completare date de input pentru calcularea emisiei radioactive. Se pastreaza valorile setate implicit in cadrul aplicatiei.**	**Scazut**	**Trecut**	

13			**Afisare informatii despre modelul cu sursa exploziva.**	**Scazut**	**Trecut**	Explosive source model data (5-level load distribution): Initial cloud top(mAG): 76.0 Initial cloud radius(m): 15.2 Horizontal dispersion standard deviation at source(m): 7.6 Vertical dispersion standard deviation at source(m): 15.2 Level Height (mAG) Radioactive load (kBq) L1 0 0.04 L2 15 0.16 L3 30 0.25 L4 46 0.35 L5 61 0.2
14			**Completare date input "Material data", "Referinte de afisare harta" si coeficienti de dispersie. Se pastreaza datele setate implicit in aplicatie.**	**Scazut**	**Trecut**	? MATERIAL DATA Carrier type Vdry aRain bRain Aerosol 0.0010 0.0000800 0.8 I2 0.0100 0.0000800 0.6 CH3I 0.0005 0.0000008 0.6 Noble-gases 0.0000 0.0000000 0.0 ? Iodine form (1-I2, 2-CH3I): 1 MAPPING PREFERENCES ? Palette (1-full color, 2-greyscale): 1 WORKING ASSUMPTIONS Adjust defaults as deemed appropriate, this including the dispersion coefficients ? Ground reflection fraction (0-1): 1 ? Inversion lid reflection fraction (0-1): 1 ? Terrain roughness correction exponent: 0.1
15			**Generare si afisare puff-uri pe baza datelor de input completate.** **Afisare harta de fundal DEM, traiectoria norului radioactiv si a comunitatilor afectate de nor precum si cele aflate in vecinateta lui. Afisarea unui sumar al raportului de situatie radioactive pe baza datelor de input prelucrate.**	**Scazut**	**Trecut**	

16			**Selectare comunitatea in afara ariei de acoperire al norului radioactiv**	**Scazut**	**Trecut**	**-**
17			**Afisare pop-up informativ despre comunitate cu mesajul ca punctul de interes se afla in afara zonei expuse.**	**Scazut**	**Trecut**	**-**
18			**Selectare comunitate in aria de acoperire al norului radioactiv**	**Scazut**	**Trecut**	**-**
19			**Afisare pop-up informativ despre comunitate cu informatii despre gradul de expunere**	**Scazut**	**Trecut**	**-**
20			**Afisare Raport in forma pentru Printare**	**Scazut**	**Trecut**	
21			**Accesare meniu matrice de vulnerabilitate**	**Scazut**	**Trecut**	**-**
22			**Setarea valorilor pentru limitele Plow si PHigh. Se pastreaza valorile setate implicit.**	**Scazut**	**Trecut**	**-**
23			**Accesare arhiva meteo pentru selectarea prognezei aferenta cazului rulat.**	**Scazut**	**Trecut**	**-**
24			**Generare matrice de vulnerabilitate si afisare nivelurile de vulnerabilitate ale comunitatilor**	**Scazut**	**Trecut**	**-**

25			**Selectare comunitate din lista si evidentierea ei pe matrice**	**Scazut**	**Trecut**	**-**
26			**Selectare comunitate din matricea de vulnerabilitate si afisarea unei ferestre pop-up cu informatii despre acestea: indecsi, dozele, dilutia si diagnosticul.**	**Scazut**	**Trecut**	**-**
27			**Export RAPORT asupra vulnerabilitatea comunitatilor**	**Scazut**	**Trecut**	**-**
28			**Apelare meniu View → View as Desktop Table map**	**Ridicat**	**Trecut**	**-**
30			**Apelare meniu View → View as Desktop Globe map**	**Ridicat**	**Trecut**	**-**
31			**Apelare meniu View → View as WEB Table map**	**Ridicat**	**Trecut**	**-**
32			**Apelare afisare harta Isodose, "1".**	**Scazut**	**Trecut**	**-**
33			**Afisare harta Isodose. Efectuare functii Zoom in/Zoom out, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**
34			**Afisare pop-up cu informatii despre valorile izoliniilor**	**Scazut**	**Trecut**	**-**
35			**Apelare afisare harta "Grid", "2".**	**Scazut**	**Trecut**	**-**
36			**Afisare harta "Grid". Efectuare functii Zoom IN/Zoom out/ Pan, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**

37			**Selectare grid din harta si afisare pop-up cu informatii despre Dilutie, dose, grad de expunere si**	**Scazut**	**Trecut**	**-**
38			**Apelare meniu View → View as WEB Globe map**	**Ridicat**	**Trecut**	**-**
39			**Apelare afisare harta Isodose, "1".**	**Ridicat**	**Trecut**	**-**
40			**Apelare afisare harta Puncte, "2".**	**Ridicat**	**Trecut**	**-**
41			**Apelare afisare harta tip "Overlay - 3".**	**Ridicat**	**Trecut**	**-**
42			**Selectare mediu de afisare pentru fisier .kml rezultat "1- Google Earth"**	**Ridicat**	**Trecut**	**-**
43			**Afisare harta Isodode in Google Earth**	**Ridicat**	**Trecut**	**-**
44			**Selectare mediu de afisare pentru fisier .kml rezultat "2- ArcGISEarth"**	**Ridicat**	**Trecut**	**-**
45			**Afisare harta Isodose in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
46			**Afisare harta Puncte in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
47			**Afisare harta optiune 3- Overlay in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
48			**Accesare meniu View →Situation Report. Afisarea si consultarea raportului html**	**Scazut**	**Trecut**	**-**

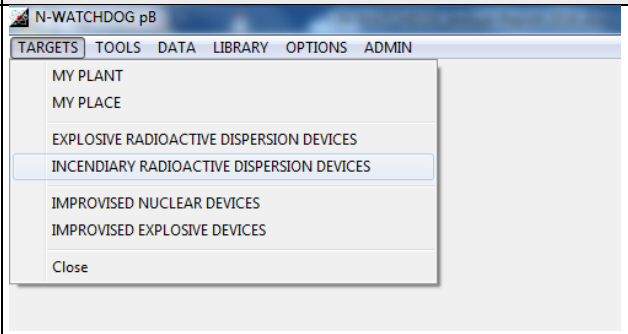
*Grad severitate: Scazut, Mediu, Ridicat

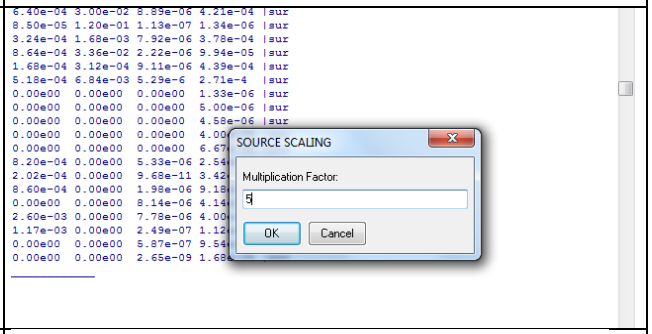
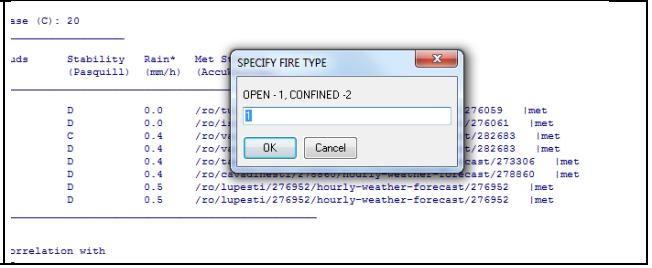
**Stare: Trecut/Netrecut;

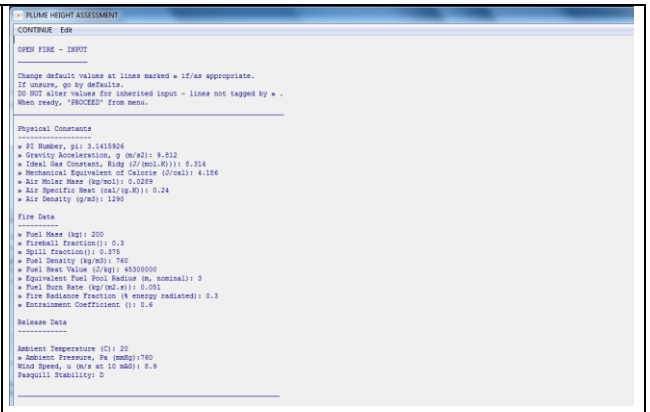
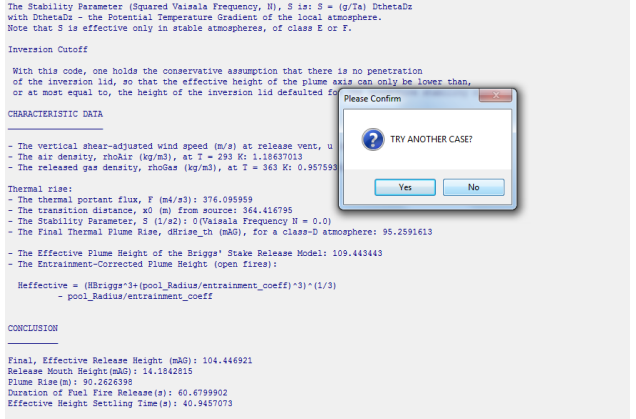
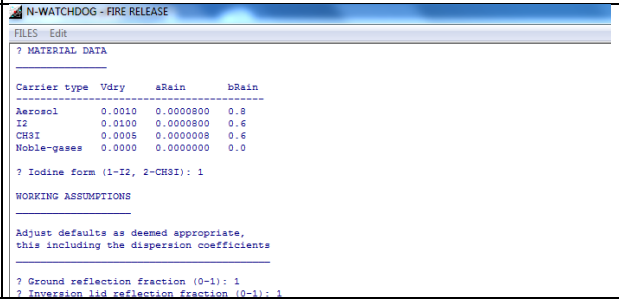
SIVECO Project Progress	RAPORT DE TESTARE

Cod: 6 **Proiect : N-Watchdog**

Descriere :Rulare modul "Incendiary Radioactive Dispersion Devices"

Nr.	Modul aplicatiei	Versiune aplicatie	Functionalitate	Grad severitate *	Stare**	Comentarii
1	Incendiary RDDs	N-Watchdog pB	Accesare modul Incendiary RDDs.	Scazut	Trecut	
2			Afisare nomenclator "Centrale nucleare" si "Comunitati".	Scazut	Trecut	-
3			Selectare locatie din nomenclator	Scazut	Trecut	-
4			Cautare locatie dupa denumire	Scazut	Trecut	-
5			Navigare in harta si selectare punct de interes.	Scazut	Trecut	-

6			Colectare date meteorologice real time	Scazut	Trecut	-
7			Afisare rezultate in urma colectarii datelor.	Scazut	Trecut	-
			Selectare modalitate introducere termen sursa	Scazut	Trecut	
8			Afisare nomenclatoare termeni sursa	Scazut	Trecut	-
9			Selectare nomenclator termen sursa	Scazut	Trecut	-
10			Aplicare factor de multiplicare (5)			
11			Setare tip incendiu (Open)	Scazut	Trecut	

12			**Completare date de input pentru determinarea inaltimii penei de emisie (pastrare valori setate implicit)**	**Scazut**	**Trecut**	
13			**Afisare informatii date input/output**	**Scazut**	**Trecut**	
14			**Completare date input "Material data", "Working assumptions" si Mapping preferences". Se pastreaza datele setate implicit in aplicatie.**	**Scazut**	**Trecut**	

15			**Generare si afisare puff-uri pe baza datelor de input completate. Afisare harta de fundal DEM, traiectoria norului radioactiv si a comunitatilor afectate de nor precum si cele aflate in vecinateta lui. Afisarea unui sumar al raportului de situatie radioactive pe baza datelor de input prelucrate.**	**Scazut**	**Trecut**	**-**
16			**Selectare comunitatea in afara ariei de acoperire al norului radioactiv**	**Scazut**	**Trecut**	**-**
17			**Afisare pop-up informativ despre comunitate cu mesajul ca punctul de interes se afla in afara zonei expuse.**	**Scazut**	**Trecut**	**-**
18			**Selectare comunitate in aria de acoperire al norului radioactiv**	**Scazut**	**Trecut**	**-**
19			**Afisare pop-up informativ despre comunitate cu informatii despre gradul de expunere**	**Scazut**	**Trecut**	**-**
20			**Afisare Raport in forma pentru Printare**	**Scazut**	**Trecut**	**-**
21			**Accesare meniu matrice de vulnerabilitate**	**Scazut**	**Trecut**	**-**
22			**Setarea valorilor pentru limitele Plow si PHigh. Se pastreaza valorile setate implicit.**	**Scazut**	**Trecut**	**-**

23			**Accesare arhiva meteo pentru selectarea prognezei aferenta cazului rulat.**	**Scazut**	**Trecut**	**-**
24			**Generare matrice de vulnerabilitate si afisare nivelurile de vulnerabilitate ale comunitatilor din evenimentul curent**	**Scazut**	**Trecut**	**-**
25			**Selectare comunitate din lista si evidentierea ei pe matrice**	**Scazut**	**Trecut**	**-**
26			**Selectare comunitate din matricea de vulnerabilitate si afisarea unei ferestre pop-up cu informatii despre acestea: indecsi, dozele, dilutia si diagnosticul.**	**Scazut**	**Trecut**	**-**
27			**Export RAPORT asupra vulnerabilitatea comunitatilor**	**Scazut**	**Trecut**	**-**
28			**Apelare meniu View → View as Desktop Table map**	**Ridicat**	**Trecut**	**-**
29			**Apelare meniu View → View as Desktop Globe map**	**Ridicat**	**Trecut**	**-**
30			**Apelare meniu View → View as WEB Table map**	**Ridicat**	**Trecut**	**-**
31			**Apelare afisare harta Isodose, "1".**	**Scazut**	**Trecut**	**-**

32			**Afisare harta Isodose. Efectuare functii Zoom in/Zoom out, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**
33			**Afisare pop-up cu informatii despre valorile izoliniilor**	**Scazut**	**Trecut**	**-**
34			**Apelare afisare harta "Grid", "2".**	**Scazut**	**Trecut**	**-**
35			**Afisare harta "Grid". Efectuare functii Zoom IN/Zoom out/ Pan, schimbare harti de fundal.**	**Scazut**	**Trecut**	**-**
36			**Selectare grid din harta si afisare pop-up cu informatii despre Dilutie, dose, grad de expunere si diagnostic.**	**Scazut**	**Trecut**	**-**
37			**Apelare meniu View → View as WEB Globe map**	**Ridicat**	**Trecut**	**-**
38			**Apelare afisare harta Isodose, "1".**	**Ridicat**	**Trecut**	**-**
39			**Apelare afisare harta Puncte, "2".**	**Ridicat**	**Trecut**	**-**
40			**Apelare afisare harta tip "Overlay - 3".**	**Ridicat**	**Trecut**	**-**

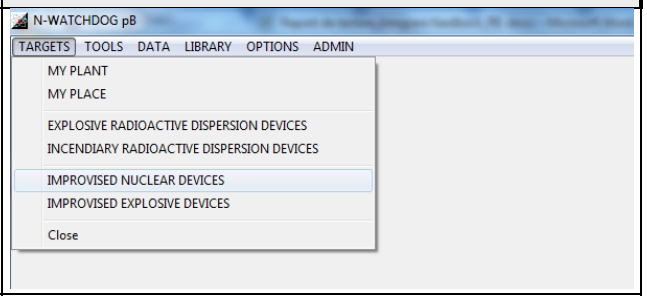
41			**Selectare mediu de afisare pentru fisier .kml rezultat "1- Google Earth"**	**Ridicat**	**Trecut**	**-**
42			**Afisare harta Isodode in Google Earth**	**Ridicat**	**Trecut**	**-**
43			**Selectare mediu de afisare pentru fisier .kml rezultat "2- ArcGISEarth"**	**Ridicat**	**Trecut**	**-**
44			**Afisare harta Isodose in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
45			**Afisare harta Puncte in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
46			**Afisare harta optiune 3- Overlay in ArcGISEarth**	**Ridicat**	**Trecut**	**-**
47			**Accesare meniu View →Situation Report. Afisarea si consultarea raportului html**	**Scazut**	**Trecut**	**-**

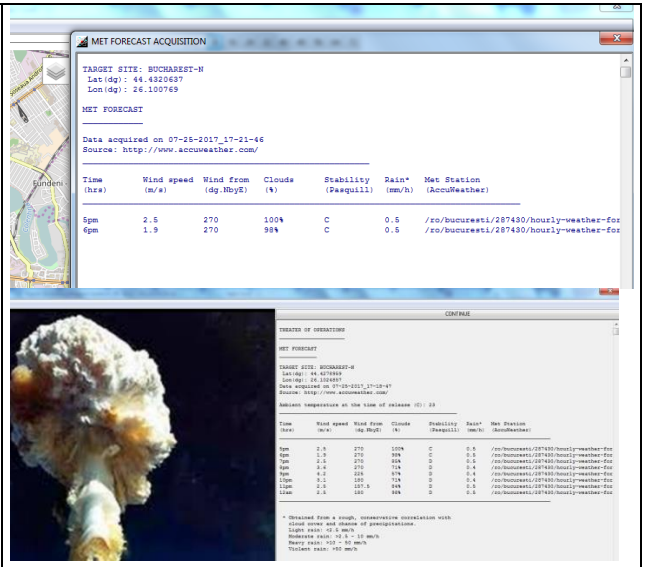
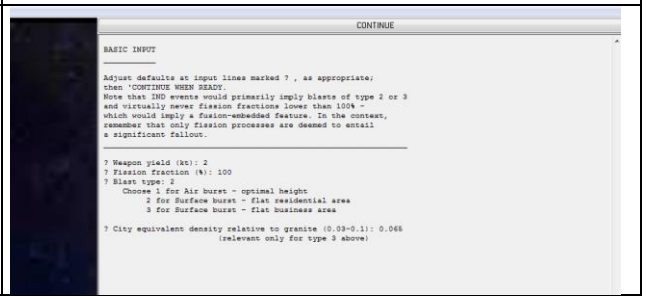
*Grad severitate: Scazut, Mediu, Ridicat
**Stare: Trecut/Netrecut;

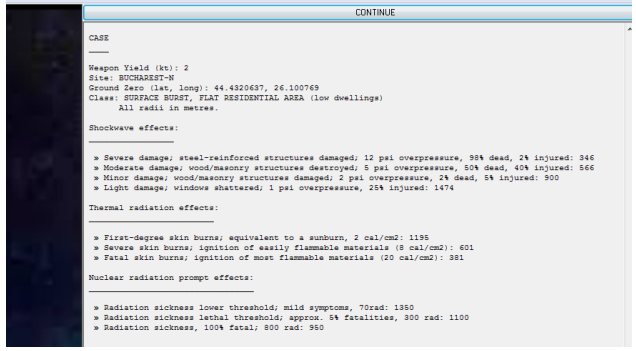
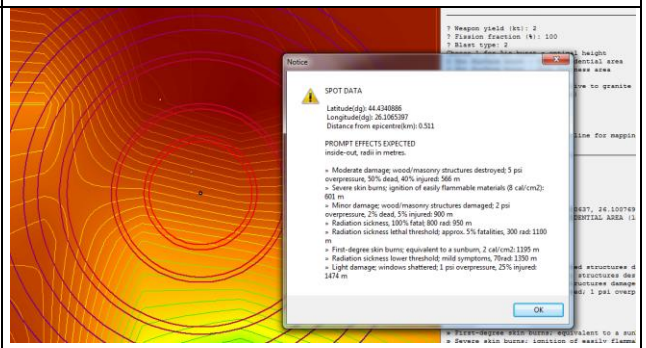
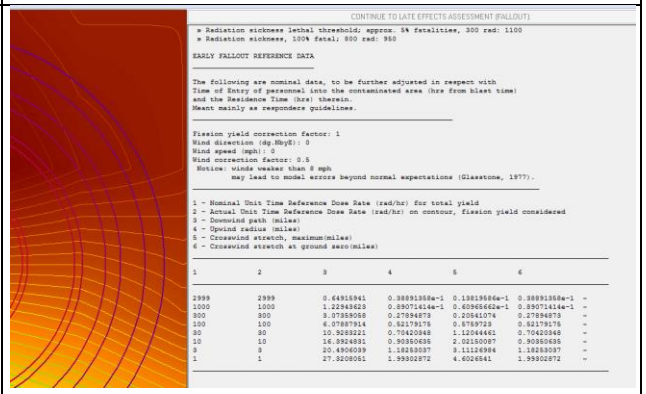
SIVECO Project Progress	RAPORT DE TESTARE

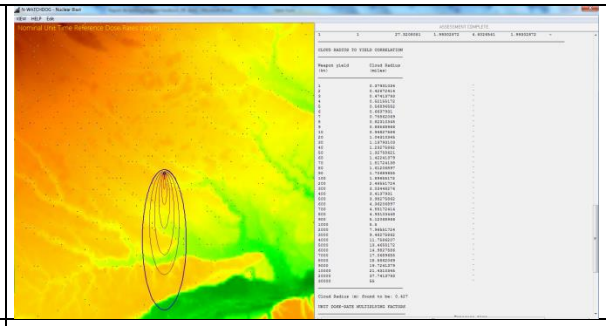
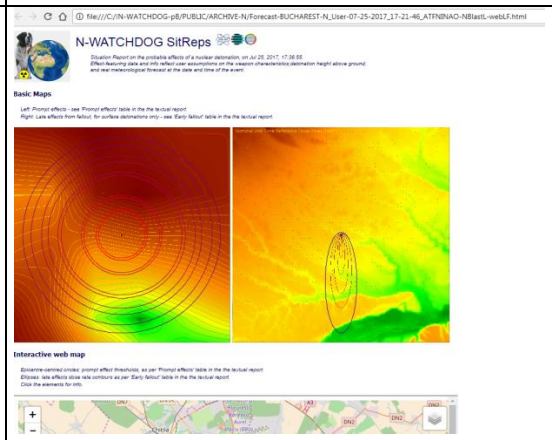
Cod: 7 **Proiect : N-Watchdog**

Descriere :Rulare modul "Improvised Nuclear Devices"

Nr.	Modul aplicatiei	Versiune aplicatie	Functionalitate	Grad severitate *	Stare**	Comentarii
1	INDs	N-Watchdog pB	Accesare modul INDs.	Scazut	Trecut	
2			Afisare nomenclator "Centrale nucleare" si "Comunitati".	Scazut	Trecut	-
3			Selectare locatie din nomenclator	Scazut	Trecut	-
4			Cautare locatie dupa denumire	Scazut	Trecut	-
5			Navigare in harta si selectare punct de interes.	Scazut	Trecut	-

6			**Colectare date meteorologice real time**	**Scazut**	**Trecut**	
7			**Afisare panou informativ cu datele de input setate.**	**Scazut**	**Trecut**	

8			**Procesare date de input si afisare efecte explozie: unda de soc, termal, nuclear**	**Scazut**	**Trecut**	
9			**Afisare harta si identificare informatii punctuale**			
10			**Afisare informatii efecte secundare ale exploziei unei bombe**	**Scazut**	**Trecut**	

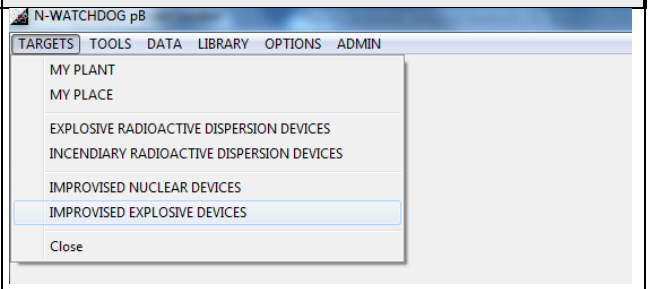
11			**Afisare pop-up cu informatii despre punctul selectat in harta, comunitatea apropiata si dozele absorbite**	**Scazut**	**Trecut**	
12			**Selectare meniu VIEW → View As 3D Web Map**	**Scazut**	**Trecut**	Salveaza un fisier de tip .kml
13			**Selectare meniu VIEW → View As 2D Web Map**	**Scazut**	**Trecut**	**–**
14			**Selectare meniu VIEW → Base Map**	**Scazut**	**Trecut**	**–**
15			**Selectare meniu VIEW → Situation Report**	**Scazut**	**Trecut**	
16			**Accesare meniu Help → Fundamental**	**Ridicat**	**Netrecut**	**–**
17			**Accesare meniu Help → Specifics**	**Scazut**	**Trecut**	**–**

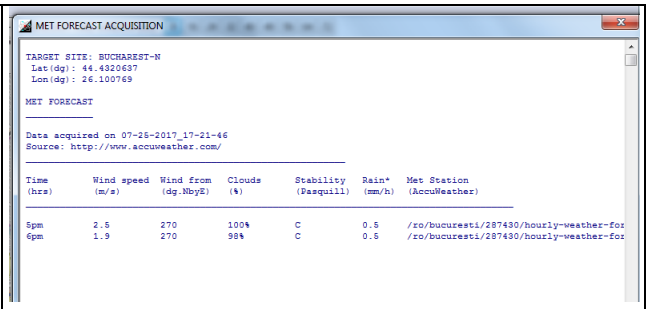
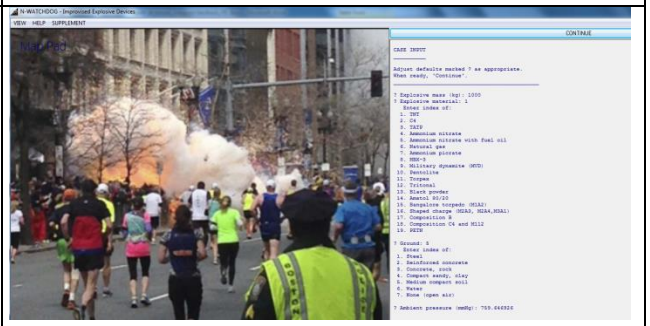
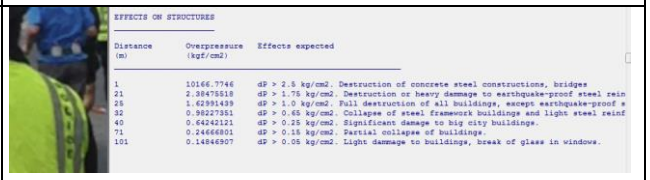
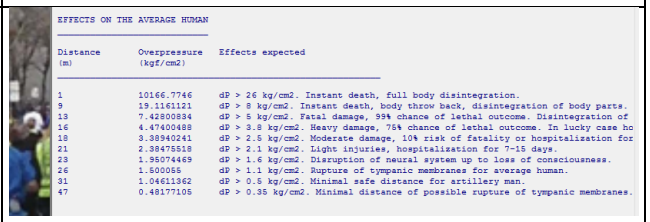
*Grad severitate: Scazut, Mediu, Ridicat
**Stare: Trecut/Netrecut;

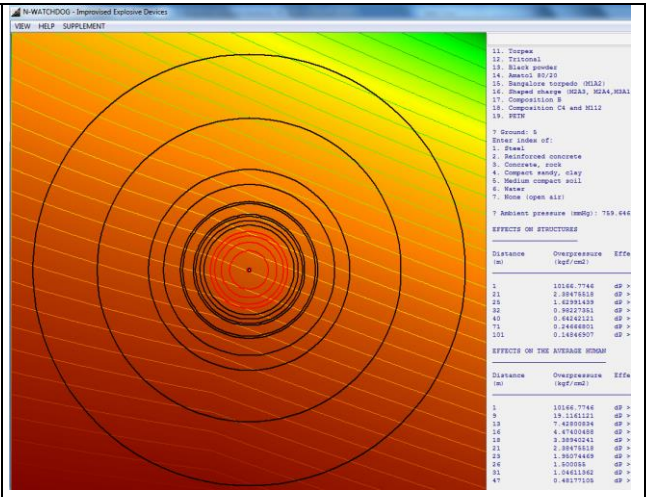
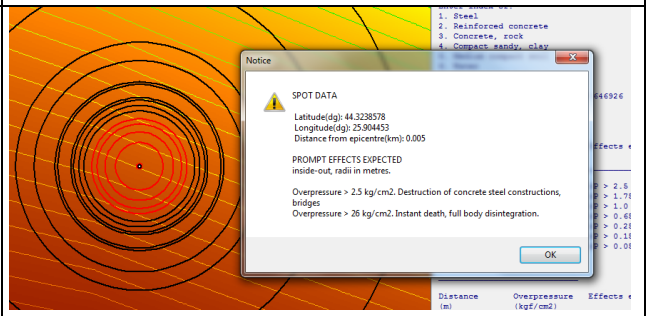
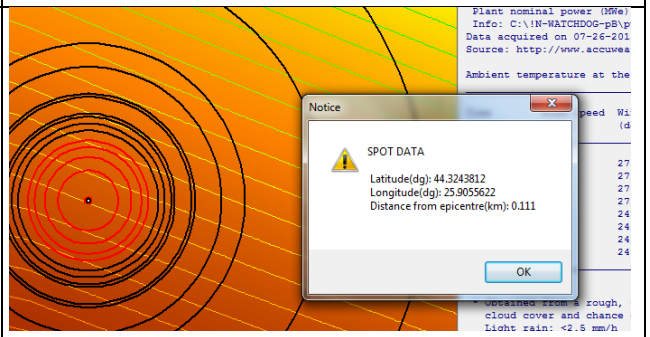
SIVECO Project Progress	RAPORT DE TESTARE

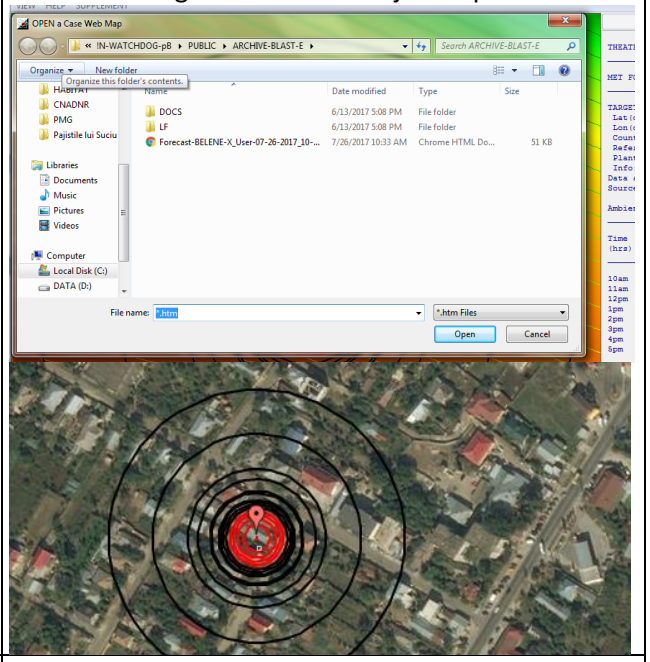
Cod: 8 **Proiect : N-Watchdog**

Descriere :Rulare modul "Improvised Explosive Devices"

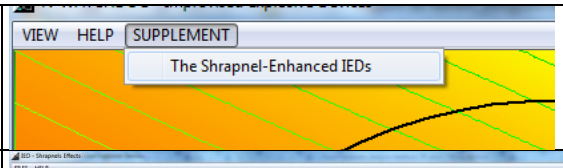
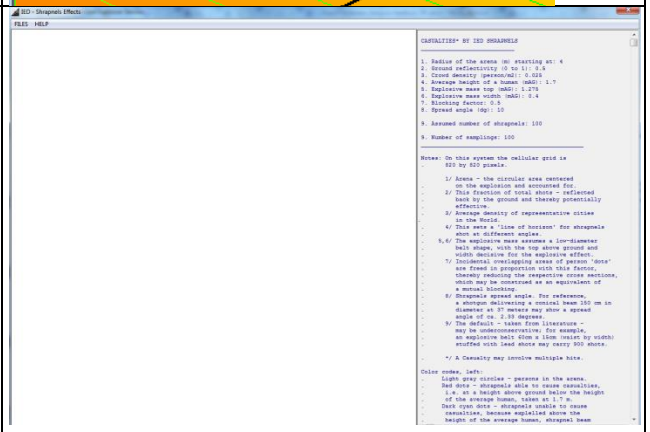
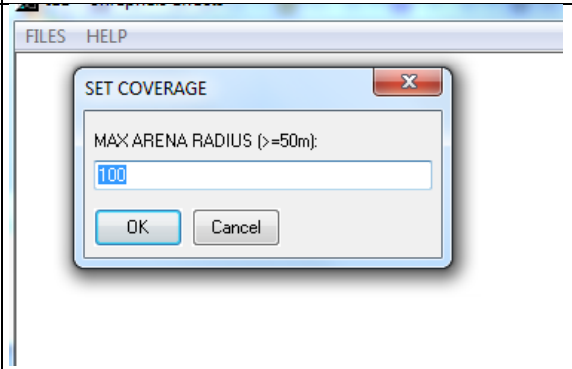
Nr.	Modul aplicatiei	Versiune aplicatie	Functionalitate	Grad severitate *	Stare**	Comentarii
1	IEDs	N-Watchdog pB	Accesare modul INDs.	Scazut	Trecut	
2			Afisare nomenclator "Centrale nucleare" si "Comunitati".	Scazut	Trecut	-
3			Selectare locatie din nomenclator	Scazut	Trecut	-
4			Cautare locatie dupa denumire	Scazut	Trecut	-
5			Navigare in harta si selectare punct de interes.	Scazut	Trecut	-

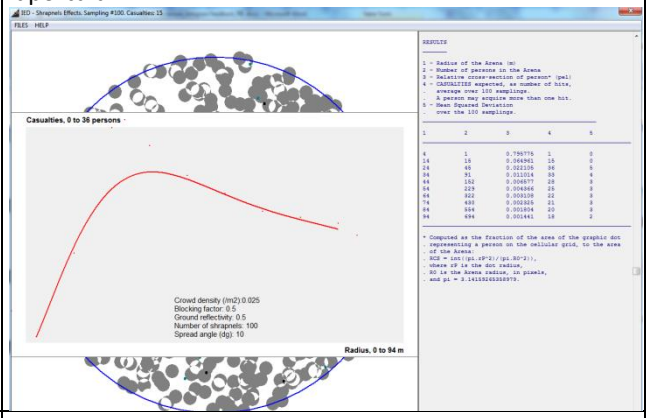
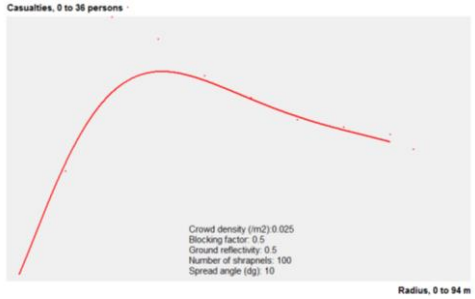
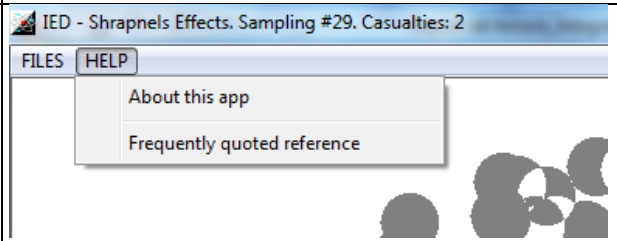
6			**Colectare date meteorologice real time**	**Scazut**	**Trecut**	
7			**Afisare panou informativ cu datele de input setate.**	**Scazut**	**Trecut**	
8			**Afisare valori ale impactului asupra structurilor**	**Scazut**	**Trecut**	
9			**Afisare valori ale impactului asupra oamenilor aflati in aproprierea evenimentului.**	**Scazut**	**Trecut**	

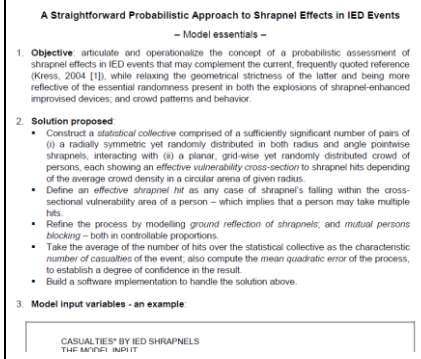
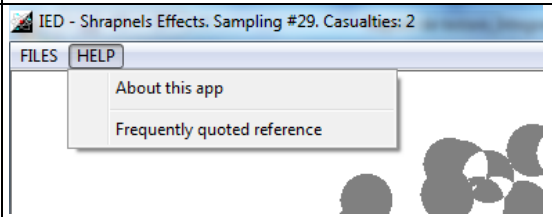
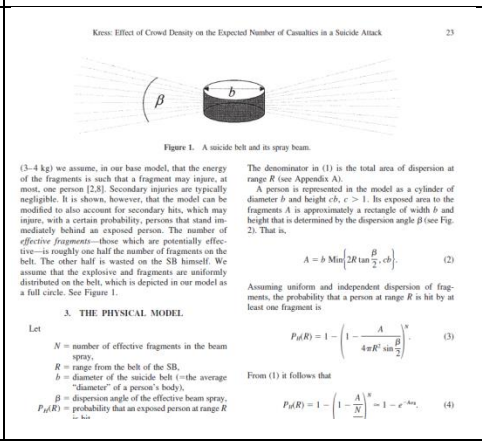
10			**Afisare harta de fundal DEM si reprezentarea vectoriala a traiectoriei exploziei.**	**Scazut**	**Trecut**	
11			**Selectare in harta a zonei din interiorul exploziei si afisare fereastra pop-up cu informatii despre zona expusa**	**Scazut**	**Trecut**	
12			**Selectare harta in afara zonei de interes si afisare pop-up cu informatii despre zona aflata in afara ariei de interes.**	**Scazut**	**Trecut**	

13			**Selectare meniu VIEW → View As 2D Web Map**	**Scazut**	**Trecut**	Poate fi eliminat pasul suplimentar inainte de deschiderea in mediul de vizualizare ales, unde utilizatorul este directionat catre o interfata in care trebue sa aleaga fisierul creat deja de aplicatie. 
14			**Selectare meniu VIEW → View As 3D Web Map**	**Scazut**	**Trecut**	Poate fi eliminat pasul suplimentar inainte de deschiderea in mediul de vizualizare ales, unde utilizatorul este directionat catre o interfata in care trebue sa aleaga fisierul creat deja de aplicatie.
15			**Selectare meniu VIEW → Base Map**	**Scazut**	**Trecut**	Poate fi eliminat pasul suplimentar inainte de deschiderea in mediul de vizualizare ales, unde utilizatorul este directionat catre o interfata in care trebue sa aleaga fisierul creat deja de aplicatie.

16			**Schimbare harta de fundal apeland biblioteca de harti disponibile:OSM, Thunderforest, ESRI**	**Scazut**	**Trecut**	**-**
17			**Navigare in harta Zoom in/ Zoom out/ Pan si selectare in harta zona de interes.**	**Scazut**	**Trecut**	**-**
18			**Accesare meniu VIEW → Situation Report**	**Ridicat**	**Trecut**	Poate fi eliminat pasul suplimentar inainte de deschiderea in mediul de vizualizare ales, unde utilizatorul este directionat catre o interfata in care trebue sa aleaga fisierul creat deja de aplicatie.
19			**Afisare raport de situatie cu permisiune de: navigare in hartile interactive, descarcare fisier kml "The Case Contours Map"**	**Scazut**	**Trecut**	**-**
20			**Accesare meniu HELP→On Blast Effects**	**Scazut**	**Trecut**	**-**
21			**Afisare documentatie informativ ace a stat la baza construirii cazului**	**Scazut**	**Trecut**	**-**
22			**Accesare meniu HELP→On Explosives**	**Scazut**	**Trecut**	**-**
23			**Afisare documentatie informativ ace a stat la baza construirii cazului**	**Scazut**	**Trecut**	**-**

24			**Accesare meniu SUPPLEMENT→The Shrapnel-Enhanced IEDs**	**Scazut**	**Trecut**	
25			**Afisare panou informativ cu datele de input asupra caracteristicilor exploziei care implica srapnel (alegere valori implicite)**	**Scazut**	**Trecut**	
26			**Selectarea ariei de acoperire a exploziei (Arena, raza de 100m)**	**Scazut**	**Trecut**	

27			**Afisarea rezultatelor in urma prelucrarii cazurilor**	**Scazut**	**Trecut**	Implementarea unei optiuni pentru posibilitate de export a raportului. 
28			**Afisare grafic cu numar de victime functie de raza exploziei**	**Scazut**	**Trecut**	Reprezentarea unor axe(subdiviziuni pentru axe) si a unei legende pentru grafic. 
29			**Accesare meniu HELP→About this app**	**Scazut**	**Trecut**	

30			**Afisare documentatie asupra modului de operare a modulului**	**Scazut**	**Trecut**	 **A Straightforward Probabilistic Approach to Shrapnel Effects in IED Events** **– Model essentials –** 1. **Objective**: articulate and operationalize the concept of a probabilistic assessment of shrapnel effects in IED events that may complement the current, frequently quoted reference (Kress, 2004 [1]), while relaxing the geometrical strictness of the latter and being more reflective of the essential randomness present in both the explosions of shrapnel-enhanced improvised devices; and crowd patterns and behavior. 2. **Solution proposed**: ▪ Construct a *statistical collective* comprised of a sufficiently significant number of pairs of (i) a radially symmetric yet randomly distributed in both radius and angle pointwise shrapnels, interacting with (ii) a planar, grid-wise yet randomly distributed crowd of persons, each showing an *effective vulnerability cross-section* to shrapnel hits depending of the average crowd density in a circular arena of given radius. ▪ Define an *effective shrapnel hit* as any case of shrapnel's falling within the cross-sectional vulnerability area of a person – which implies that a person may take multiple hits. ▪ Refine the process by modelling *ground reflection of shrapnels*; and *mutual persons blocking* – both in controllable proportions. ▪ Take the average of the number of hits over the statistical collective as the characteristic *number of casualties* of the event; also compute the *mean quadratic error* of the process, to establish a degree of confidence in the result. ▪ Build a software implementation to handle the solution above. 3. **Model input variables - an example**: CASUALTIES* BY IED SHRAPNELS THE MODEL INPUT
31			**Accesare meniu HELP→Frequently quoted reference**	**Scazut**	**Trecut**	
32			**Afisare documentatie ce a stat la baza construirii modulului**	**Scazut**	**Trecut**	 Kress: Effect of Crowd Density on the Expected Number of Casualties in a Suicide Attack 23 **Figure 1.** A suicide belt and its spray beam. (3–4 kg) we assume, in our base model, that the energy of the fragments is such that a fragment may injure, at most, one person [2,8]. Secondary injuries are typically negligible. It is shown, however, that the model can be modified to also account for secondary hits, which may injure, with a certain probability, persons that stand immediately behind an exposed person. The number of *effective fragments*—those which are potentially effective—is roughly one half the number of fragments on the belt. The other half is wasted on the SB himself. We assume that the explosive and fragments are uniformly distributed on the belt, which is depicted in our model as a full circle. See Figure 1. **3. THE PHYSICAL MODEL** Let N = number of effective fragments in the beam spray, R = range from the belt of the SB, b = diameter of the suicide belt (=the average "diameter" of a person's body), β = dispersion angle of the effective beam spray, $P_H(R)$ = probability that an exposed person at range R The denominator in (1) is the total area of dispersion at range R (see Appendix A). A person is represented in the model as a cylinder of diameter b and height cb, $c > 1$. Its exposed area to the fragments A is approximately a rectangle of width b and height that is determined by the dispersion angle β (see Fig. 2). That is, $A = b\,\mathrm{Min}\left(2R\tan\frac{\beta}{2}, cb\right).$ (2) Assuming uniform and independent dispersion of fragments, the probability that a person at range R is hit by at least one fragment is $P_H(R) = 1 - \left(1 - \frac{A}{4\pi R^2 \sin\frac{\beta}{2}}\right)^N$ (3) From (1) it follows that $P_H(R) = 1 - \left(1 - \frac{A}{N}\right)^N \simeq 1 - e^{-A\alpha_A}.$ (4)

*Grad severitate: Scazut, Mediu, Ridicat
**Stare: Trecut/Netrecut;

Etapa 4. Activitatea 4.2. Dezvoltarea si implementarea modelului experimental N-WATCHDOG, Partea a II-a

SIVECO

1. Scopul documentului

Scopul acestui document este de a face o prezentare a functionalitatilor implementate in cadrul platformei N-Watchdog model Experimental realizata prin integrarea modulelor executabile ale aplicatiilor N-Watchdog PoC.

Functionalitatile incluse in cadrul platformei au rolul de a a oferi utilizatorilor posibilitati de manipulare facila a modulelor aplicatiei;

2. Aria de acoperire a documentului

Documentul de fata reprezinta livrabil documentat pentru activitatea de “Dezvoltarea si implementarea modelului experimental N-WATCHDOG, Partea a II-a” si se concretizeaza ca un “Raport cu privire la functionalitatile sistemului N-WATCHDOG”.

In cazul in care vor exista solicitari de schimbare asupra continutului, acesta va fi supus procesului de management al schimbarii, conform procedurii stabilite la nivel de proiect.

3. Termeni si definitii

Termen	Descriere
IFIN-HH	Institutul National de Cercetare-Dezvoltare pentru Fizica si Inginerie Nucleara Horia Hulubei.
HTML	Hyper Text Markup Language
WS	Web Service
HTTP	HyperText Transfer Protocol
UI	User Interface
GeoServer	Server bazat pe software JAVA care permit utilizatorilor sa incarce, vizualizeze, editeze date spatiale, precum vizualizare si afisare harti.
XML	Extensible Markup Language – Limbaj usor interpretabil de calculatoare.
View	Vizualizare
MVC	Model-View-Controler
CSS	Cascading Style Sheets
EIP	Enterprise Integration Patterns
WAR	Web Archive
WMS	Web Map Service
WFS	Web Feature Service
J2EE	Platforma Java conceputa pentru calculul la scara mare, specifice intreprinderilor mari.
Framework	Structura conceptuala reprezentata de o arhitectura de software care modeleaza relatiile generale ale entitatilor site-ului.
Browser	Aplicatie software ce permite utilizatorilor sa afiseze text, grafica, si alte informatii suite pe o pagina web.
Text-box	Camp de tip text care permite utilizatorului sa introduca o informatie de tip text.
Website	Prezentare contextuala alcatuita din mai multe pagini web, video, animatii, imagini, etc.
Baza de date	Colectie de date date centralizate, create si mentinuta computerizat, in scopul prelucrarii datelor in contextul unui set de aplicatii.

4. Solutia tehnica

In ceea ce priveste solutiile tehnice software implementate in vederea realizarii platforme N-Watchdog model Experimental, au fost identificate o serie de unelte folosite pentru dezvoltare.

Solutia informatica propusa constituie o solutie integrata care inglobeaza mai multe componente software pentru a acoperi cerintele formulate in cadrul cererii de finantare.

Solutia are caracter centralizat, care va permite accesarea acesteia din toate locatiile asigurand in acelasi timp un nivel ridicat de securitate a accesului.

Din punct de vedere functional, solutia tehnica propusa are o structura modulara si stratificata, iar in acest fel se asigura flexibilitate si scalabilitate solutiei.

Solutia propusa este una deschisa, scalabila si in tendinta cu tehnologiile actuale existente pe piata. Fiecare componenta functioneaza independent din punct de vedere logic, dar luate impreuna, alcatuiesc o solutie complet integrata.

Solutia garanteaza exploatarea pe termen lung a sistemului informatic caracterizat prin actualitate tehnologica, integrabilitate, disponibilitate ridicata, modularitate si scalabilitate. Solutia propusa este una flexibila fiind permise actiuni de extindere cu noi functionalitati

a. Infrastructura software de baza

Infrastructura software utilizata la dezvoltarea aplicatiei contine:

- *Apache Tomcat* – server de aplicatie de tip open source ce contine un web server pentru comunicarea cu clientii (browsere) si un container special pentru rularea aplicatiilor dezvoltate in limbajul Java;
- *PostgreSQL* – sistem de baza de date relationale de tip open source;
- *PostGIS* – extensie spatiala pentru baza de date PostgreSQL ce adauga suport pentru lucru cu obiecte spatiale si localizare spatiala;
- *GeoServer* – aplicatie open source, cross-platform, ce permite incarcarea, editarea si partajarea/publicarea datelor geospatiale sub forma unor servicii standardizate (WMS, WFS, WCS).

Din punct de vedere tehnologic, modulele aplicatiei sunt dezvoltate utilizand limbajul de programare Java, care face posibila rularea pe web server-ul Apache Tomcat sau pe orice server de aplicatie de tip J2EE.

Partea client-side se bazeaza pe framework-uri javascript/css compatibile cu HTML5, CSS3 (Bootstrap, jQuery, Angular material – librarii pentru dezvoltarea interfetei grafice puse la dispozitie de comunitatea Google) fiind compatibila cu browsere desktop.

Aplicatia va putea rula pe browser-ele moderne care ofera suport javascript/HTML5/CSS3 printre care enumeram: Chrome, Firefox, Opera, Internet Explorer (de la versiunea 9.x in sus).

Bootstrap – este framework-ul CSS folosit pentru a afisa UI-ul aplicatiei pe orice tip de browser din cele enumerate mai sus.

jQuery – este o librarie bazata pe Javascript ce faciliteaza creare de cod simplu si clar prin intermediul functionalitatilor ce permit accesarea si manipularea elementelor HTML, gestionarea evenimentelor, apelarea prin tehnica AJAX a serviciilor din backend.

Spring – este framework-ul care ofera suport la nivel de infrastructura de aplicatie care pune la dispozitie un model complex si complet de dezvoltare si configurare a aplicatiilor moderne realizate in tehnologie Java.

GeoTools – este o librarie open source bazata pe limbajul Java ce ofera suport pentru lucru cu obiecte spatiale la nivelul serviciilor backend.

Hibernate – este un framework de mapare (ORM) a entitatilor de business pe entitati relationale de la nivelul bazei de date, care ofera posibilitatea utilizarii si a altor tipuri de servere

de baze de date. Totodata, acesta permite crearea si actualizarea structurilor tabelare in mod automat.

Server-ul de baza de date PostgreSQL respecta standardul SQL 92, care permite un limbaj de programare comun cu alte aplicatii de management al datelor (exemplu: MS Access, SQL Server, Oracle DB etc.). Un alt motiv de alegere a acestui server este faptul ca se poate instala atat pe sisteme de operare Windows cat si pe cele Linux dar si pentru ca este un open source cu evolutie permanenta si are in spate o comunitate puternica.

Pe langa identificarea acestora pachete de soft utilizate in cadrul dezvoltarii au fost identificate si posibile constrangeri pe care acestea le pot avea in decursul etapei de exploatare.

b. Constrangeri

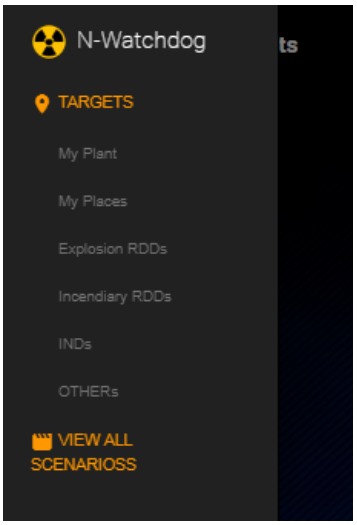
Din punct de vedere tehnic s-au identificat urmatoarele constrangeri:

- Solutia propusa este de tip client-server. Dezvoltarea aplicatiei, utilizarea functionalitatilor si afisarea rezultatelor se va efectua in functie de limitarile tehnologiilor si standardelor browser-elor web.
- Limitarile de natura hardware ale masinilor pe care vor rula clientii aplicatiei (browser web). Clientul aplicatiei este de tip rich-client adica ruleaza cod de complexitate peste medie si manipuleaza seturi de date (alfanumerice, spatiale) ceea ce necesita resurse de tip CPU si RAM.
- Latenta retelei de comunicatie la care sunt conectati clientii si serverele aplicatiei. Intre clienti si servere se transfera diferite volume de date astfel ca performanta retelei are un impact direct asupra timpului de raspuns al aplicatiei.

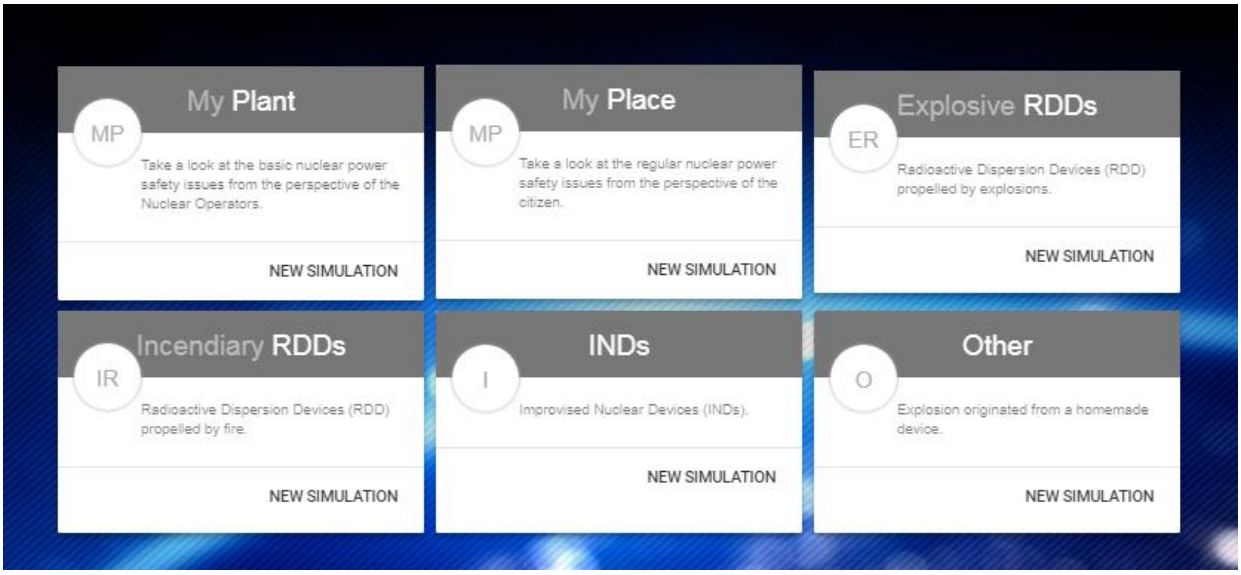
5. Modelul de interfata final al Modulului experimental N-WatchDog

Va reprezenta punctul principal de acces a functionalitatilor implementate in cadrul aplicatiei dezvoltate.

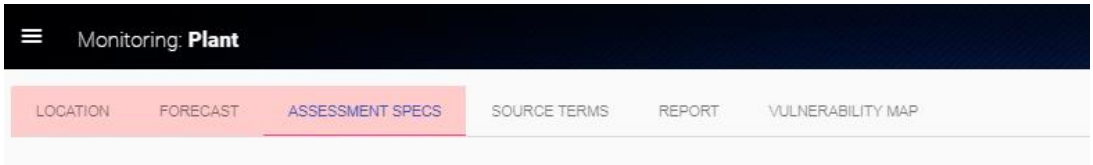
Utilizatorul va avea la dispozitie un meniu in care se vor regasii enumerate modulele prezente in aplicatie.



Pentru un acces facil s-au implementat modalitatilor de acces sub forma unor taburi grafice in cadrul carora se regaseste o descriere succinta a simularii vizate si o pictograma sugestiva.



In cadrul fiecarui modul functionalitatile sunt prezentate in taburi independente denumite sugestiv functie de procesul care se desfasoara la nivelul fiacaruia.

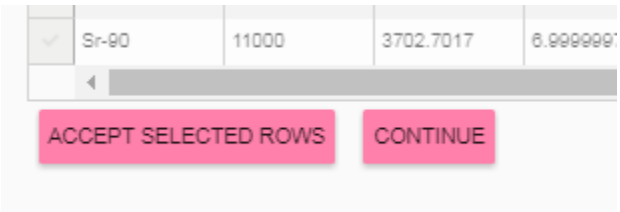


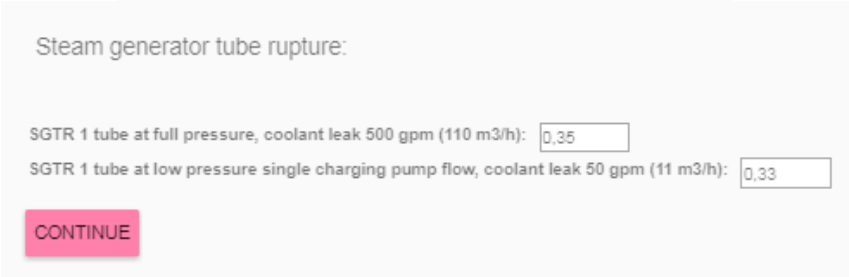
Trecerea la pasul urmator in cadrul unei sumulari se realizeaza utilizand butonul „PROCEED”.

Utilizatorul poate vizualiza gradul de parcurgere al simularii prin urmarirea modificarilor etichetelor taburilor, etapele care au fost parcurse fiind simbolizate diferite de taburile corespunzatoare etapelor ramase de parcurs.

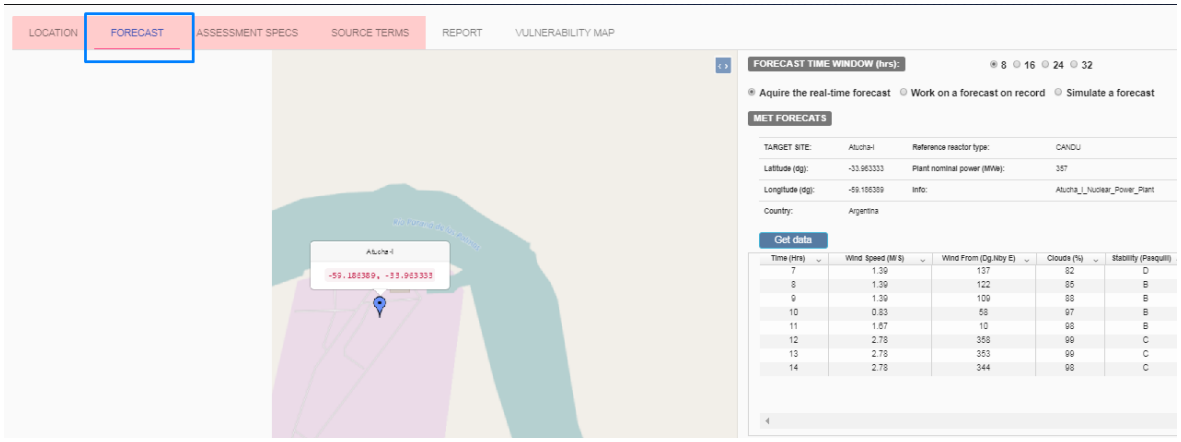
De asemena tabul curent este indicat prin intermediul unui pointer in cadrul unei linii de tip time-line.

Pentru etapele simularii in care exista pasi intermediari de procesare sunt configurate butoane suplimentare in cadrul fiecarui tab care permit trecerea in interfata urmatoare.
Functie de specificul actiunii pe care il indeplinesc aceste butoane poarta etichete sugestive pentru utilizator.





Pentru vizualizarea datelor introduse in etapele anterioare ale simularii se utilizeaza butonul „PREV”. In acest caz in interfata nu se pot face modificari asupra parametrilor deja introdusi, interfata permitand doar vizualizarea datelor introduse anterior



6. Descrierea modulelor implementate in cadrul modulului experimental

Solutia dezvoltata pentru modulul experimental N-WatchDog are o structura modulara, dupa cum urmeaza:

- Modulul ***"My plant"*** permite simularea incidentelor ce pot avea loc in cadrul unei facilitati in care este prezent un reactor nuclear, precum si modul de dispersie al particulelor rezultate si comunitatile afectate;

- Modulul ***"My Place"*** este destinat evaluarii influentelor unui incident ce are loc la nivelul unei facilitati nucleare asupra unei locatii alese de utilizator;

- Modulul ***"Explosive radioactive dispersion devices"*** trateaza cazul unei imprastieri in atmosfera a materialului radioactiv ca urmare a unei explozii;

- Modulul ***"Incendiary radioactive dispersion devices"*** trateaza cazul unei imprastieri in atmosfera de material radioactiv ca urmare a unei incendiu;

- Modulul ***"Improvised nuclear devices"*** abordeaza efectele directe ale detonarii unui dispozitiv improvizat de natura nucelara, precum si modul de imprastiere al particulelor emanate in urma exploziei;

- Modulul ***"Improvised explosive devices"*** ofera o unealta pentru a estima efectele asupra structurilor si a oamenilor, a detonarii unui dipozitiv explozibil care nu are atasata o incarcatura nucleara.

6.1. Componente comune

Rezultatul evaluarii intreprinse in cadrul fiecarui modul din cele prezentate mai sus este reprezentat de un raport de evaluare asupra situatiei simulate.

Pentru realizarea acestui raport, in cadrul modulelor prezentate mai sus sunt parcurse anumite etape care sunt similare in cazul mai multor module.

Aceste etape inglobeaza functionalitati de afisare, vizualizare, cautare sau selectie si nu numai, care se contureaza in cadrul unor componente ce constituie etape individuale in realizarea simularilor.

In continuare sunt prezentate aceste componente cu detalierea functionalitatilor pe care acestea le includ.

6.1.1. Componenta de localizare

Aceasta componenta permite localizarea amplasamentului simularii in cadrul unei interfete grafice intuitive.

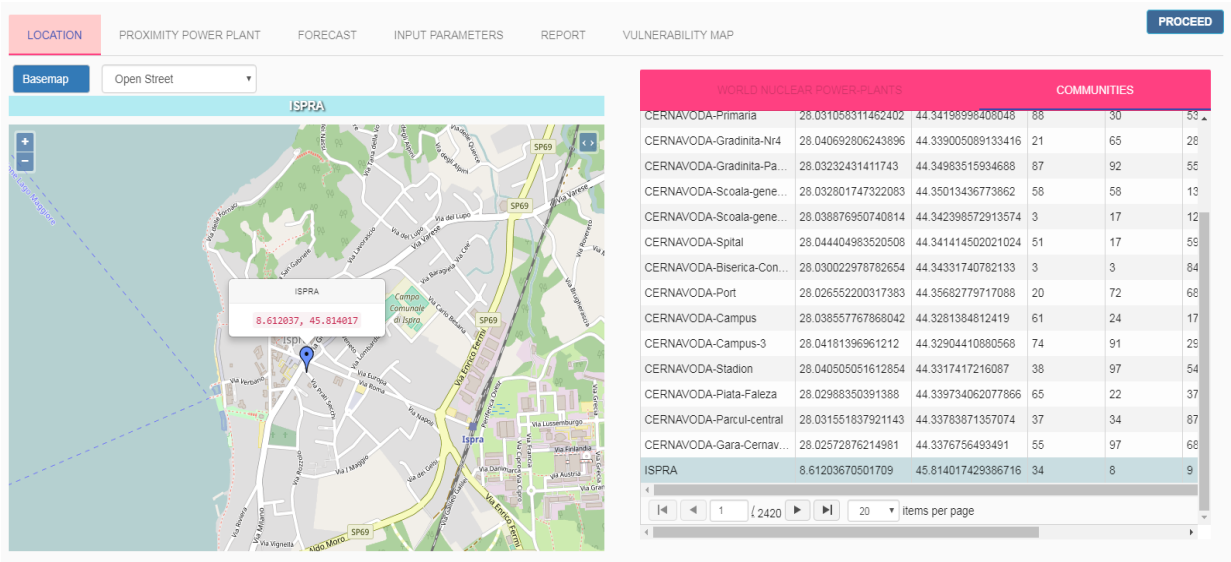
In cadrul acestei componente ai fost dezvoltate urmatoarele functionalitati:

- Afisare in harta a locatiei selectate;
- Navigare in harta (PAN/ZOOM)
- Particularizare harta fundal;
- Afisare lista comunitati;
- Afisare lista facilitati nucleare;
- Cautare in cadrul unei liste;

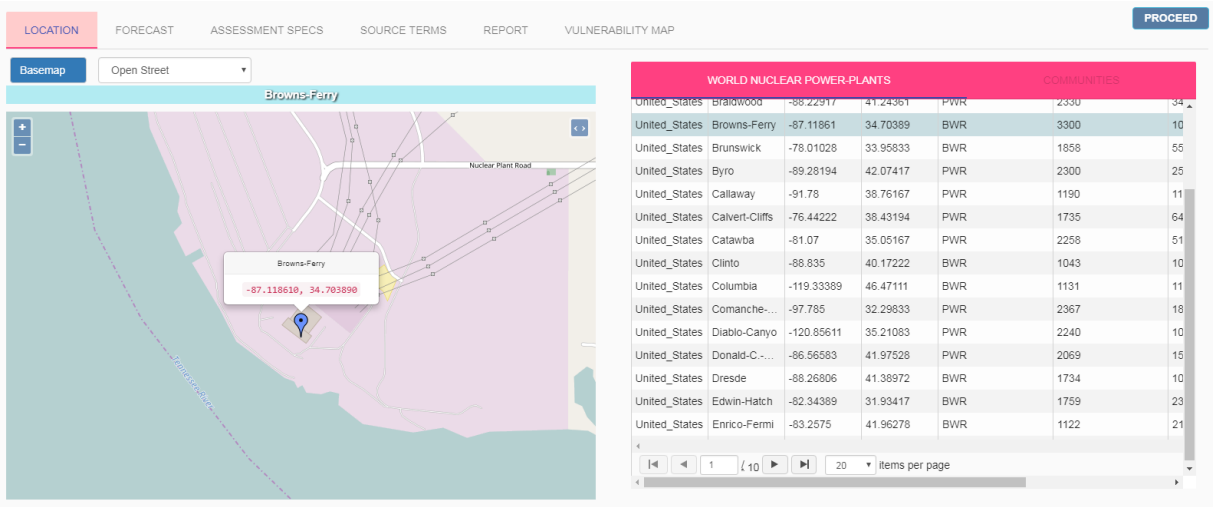
6.1.1.1. Afisare in harta a locatiei selectate

Aceasta functionalitate permite utilizatorilor accesul la o interfata de harta si afisarea coordonatelor geografice ale locatiei selectate.
Locatia poate fi aleasa de utilizator prin multiple modalitati:

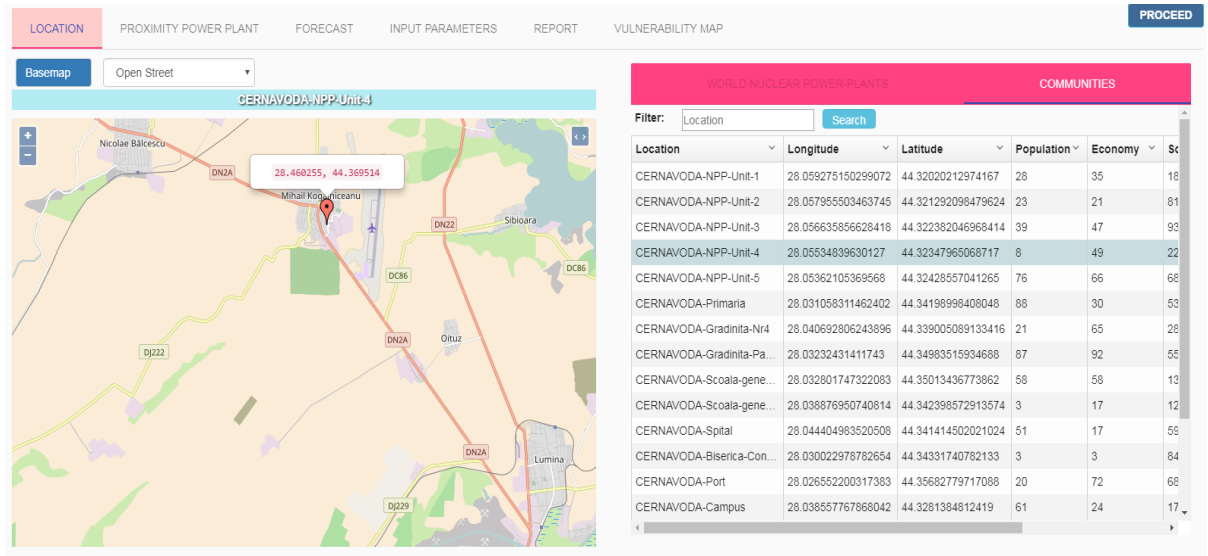
- Alegerea unei in inregistrarile disponibile in lista comunitatilor;



- Alegerea unei inregistrari disponibile in lista centralelor nucleare;



- Alegerea unei locatii in interfata de harta.

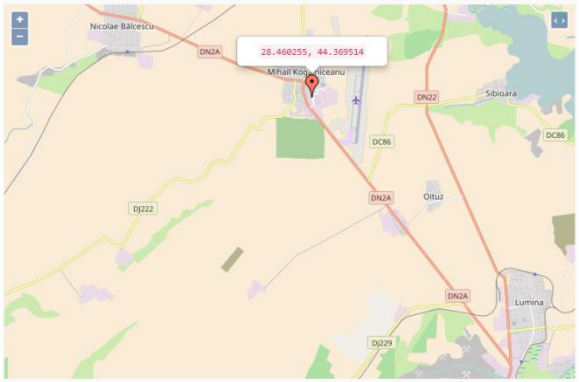


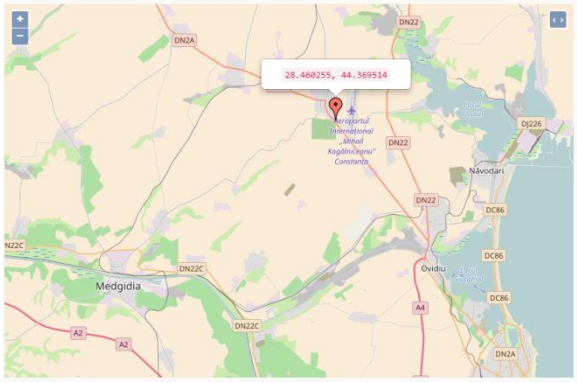
6.1.1.2. Navigarea in harta

Aceaste functionalitati permit utilizatorilor sa afiseze interfata de harta in mod interactiv la diferite scari de zoom.

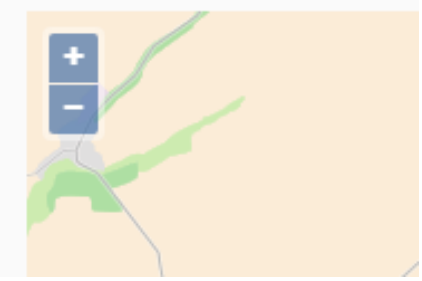
Aceste functionalitati se vor putea accesa astfel:

- Prin intermediul butonul de Scroll al mouse-ului care activeaza optiunile de marire / miscorare (Mouse Scroll Forward pentru zoom in si Mouse Scroll Backward to zoom out);



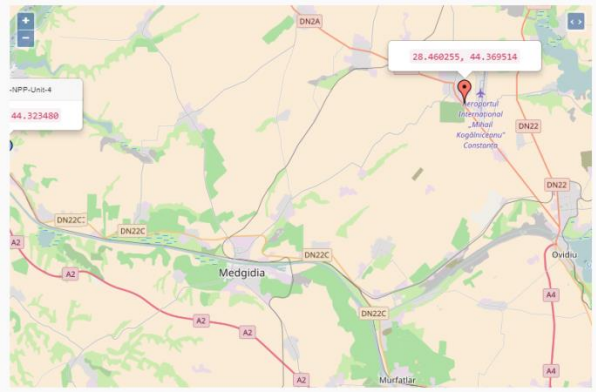


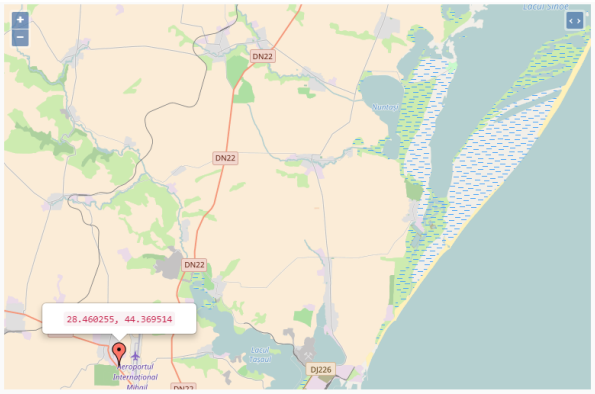
- Implementare zoom widget cu butoane Marire (Zoom in) / Micsorare (Zoom out) in cadrul barei de unelte care permite marirea sau micsorarea scarii de lucru.



Functionalitatea de PAN ofera posibilitatea de deplasare in interfata de harta, fara a modifica scara de afisare, utilizand butonul M1 (mouse stanga) sau butonul Scroll al mouse-ului. Aceasta functionalitate se va accesa astfel:

- Se tine apasat butonul M1 sau butonul Scroll al mouse-ului si se efectueaza deplasarea in interfata harta. Harta se deplaseaza conform comenzilor efectuate.

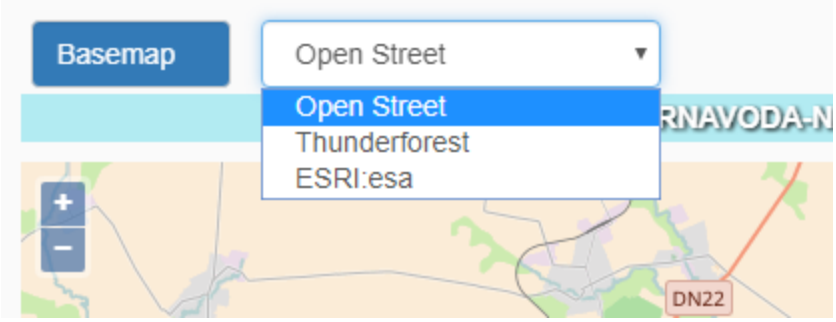




6.1.1.3. Particularizare harta fundal

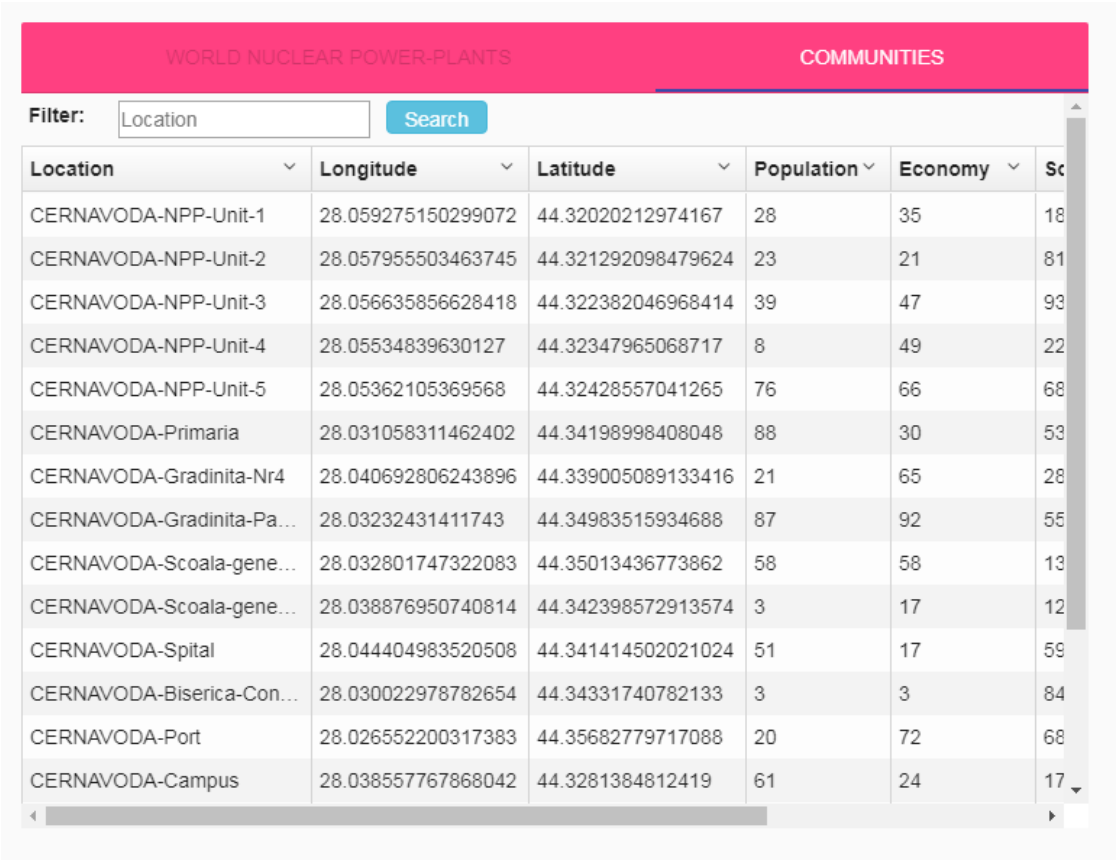
Prin intermediul acestei functionalitati se pune la dispozitia utilizatorilor un set de harti de fundal. Acestea pot fi accesate pentru particularizarea intefetei de harta.

S-a dezvoltat o sectiune denumita Basemap in interfata principala, care va accesa acest set de harti. Lista de optiuni include harti furnizate de Open Street Map, Thunderforest si ESA.



6.1.1.4. Afisare lista comunitati

In cadrul etapei de definire a locatiei pentru care se porneste o simulare, utilizatorul are la dispozitie lista aferenta comunitatilor din care poate alege o locatie predefinita.



Location	Longitude	Latitude	Population	Economy	Sc
CERNAVODA-NPP-Unit-1	28.059275150299072	44.32020212974167	28	35	18
CERNAVODA-NPP-Unit-2	28.057955503463745	44.321292098479624	23	21	81
CERNAVODA-NPP-Unit-3	28.056635856628418	44.322382046968414	39	47	93
CERNAVODA-NPP-Unit-4	28.05534839630127	44.32347965068717	8	49	22
CERNAVODA-NPP-Unit-5	28.05362105369568	44.32428557041265	76	66	68
CERNAVODA-Primaria	28.031058311462402	44.34198998408048	88	30	53
CERNAVODA-Gradinita-Nr4	28.040692806243896	44.339005089133416	21	65	28
CERNAVODA-Gradinita-Pa...	28.03232431411743	44.34983515934688	87	92	55
CERNAVODA-Scoala-gene...	28.032801747322083	44.35013436773862	58	58	13
CERNAVODA-Scoala-gene...	28.038876950740814	44.342398572913574	3	17	12
CERNAVODA-Spital	28.044404983520508	44.341414502021024	51	17	59
CERNAVODA-Biserica-Con...	28.030022978782654	44.34331740782133	3	3	84
CERNAVODA-Port	28.026552200317383	44.35682779717088	20	72	68
CERNAVODA-Campus	28.038557767868042	44.3281384812419	61	24	17

Pentru aceasta lista sunt definite capabilitati de paginare a inregistrarilor pentru o vizualizare interactiva a inregistrarilor.

AALBORG	9.917771	57.028811	58	57	30
AALST	4.0409517	50.9378101	65	75	77
Aarau	8.05	47.39	49	4	37
Aarberg	7.28	47.05	33	98	88
Aarburg	7.91	47.32	90	40	32
AARGUS-POLY-BAG-CO	-88.0275	42.0975	4	26	80
Aarschot	4.83124	50.98264	75	24	23
Aart	4.98505	51.19828	59	70	64
Aarwangen	7.76	47.24	26	41	61
Aasleagh	-9.666667	53.61667	2	29	65
Aawangen	8.9	47.52	48	95	90
ABA	35.171969	32.95803	34	43	40

1 / 1647 20 items per page

20
40
80

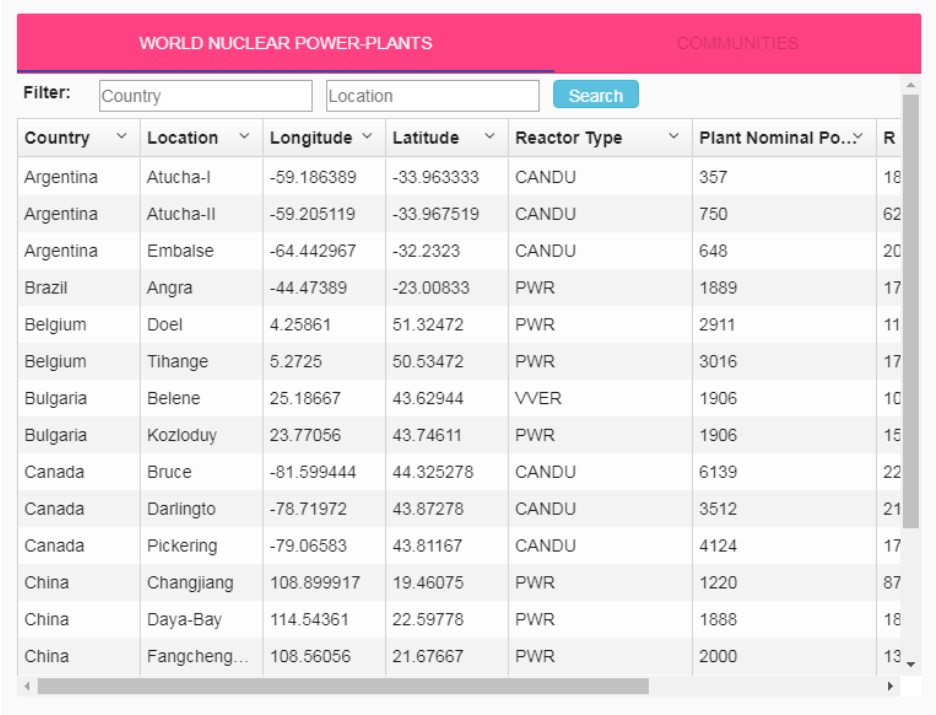
Pentru regasirea inregistrarilor intr-o maniera facila sunt de asemenea introduse facilitati de sortare a inregistrarilor dupa denumirea locatiei.

Location	Longitude	Latitude	Population	Economy	Sc
Aabenraa	9.433333	55.03333	86	7	17
Aachen	6.105277	50.77083	64	99	13
AACHEN	6.0838868	50.7753455	72	82	93
Aadorf	8.91	47.49	99	87	58
Aalborg	9.933333	57.05	81	17	26
AALBORG	9.917771	57.028811	58	57	30
AALST	4.0409517	50.9378101	65	75	77
Aarau	8.05	47.39	49	4	37
Aarberg	7.28	47.05	33	98	88
Aarburg	7.91	47.32	90	40	32
AARGUS-POLY-BAG-CO	-88.0275	42.0975	4	26	80
Aarschot	4.83124	50.98264	75	24	23
Aart	4.98505	51.19828	59	70	64
Aarwangen	7.76	47.24	26	41	61

6.1.1.5. Afisare lista facilitati nucleare

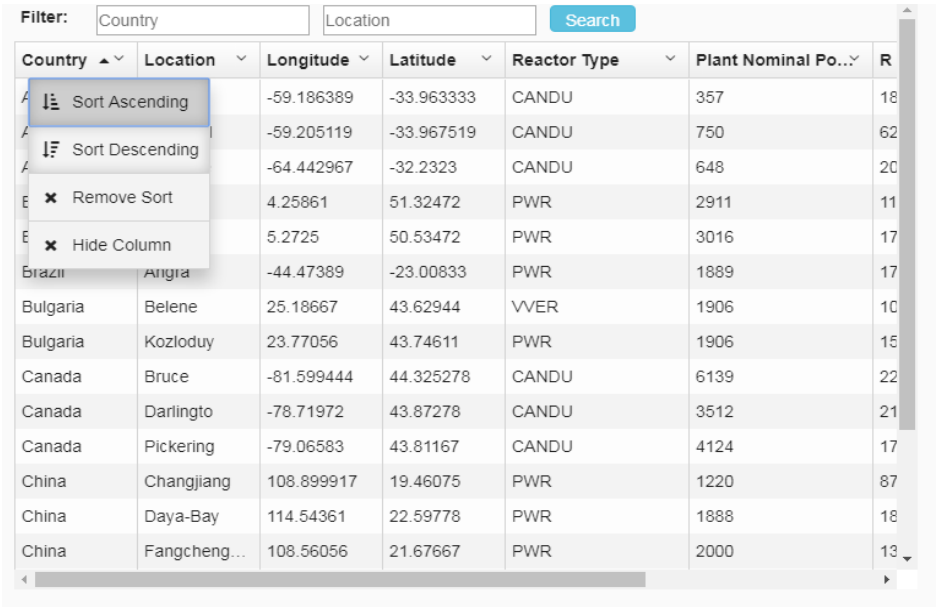
In cadrul etapei de definire a locatiei pentru care se genereaza o simulare, utilizatorul are la dispozitie lista facilitatilor in care exista reactoare nucleare. Utilizand aceasta lista se poate alege o locatie predefinita.

Pentru aceasta lista sunt definite capabilitati de paginare a inregistrarilor pentru o vizualizare interactiva a inregistrarilor.



Country	Location	Longitude	Latitude	Reactor Type	Plant Nominal Po...	R
Argentina	Atucha-I	-59.186389	-33.963333	CANDU	357	18
Argentina	Atucha-II	-59.205119	-33.967519	CANDU	750	62
Argentina	Embalse	-64.442967	-32.2323	CANDU	648	20
Brazil	Angra	-44.47389	-23.00833	PWR	1889	17
Belgium	Doel	4.25861	51.32472	PWR	2911	11
Belgium	Tihange	5.2725	50.53472	PWR	3016	17
Bulgaria	Belene	25.18667	43.62944	VVER	1906	10
Bulgaria	Kozloduy	23.77056	43.74611	PWR	1906	15
Canada	Bruce	-81.599444	44.325278	CANDU	6139	22
Canada	Darlingto	-78.71972	43.87278	CANDU	3512	21
Canada	Pickering	-79.06583	43.81167	CANDU	4124	17
China	Changjiang	108.899917	19.46075	PWR	1220	87
China	Daya-Bay	114.54361	22.59778	PWR	1888	18
China	Fangcheng...	108.56056	21.67667	PWR	2000	13

Pentru regasirea inregistrarilor intr-o maniera facila sunt de asemenea introduse facilitati de sortare a inregistrarilor dupa denumirea locatiei centralei nucleare, precum si dupa tara.



Country	Location	Longitude	Latitude	Reactor Type	Plant Nominal Po...	R
A		-59.186389	-33.963333	CANDU	357	18
A		-59.205119	-33.967519	CANDU	750	62
A		-64.442967	-32.2323	CANDU	648	20
B		4.25861	51.32472	PWR	2911	11
B		5.2725	50.53472	PWR	3016	17
Brazil	Angra	-44.47389	-23.00833	PWR	1889	17
Bulgaria	Belene	25.18667	43.62944	VVER	1906	10
Bulgaria	Kozloduy	23.77056	43.74611	PWR	1906	15
Canada	Bruce	-81.599444	44.325278	CANDU	6139	22
Canada	Darlingto	-78.71972	43.87278	CANDU	3512	21
Canada	Pickering	-79.06583	43.81167	CANDU	4124	17
China	Changjiang	108.899917	19.46075	PWR	1220	87
China	Daya-Bay	114.54361	22.59778	PWR	1888	18
China	Fangcheng...	108.56056	21.67667	PWR	2000	13

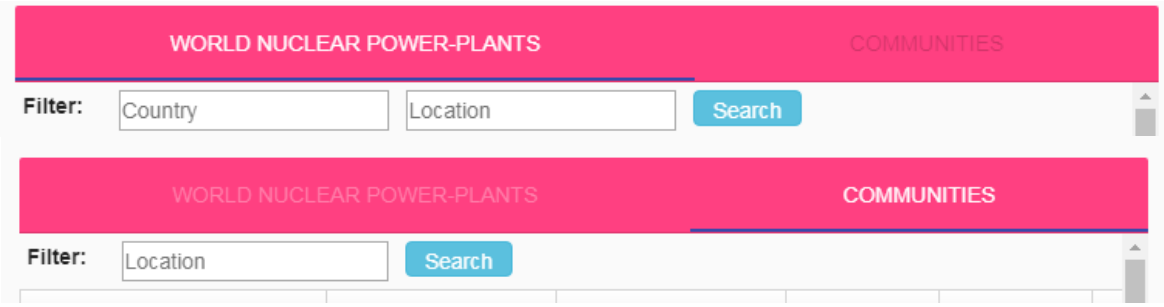
6.1.1.6. Cautare in cadrul unei liste

Afisarea celor doua tipuri de liste se realizeaza in cadrul aceleiasi sectiuni a interfetei aplicatiei prin comutarea celor doua taburi displonibile:

- WORLD NUCLEAR POWER-PLANTS;
- COMMUNITIES.

Functie de specificul fiecarui modul dezvoltat(My place, My Plant, Explosion RDDs, s.a.) se particularizeaza interfata de intrare aplicatiei prin dezactivarea taburilor care nu sunt de interes;

Pentru regasirea facila in cadrul listelor s-a dezvoltat o sectiune de filtrare a acestora in care se poate realiza interogare functie de denumirea facilitatii, tara, sau denumirea locatiei centralei nucleare.



6.1.2. Componenta de achizitie a datelor meteo

Acesta componenta este integrata in toate modulele aplicatiei si trateaza trei cazuri de achizitie de date meteo:

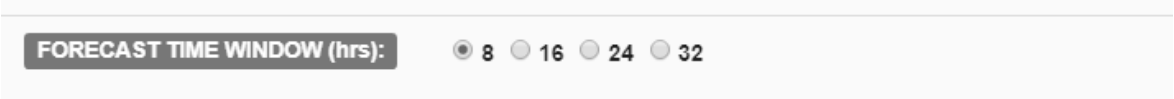
- Achizitie in timp real a dateleor meto;
- Regasirea unei prognoze stocate anterior;
- Simularea unei prognoze meteo de catre utilizator.

Functionalitatile dezvoltate pentru aceasta componenta sunt urmatoarele:

- Selectarea ferestrei de timp pentru achizitia datelor in timp real;
- Selectarea cazului de achizitia a datelor meteo;
- Afisare detalii generale date meteo;
- Achizitie date meteo in timp real;
- Listare date meteo stocate;
- Editare date meteo pentru simulare.

6.1.2.1. Selectarea intervalului de timp pentru achizitia datelor in timp real;

In cazul preluarii datelor in timp real utilizatorul are la dispozitie o functionalitate care permite selectia a perioadei de prognoza.



6.1.2.2. Selectarea cazurilor de achizitie a datelor meteo

Pentru selectarea modului de introducere a datelor meteo s-au implementat butoane radio pentru fiecare din obtiunile disponibile. In functie de butonul selectat se face si adaptarea interfetei de afisare adatelor meteo.

6.1.2.3. Afisare detalii generale date meteo

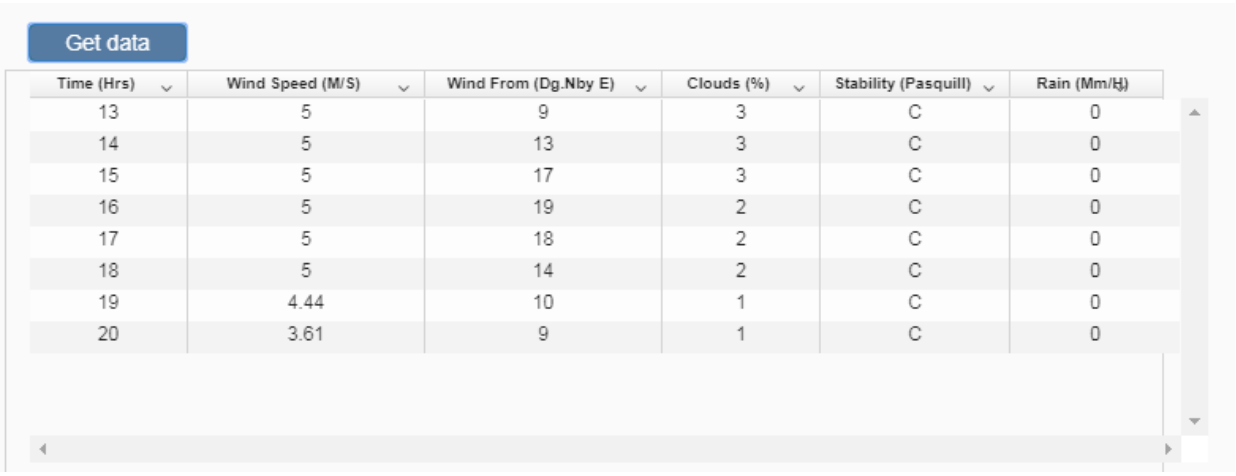
Aceasta functionalitate permite afisarea detaliilor generale ale centralei nucleare, precum si a detaliilor legate de datele meteo: sursa datelor, data de achizitie si temperatura la momentul evenimentului.

6.1.2.4. Achizitie date meteo in timp real

Aceasta functionalitate este declansata de atasarea butonului „Get data” care determina afisarea datelor furnizate in timp real de serviciul meteo pentru perioada aleasa de utilizator.

Datele sunt furnizate la intervale de o ora pentru perioada aleasa si cuprind urmatoarele informatii:

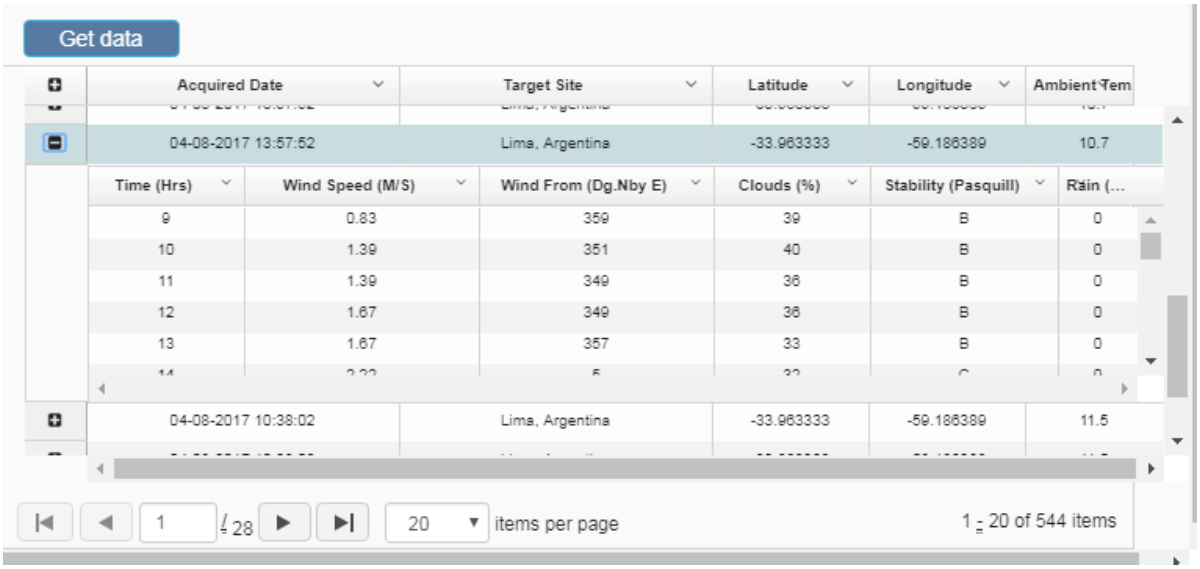
- Viteza vantului;
- Directia vantului;
- Gradul de acoperire cu nori;
- Stabilitatea atmosferica;
- Nivelul de precipitatii.



Time (Hrs)	Wind Speed (M/S)	Wind From (Dg.Nby E)	Clouds (%)	Stability (Pasquill)	Rain (Mm/H)
13	5	9	3	C	0
14	5	13	3	C	0
15	5	17	3	C	0
16	5	19	2	C	0
17	5	18	2	C	0
18	5	14	2	C	0
19	4.44	10	1	C	0
20	3.61	9	1	C	0

6.1.2.5. Listare date meteo stocate

Aceasta functionalitate este corelata cu optiunea de utilizare a datelor meteo existente in inregistrari, interfata de afisare fiind particularizata in functie e optiunea aleasa.



Lista fisierelor meteo stocate contine pentru fiecare inregisterare urmatoarele informatii:

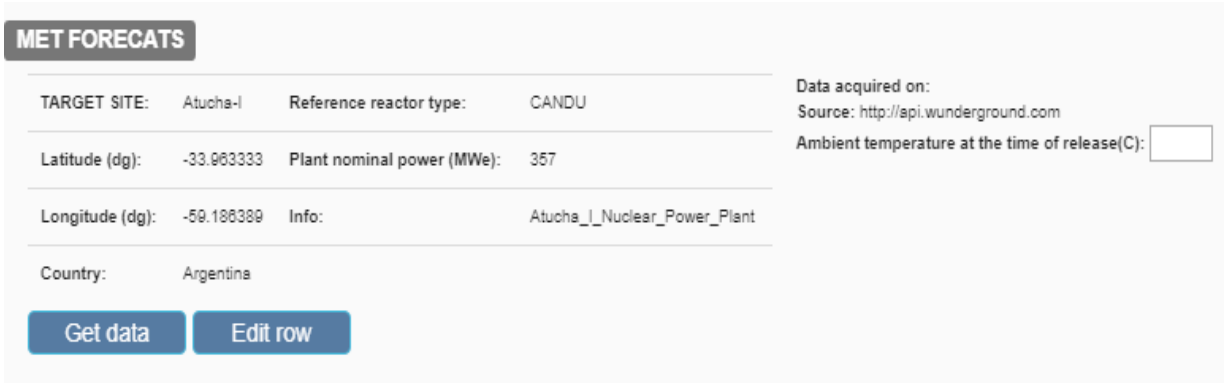
- Data de achizitie;
- Denumirea locatiei;
- Latitudine;
- Longitudine;
- Temperatura ambientala;

Pentru fiecare fisier din lista sunt disponibile pentru vizualizare inregistrarile la fiecare ora asupra parametrilor meteo. Parametrii stocati sunt aceiasi cu cei prezentati la achizitia datelor meteo in timp real.

Interfata dispune de paginare si de posibilitatea de particularizare a numarului de inregistrari afisate in cadrul unei pagini.

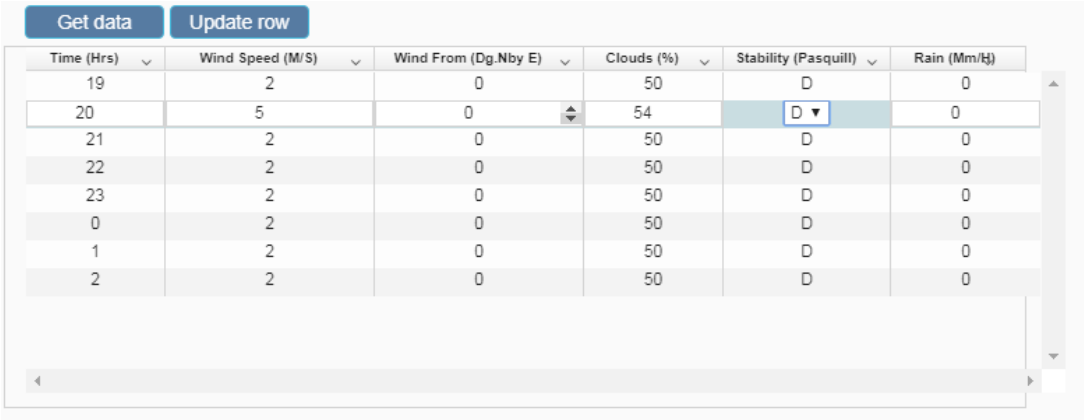
6.1.2.6. Editare date meteo pentru simulare

Aceasta functionalitate este corelata cu optiunea de simulare a datelor meteo, interfata de afisare fiind particularizata in functie e optiunea aleasa.



In cadrul acestei functionalitati se ofera posibilitatea de editare a parametrilor meteo, astfel ca utilizatorul poate insera o valoare a temperaturii mediului la locul simularii.

Pentru editarea inregistrarilor se foloseste butonul „Edit row” care va permite utilizatorului sa introduca noi valori pentru parametrii alesi.



Time (Hrs)	Wind Speed (M/S)	Wind From (Dg.Nby E)	Clouds (%)	Stability (Pasquill)	Rain (Mm/H)
19	2	0	50	D	0
20	5	0	54	D	0
21	2	0	50	D	0
22	2	0	50	D	0
23	2	0	50	D	0
0	2	0	50	D	0
1	2	0	50	D	0
2	2	0	50	D	0

Pentru editarea valorilor sunt implementate butoane ajutatoare pentru incrementarea si decrementarea valorilor, precum si liste de alegere a parametrilor predefiniti (stabilitate atmosferica). Dupa finalizarea editarii unei inregistrari, modificarile se accepta utilizand butonul „Update row”.

6.1.3. Componenta de configurare a termenului sursa utilizat in cadrul simulariilor

In cadrul acestei etape sunt inglobate functionalitati similare cu cele din etapa precedenta, și anume de introducere a paramtrilor specifici simularii sub diferite forme:

- Casuta text;
- Tabele interactive cu valori predefinite;
- Liste derulante cu variante ale parametrilor.

Parametri introdusi in aceasta etapa a simularii sunt configurati in pasi intermediari care permit simularea unei actiuni specifice, functie de parametri selectati in pasul precedent.
Acest tip de functionalitate permite implementarea unui proces ramificat controlat, in care utilizatorul poate urma oricare dintre ramurile disponibile functie de obtiunile anterioare.
Acesti pasi intermediari sunt dupa cum urmeaza:

6.1.3.1. Selectarea modului de configurare a termenului sursa

Aceasta functionalitate permite 3 modalitati de alegere a termenului sursa:

- Generarea unui termen sursa functie de o situatie simulata;
- Generarea unui termen sursa functie de specificatiile unui operator;
- Utilizarea unui termen sursa configurat anterior.

In cazul generarii unui termen sursa pe baza unei situatii simulate se vor parcurge o serie de pasi intermediari.

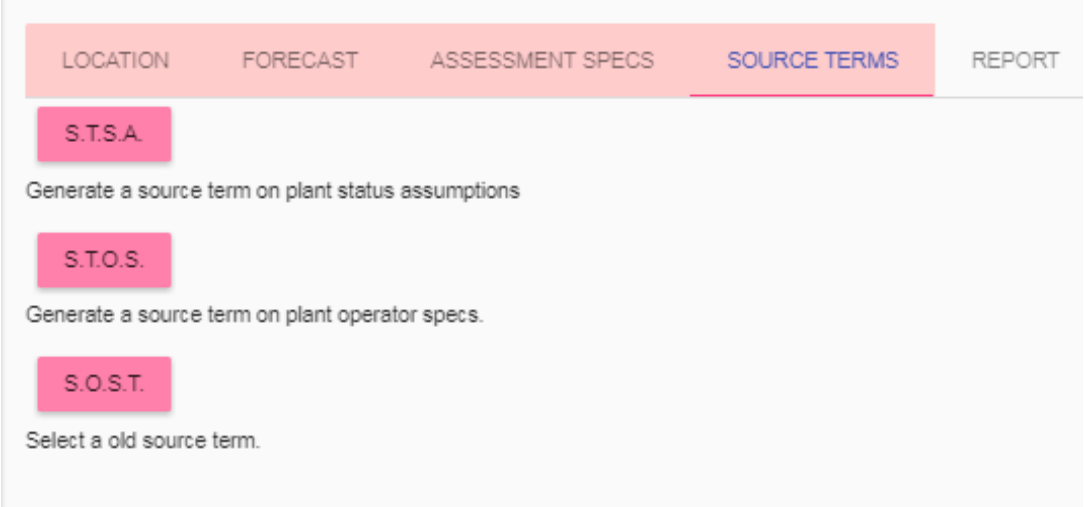
Introducerea datelor referitoare la nuclide reprezinta primul pas, in care se selecteaza pe baza unui tabel interactiv , doar valorile considerate reprezentative pentru simularea resepctiva.

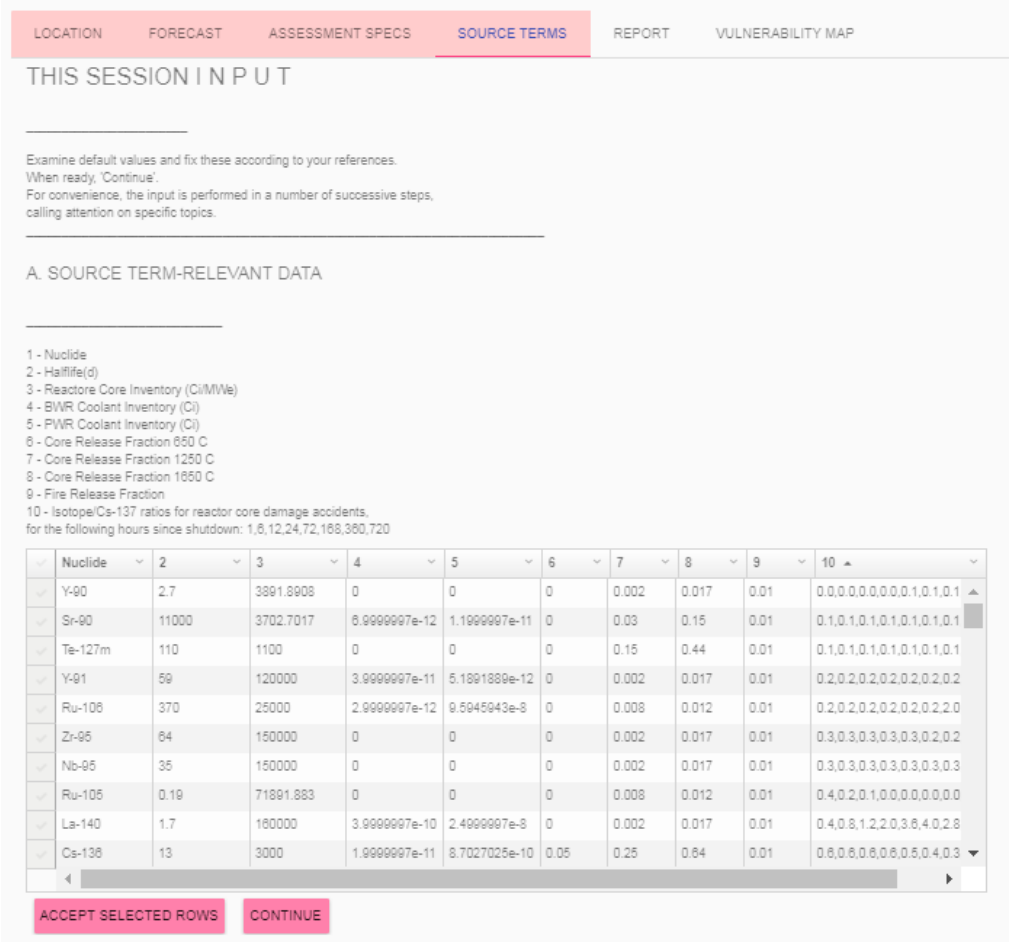
Interfata curpinde o scurta introducere a modului de structurare al acestei etape, precum și o descriere a coloanelor tabelului care contine lista de nuclizi.

Utilizand functii de selectie, sau selectie multipla se pot selecta valorile dorite in cadrul acestui tabel.

Selectia efectuata este confirmata de utilizator prin apasarea butonului „ACCEPT SELECTED ROWS”.

Trecerea la pasul urmator se face prin apasarea butonului “CONTINUE”





Nuclide	2	3	4	5	6	7	8	9	10
Y-90	2.7	3891.8908	0	0	0	0.002	0.017	0.01	0.0,0.0,0.0,0.0,0.0,0.1,0.1,0.1
Sr-90	11000	3702.7017	6.9999997e-12	1.1999997e-11	0	0.03	0.15	0.01	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1
Te-127m	110	1100	0	0	0	0.15	0.44	0.01	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1
Y-91	59	120000	3.9999997e-11	5.1891889e-12	0	0.002	0.017	0.01	0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2
Ru-106	370	25000	2.9999997e-12	9.5945943e-8	0	0.008	0.012	0.01	0.2,0.2,0.2,0.2,0.2,0.2,0.2,2.0
Zr-95	64	150000	0	0	0	0.002	0.017	0.01	0.3,0.3,0.3,0.3,0.3,0.3,0.2,0.2
Nb-95	35	150000	0	0	0	0.002	0.017	0.01	0.3,0.3,0.3,0.3,0.3,0.3,0.3,0.3
Ru-105	0.19	71891.883	0	0	0	0.008	0.012	0.01	0.4,0.2,0.1,0.0,0.0,0.0,0.0,0.0
La-140	1.7	160000	3.9999997e-10	2.4999997e-8	0	0.002	0.017	0.01	0.4,0.8,1.2,2.0,3.6,4.0,2.8
Cs-136	13	3000	1.9999997e-11	8.7027025e-10	0.05	0.25	0.64	0.01	0.6,0.6,0.6,0.6,0.5,0.4,0.3

A. SOURCE TERM-RELEVANT DATA

1 - Nuclide
2 - Halflife(d)
3 - Reactore Core Inventory (Ci/MWe)
4 - BWR Coolant Inventory (Ci)
5 - PWR Coolant Inventory (Ci)
6 - Core Release Fraction 650 C
7 - Core Release Fraction 1250 C
8 - Core Release Fraction 1650 C
9 - Fire Release Fraction
10 - Isotope/Cs-137 ratios for reactor core damage accidents,
for the following hours since shutdown: 1,6,12,24,72,168,360,720

Nuclide	2	3	4	5	6	7	8	9	10
Y-90	2.7	3891.8908	0	0	0	0.002	0.017	0.01	0.0,0.0,0.0,0.0,0.0,0.1,0.1,0.1
Sr-90	11000	3702.7017	6.9999997e-12	1.1999997e-11	0	0.03	0.15	0.01	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1
Te-127m	110	1100	0	0	0	0.15	0.44	0.01	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1
Y-91	59	120000	3.9999997e-11	5.1891889e-12	0	0.002	0.017	0.01	0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2
Ru-106	370	25000	2.9999997e-12	9.5945943e-8	0	0.008	0.012	0.01	0.2,0.2,0.2,0.2,0.2,0.2,0.2,0
Zr-95	64	150000	0	0	0	0.002	0.017	0.01	0.3,0.3,0.3,0.3,0.3,0.3,0.2,0.2
Nb-95	35	150000	0	0	0	0.002	0.017	0.01	0.3,0.3,0.3,0.3,0.3,0.3,0.3,0.3

ACCEPT SELECTED ROWS CONTINUE

6.1.3.2. Selectarea parametrilor legati de aerosoli/ fractii nucleare

In pasul urmator se face setarea parametrilor referitor la aerosoli. In cadrul acestei sectiuni utilizatorul are la dispozitie posibilitate de editare a valorilore in cadrul casutelor text.

B. PARTICULATE/AEROSOL RELEASE REDUCTION FACTORS

Standby Gas Treatment System filters:

Dry-low pressure flow: 0,01
Wet-high pressure flow (blowout): 1

Other Filters:

Other dry-low pressure: 1
Other wet-high pressure flow (blowout): 1

Subpression Pool Scrubbing:

Pool sub-cooled 0.5-1.0 m: 0,5
Pool sub-cooled 1.0-2.0 m: 0,1
Pool sub-cooled > 2.0 m: 0,05

Pool saturated: 1
Pool bypass: 1

Removal of Suspended Aerosols and Particulate:

Natural processes, no sprays, < 1 hour holdup time: 0,75
Natural processes, no sprays, 1 to 12 hour holdup time: 0,36
Natural processes, no sprays, > 12 hour holdup time: 0,03

Spray on, < 1 hour holdup time: 0,03
Spray on, 1 to 12 hour holdup time: 0,02
Spray on, > 12 hour holdup time: 0,01

Ice Condenser:

One pass through condenser: 0,5
Continual recirculation through condenser: 0,25
Ice bed exhausted before core damage: 1

Primary System Retention (plate-out):

Plate-out in bypass accidents: 0,2

Steam generator partitioning, liquid release from reactor cooling system:

Steam generator partitioned: 0,02
Steam generator not partitioned: 0,5
Air ejector: 0,02

In cadrul aceluiasi pas intermediar se face setarea parametrilor referitori la fractiile eliberate urmata de continuarea la pasul urmator prin accesarea butonului “CONTINUE”.

C. ESCAPE FRACTIONS

Primary containment failure leakage:

PWR large dry or subatmospheric containment, design leakage: 0,00004
PWR ice condenser, design leakage: 0,0001
BWR, at 0.5%/day, design leakage: 0,0002

Failure to isolate, 100%/day - via compromised isolation valve seal: 0,04
Catastrophic failure, 100%/hour puff: 1

Steam generator tube rupture:

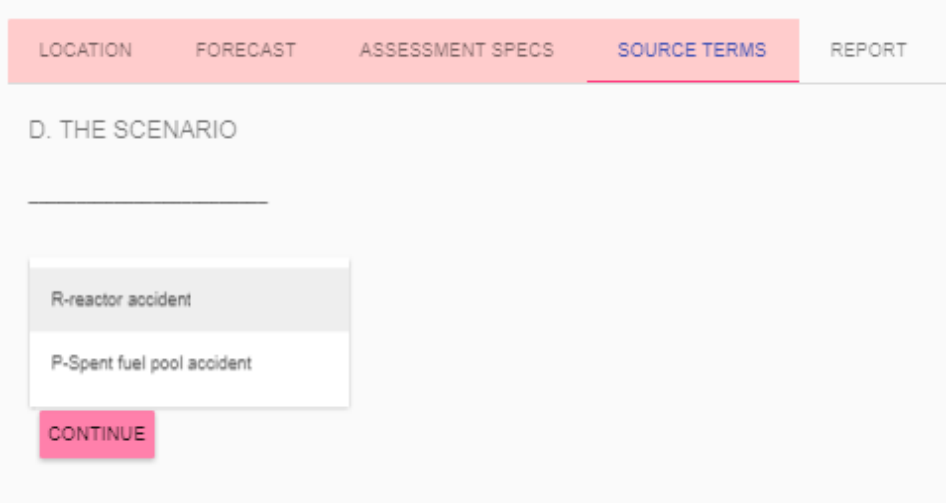
SGTR 1 tube at full pressure, coolant leak 500 gpm (110 m3/h): 0,35
SGTR 1 tube at low pressure single charging pump flow, coolant leak 50 gpm (11 m3/h): 0,33

CONTINUE

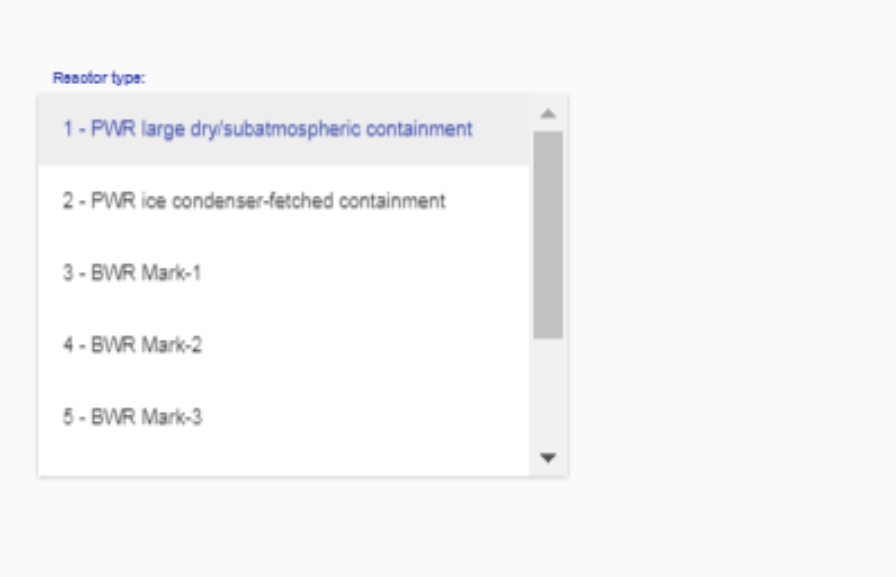
6.1.3.3. Configurarea scenariului

In urmatorul pas al acestei etape se realizeaza selectia tipului de scenariu.

Pentru alegerea tipului de scenariu este implementata o fuctionalitate de selectie din cadrul unei liste de scenarii predefinite disponibile.



In pasul urmator se ofera posibilitatea de configura a tipul reactorului. Si in acest caz este implementata functionalitatea de selectie pe baza a unei liste de valori predefinite



Pe baza valorilor setate anterior, in pasul urmator al simularii sunt vizualizati o serie de parametri specifici scenariului ales pentru care se pot modifica in mod interactiv valorile in vadrul casuteleor text disponibile.

LOCATION | FORECAST | ASSESSMENT SPECS | SOURCE TERMS | REPORT | VULNERABI

D. THE SCENARIO

Abnormal occurence type:
specify from: R - Reactor accident
P - Spent Fuel Pool accident

Reactor type:
specify from: 1 - PWR large dry/subatmospheric containment
2 - PWR ice condenser-fetched containment
3 - BWR Mark-1
4 - BWR Mark-2
5 - BWR Mark-3
6 - VVER-440-V213
7 - VVER-440-V230
8 - VVER-1000

Reactor power (MWe): 1000
Reactor coolant mass(kg)*: 250000

Time since shutdown(hrs)**: 0,5
Primary system pressure, following occurence (MPa): 12,5
Primary coolant temperature at core exit, following occurence (C): 310

* In the sequel, coolant mass is relevant only in accidents involving coolant (as opposed to core) inventories.
** May be useful for core inventory corrections if, after an unscheduled shutdown core integrity is however maintained for up to one month. For a few hours, ignoring the shutdown correction is tolerable; otherwise the neglect would turn the estimation conservative by a factor of 1.5-3 or more, especially if short-lived isotopes prevail in the mix.
Since, overall, the issue is debatable change the 0.5 hrs default only you feel truly compelled to.

CONTINUE

Pe baza datelor introduse se ofera o posibila evolutie a situatiei in cazul simularii efectuate sub forma unor evenimente probabile.

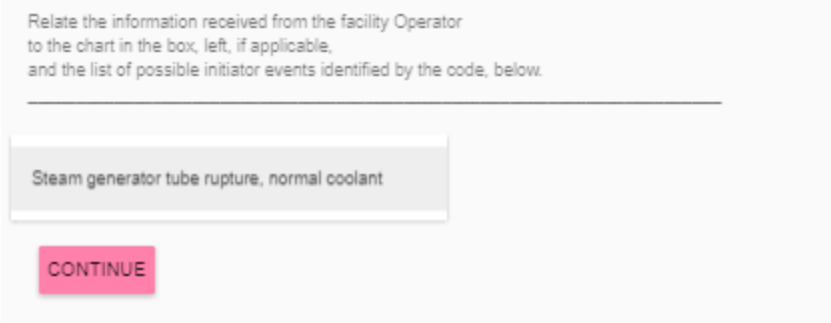
In consideration of the data above, the code issues the following

CORE DIAGNOSE CORE COVERED. Subcooling margin: positive.

RELEASE INITOATOR EVENTS POSSIBLE,
in consideration of the input

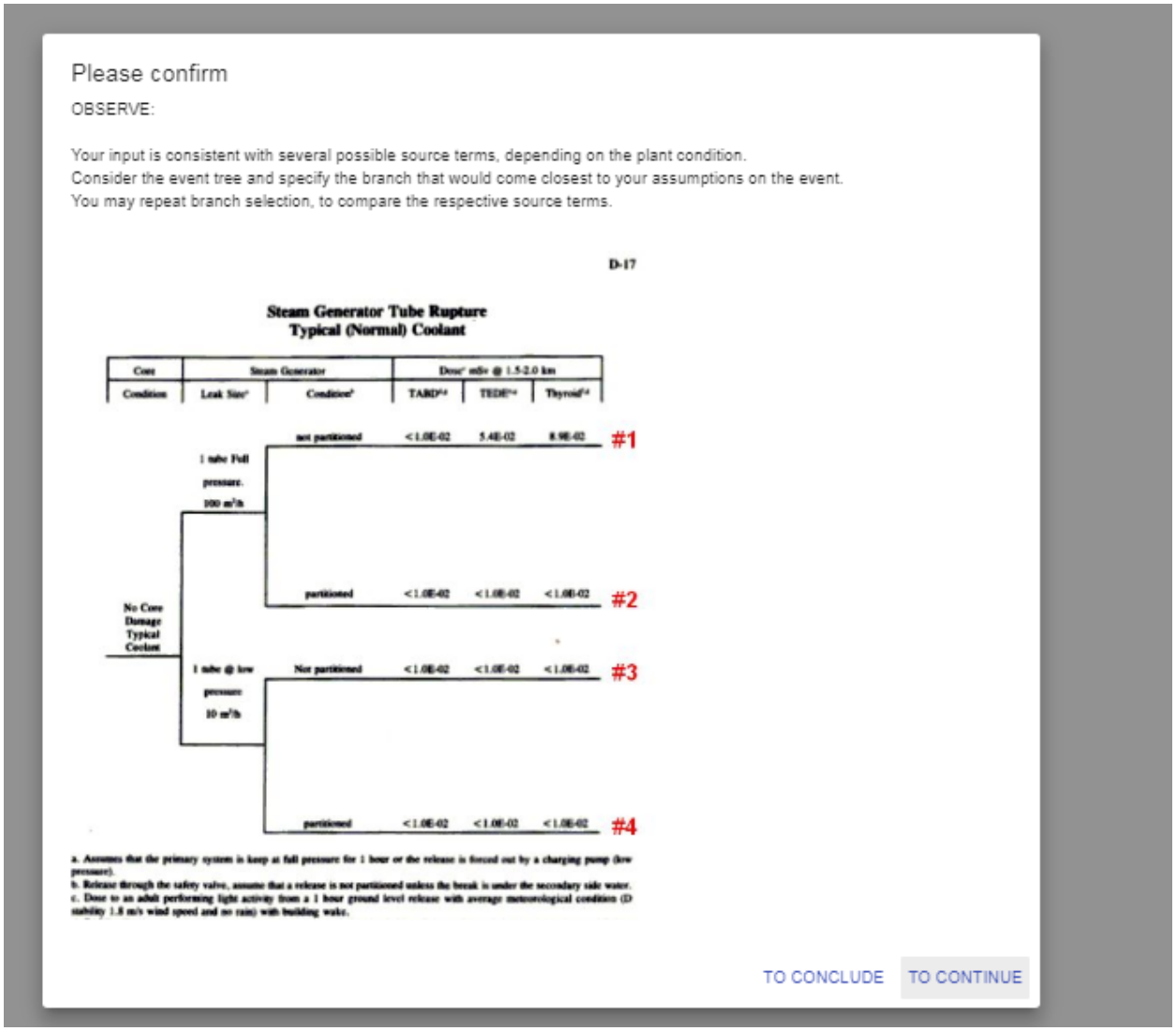
Relate the information received from the facility Operator
to the chart in the box, left, if applicable,
and the list of possible initiator events identified by the code, below.

CONTINUE

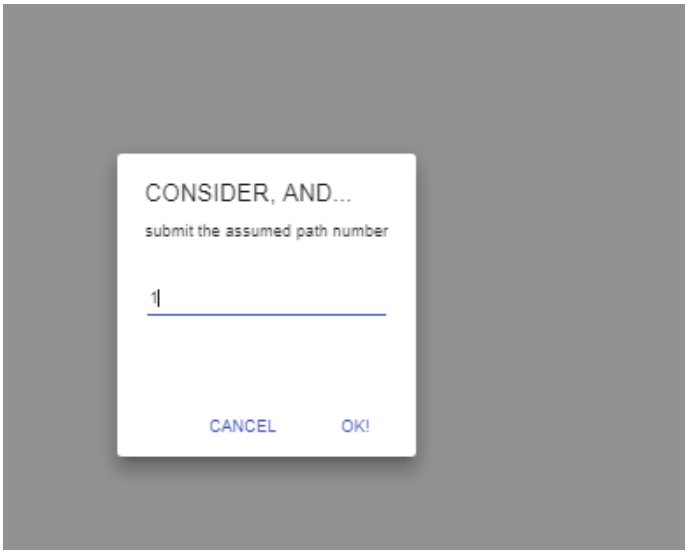


6.1.3.4. Alegerea unei posibile situatii de evolutie a simularii

Pe baza evenimentului selectat se ofera utilizatorului posibilitatea de a evalua alegerea unui termen sursa pe baza unei diagrame. Fiecare actiune probabila este inventariata si afisata in figura.



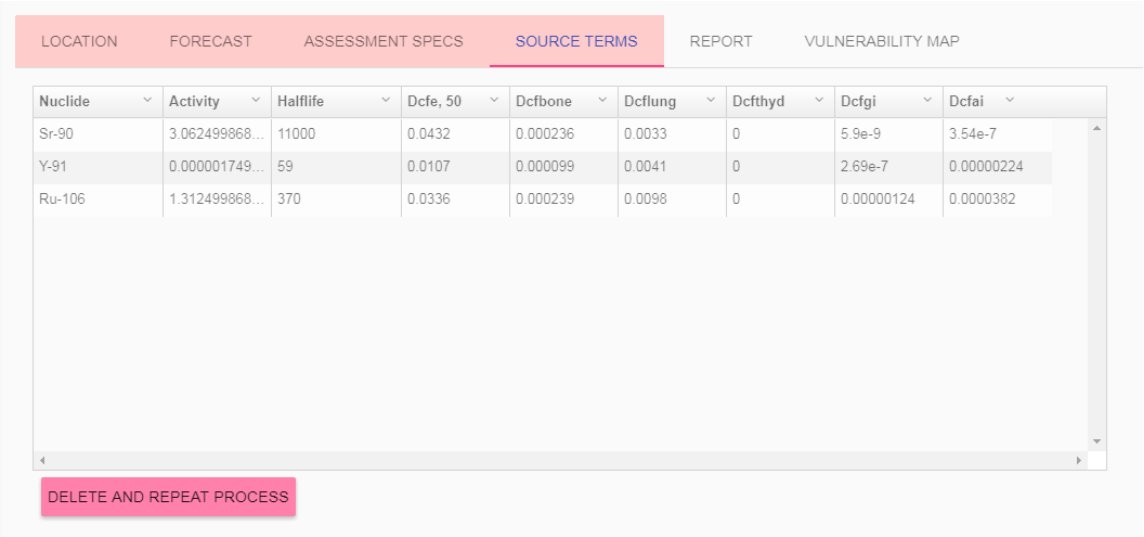
Utilizatorul are la dispozitie o fereastra interactiva in care introduce valoarea cea mai probabila pentru simularea efectuata.



6.1.3.5. Afisarea rezultatelor configurarii termenului sursa

In cadrul interfetei din pasul final al generarii termenului sursa se afiseaza informatiile relevante legate de acesta.

Utilizatorul are posibilitatea de a acepta rezultatele genererii termenului sursa prin apasarea butonului PROCEED care face trecerea la etapa urmatoarea, reprezentata prin pasul urmator, sau poate alege sa repete configurarea termenului sursa, caz in care se reia pasul initial procesul.



Nuclide	Activity	Halflife	Dcfe, 50	Dcfbone	Dcflung	Dcfthyd	Dcfgi	Dcfai
Sr-90	3.062499868...	11000	0.0432	0.000236	0.0033	0	5.9e-9	3.54e-7
Y-91	0.000001749...	59	0.0107	0.000099	0.0041	0	2.69e-7	0.00000224
Ru-106	1.312499868...	370	0.0336	0.000239	0.0098	0	0.00000124	0.0000382

6.1.3.6. Configurarea mixului pe baza recomandarilor unui operator experimentat

Alaturi de posibilitate de configurare a termenului sursa este disponibila si posibilitatea de a configura un termen sursa in baza specificatiilor finale referitoare la nuclizi si „dose conversion factors”.

Utilizatorul are la dispozitie un tabel in care sunt listate valorile referitoare la nuclizi.

Nuclide	Activity	Halflife	Dcfe, 50	Dcfbone	Dcflung	Dcfthyd	Dcfgi	Dcfai
H-3	1	4500	0.000054	0.00000258	0.00000258	0	0	0
C-14	1	2100000	0.0024	0.0000227	0.0000227	0	4.57e-11	9.36e-9
Na-22	1	950	0.00156	0	0	0	0.00000738	0.000367
Na-24	1	0.63	0.000324	0.000172	0.00134	0	0.0000129	0.000749
P-32	1	14	0.00408	0.00045	0.0043	0	3.07e-7	0.00000193
P-33	1	25	0.0018	0	0	0	1.31e-10	5.22e-8
S-35	1	87	0.00168	0.0000075	0.000328	0	4.79e-11	1.12e-8
Cl-36	1	110000000	0.00676	0	0	0	4.03e-8	5.98e-7
K-40	1	470000000000	0.00252	0	0	0	7.34e-7	0.0000265
K-42	1	0.52	0.000144	0	0	0	0.00000143	0.0000533

Acesti parametri sunt editabili de catre utilizator in cadrul unei sectiuni separate.

Editable values:

Activity: 1 Halflife: 950

DCFe, 50: 0,00156 DCFbone:** 0 DCFlung: 0

DCFthyd: 0 DCFgi** 0,00000738 DCFai: 0,000367

ACCEPT SELECTED ROWS

Dupa introducerea valorilor considerate corespunzatoare se vor salveaza modificarile efectuate.

6.1.3.7. Selectarea unui termen sursa predefinit

Aceasta functionalitate presupune selectarea de catre utilizator din cadrul unei liste a unei configuratii prestabilite pentru termenul sursa.

Id	Source Terms Name	Data Creation
8	PWR1-1000-Containment leakage dry/with spray, in-vessel core melt,FTB-#5	2017-05-23
26	PWR-VVER2-440-Steam generator tube rupture, gap release,FTB-#1	2017-06-28
27	PWR-VVER2-440-Steam generator tube rupture, gap release,FTB-#1	2017-06-28
28	PWR1-1000-Steam generator tube rupture, gap release,FTB-#1	2017-06-28
30	-1000-Spent fuel pool zircaloy fire,FTB-#1	2017-06-29
31	PWR1-1000-Steam generator tube rupture, gap release,FTB-#1	2017-06-29
32	PWR1-1000-Containment leakage dry/with spray, gap release,FTB-#1	2017-06-29
33	PWR1-1000-Containment bypass, gap release,FTB-#1	2017-06-29
34	-1000-Spent fuel pool zircaloy fire,FTB-#1	2017-06-29

1 / 1 250 items per page 1 - 54 of 54 items

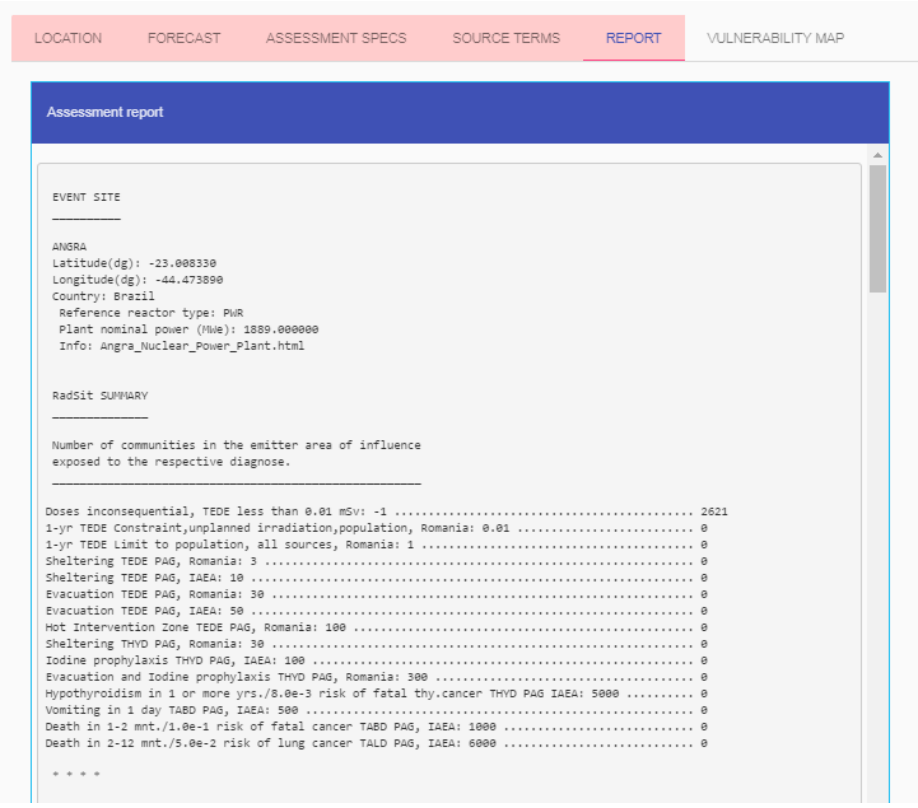
RETURN

6.1.4. Componenta de raportare a rezultatelor simularii

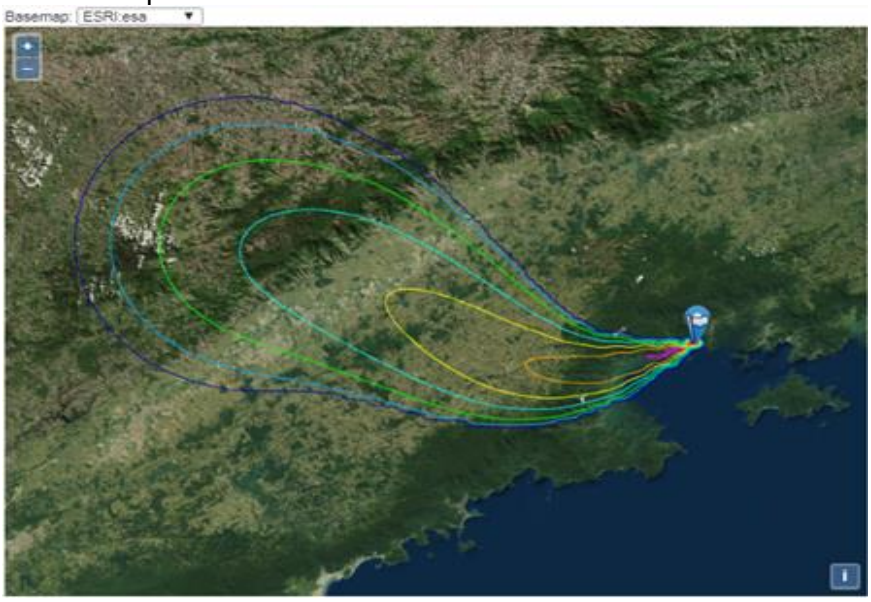
Componenta de raportare are rolul de a reliefa toate concluziile rezultate in urma rularii unui scenariu de simular in oricare din modulele aplicatiei.

In cadrul acestei componente sunt prezentate rezultatele textuale si grafice ale simularii:

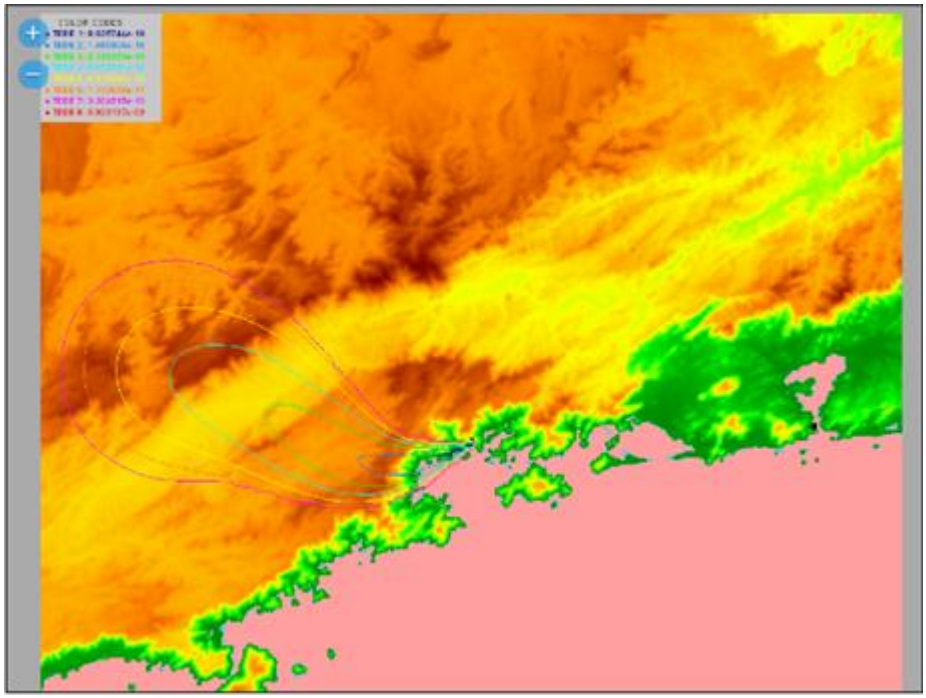
- Raportul de evaluare rezultat in cadrul simularii;



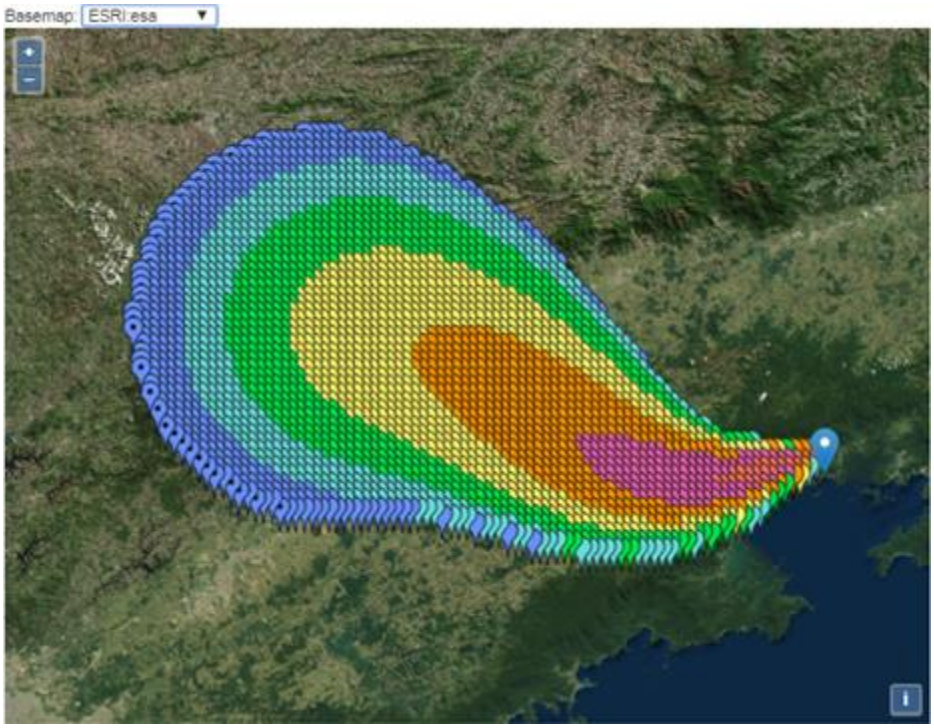
- Reprezentarea pe harta lumii a zonei afectate calculate in cadrul simularii;



- Reprezentarea prin Isodose a zonei afectate calculate in cadrul simularii;



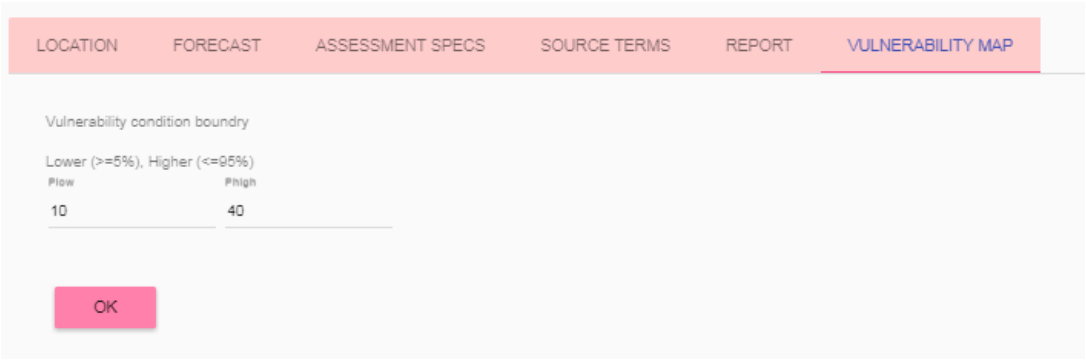
- Reprezentarea sub forma de grid de puncte a zonei afectate calculate in cadrul simularii;



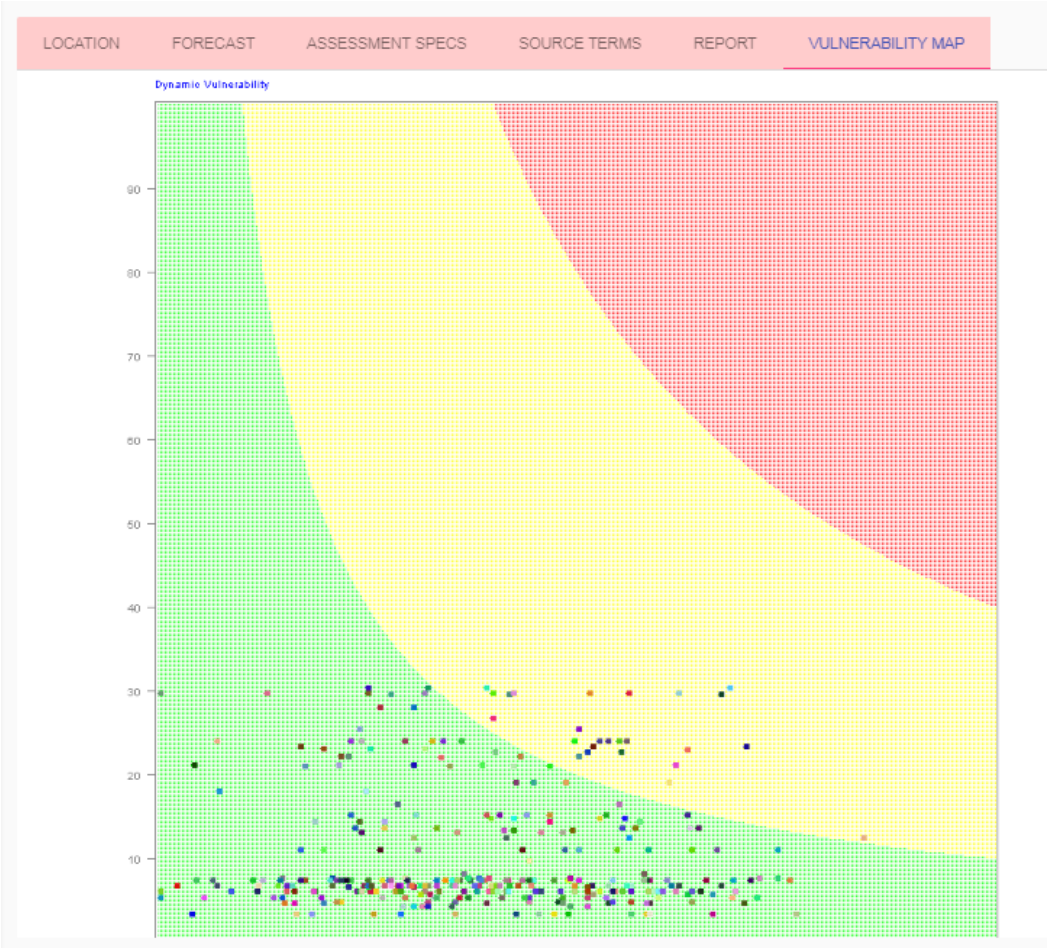
6.1.5. Realizarea matricii de vulnerabilitate

Matricea de vulnerabilitate este o reprezentare sinoptica care permite vizualizarea si compararea vulnerabilitatii comunitatilor aflate in aria de incidenta a norului radioactiv eliberat in cazul unui incident la o facilitate nucleara sau in cazul unui incident radiologic.

In cadrul primului pas sunt definite limitele pentru calculul matricii de vulnerabilitate corespunzatoare pragurilor de 5%, respectiv de 95%, urmat de confirmarea acestora.



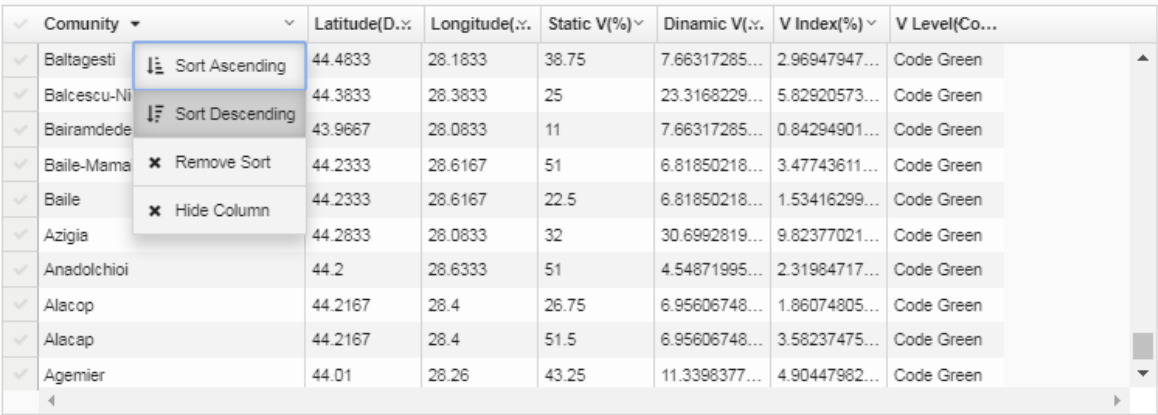
In pasul urmator se face afisarea matricii de vulnerabilitate conform figurii de mai jos, precum și a listei de comunitati afectate de evenimentul simulat.



Interfata permite afisarea informatiilor legate de vulnerabilitatea statica, respectiv vulnerabilitatea dinamica, prin selectarea comunitatilor reprezentate in cadrul matricii. Pentru fiecare comunitate reprezentata se pot afisa o serie de informatii necesare in procesul de estimare a vulnerabilitatii, conform figurii de mai jos:

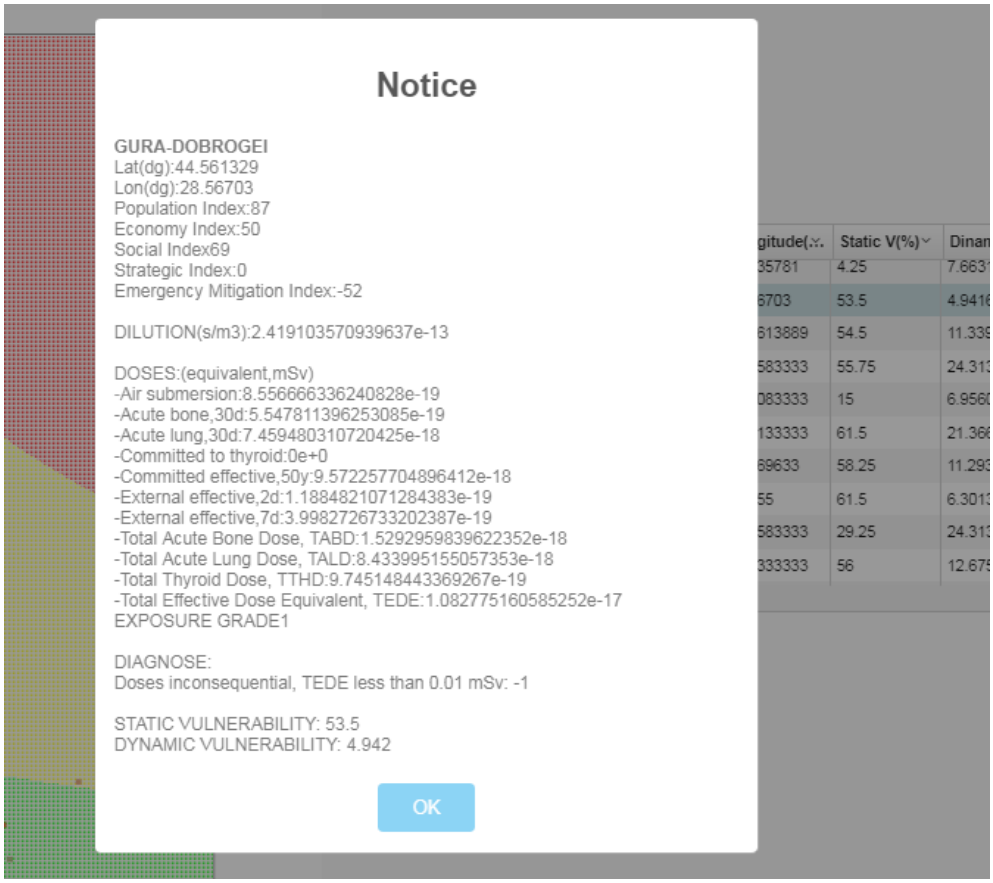
Lista comunitatilor afectate se prezinta ca in figura de mai jos, unde exista posibilitati de ordonare a acestora functie de o serie de atributele prezente:

- Denumire;
- Latitudine;
- Longitudine;
- Vulnerabilitate statica;
- Vulnerabilitate dinamica;



Comunity	Latitude(D...	Longitude(...	Static V(%)	Dinamic V(...	V Index(%)	V Level(Co...
Baltagesti	44.4833	28.1833	38.75	7.66317285...	2.96947947...	Code Green
Balcescu-Ni	44.3833	28.3833	25	23.3168229...	5.82920573...	Code Green
Bairamdede	43.9667	28.0833	11	7.66317285...	0.84294901...	Code Green
Baile-Mama	44.2333	28.6167	51	6.81850218...	3.47743611...	Code Green
Baile	44.2333	28.6167	22.5	6.81850218...	1.53416299...	Code Green
Azigia	44.2833	28.0833	32	30.6992819...	9.82377021...	Code Green
Anadolchioi	44.2	28.6333	51	4.54871995...	2.31984717...	Code Green
Alacop	44.2167	28.4	26.75	6.95606748...	1.86074805...	Code Green
Alacap	44.2167	28.4	51.5	6.95606748...	3.58237475...	Code Green
Agemier	44.01	28.26	43.25	11.3398377...	4.90447982...	Code Green

Afisarea informatiilor despre o anumita comunitate se poate face si prin alegerea acesteia din lista pusa la dispozitie in interfata.



6.2. Modulul “My Plant“

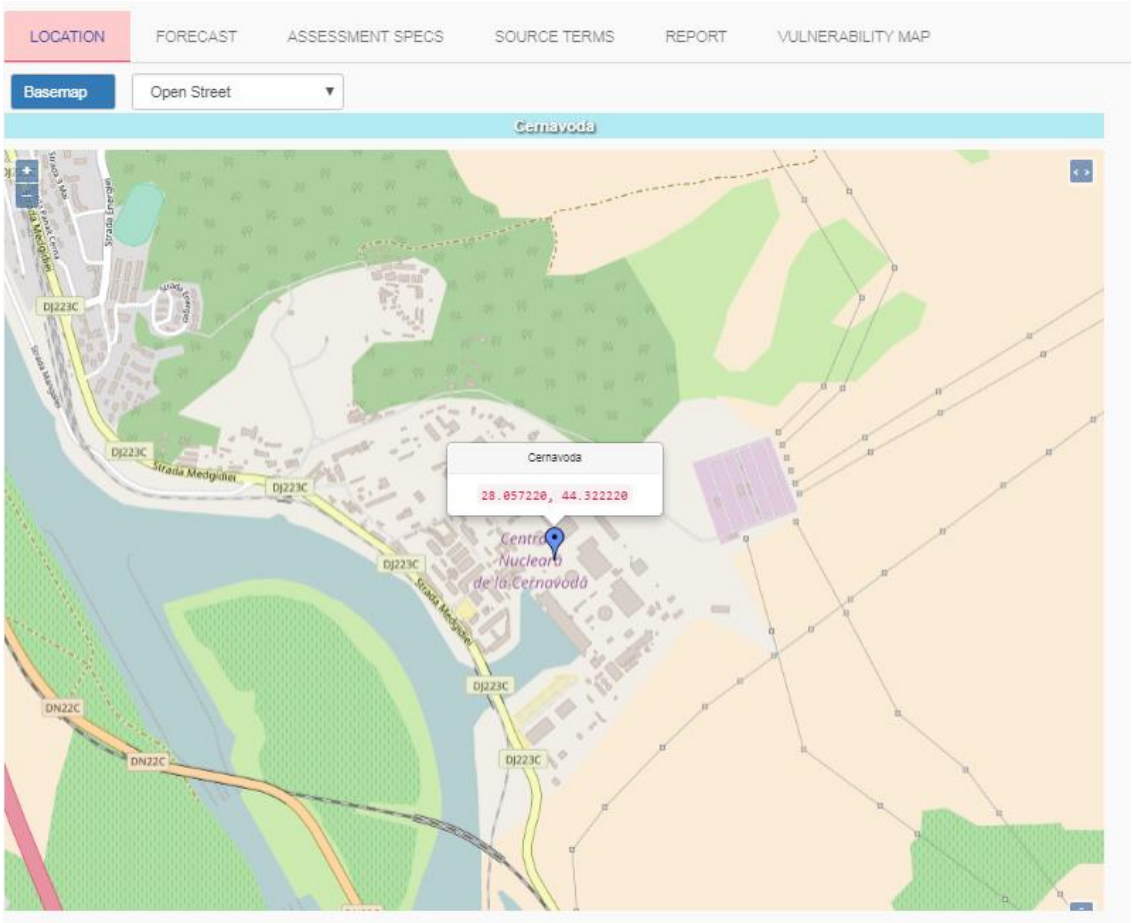
Modulul “***My plant***“ permite simularea incidentelor ce pot avea loc in cadrul unei facilitati in care este prezent un reactor nuclear, precum si modul de dispersie al particulelor rezultate si comunitatile afectate.

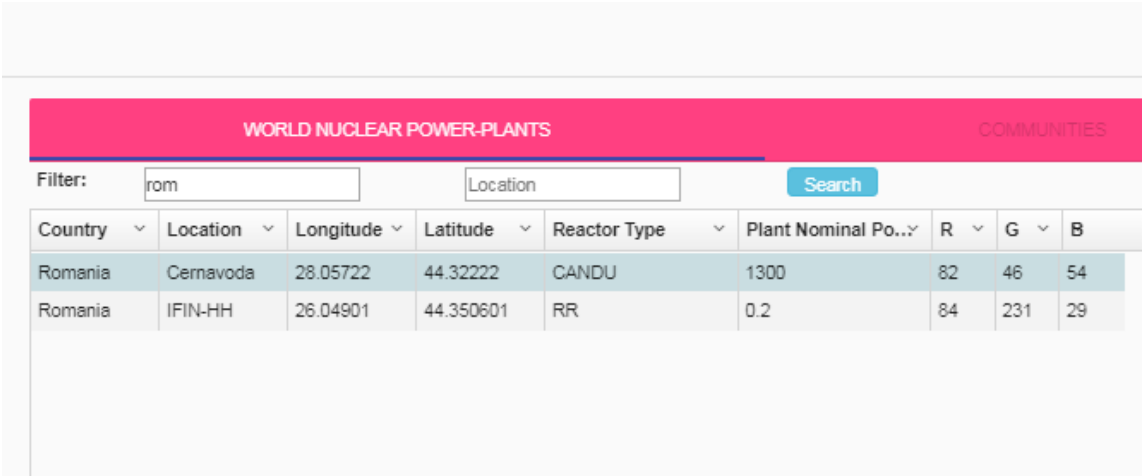
In cadrul acestui modul sunt implementate functionalitati din randul componentelor comune prezentate anterior in curpinsul acestui document.

Pentru prelucrarea unei simularii in cadrul modulului „***My plant***” vor fi accesate, in ordinea specificata urmatoarele functionalitati:

6.2.1. Selectarea locatiei

Aceasta functionalitate a fost descrisa in cadrul componentei de localizare. Ca particularitate, utilizatorul are la dispozitie doar lista utilitatilor nucleare, simularea referindu-se la un eveniment petrecut la nivelul unei centrale nucleare.





Country	Location	Longitude	Latitude	Reactor Type	Plant Nominal Po...	R	G	B
Romania	Cernavoda	28.05722	44.32222	CANDU	1300	82	46	54
Romania	IFIN-HH	26.04901	44.350601	RR	0.2	84	231	29

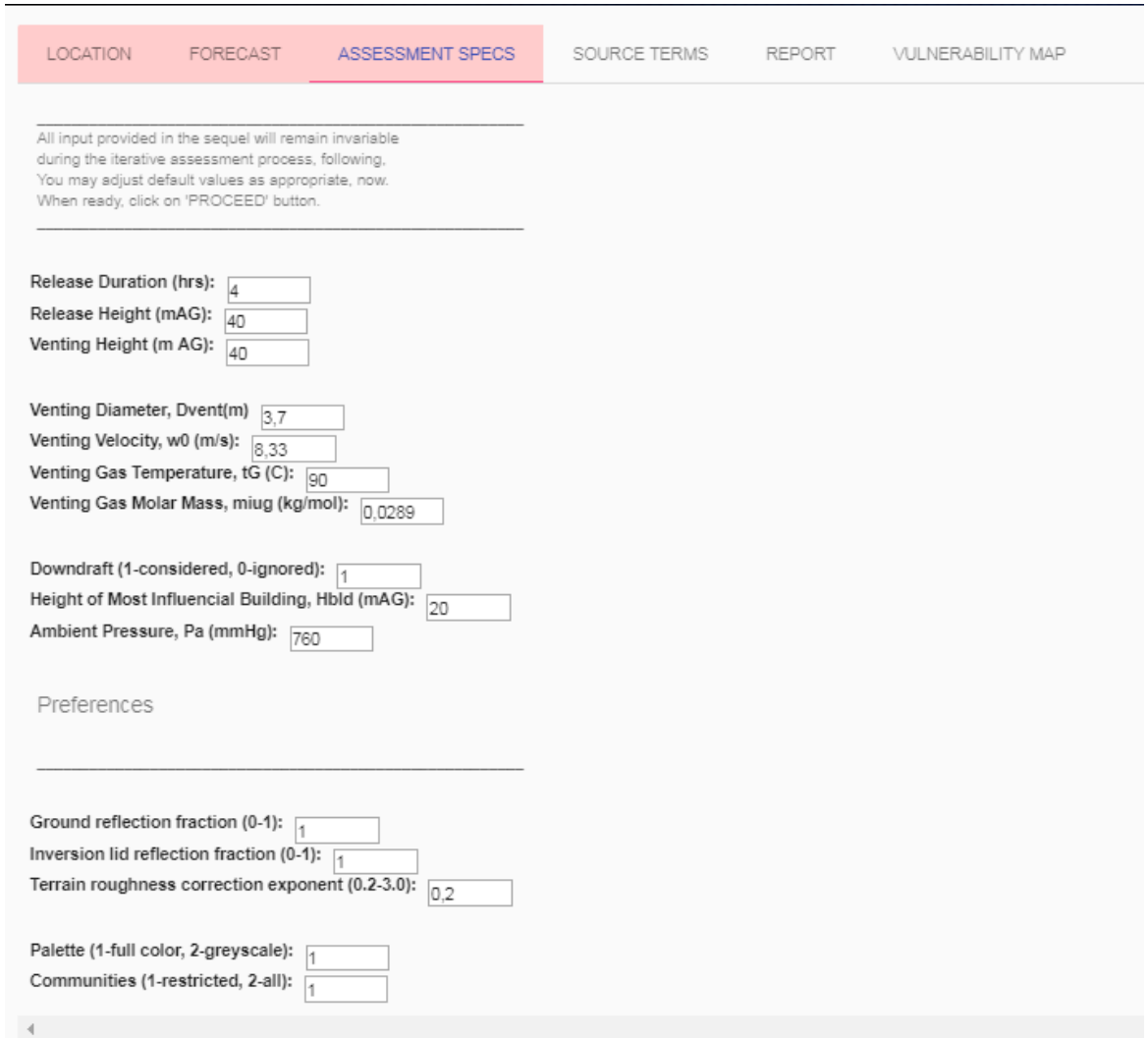
6.2.2. Achizitia datelor meteo

Aceasta functionalitate a fost descrisa in cadrul componentei achizitie a datelor meteo.

6.2.3. Introducere parametri specifici

In cadrul acestei functionalitati se face introducerea parametrilor specifici. Interfata curpind o serie de 15 parametri care pot fi configurati independent.

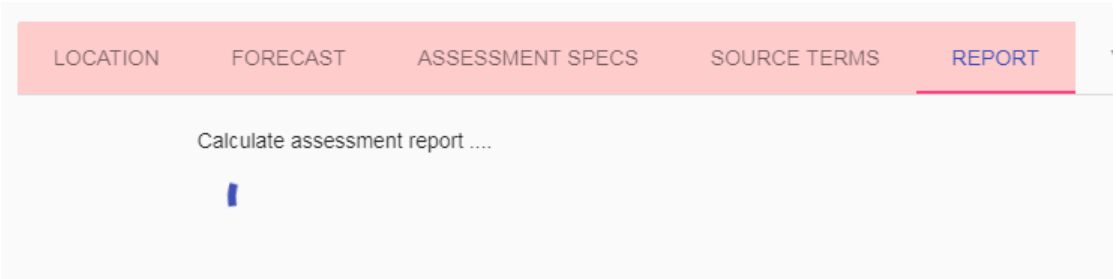
Pentru valorile acestor parametrii sunt setate valori optime recomandate. Utilizatorul are la dispozitie textbox-uri in care poate modifica valorile presetate.



6.2.4. Selectarea termenului sursa

Aceasta functionalitate a fost descrisa in cadrul componentei de selectare a termenului sursa.

6.2.5. Generarea raportului



Aceasta functionalitate a fost descrisa in cadrul componentei de raportare a rezultatelor simularii.

In cazul simularii unui eveniment in cadrul modulului „MyPlant” se va genera raportul de forma urmatoare, alaturi de hartile in care se face reprezentarea prin isodose sau grid de puncte a zonei de influenta a norului radioactiv.

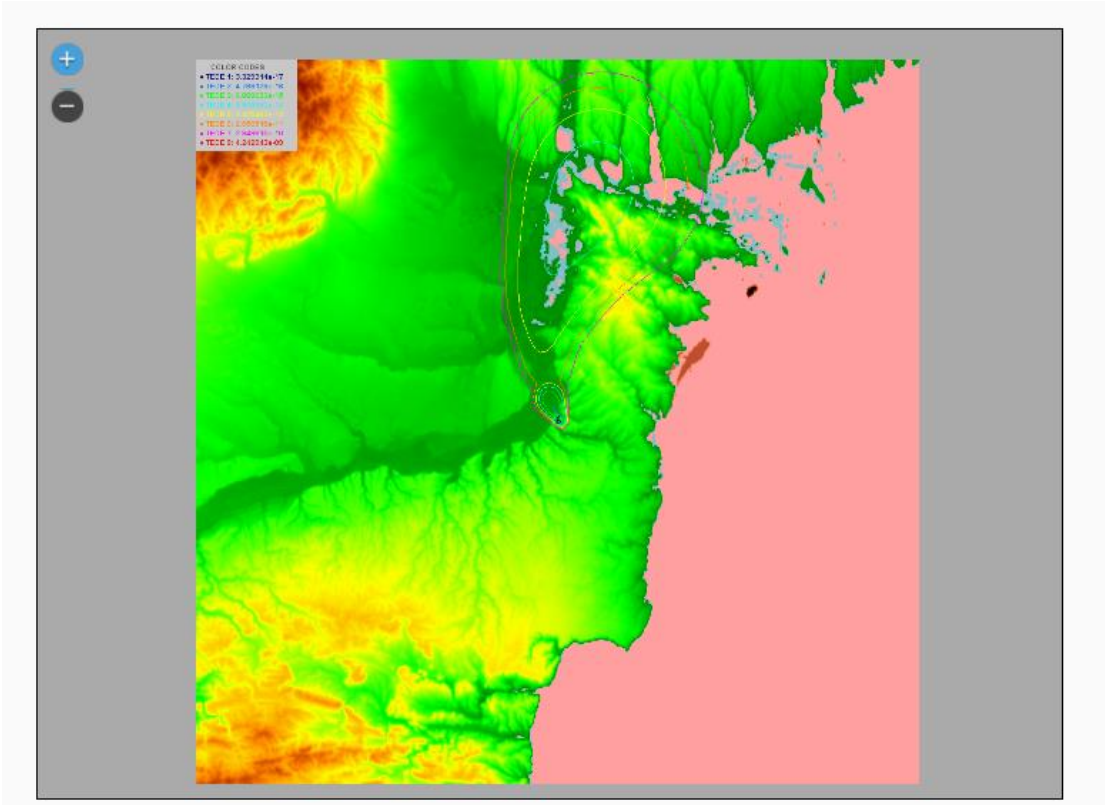
LOCATION FORECAST ASSESSMENT SPECS SOURCE TERMS REPORT VULNERABILITY MAP

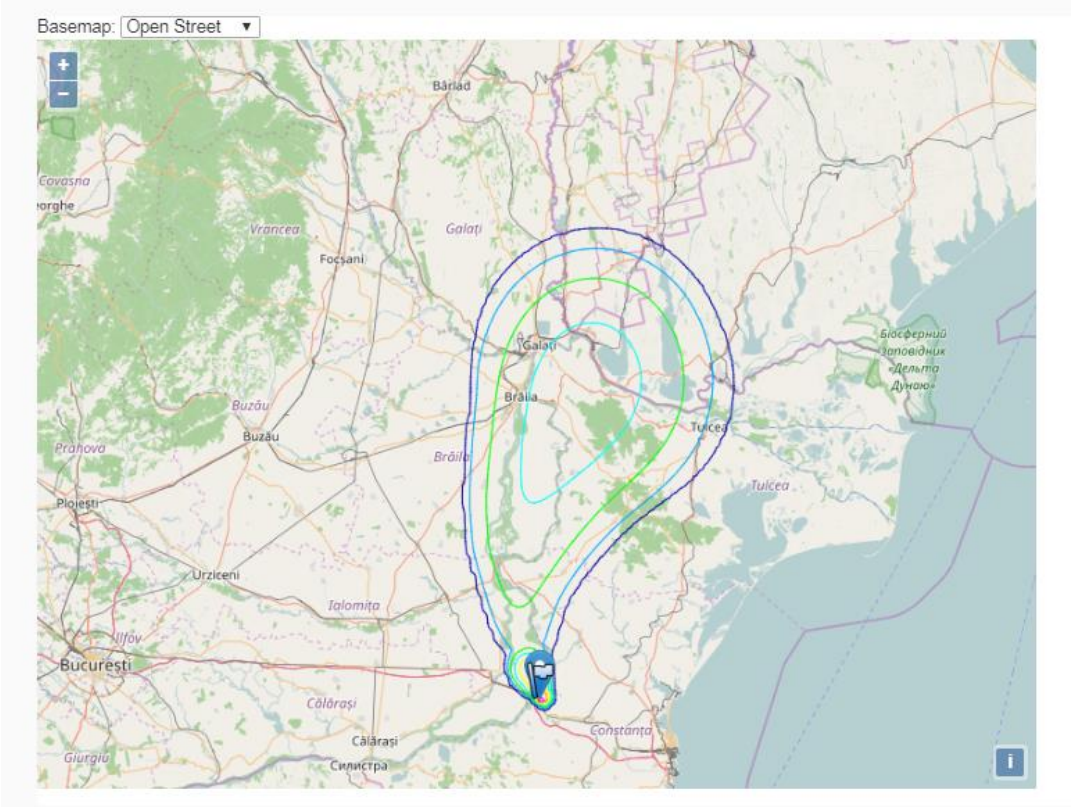
Assessment report

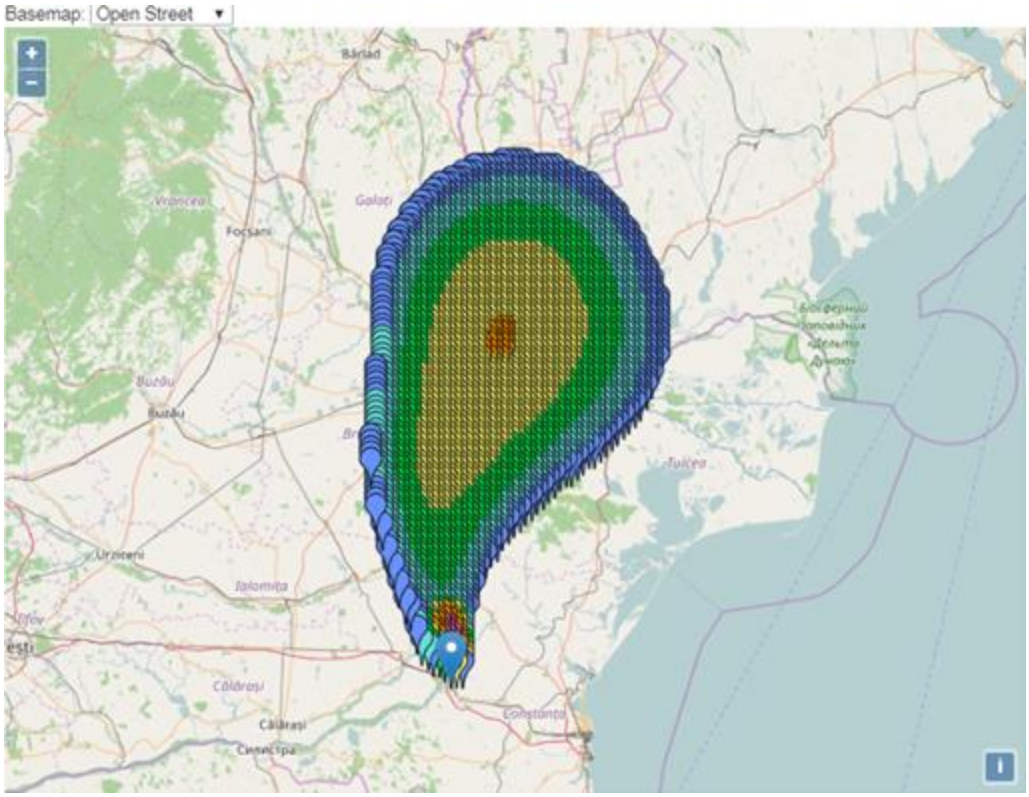
```
EVENT SITE
__________

CERNAVODA
Latitude(dg): 44.322220
Longitude(dg): 28.057220
Country: Romania
 Reference reactor type: CANDU
 Plant nominal power (MWe): 1300.000000
 Info: Cernavoda_Nuclear_Power_Plant.html


RadSit SUMMARY
______________

Number of communities in the emitter area of influence
exposed to the respective diagnose.
_____________________________________________________

Doses inconsequential, TEDE less than 0.01 mSv: -1 ........................................... 2744
1-yr TEDE Constraint,unplanned irradiation,population, Romania: 0.01 ......................... 0
1-yr TEDE Limit to population, all sources, Romania: 1 ....................................... 0
Sheltering TEDE PAG, Romania: 3 ............................................................... 0
Sheltering TEDE PAG, IAEA: 10 ................................................................. 0
Evacuation TEDE PAG, Romania: 30 ............................................................... 0
```

LOCATION FORECAST ASSESSMENT SPECS SOURCE TERMS REPORT VULNERABILITY MAP

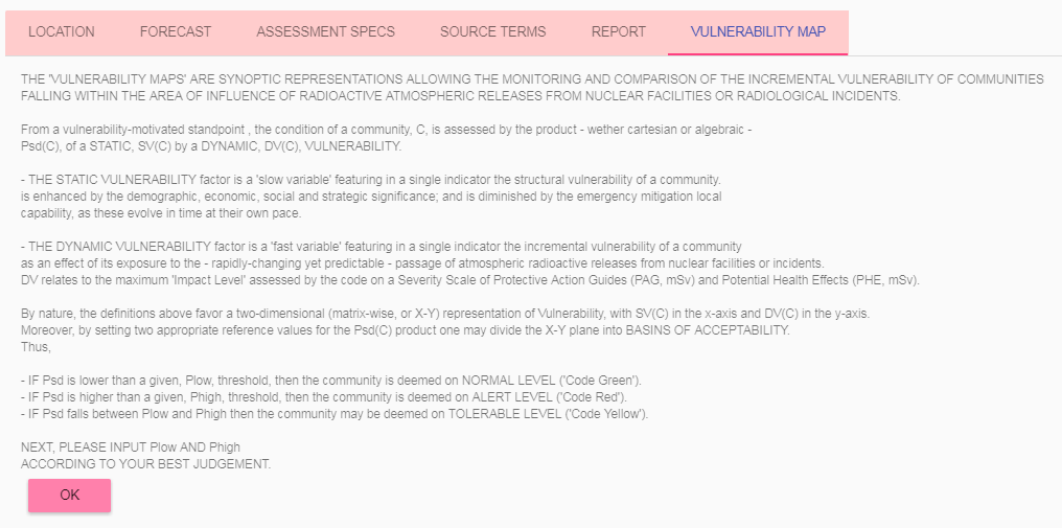
```
DIRECT INPUT
____________

Directly relevant model data to be used by code engines, next
____________________________________________________________


 Monitoring time(h): 4.0

Source strength (an activity multiplication factor): 4.0

Release mouth height (m AG): 40.000000
Puff rise (m): 806.494559
Release duration (s): 14400.000000
Effective Height Settling Time(s): 308.901778

DISPERSION DATA
_______________

Time-dependent dispersion coefficients (Doury).
_______________________________________________

Time-range (s)  Ah      Kh      Av      Kv
_________________________________________________

Strongest Diffusion (A-Pasquill)
--------------------------------
0               0.405   0.859   0.420   0.814  s1
240             0.135   1.130   1.000   0.685  s2
3280            0.135   1.130   20.00   0.500  s3
97000           0.463   1.000   20.00   0.500  s4
```




Basemap: Open Street
Bârlad
Covasna
Vrancea
Focșani
Galați
Galați
Brăila
Tulcea
Buzău
Buzău
Prahova
Brăila
Tulcea
Ploiești
Urziceni
Ialomița
Ilfov
București
Călărași
Constanța
Giurgiu
Călărași
Силистра



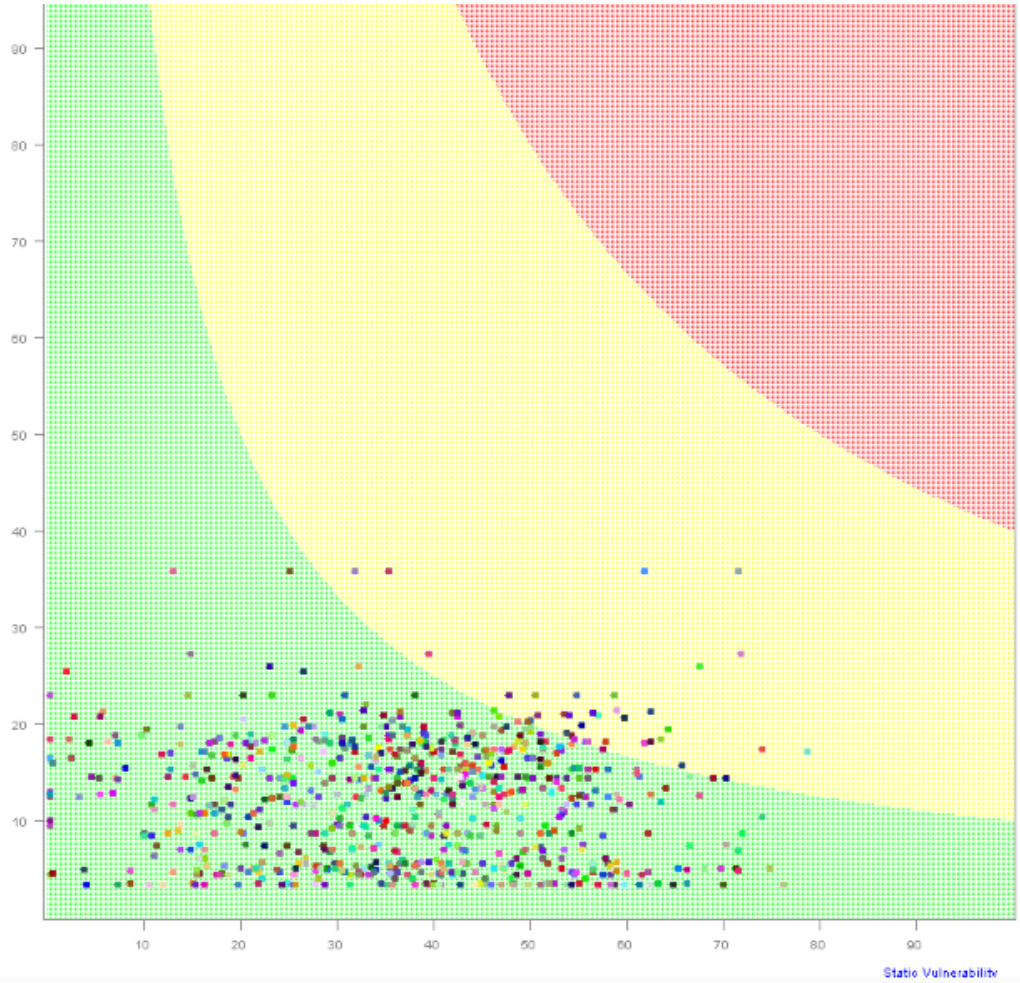
6.2.6. Generarea matricii de vulnerabilitate



Aceasta functionalitate a fost descrisa in cadrul componentei de realizarea a matricii de vulnerabilitate.

In cadrul primului pas sunt definite limitele pentru calculul matricii de vulnerabilitate corespunzatoare pragurilor de 5%, respectiv de 95%, urmat de confirmarea acestora.

In interfata urmatoare este afisata matricea de vulnerabilitate care este alcatuita prin reprezentarea intr-un sistem bidimensional a locatiilor efectate, in care cele doua dimensiuni sunt reprezentate de vulnerabilitatea statica, respectiv de vulnerabilitatea dinamica.



Comunity	Latitude(D..	Longitude(..	Static V(%)	Dinamic V(..	V Index(%)	V Level(Co...
CERNAVODA-NPP-Unit-1	44.3202021...	28.0592751...	31.5	36.0886408...	11.3679218...	Code Yellow
CERNAVODA-NPP-Unit-2	44.3212920...	28.0579555...	24.75	36.0886408...	8.93193861...	Code Green
CERNAVODA-NPP-Unit-3	44.3223820...	28.0566358...	61.5	36.0886408...	22.1945141...	Code Yellow
CERNAVODA-NPP-Unit-4	44.3234796...	28.0553483...	35	36.0886408...	12.6310243...	Code Yellow
CERNAVODA-NPP-Unit-5	44.3242855...	28.0536210...	71.25	36.0886408...	25.7131566...	Code Yellow
CERNAVODA-Primaria	44.3419899...	28.0310583...	23	23.2010105...	5.33623242...	Code Green
CERNAVODA-Gradinita-Nr4	44.3390050...	28.0406928...	30.5	23.2010105...	7.07630821...	Code Green
CERNAVODA-Gradinita-Panselu.	44.3498351...	28.0323243...	67.25	26.2687941...	17.6657640...	Code Yellow
CERNAVODA-Scoala-generala-N.	44.3501343...	28.0328017...	32	26.2687941...	8.40601412...	Code Green
CERNAVODA-Scoala-generala-N.	44.3423965...	28.0388769...	14.25	23.2010105...	3.30614400...	Code Green

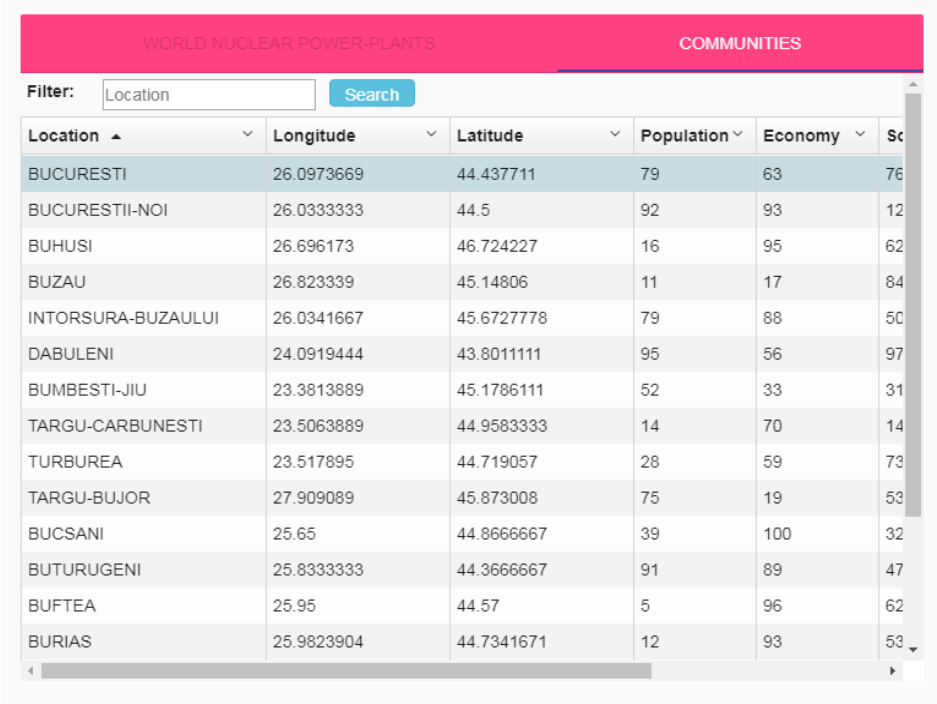
Notice
DEFCEA
Lat(dg):44.3167
Lon(dg):28.1833
Population Index:54
Economy Index:93
Social Index5
Strategic Index:0
Emergency Mitigation Index:-100
DILUTION(s/m3):1.2964639588686497e-9
DOSES:(equivalent,mSv)
-Air submersion:4.3439003245875506e-15
-Acute bone,30d:2.5142867849645993e-15
-Acute lung,30d:3.4069183795020895e-14
-Committed to thyroid:0e+0
-Committed effective,50y:3.685382798186561e-14
-External effective,2d:6.001582609632334e-16
-External effective,7d:2.014651906977157e-15
-Total Acute Bone Dose, TABD:7.458345370515384e-15
-Total Acute Lung Dose, TALD:3.901324238057168e-14
-Total Thyroid Dose, TTHD:4.944058585550784e-15
-Total Effective Dose Equivalent, TEDE:4.321238021343032e-14
EXPOSURE GRADE5
DIAGNOSE:
Doses inconsequential, TEDE less than 0.01 mSv: -1
STATIC VULNERABILITY: 24.5
DYNAMIC VULNERABILITY: 18.26
OK
Static V(%)
Dinamic V(:.
V Index(%

SSMENT SPECS
SOURCE TERMS
REPORT
VULNERABILITY MAP
Notice
ALBINA
Lat(dg):45.1833
Lon(dg):27.8667
Population Index:20
Economy Index:68
Social Index91
Strategic Index:0
Emergency Mitigation Index:-52
DILUTION(s/m3):2.6769432229121946e-10
DOSES:(equivalent,mSv)
-Air submersion:8.969300268908473e-16
-Acute bone,30d:5.191507965514204e-16
-Acute lung,30d:7.034616739351344e-15
-Committed to thyroid:0e+0
-Committed effective,50y:7.609591024845619e-15
-External effective,2d:1.239208832895189e-16
-External effective,7d:4.1598601580994874e-16
-Total Acute Bone Dose, TABD:1.5400017067317866e-15
-Total Acute Lung Dose, TALD:8.05546764953171e-15
-Total Thyroid Dose, TTHD:1.0208509101803662e-15
-Total Effective Dose Equivalent, TEDE:8.922507067546415e-15
EXPOSURE GRADE4
DIAGNOSE:
Doses inconsequential, TEDE less than 0.01 mSv: -1
STATIC VULNERABILITY: 50.75
DYNAMIC VULNERABILITY: 15.813
OK

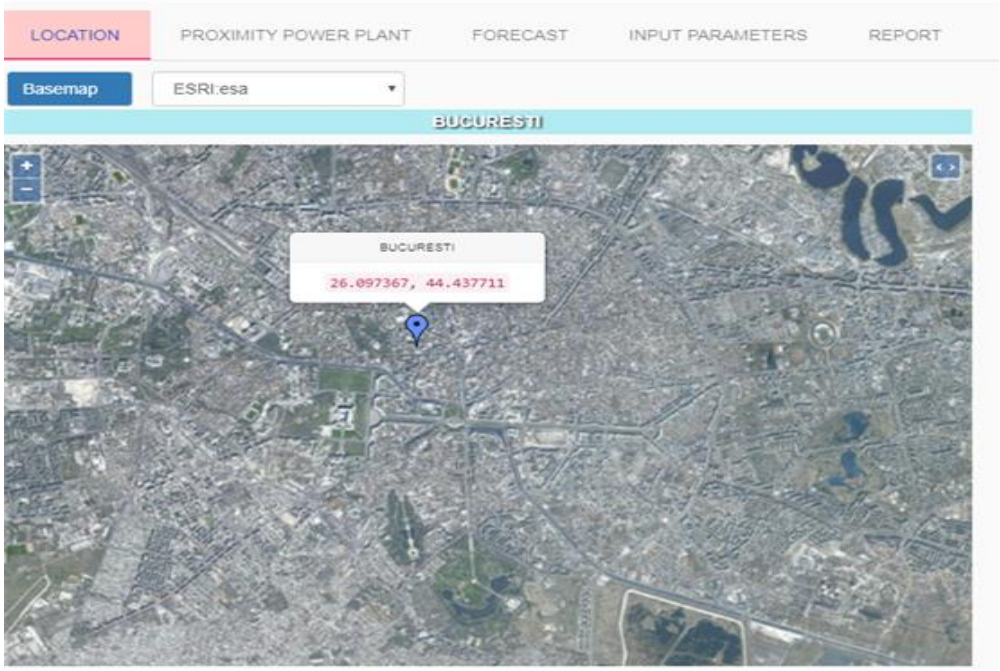
6.3. Modulul “My Place“

6.3.1. Selectarea locatiei

Aceasta functionalitate a fost descrisa in cadrul componentei de localizare. Ca particularitate, utilizatorul are la dispozitie doar lista comunitatilor, simularea referindu-se la un eveniment petrecut la nivelul unei locatii alese de utilizator.



Location	Longitude	Latitude	Population	Economy	Sc
BUCURESTI	26.0973669	44.437711	79	63	76
BUCURESTII-NOI	26.0333333	44.5	92	93	12
BUHUSI	26.696173	46.724227	16	95	62
BUZAU	26.823339	45.14806	11	17	84
INTORSURA-BUZAULUI	26.0341667	45.6727778	79	88	50
DABULENI	24.0919444	43.8011111	95	56	97
BUMBESTI-JIU	23.3813889	45.1786111	52	33	31
TARGU-CARBUNESTI	23.5063889	44.9583333	14	70	14
TURBUREA	23.517895	44.719057	28	59	73
TARGU-BUJOR	27.909089	45.873008	75	19	53
BUCSANI	25.65	44.8666667	39	100	32
BUTURUGENI	25.8333333	44.3666667	91	89	47
BUFTEA	25.95	44.57	5	96	62
BURIAS	25.9823904	44.7341671	12	93	53



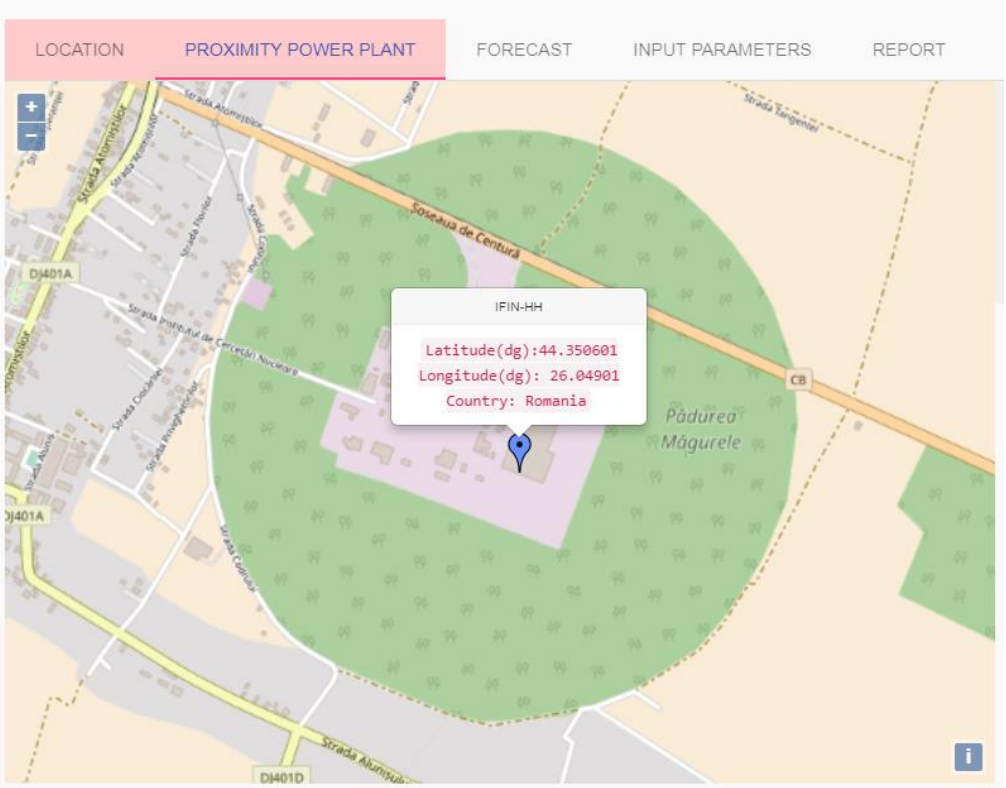
6.3.2. Identificarea centralei nucleare din proximitate

In cadrul acestei functionalitati este identificata cea mai apropiata centrala nucleara in functie de locatia aleasa de utilizator in pasul precedent.

The closest NPP is: **IFIN-HH**
Latitude(dg): **44.350601**
Longitude(dg): **26.04901**
Country: **Romania**
Reference reactor type: **RR**
Nominal Power installed(MWe): **0.2**
Info: **IFIN_HH**
Distance to my place (km): **10.43**

Sunt afisate informatiile relevante legate de centrala nucleara identificata, precum si distanta fata de locatia aleasa.

Interfata contine si o reprezentare in harta a centralei identificate alaturi de coordonatele exprimate in grade de latitudine, respectiv longitudine.



6.3.3. Achizitia datelor meteo pentru locatia centralei nucleare din proximitate

Aceasta functionalitate a fost descrisa in cadrul componentei achizitie a datelor meteo. In cazul acestui modul achizitia datelor meteo se face pentru locatia centralei nucleare identificate in proximitate.

VULNERABILITY MAP

PREV PROCEED

FORECAST TIME WINDOW (hrs): 8 16 24 32

Aquire the real-time forecast Work on a forecast on record Simulate a forecast

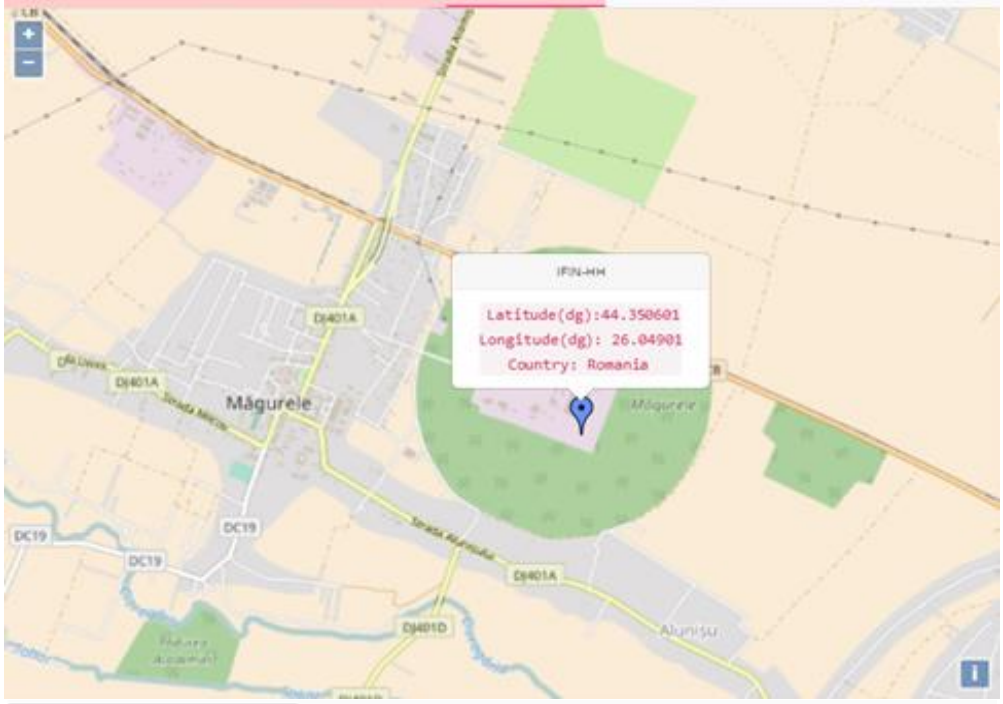
MET FORECATS

Target site : IFIN-HH
Latitude (dg): 44.350601
Longitude (dg): 26.04901

Data acquired on:
Source: http://api.wunderground.com
Ambient temperature at the time of release(C):

Get data

LOCATION PROXIMITY POWER PLANT FORECAST INPUT PARAMETERS REPORT



FORECAST TIME WINDOW (hrs): 8 16 24 32

Aquire the real-time forecast Work on a forecast on record Simulate a forecast

MET FORECATS

Data acquired on: 25-08-2017 10:22:31
Source: http://api.wunderground.com
Ambient temperature at the time of release(C): 21.5

Target site : IFIN-HH
Latitude (dg): 44.350601
Longitude (dg): 26.04901

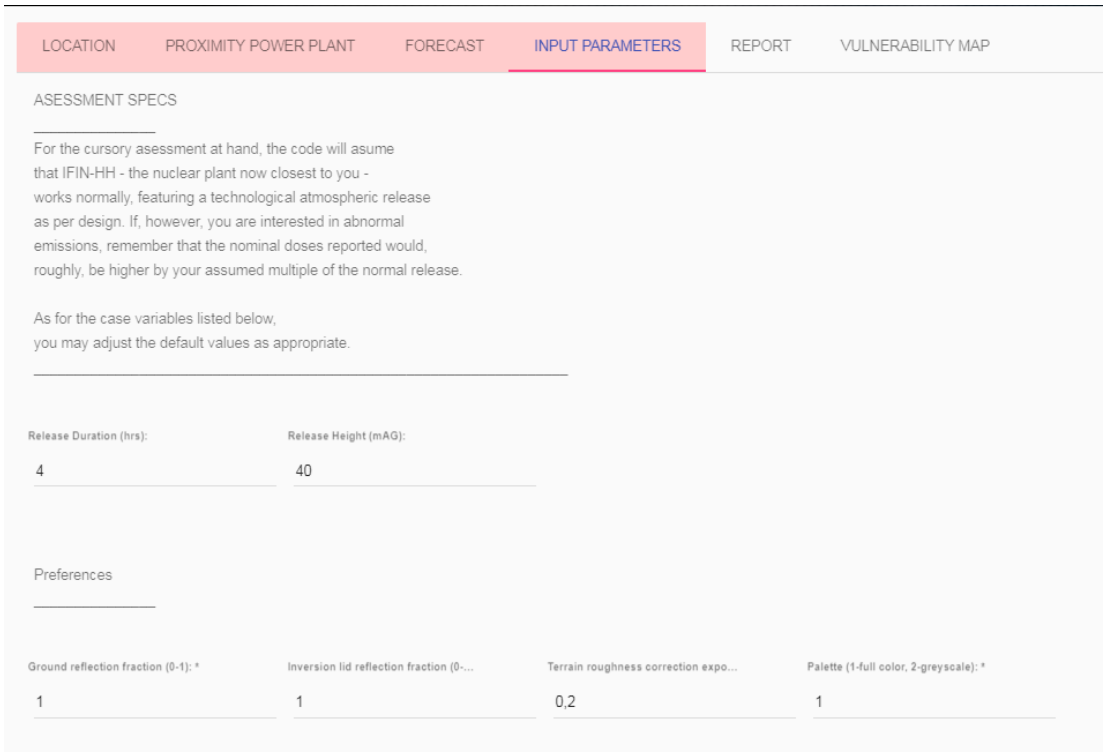
Obtained from a rough, conservative correlation with clo
cover and chance of precipitations
Light rain: < 2.5 mm/h
Moderate rain: 2.5 - 10 mm/h
Heavy rain: > 10 - 50 mm/h
Violent rain: > 50 mm/h

Get data

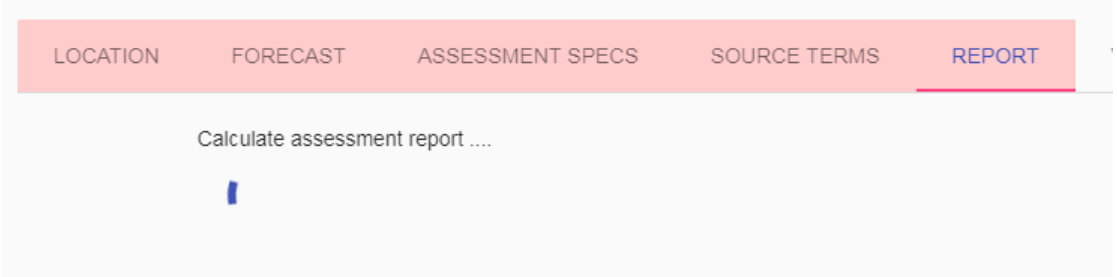
Time (Hrs)	Wind Speed (M/S)	Wind From (Dg.Nby E)	Clouds (%)	Stability (Pasquill)	Rain (Mm/H)
11	1.67	177	25	B	0
12	2.22	199	21	C	0
13	2.22	216	18	C	0
14	1.67	233	0	A	0
15	1.67	251	0	A	0
16	1.67	263	0	A	0
17	1.67	276	0	A	0
18	1.67	275	0	A	0

6.3.4. Introducerea parametrilor specifici

In cadrul acestei etape sunt afisati in cadrul interfetei parametrii ce caracterizeaza fenomenul de eliberare a particulelor radioactive la nivelul centralei nucleare. Introducerea parametrilor se face de catre un utilizator prin intermediul casutelor text. Valorile initiale sunt populate cu valori recomandate ale acestor parametrii.



6.3.5. Generarea raportului



Aceasta functionalitate a fost descrisa in cadrul componentei de raportare a rezultatelor simularii.

In cazul simularii unui eveniment in cadrul modulului „MyPlace” se va genera raportul de forma urmatoare, alaturi de hartile in care se face reprezentarea prin isodose sau grid de puncte a zonei de influenta a norului radioactiv.

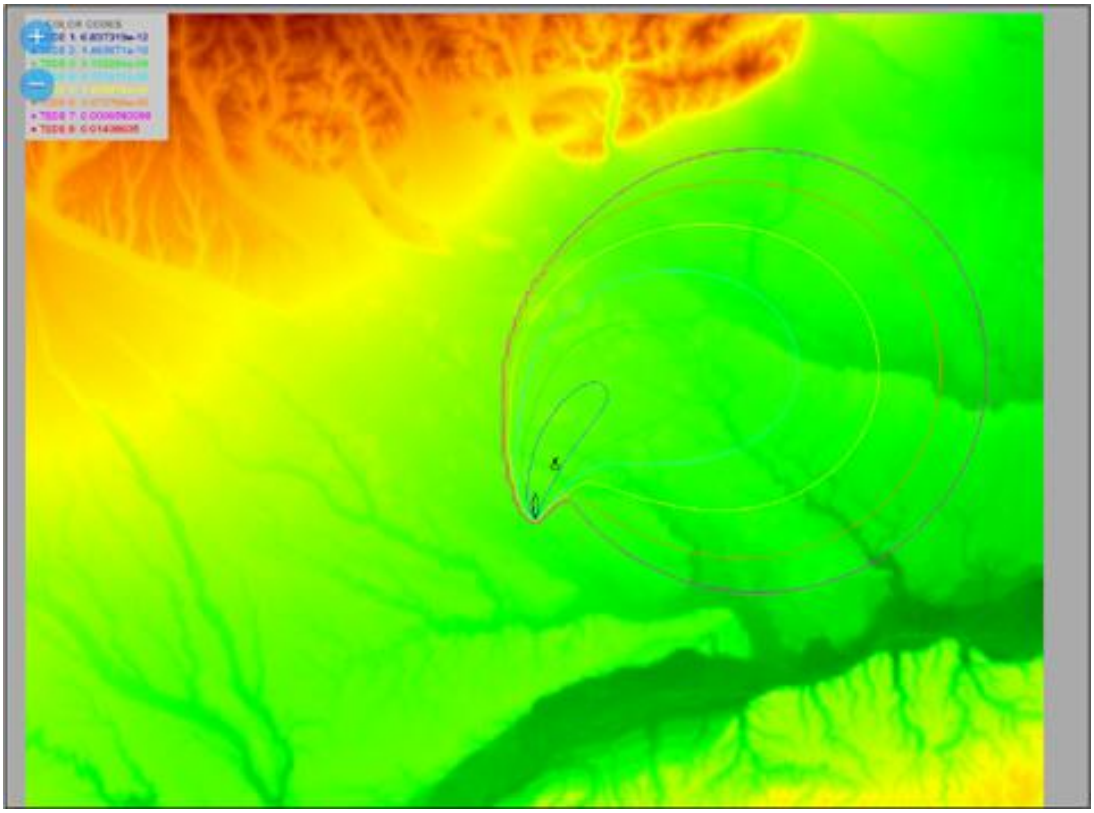
In cadrul raportului sunt prezentate informatiile referitoare la locatia aleasa de utilizator, aceasta locatie fiind reprezentata pe hartile din interfata alaturi de punctul de emisie al particulelor nucleare si aria afectata.

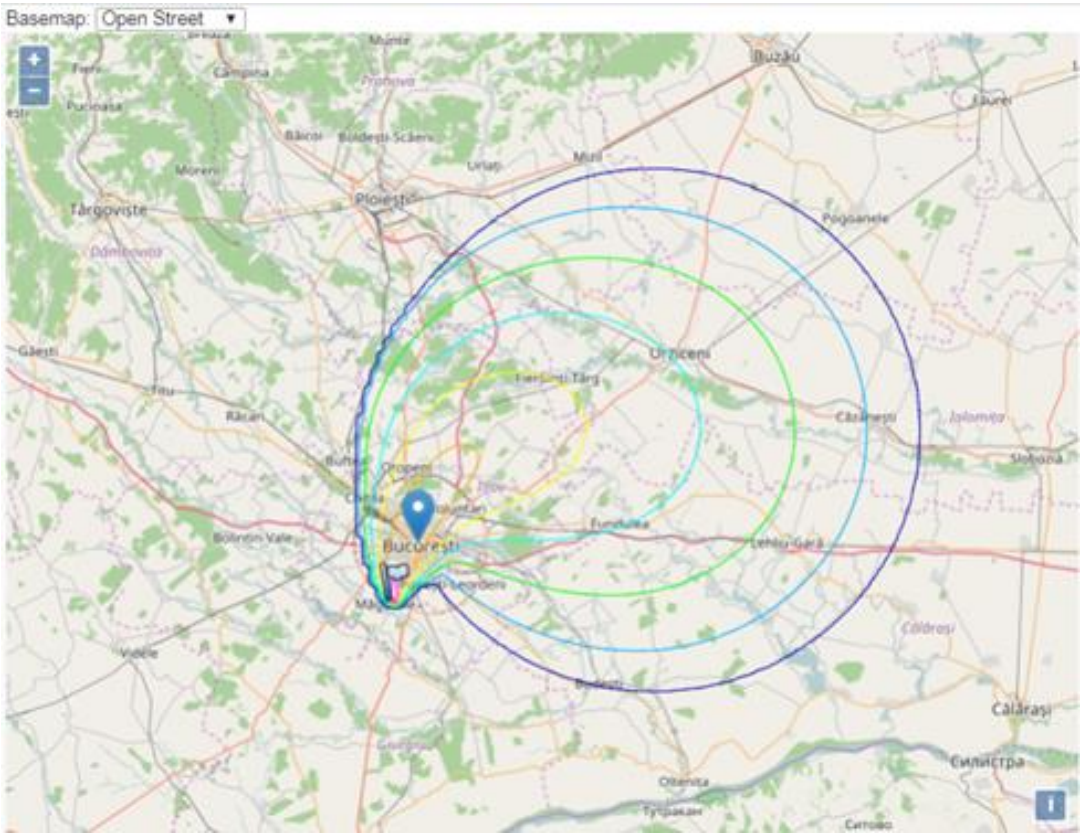
Assessment report

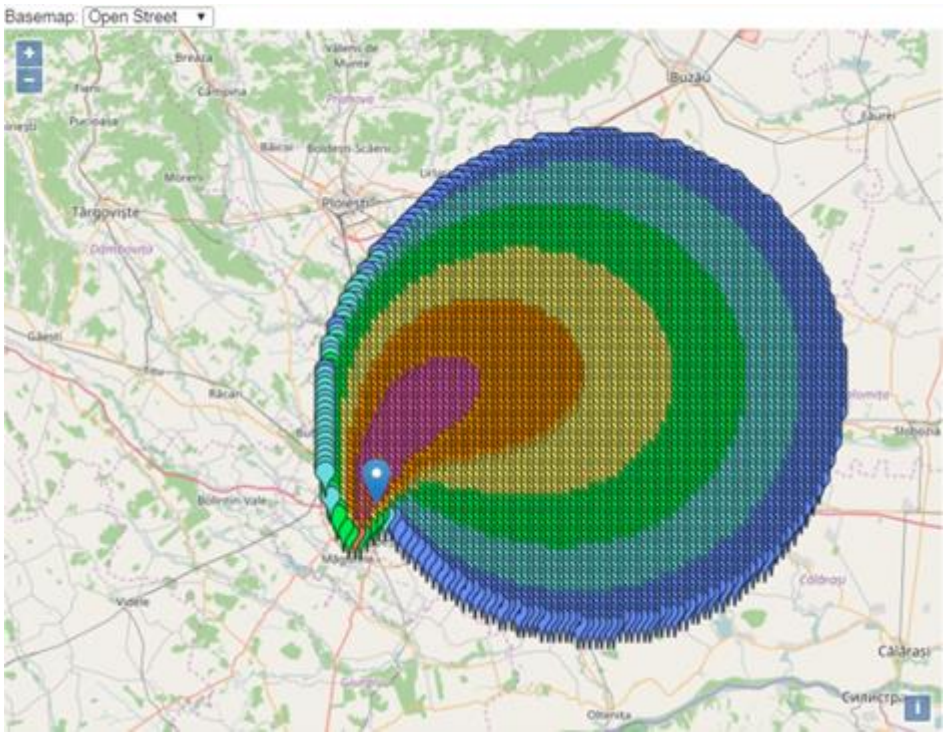
```
EVENT SITE
__________

IFIN-HH
Latitude(dg): 44.350601
Longitude(dg): 26.049010
Country: Romania
 Reference reactor type: RR
 Plant nominal power (MWe): 0.200000
 Info: IFIN_HH.html


RadSit SUMMARY
______________

Number of communities in the emitter area of influence
exposed to the respective diagnose.
_____________________________________________________

Doses inconsequential, TEDE less than 0.01 mSv: -1 ........................................... 5369
1-yr TEDE Constraint,unplanned irradiation,population, Romania: 0.01 ......................... 2
1-yr TEDE Limit to population, all sources, Romania: 1 ....................................... 0
Sheltering TEDE PAG, Romania: 3 ............................................................... 0
Sheltering TEDE PAG, IAEA: 10 ................................................................. 0
Evacuation TEDE PAG, Romania: 30 ............................................................... 0
Evacuation TEDE PAG, IAEA: 50 ................................................................. 0
Hot Intervention Zone TEDE PAG, Romania: 100 ................................................... 0
Sheltering THYD PAG, Romania: 30 ............................................................... 0
Iodine prophylaxis THYD PAG, IAEA: 100 ......................................................... 0
```

LOCATION | PROXIMITY POWER PLANT | FORECAST | INPUT PARAMETERS | REPORT | VULNERABILITY MAP

```
YOUR SITUATION
______________

WITHIN THE NEXT 8 hours it is probable that
BUCURESTI, your location of interest,
WILL FALL  W I T H I N  THE AREA OF INFLUENCE
OF THE CLOSEST NUCLEAR FACILITY,
IFIN-HH,
under the terms of the current 8 hours met forecast.

YOUR EXPOSURE,
based on closest data grid knot at
Latitude (dg): 44.44132810893757
Longitude (dg): 26.091302545968645

'DILUTION(s/m3): 1.387516267253168E-7
DOSES (equivalent, mSv)
- Air submersion: 1.7125191087616337E-4
- Acute bone, 30d: 8.05933536271236E-8
- Acute lung, 30d: 9.7743924636541E-7
- Committed to thyroid: 1.7768801571589072E-5
- Committed effective, 50y: 3.214295331003854E-6
- External effective, 2d: 4.747484857165759E-8
- External effective, 7d: 1.659836692110043E-7
- Total Acute Bone Dose, TABD: 1.7137997907836215E-4
- Total Acute Lung Dose, TALD: 1.7227682497110045E-4
- Total Thyroid Dose, TTHD: 1.890681872963241E-4
- Total Effective Dose Equivalent, TEDE: 1.7463218987637822E-4
EXPOSURE GRADE: 7

DIAGNOSE:
Doses inconsequential, TEDE less than 0.01 mSv: -1'
```




Basemap: Open Street
Târgoviste
Ploiesti
Urziceni
Bucuresti
Buzău
Călărași
Силистра



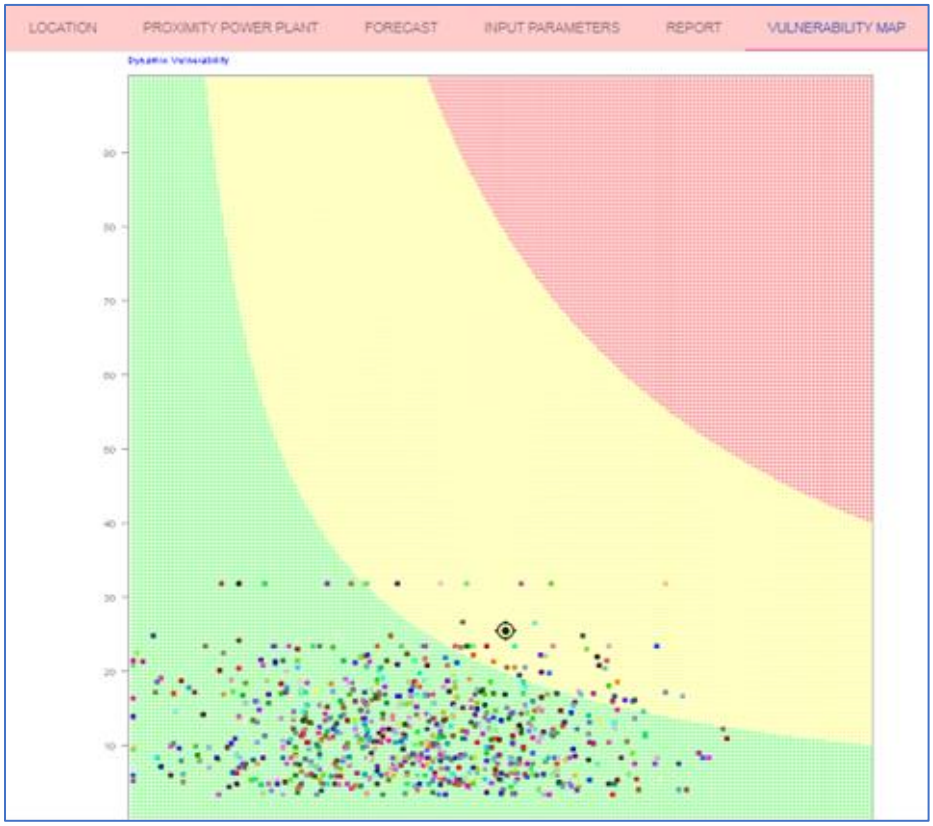
6.3.6. Generarea matricii de vulnerabilitate

Aceasta functionalitate a fost descrisa in cadrul componentei de realizarea a matricii de vulnerabilitate.

In cadrul primului pas sunt definite limitele pentru calculul matricii de vulnerabilitate corespunzatoare pragurilor de 5%, respectiv de 95%, urmat de confirmarea acestora. In cadrul interfetei este afisata lista comunitatilor aflate in aria de influenta, pe baza careia se poate identifica pozitia in cadrul matricii de vulnerabilitate.

Comunity	Latitude(D...	Longitude(...	Static V(%)	Dinamic V(...	V Index(%)	V Level(Co...
BUCURESTI	44.437711	26.0973669	50.5	25.5079931...	12.8815365...	Code Yellow
BUCURESTII-NOI	44.5	26.0333333	52.75	18.8382589...	9.93718160...	Code Green
DRAGANESTI	44.8282463	26.287209	54	9.23524168...	4.96703050...	Code Green
PITULICEA	44.8889109	26.6591021	43.75	5.66210130...	2.47716932...	Code Green
COJESTI	44.4833333	26.4333333	30.75	15.0644668...	4.63232418...	Code Green
CONSTANTIN-BRANCOVEANU	44.398732	26.1090837	29.75	17.8557638...	5.31208973...	Code Green
COTOFANCA	44.3783376	26.690614	15.25	7.81650462...	1.19201695...	Code Green
DOR-MARUNT	44.445599	26.919411	30.75	4.74769149...	1.45991513...	Code Green
FUNDULEA	44.4527776	26.5152776	58	12.8484340...	7.45093177...	Code Green
CIURESTI	44.437711	26.0973669	27.25	25.5079931...	6.95092813...	Code Green

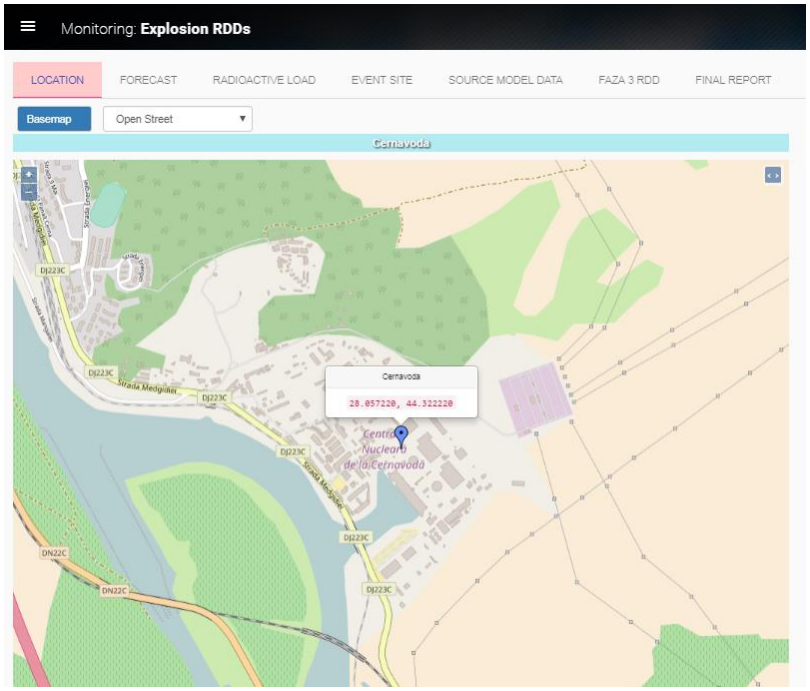
In interfata urmatoare este afisata matricea de vulnerabilitate care este alcatuita prin reprezentarea intr-un sistem bidimensional a locatiilor efectate, in care cele doua dimensiuni sunt reprezentate de vulnerabilitatea statica, respectiv de vulnerabilitatea dinamica.

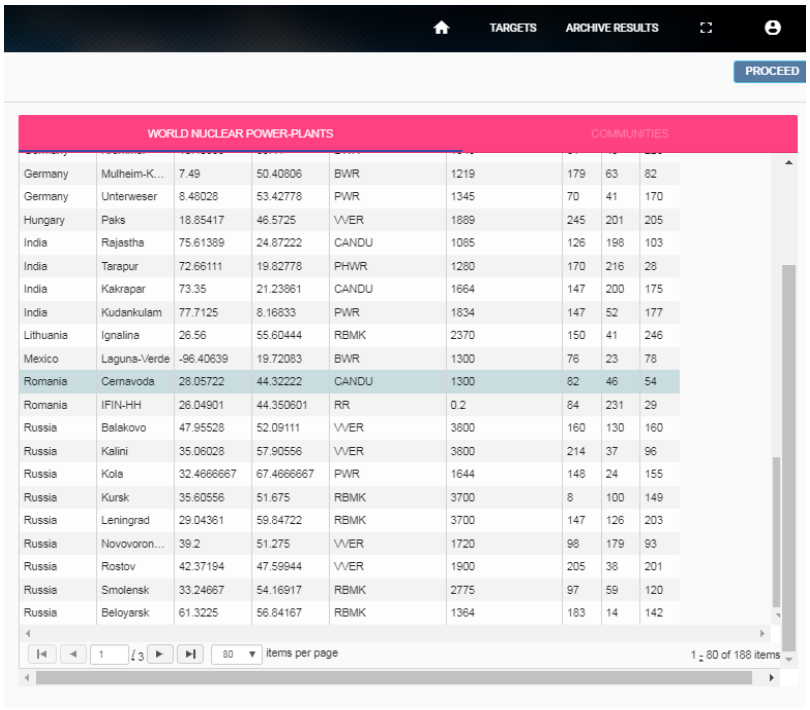


6.4. Modulul “Explosive radioactive dispersion devices”

6.4.1. Selectarea locatiei

Aceasta functionalitate a fost descrisa in cadrul componentei de localizare. Ca particularitate, utilizatorul are la dispozitie atat lista utilitatilor nucleare, cat si lista comunitatilor, simularea referindu-se la un eveniment petrecut la nivelul unei locatii aleasa de utilizator.
Pentru locatia aleasa se vor afisa de asemenea in harta coordonatele locatiei.

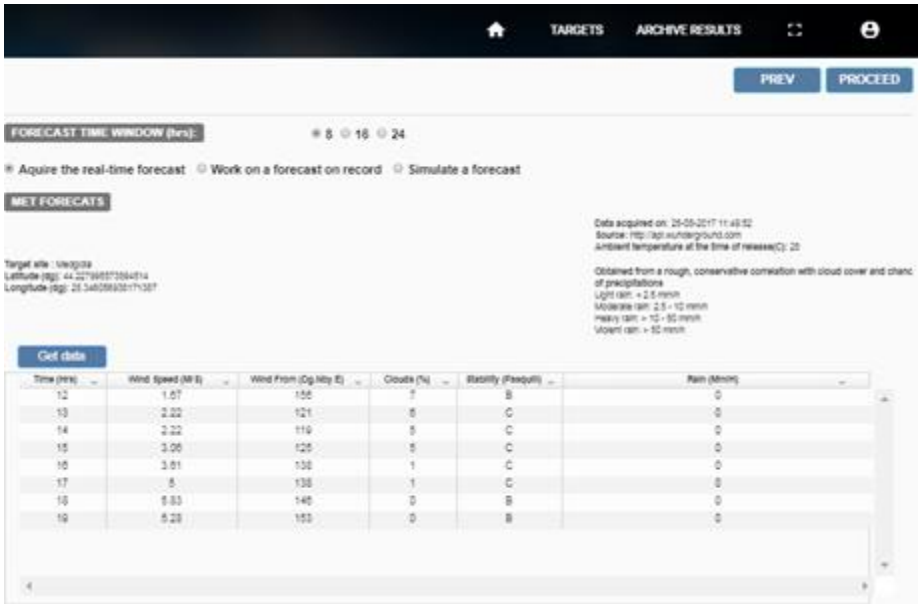




Germany	Mulheim-K...	7.49	50.40806	BWR	1219	179	63	82
Germany	Unterweser	8.48028	53.42778	PWR	1345	70	41	170
Hungary	Paks	18.85417	46.5725	VVER	1889	245	201	205
India	Rajastha	75.61389	24.87222	CANDU	1085	126	198	103
India	Tarapur	72.66111	19.82778	PHWR	1280	170	216	28
India	Kakrapar	73.35	21.23861	CANDU	1664	147	200	175
India	Kudankulam	77.7125	8.16833	PWR	1834	147	52	177
Lithuania	Ignalina	26.56	55.60444	RBMK	2370	150	41	246
Mexico	Laguna-Verde	-96.40639	19.72083	BWR	1300	76	23	78
Romania	Cernavoda	28.05722	44.32222	CANDU	1300	82	46	54
Romania	IFIN-HH	26.04901	44.350601	RR	0.2	84	231	29
Russia	Balakovo	47.95528	52.09111	VVER	3800	160	130	160
Russia	Kalini	35.06028	57.90556	VVER	3800	214	37	96
Russia	Kola	32.4666667	67.4666667	PWR	1644	148	24	155
Russia	Kursk	35.60556	51.675	RBMK	3700	8	100	149
Russia	Leningrad	29.04361	59.84722	RBMK	3700	147	126	203
Russia	Novovoron...	39.2	51.275	VVER	1720	98	179	93
Russia	Rostov	42.37194	47.59944	VVER	1900	205	38	201
Russia	Smolensk	33.24667	54.16917	RBMK	2775	97	59	120
Russia	Beloyarsk	61.3225	56.84167	RBMK	1364	183	14	142

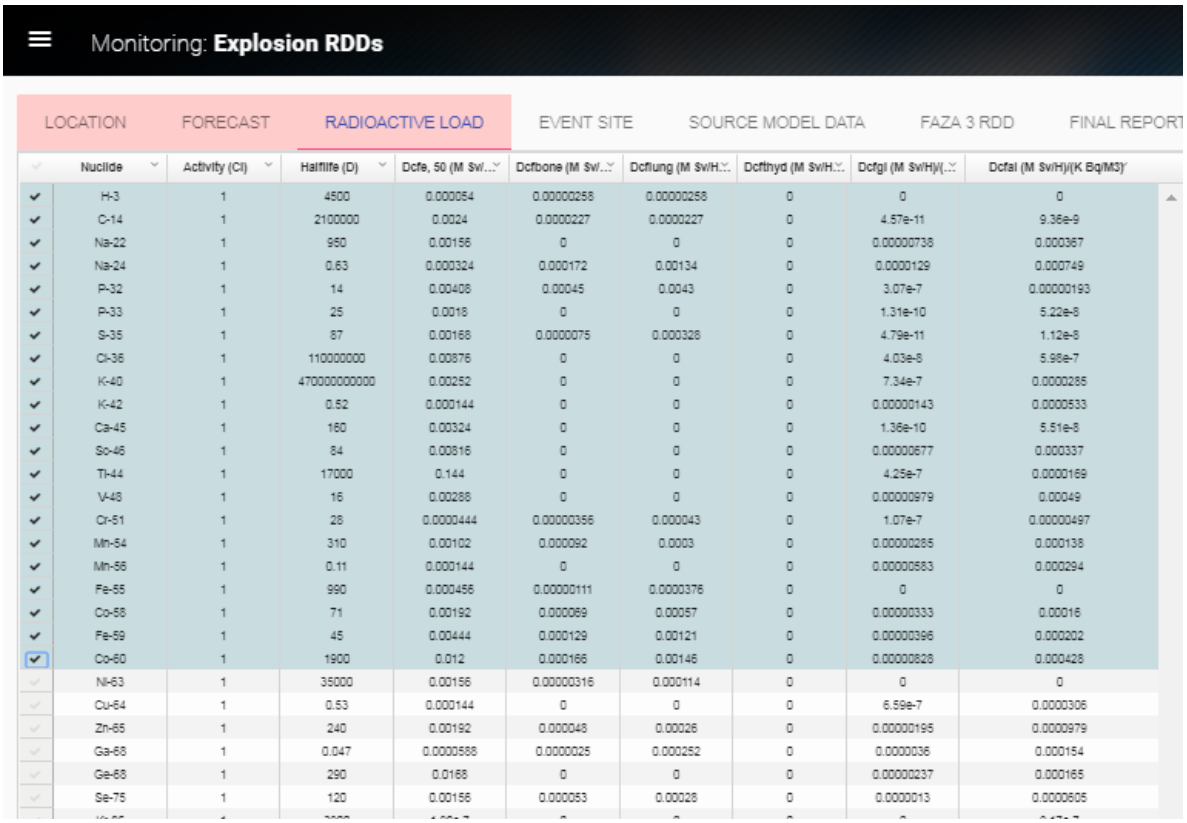
6.4.2. Achizitia datelor meteo pentru locatia aleasa

Aceasta functionalitate a fost descrisa in cadrul componentei achizitie a datelor meteo.



6.4.3. Selectarea incarcaturii radioactive

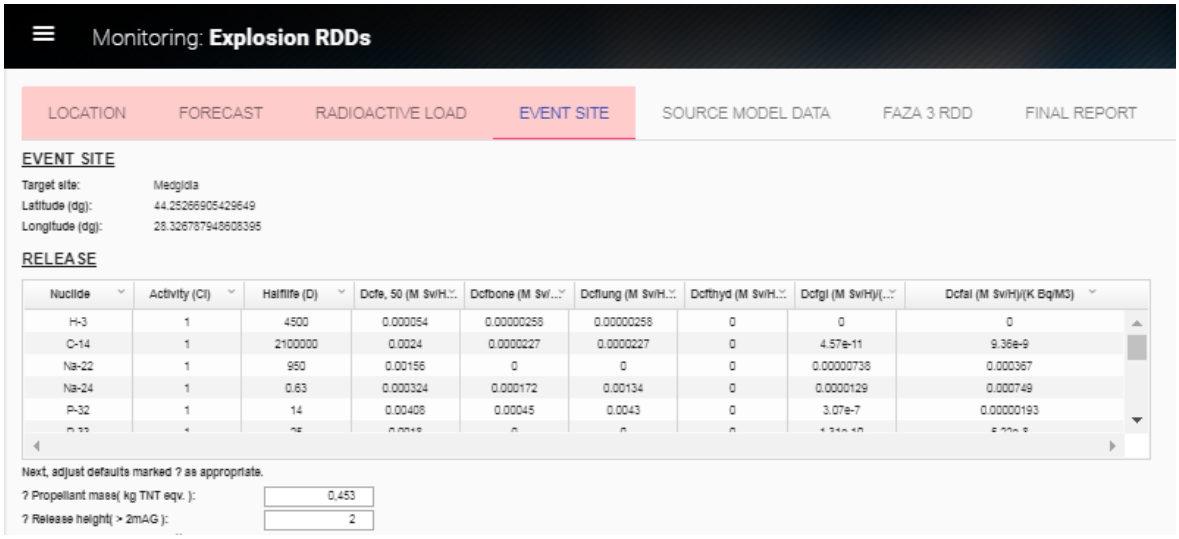
Aceasta interfata ofera posibilitatea de a particulariza tipul de incarcatura nuceara utilizat in explozie. Alegerea nuclidelor se face prin selectie din cadrul unui tabel cu inregistrari. In cadrul tabelei sunt disponibile functionalitati de sortare a adatelor functie de valorile atributelor.



Nuclide	Activity (Ci)	Halflife (D)	Dcfe, 50 (M Sv/...	Dcfbone (M Sv/...	Dcflung (M Sv/H...	Dcfthyd (M Sv/H...	Dcfgi (M Sv/H)/(...	Dcfai (M Sv/H)/(K Bq/M3)
H-3	1	4500	0.000054	0.00000258	0.00000258	0	0	0
C-14	1	2100000	0.0024	0.0000227	0.0000227	0	4.57e-11	9.36e-9
Na-22	1	950	0.00156	0	0	0	0.00000738	0.000367
Na-24	1	0.63	0.000324	0.000172	0.00134	0	0.0000129	0.000749
P-32	1	14	0.00408	0.00045	0.0043	0	3.07e-7	0.00000193
P-33	1	25	0.0018	0	0	0	1.31e-10	5.22e-8
S-35	1	87	0.00168	0.0000075	0.000328	0	4.79e-11	1.12e-8
Cl-36	1	110000000	0.00876	0	0	0	4.03e-8	5.98e-7
K-40	1	470000000000	0.00252	0	0	0	7.34e-7	0.0000285
K-42	1	0.52	0.000144	0	0	0	0.00000143	0.0000533
Ca-45	1	160	0.00324	0	0	0	1.36e-10	5.51e-8
Sc-46	1	84	0.00816	0	0	0	0.00000677	0.000337
Ti-44	1	17000	0.144	0	0	0	4.25e-7	0.0000169
V-48	1	16	0.00288	0	0	0	0.00000979	0.00049
Cr-51	1	28	0.0000444	0.00000356	0.000043	0	1.07e-7	0.00000497
Mn-54	1	310	0.00102	0.000092	0.0003	0	0.00000285	0.000138
Mn-56	1	0.11	0.000144	0	0	0	0.00000583	0.000294
Fe-55	1	990	0.000456	0.00000111	0.0000376	0	0	0
Co-58	1	71	0.00192	0.000069	0.00057	0	0.00000333	0.00016
Fe-59	1	45	0.00444	0.000129	0.00121	0	0.00000396	0.000202
Co-60	1	1900	0.012	0.000166	0.00146	0	0.00000828	0.000428
Ni-63	1	35000	0.00156	0.00000316	0.000114	0	0	0
Cu-64	1	0.53	0.000144	0	0	0	6.59e-7	0.0000306
Zn-65	1	240	0.00192	0.000048	0.00026	0	0.00000195	0.0000979
Ga-68	1	0.047	0.0000588	0.0000025	0.000252	0	0.0000036	0.000154
Ge-68	1	290	0.0168	0	0	0	0.00000237	0.000165
Se-75	1	120	0.00156	0.000053	0.00028	0	0.0000013	0.0000605

6.4.4. Selectarea parametrilor referitori la locatie

In cadrul acestei interfete sunt afisate valorile selectate anterior pe baza carora se va rula simularea in continuare.



Nuclide	Activity (Ci)	Halflife (D)	Dcfe, 50 (M Sv/H...	Dcfbone (M Sv/...	Dcflung (M Sv/H...	Dcfthyd (M Sv/H...	Dcfgi (M Sv/H)/(...	Dcfai (M Sv/H)/(K Bq/M3)
H-3	1	4500	0.000054	0.00000258	0.00000258	0	0	0
C-14	1	2100000	0.0024	0.0000227	0.0000227	0	4.57e-11	9.36e-9
Na-22	1	950	0.00156	0	0	0	0.00000738	0.000367
Na-24	1	0.63	0.000324	0.000172	0.00134	0	0.0000129	0.000749
P-32	1	14	0.00408	0.00045	0.0043	0	3.07e-7	0.00000193

In cadrul acestei interfete se introduc si valorile parametrilor legati de masa materialului exploziv, precum si inaltimea la care s-a produs explozia exprimata in „metri deasupra suprafetei terestre”.

6.4.5. Selectarea modelului

In cadrul acestui pas este implementata functionalitatea de parametrizarea a modelului de analiza a simularii. In cadrul simularii unei explozii radioactive a unui dispozitiv de dispersie este folosit un model care permite configurarea a 5 trepte de eliberarea a incarcaturii radioactive. Pentru aceste 5 trepte se permite parametrizarea factorilor referitori la inaltimea la care se face eliberarea in fiecarea trepta, alaturi de factorii specifici incarcaturii eliberate.

? Columnar Source Model Settings*

Level	Height Factor	Load Factor
H1	0	0.04
H2	0.2	0.16
H3	0.4	0.25
H4	0.6	0.35
H5	0.8	0.2

* An explosive release is modelled by five puffs on the vertical of the source.
The 'Height factor' is the fraction of the initial cloud top height.
The 'Load factor' if the fraction of the total activity (kBq, Ci) assumed to having been released by the explosion.

Functionalitatea implementata in acest caz permite configurarea celor 5 praguri de inaltime, alaturi de incarcatura eliberata la nivelul fiecarei trepte.

Monitoring: **Explosion RDDs**

LOCATION | FORECAST | RADIOACTIVE LOAD | EVENT SITE | SOURCE MODEL DATA | FAZA 3 RDD | FINAL REPORT

Explosive source model data (5-level load distribution):

Initial cloud top(mAG): 76.0
Initial cloud radius(m): 15.2
Horizontal dispersion standard deviation at source(m): 7.6
Vertical dispersion standard deviation at source(m): 15.2

Level	Height (M A G)	Radioactive Load (K Bq)
L1	0	0.04
L2	15	0.16
L3	30	0.25
L4	46	0.35
L5	61	0.2

6.4.6. Introducere parametri specifici

In aceasta etapa sunt confirmate datele meteo introduse si se fac setarile parametrilor legati de dispersia substantelor eliberate.

LOCATION | FORECAST | RADIOACTIVE LOAD | EVENT SITE | SOURCE MODEL DATA | FAZA 3 RDD | FINAL REPORT

MET FORECATS

Target site : Medgidia
Latitude (dg): 44.2526690542964 9
Longitude (dg): 28.3267879456839 5

Data acquired on: 25-08-2017 12:09:32
Source: http://api.wunderground.com
Ambient temperature at the time of release(C): 27

Obtained from a rough, conservative correlation with cloud cover and chance of precipitations
Light rain: < 2.5 mm/h
Moderate rain: 2.5 - 10 mm/h
Heavy rain: > 10 - 50 mm/h
Violent rain: > 50 mm/h

Time (Hrs)	Wind Speed (M/S)	Wind From (Dg.Nby E)	Clouds (%)	Stability (Pasquill)	Rain (Mm/H)
13	1.67	126	7	B	0
14	1.67	122	6	B	0
15	2.78	127	4	C	0
16	3.06	139	0	B	0
17	4.44	138	0	B	0
18	5.28	145	0	B	0
19	5.28	156	0	B	0
20	4.44	161	0	E	0

>> DISPERSION DATA

Time-dependent dispersion coefficients (Doury)

Strongest Diffusion (A-Pasquill)

Time-range (s)	Ah	Kh	Av	Kv	
0	0.405	0.859	0.420	0.814	s1
240	0.135	1.130	1.000	0.685	s2
3280	0.135	1.130	20.000	0.500	s3
97000	0.463	1.000	20.000	0.500	s4
508000	6.500	0.824	20.000	0.500	s5
1300000	200,000.000	0.500	20.000	0.500	s6

Weakest Diffusion (F-Pasquill)

Time-range (s)	Ah	Kh	Av	Kv	
0	0.405	0.859	0.200	0.500	w1
240	0.135	1.130	0.200	0.500	w2
3280	0.135	1.130	0.200	0.500	w3
97000	0.463	1.000	0.200	0.500	w4
508000	6.500	0.824	0.200	0.500	w5
1300000	200,000.000	0.500	0.200	0.500	w6
Stability	Wind shear ()	Inversion Cap (mAG)		Sigma-Theta (dd)	
B	0.13	1200		20	kB
C	0.21	800		15	kC
D	0.34	560		10	kD
E	0.44	320		5	kE
F	0.44	200		2.5	kF
A	0.07	1600		25	kA

? MATERIAL DATA

Carrier Type	Vdry	A Rain	B Rain
Aerosol	0.0010	0.0000800	0.8
I2	0.0100	0.0000800	0.6
CH3I	0.0005	0.0000008	0.6
Noble-gases	0.0000	0.0000000	0.0

Pentru regasirea facila in cadrul interfetei, parametri sunt grupati in tabele functie de specificul acestora. In cadrul acestor tabele este permisa editarea valorilor predefinite.
Interfata contine parametrii necesari definitivarii simularii, precum si parametrii destinatii particularizarii modului de afisarea al rezultatelor.

? Iodine form (1-I2, 2-CH3I): 1-I2

MAPPING PREFERENCES

? Palette (1-full color, 2-greyscale): 1-full color

WORKING ASSUMPTIONS

Adjust defaults as deemed appropriate, this including the dispersion coefficients

? Ground reflection fraction (0-1): 1

? Inversion lid reflection fraction (0-1): 1

? Terrain roughness correction exponent: 0,2

Effective monitoring time (h) set to: 8

Puff time step* (s): 21.0

*Standing for process sampling time

6.4.7. Generarea raportului

Aceasta functionalitate a fost descrisa in cadrul componentei de raportare a rezultatelor simularii. In cazul simularii unui eveniment in cadrul modulului „***Explosive radioactive dispersion devices***” se va genera raportul de forma urmatoare, alaturi de hartile in care se face reprezentarea prin isodose a zonei de influenta a norului radioactiv.

Monitoring: **Explosion RDDs**

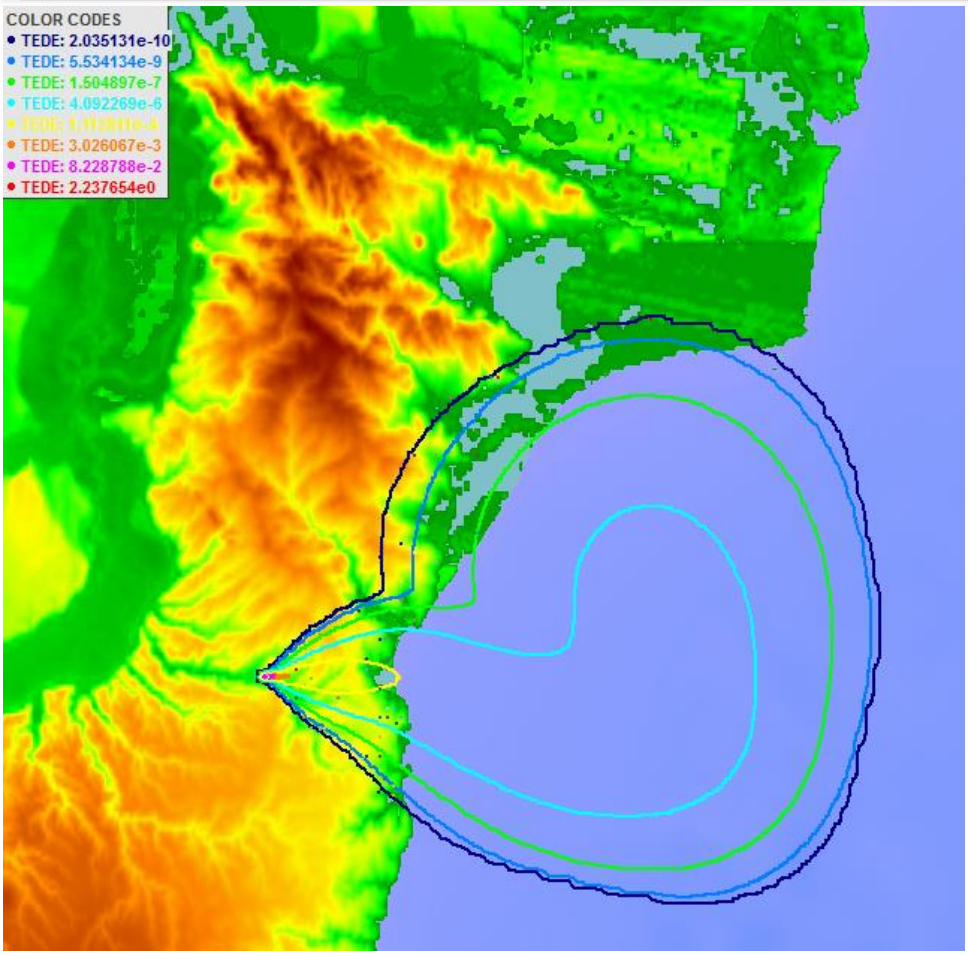
LOCATION | FORECAST | RADIOACTIVE LOAD | EVENT SITE | SOURCE MODEL DATA | FAZA 3 RDD | FINAL REPORT | VULNERABILIT

EVENT SITE

CICLOVA-ROMÂNA-E
Latitude(dg): 44.2541752
Longitude(dg): 28.3246422

RELEASE

NUCLIDE	ACTIVITY (Ci)	Halflife (d)	DCFe,50 (mSv/h)/ (kBq/m3)	DCFbone (mSv/h)/ (kBq/m3)	DCFlung (mSv/h)/ (kBq/m3)	DCFthyd (mSv/h)/ (kBq/m3)	DCFgi (mSv/h)/ (kBq/m2)	DCFai (mSv/h), (kBq/m
H-3	1.0	4.5e03	5.40e-05	2.58e-06	2.58e-06	0.00e00	0.00e00	0.00e00
C-14	1.0	2.1e06	2.40e-03	2.27e-05	2.27e-05	0.00e00	4.57e-11	9.36e-09
Na-22	1.0	9.5e02	1.56e-03	0.00e00	0.00e00	0.00e00	7.38e-06	3.67e-04
H-3	1.0	4.5e03	5.40e-05	2.58e-06	2.58e-06	0.00e00	0.00e00	0.00e00
P-32	1.0	1.4e01	4.08e-03	4.50e-04	4.30e-03	0.00e00	3.07e-07	1.93e-06
P-33	1.0	2.5e01	1.80e-03	0.00e00	0.00e00	0.00e00	1.31e-10	5.22e-08
S-35	1.0	8.7e01	1.68e-03	7.50e-06	3.28e-04	0.00e00	4.79e-11	1.12e-08
K-40	1.0	4.7e11	2.52e-03	0.00e00	0.00e00	0.00e00	7.34e-07	2.85e-05
K-42	1.0	5.2e-01	1.44e-04	0.00e00	0.00e00	0.00e00	1.43e-06	5.33e-05
Ca-45	1.0	1.6e02	3.24e-03	0.00e00	0.00e00	0.00e00	1.36e-10	5.51e-08
Sc-46	1.0	8.4e01	8.16e-03	0.00e00	0.00e00	0.00e00	6.77e-06	3.37e-04
Ti-44	1.0	1.7e04	1.44e-01	0.00e00	0.00e00	0.00e00	4.25e-07	1.69e-05
Cr-51	1.0	2.8e01	4.44e-05	3.56e-06	4.30e-05	0.00e00	1.07e-07	4.97e-06
Mn-54	1.0	3.1e02	1.02e-03	9.20e-05	3.00e-04	0.00e00	2.85e-06	1.38e-04
Mn-56	1.0	1.1e-01	1.44e-04	0.00e00	0.00e00	0.00e00	5.83e-06	2.94e-04
Fe-55	1.0	9.9e02	4.56e-04	1.11e-06	3.76e-05	0.00e00	0.00e00	0.00e00
Co-58	1.0	7.1e01	1.92e-03	6.90e-05	5.70e-04	0.00e00	3.33e-06	1.60e-04
Co-60	1.0	1.9e03	1.20e-02	1.66e-04	1.46e-03	0.00e00	8.28e-06	4.28e-04
Cu-64	1.0	5.3e-01	1.44e-04	0.00e00	0.00e00	0.00e00	6.59e-07	3.06e-05
Ge-68	1.0	2.9e02	1.68e-02	0.00e00	0.00e00	0.00e00	2.37e-6	1.65e-4



6.4.8. Generarea matricii de vulnerabilitate

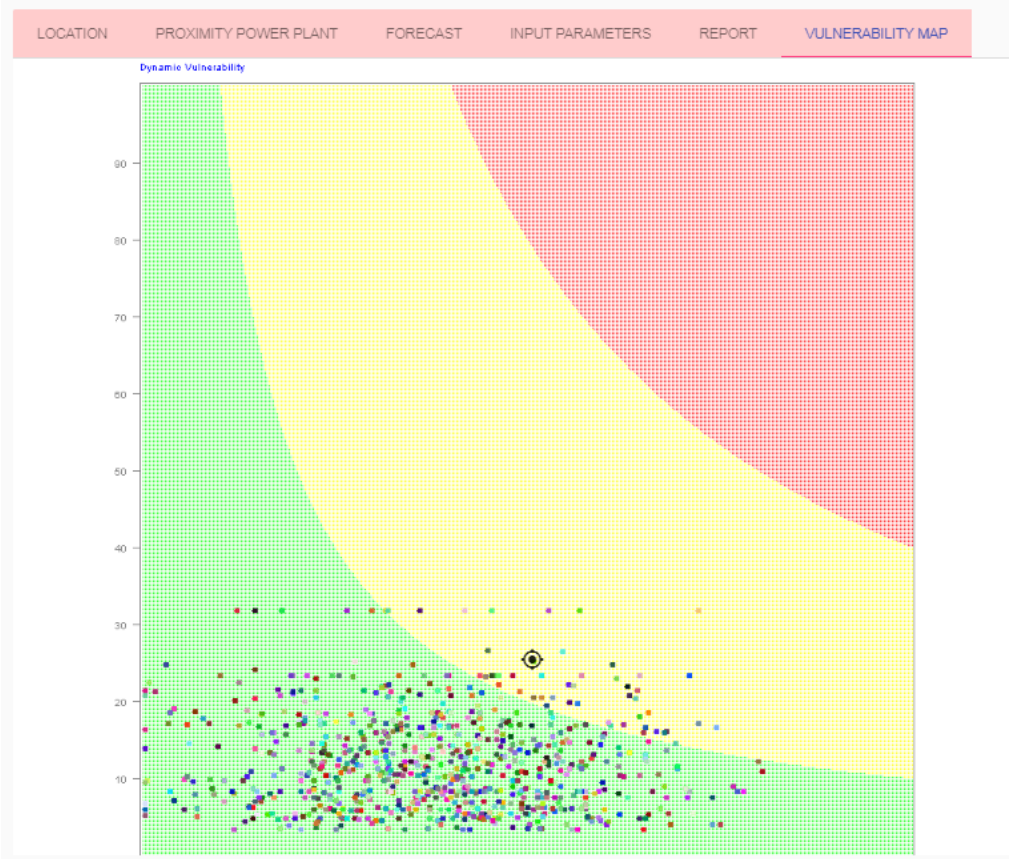
Aceasta functionalitate a fost descrisa in cadrul componentei de realizarea a matricii de vulnerabilitate.

In cadrul primului pas sunt definite limitele pentru calculul matricii de vulnerabilitate corespunzatoare pragurilor de 5%, respectiv de 95%, urmat de confirmarea acestora.

In cadrul interfetei este afisata lista comunitatilor aflate in aria de influenta, pe baza careia se poate identifica pozitia in cadrul matricii de vulnerabilitate.

Comunity	Latitude(D..	Longitude(..	Static V(%)	Dinamic V(..	V Index(%)	V Level(Co...
BUCURESTI	44.437711	26.0973669	50.5	25.5079931...	12.8815365...	Code Yellow
BUCURESTII-NOI	44.5	26.0333333	52.75	18.8382589...	9.93718160...	Code Green
DRAGANESTI	44.8282463	26.287209	54	9.23524168...	4.98703050...	Code Green
PITULICEA	44.8889109	26.6591021	43.75	5.66210130...	2.47716932...	Code Green
COJESTI	44.4833333	26.4333333	30.75	15.0644688...	4.63232418...	Code Green
CONSTANTIN-BRANCOVEANU	44.398732	26.1090837	29.75	17.8557638...	5.31208973...	Code Green
COTOFANCA	44.3783376	26.690614	15.25	7.81650462...	1.19201695...	Code Green
DOR-MARUNT	44.445599	26.919411	30.75	4.74769149...	1.45991513...	Code Green
FUNDULEA	44.4527778	26.5152778	58	12.8464340...	7.45093177...	Code Green
CIURESTI	44.437711	26.0973669	27.25	25.5079931...	6.95092813...	Code Green

In interfata urmatoare este afisata matricea de vulnerabilitate care este alcatuita prin reprezentarea intr-un sistem bidimensional a locatiilor efectate, in care cele doua dimensiuni sunt reprezentate de vulnerabilitatea statica, respectiv de vulnerabilitatea dinamica.

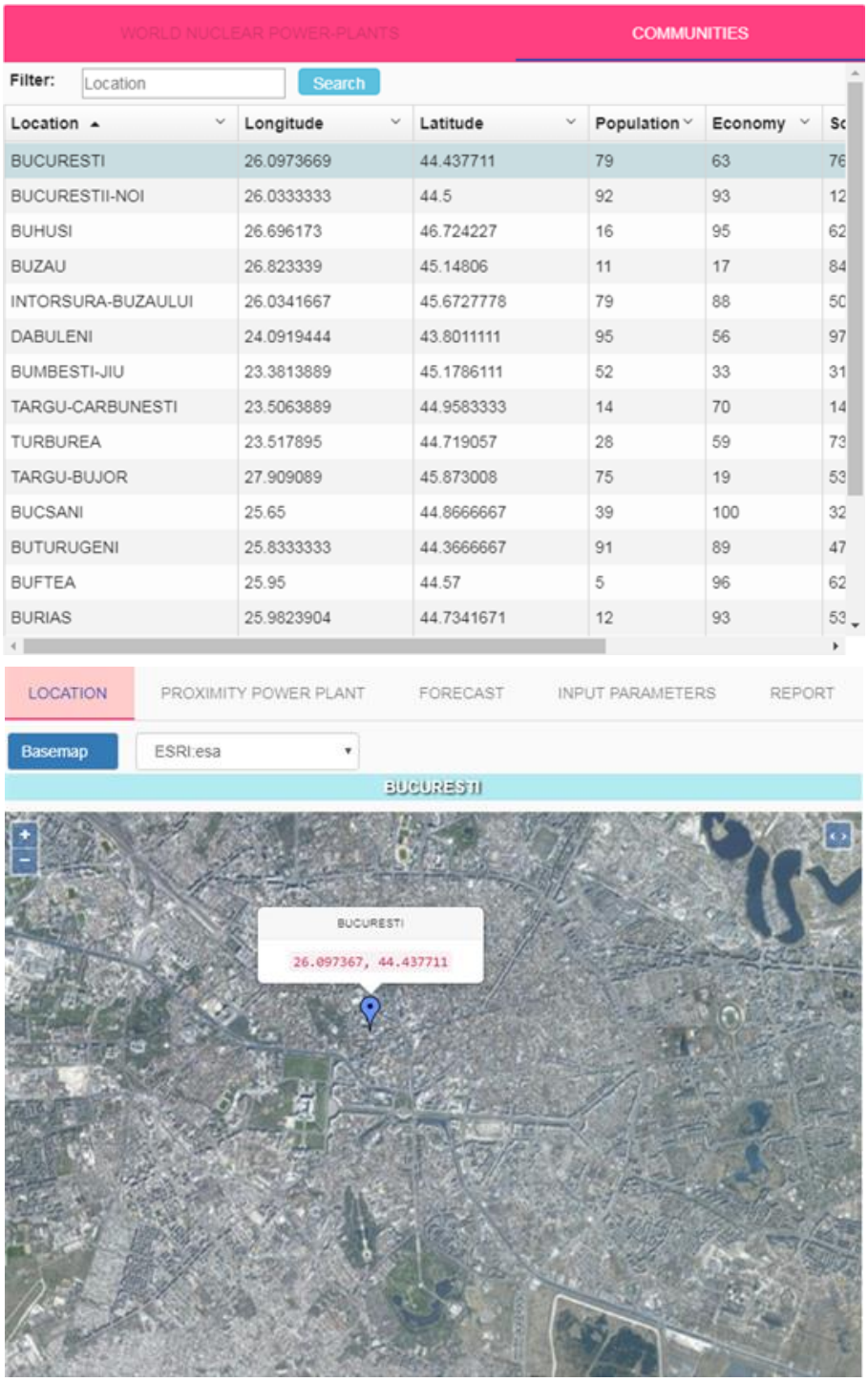

LOCATION
PROXIMITY POWER PLANT
FORECAST
INPUT PARAMETERS
REPORT
VULNERABILITY MAP
Dynamic Vulnerability
90
80
70
60
50
40
30
20
10

INPUT PARAMETERS
REPORT
VULNERABILITY MAP
Notice
VVR-S-MAGURELE
Lat(dg):44.350835
Lon(dg):26.048845
Population Index:94
Economy Index:82
Social Index94
Strategic Index:0
Emergency Mitigation Index:-41
DILUTION(s/m3):9.577741023204332e-6
DOSES:(equivalent,mSv)
-Air submersion:1.1821169169770088e-2
-Acute bone,30d:5.563194374363851e-6
-Acute lung,30d:6.74706321543672e-5
-Committed to thyroid:1.226544032397525e-3
-Committed effective,50y:2.2187623294244645e-4
-External effective,2d:3.27709170311451 93e-6
-External effective,7d:1.1457513222035227e-5
-Total Acute Bone Dose, TABD:1.1830009455847567e-2
-Total Acute Lung Dose, TALD:1.189191689362757e-2
-Total Thyroid Dose, TTHD:1.3050990293870728e-2
-Total Effective Dose Equivalent, TEDE:1.205450291593457e-2
EXPOSURE GRADE8
DIAGNOSE:
null
STATIC VULNERABILITY: 72
DYNAMIC VULNERABILITY: 32.076
OK
Static V(%)
54.25
49.75
30.75
21.75
55.5
39.75
41.5
22.5
26.25
53.5
50
60
70
80

6.5. Modulul “Incendiary radioactive dispersion devices”

6.5.1. Selectarea locatiei

Aceasta functionalitate a fost descrisa in cadrul componentei de localizare. Ca particularitate, utilizatorul are la dispozitie atat lista utilitatilor nucleare, cat si lista comunitatilor, simularea referindu-se la un eveniment petrecut la nivelul unei locatii aleasa de utilizator. Pentru locatia aleasa se vor afisa de asemenea in harta coordonatele locatiei.



Location	Longitude	Latitude	Population	Economy	Sc
BUCURESTI	26.0973669	44.437711	79	63	76
BUCURESTII-NOI	26.0333333	44.5	92	93	12
BUHUSI	26.696173	46.724227	16	95	62
BUZAU	26.823339	45.14806	11	17	84
INTORSURA-BUZAULUI	26.0341667	45.6727778	79	88	50
DABULENI	24.0919444	43.8011111	95	56	97
BUMBESTI-JIU	23.3813889	45.1786111	52	33	31
TARGU-CARBUNESTI	23.5063889	44.9583333	14	70	14
TURBUREA	23.517895	44.719057	28	59	73
TARGU-BUJOR	27.909089	45.873008	75	19	53
BUCSANI	25.65	44.8666667	39	100	32
BUTURUGENI	25.8333333	44.3666667	91	89	47
BUFTEA	25.95	44.57	5	96	62
BURIAS	25.9823904	44.7341671	12	93	53

Aceasta functionalitate a fost descrisa in cadrul componentei achizitie a datelor meteo. In cazul acestui modul achizitia datelor meteo se face pentru locatia centralei nucleare identificate in proximitate.

6.5.2. Achizitia datelor meteo pentru locatia aleasa

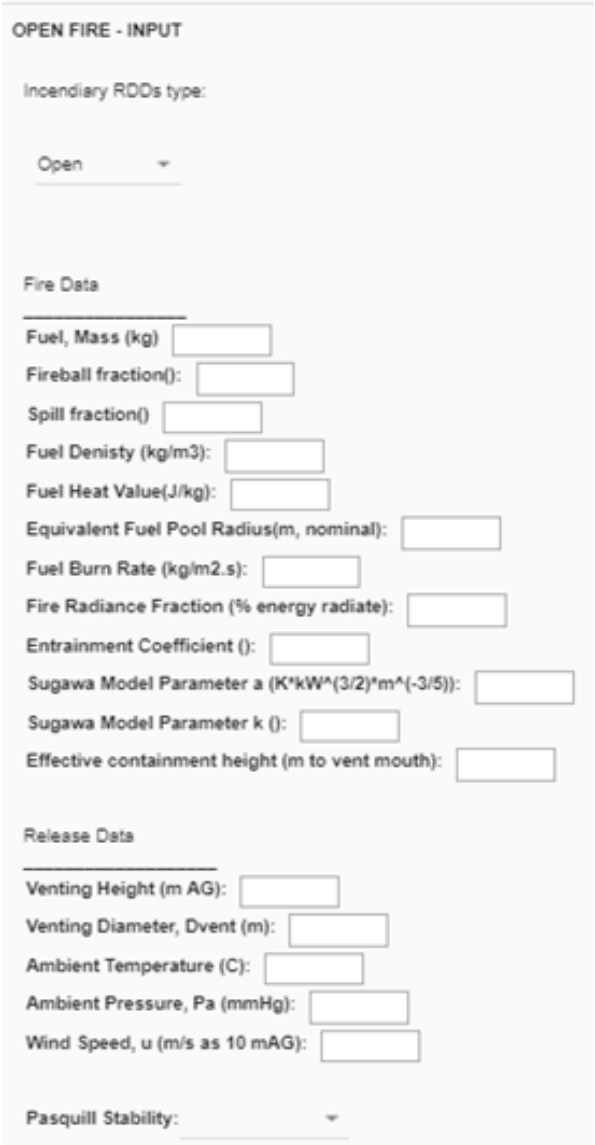
Aceasta functionalitate a fost descrisa in cadrul componentei achizitie a datelor meteo.

6.5.3. Selectarea termenului sursa

Aceasta functionalitate a fost descrisa in cadrul componentei de selectare a termenului sursa.

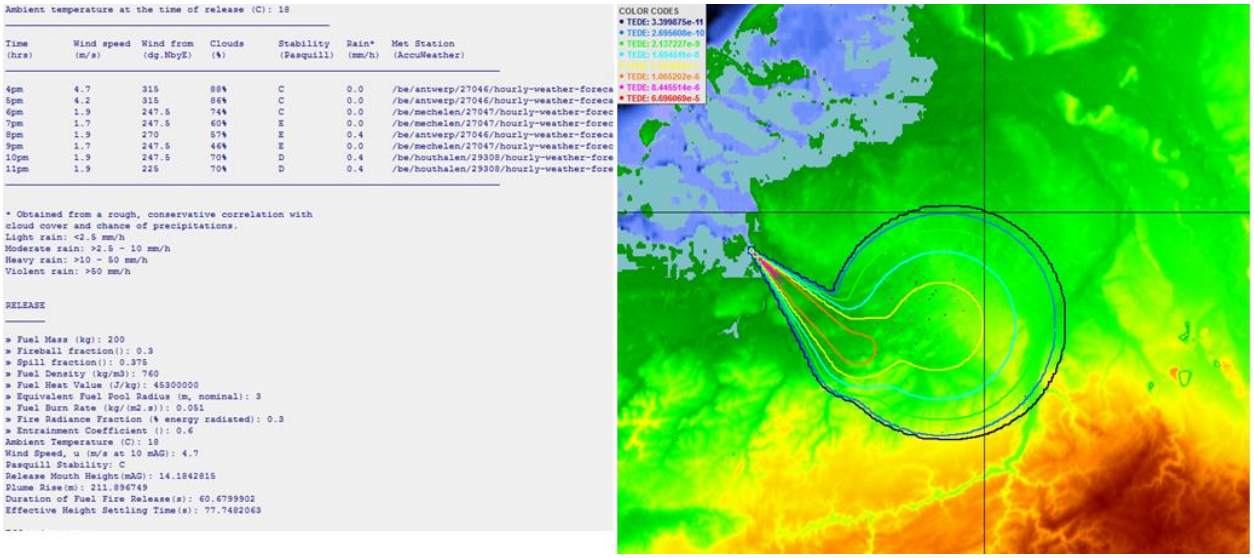
6.5.4. Selectarea parametrilor legati de incendiu

In cadrul acestei functionalitati sunt impelmentate functii de editare asupra paremetrilor specifici



6.5.5. Generarea raportului

Aceasta functionalitate a fost descrisa in cadrul componentei de raportare a rezultatelor simularii. In cazul simularii unui eveniment in cadrul modulului „***Incendiary radioactive dispersion devices***” se va genera raportul de forma urmatoare, alaturi de hartile in care se face reprezentarea prin isodose a zonei de influenta a norului radioactiv.



Ambient temperature at the time of release (C): 18

Time (hrs)	Wind speed (m/s)	Wind from (dg.NbyE)	Clouds (%)	Stability (Pasquill)	Rain* (mm/h)	Met Station (AccuWeather)
4pm	4.7	315	88%	C	0.0	/be/antwerp/27046/hourly-weather-foreca
5pm	4.2	315	86%	C	0.0	/be/antwerp/27046/hourly-weather-foreca
6pm	1.9	247.5	74%	C	0.0	/be/mechelen/27047/hourly-weather-forec
7pm	1.7	247.5	60%	E	0.0	/be/mechelen/27047/hourly-weather-forec
8pm	1.9	270	57%	E	0.4	/be/antwerp/27046/hourly-weather-foreca
9pm	1.7	247.5	46%	E	0.0	/be/mechelen/27047/hourly-weather-forec
10pm	1.9	247.5	70%	D	0.4	/be/houthalen/29308/hourly-weather-fore
11pm	1.9	225	70%	D	0.4	/be/houthalen/29308/hourly-weather-fore

* Obtained from a rough, conservative correlation with cloud cover and chance of precipitations.
Light rain: <2.5 mm/h
Moderate rain: >2.5 - 10 mm/h
Heavy rain: >10 - 50 mm/h
Violent rain: >50 mm/h

RELEASE

» Fuel Mass (kg): 200
» Fireball fraction(): 0.3
» Spill fraction(): 0.375
» Fuel Density (kg/m3): 760
» Fuel Heat Value (J/kg): 45300000
» Equivalent Fuel Pool Radius (m, nominal): 3
» Fuel Burn Rate (kg/(m2.s)): 0.051
» Fire Radiance Fraction (% energy radiated): 0.3
» Entrainment Coefficient (): 0.6
Ambient Temperature (C): 18
Wind Speed, u (m/s at 10 mAG): 4.7
Pasquill Stability: C
Release Mouth Height(mAG): 14.1842815
Plume Rise(m): 211.896749
Duration of Fuel Fire Release(s): 60.6799902
Effective Height Settling Time(s): 77.7482063

6.5.6. Generarea matricii de vulnerabilitate

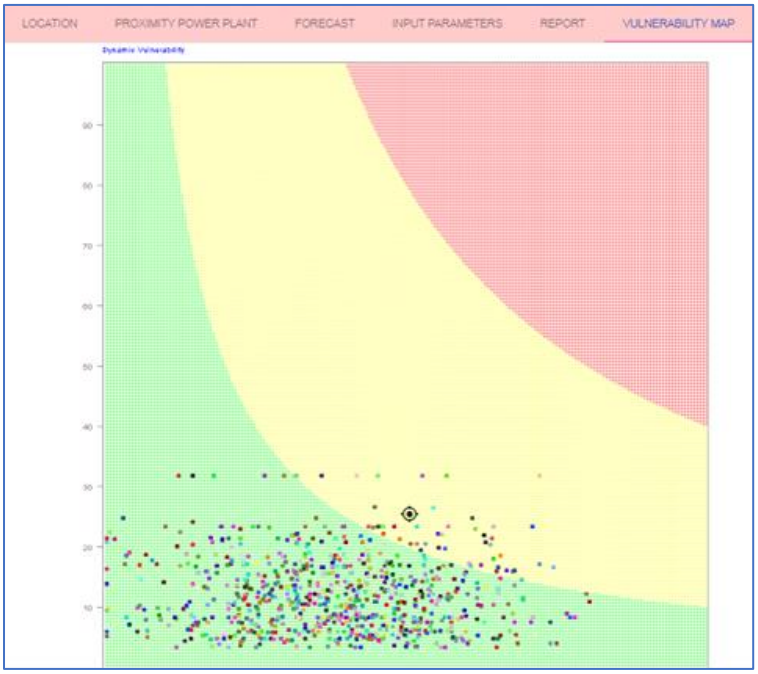
Aceasta functionalitate a fost descrisa in cadrul componentei de realizarea a matricii de vulnerabilitate.

In cadrul primului pas sunt definite limitele pentru calculul matricii de vulnerabilitate corespunzatoare pragurilor de 5%, respectiv de 95%, urmat de confirmarea acestora. In cadrul interfetei este afisata lista comunitatilor aflate in aria de influenta, pe baza careia se poate identifica pozitia in cadrul matricii de vulnerabilitate.

Comunity	Latitude(D.x	Longitude(.x	Static V(%)	Dinamic V(.x	V Index(%)	V Level(Co...
BUCURESTI	44.437711	26.0973669	50.5	25.5079931...	12.8815365...	Code Yellow
BUCURESTII-NOI	44.5	26.0333333	52.75	18.8382589...	9.93718160...	Code Green
DRAGANESTI	44.8282463	26.287209	54	9.23524168...	4.98703050...	Code Green
PITULICEA	44.8689109	26.6591021	43.75	5.66210130...	2.47716932...	Code Green
COJESTI	44.4833333	26.4333333	30.75	15.0644668...	4.63232418...	Code Green
CONSTANTIN-BRANCOVEANU	44.396732	26.1090837	29.75	17.8557638...	5.31208973...	Code Green
COTOFANCA	44.3783376	26.690614	15.25	7.81650482...	1.19201695...	Code Green
DOR-MARUNT	44.445599	26.919411	30.75	4.74769149...	1.45991513...	Code Green
FUNDULEA	44.4527776	26.5152776	58	12.8464340...	7.45093177...	Code Green
CIURESTI	44.437711	26.0973669	27.25	25.5079931...	6.95092813...	Code Green

Comunity	Latitude(D.x	Longitude(.x.	Static V(%)	Dinamic V(.x.	V Index(%)	V Level(Co...
BUCURESTI	44.437711	26.0973669	50.5	25.5079931...	12.8815365...	Code Yellow
BUCURESTII-NOI	44.5	26.0333333	52.75	18.8382589...	9.93718160...	Code Green
DRAGANESTI	44.8282463	26.287209	54	9.23524168...	4.96703050...	Code Green
PITULICEA	44.8689109	26.6591021	43.75	5.66210130...	2.47716932...	Code Green
COJESTI	44.4833333	26.4333333	30.75	15.0644668...	4.63232418...	Code Green
CONSTANTIN-BRANCOVEANU	44.396732	26.1090837	29.75	17.8557638...	5.31208973...	Code Green
COTOFANCA	44.3783376	26.690614	15.25	7.81650462...	1.19201695...	Code Green
DOR-MARUNT	44.445599	26.919411	30.75	4.74769149...	1.45991513...	Code Green
FUNDULEA	44.4527776	26.5152776	58	12.8464340...	7.45093177...	Code Green
CIURESTI	44.437711	26.0973669	27.25	25.5079931...	6.95092813...	Code Green

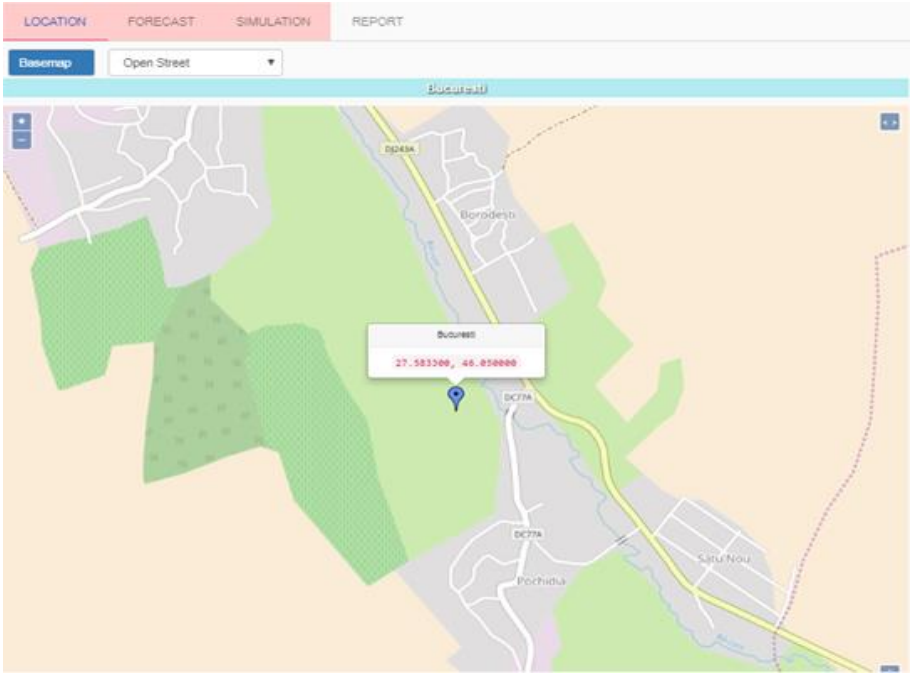
In interfata urmatoare este afisata matricea de vulnerabilitate care este alcatuita prin reprezentarea intr-un sistem bidimensional a locatiilor efectate, in care cele doua dimensiuni sunt reprezentate de vulnerabilitatea statica, respectiv de vulnerabilitatea dinamica.

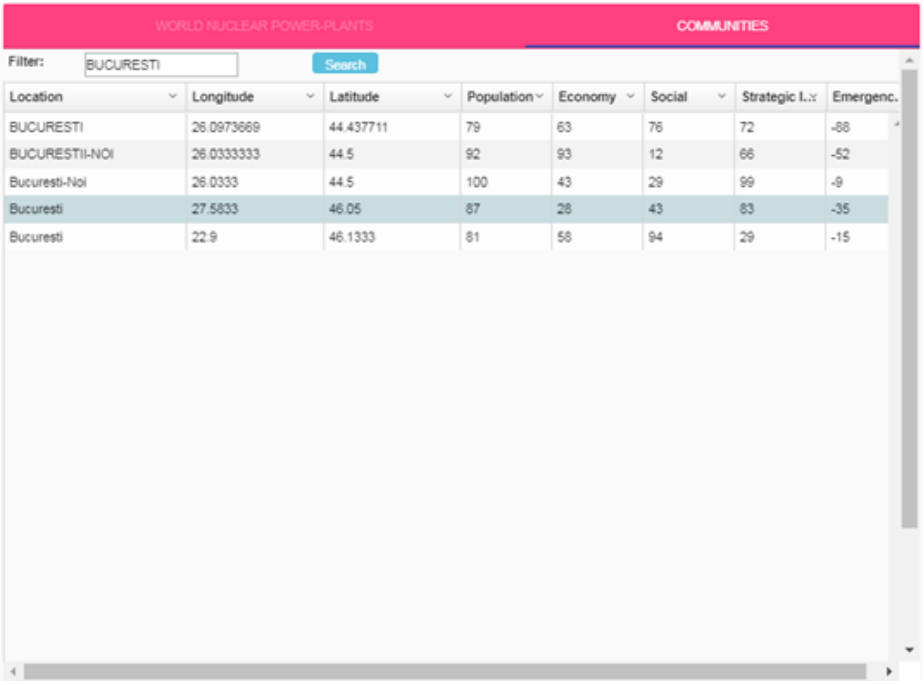


6.6. Modulul “Improvised nuclear devices”

6.6.1. Selectarea locatiei

Aceasta functionalitate a fost descrisa in cadrul componentei de localizare. Ca particularitate, utilizatorul are la dispozitie atat lista utilitatilor nucleare, cat si lista comunitatilor, simularea referindu-se la un eveniment petrecut la nivelul unei locatii aleasa de utilizator. Pentru locatia aleasa se vor afisa de asemenea in harta coordonatele locatiei.

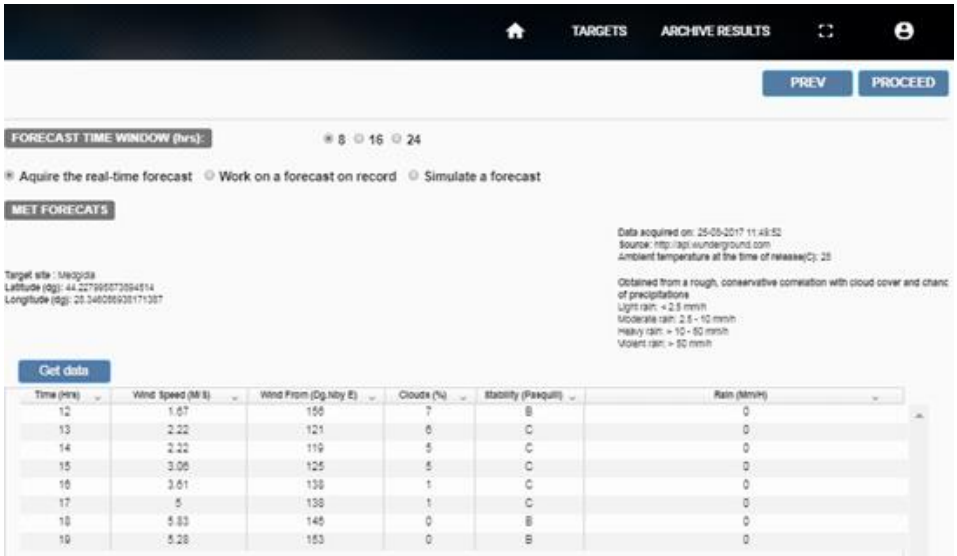




Location	Longitude	Latitude	Population	Economy	Social	Strategic I..	Emergenc.
BUCURESTI	26.0973669	44.437711	79	63	76	72	-88
BUCURESTII-NOI	26.0333333	44.5	92	93	12	66	-52
Bucuresti-Noi	26.0333	44.5	100	43	29	99	-9
Bucuresti	27.5833	46.05	87	28	43	83	-35
Bucuresti	22.9	46.1333	81	58	94	29	-15

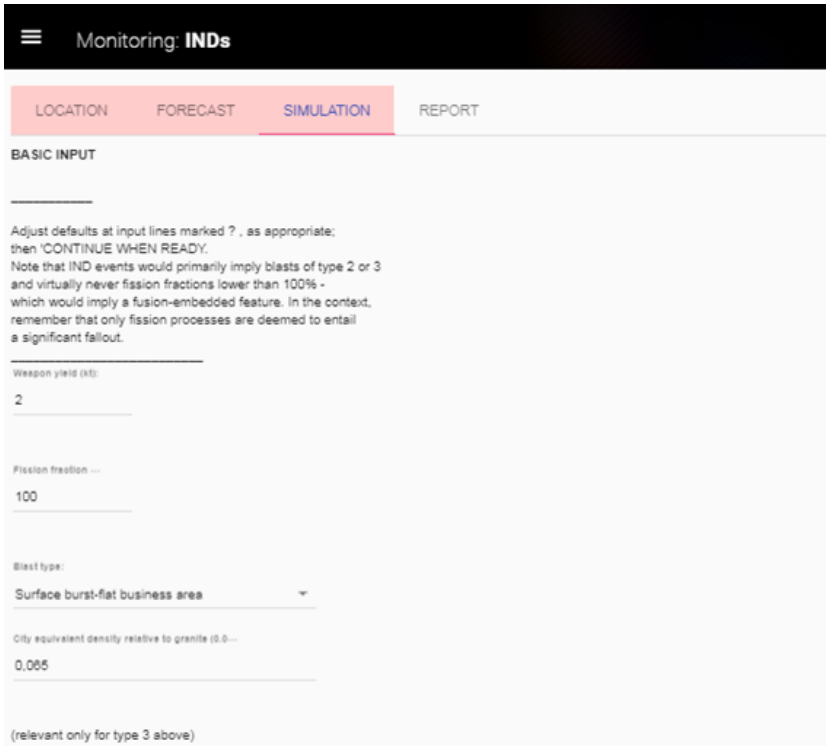
6.6.2. Achizitia datelor meteo

Aceasta functionalitate a fost descrisa in cadrul componentei achizitie a datelor meteo.



6.6.3. Selectarea parametrilor simularii

In cadrul acestei etape sunt afisati in cadrul interfetei parametrii ce caracterizeaza fenomenul de eliberare a particulelor radioactive de catre un dispozitivul improvizat. Introducerea parametrilor se face de catre un utilizator prin intermediul casutelor text. Valorile initiale sunt populate cu valori recomandate ale acestor parametrii.



6.6.4. Generarea raportului

Raportul genarat pe baza parametrilor introdusi este vizibil in interfata aferenta rapoartelor, alaturi de reprezentarile grafice ale simularii.

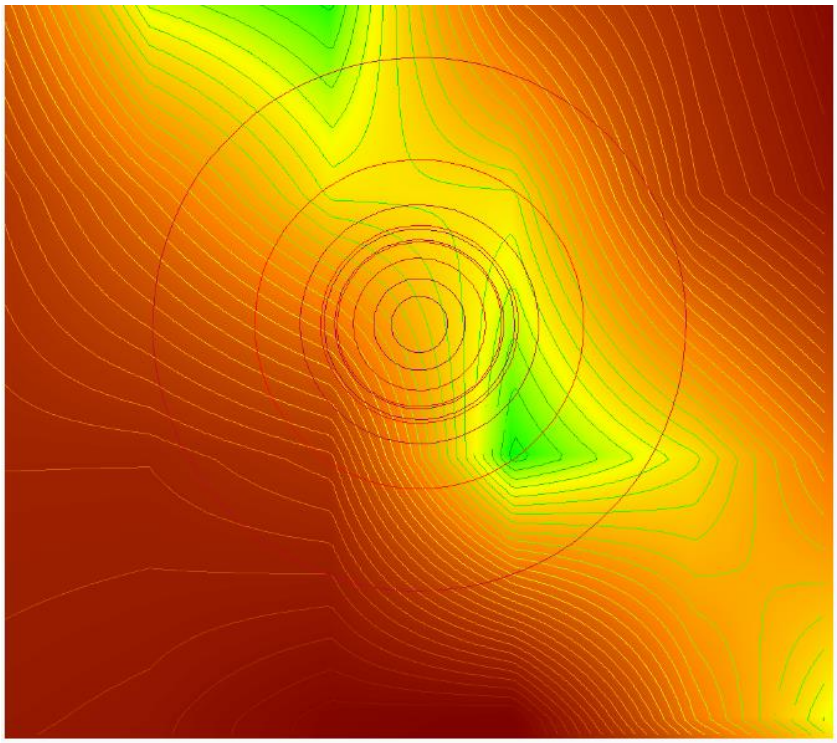
Monitoring: **INDs**

LOCATION FORECAST SIMULATION REPORT

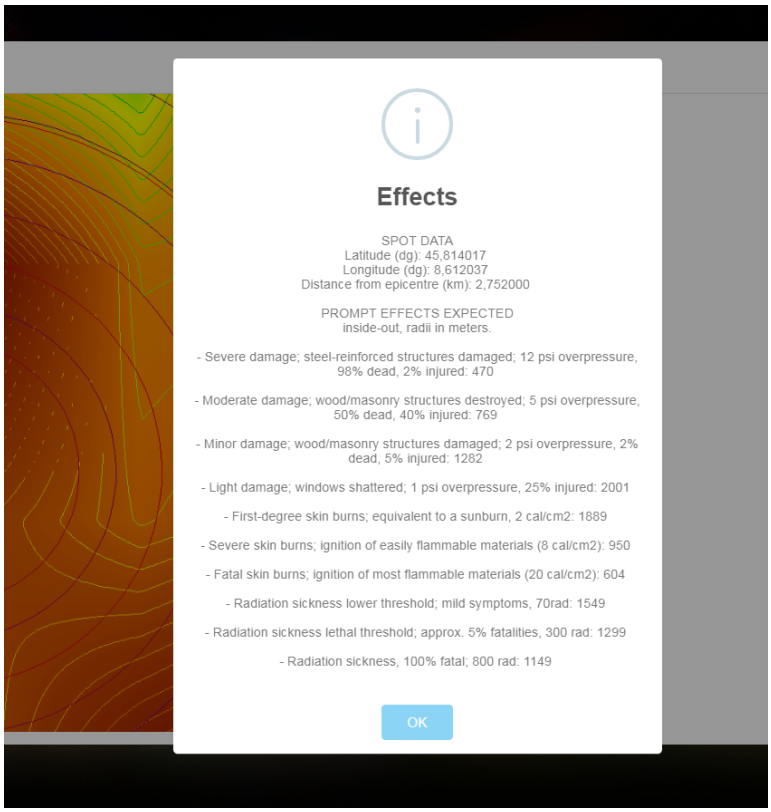
INDs report

```
THEATER OF OPERATIONS
_____________________

TARGET SITE: Bucuresti
Lat(dg): 46.050000
Lon(dg):27.583300
Data acquired on 25.08.2017 04:06:59
Source: Pochidia, Romania

Ambient temperature at the time of release (C): 24.6
____________________________________________________

Time        Wind speed  Wind from   Clouds      Stability   Rain*
(hrs)       (m/s)       (dg.NbyE)   (%)         (Pasquill)  (mm/h)
____________________________________________________________________
17PM        1.39        198.0       0               A        0
18PM        1.39        186.0       0               A        0
19PM        1.67        172.0       0               A        0
20PM        2.22        164.0       0               B        0
21PM        2.22        164.0       0               F        0
22PM        2.22        166.0       0               F        0
23PM        2.22        168.0       0               F        0
0AM         2.22        168.0       0               F        0
____________________________________________________________________

 Class: SURFACE BURST, FLAT BUSINESS AREA (tall buildings)
        All radii in metres.
        Ground assumed, density relative to granite: 0
        All values to be taken as overconservative upper bounds only.
```

```
Shockwave effects:
__________________

- Severe damage; steel-reinforced structures damaged; 12 psi overpressure, 98% dead, 2% injured: 235
- Moderate damage; wood/masonry structures destroyed; 5 psi overpressure, 50% dead, 40% injured: 292
- Minor damage; wood/masonry structures damaged; 2 psi overpressure, 2% dead, 5% injured: 351
- Light damage; windows shattered; 1 psi overpressure, 25% injured: 585

- Crater, buildings shattered and toppled inside: 152
- Ejecta, buildings damaged/destroyed by impact of flying debris: 327

Thermal radiation effects:
__________________________

- Fireball: 57
- First-degree skin burns; equivalent to a sunburn, 2 cal/cm2: 949
- Severe skin burns; ignition of easily flammable materials (8 cal/cm2): 424
- Fatal skin burns; ignition of most flammable materials (20 cal/cm2): 300

Nuclear radiation prompt effects:
_________________________________

- Radiation sickness lower threshold; mild symptoms, 70rad: 338
- Radiation sickness lethal threshold; approx. 5% fatalities, 300 rad: 163
- Radiation sickness, 100% fatal; 800 rad: 100
```



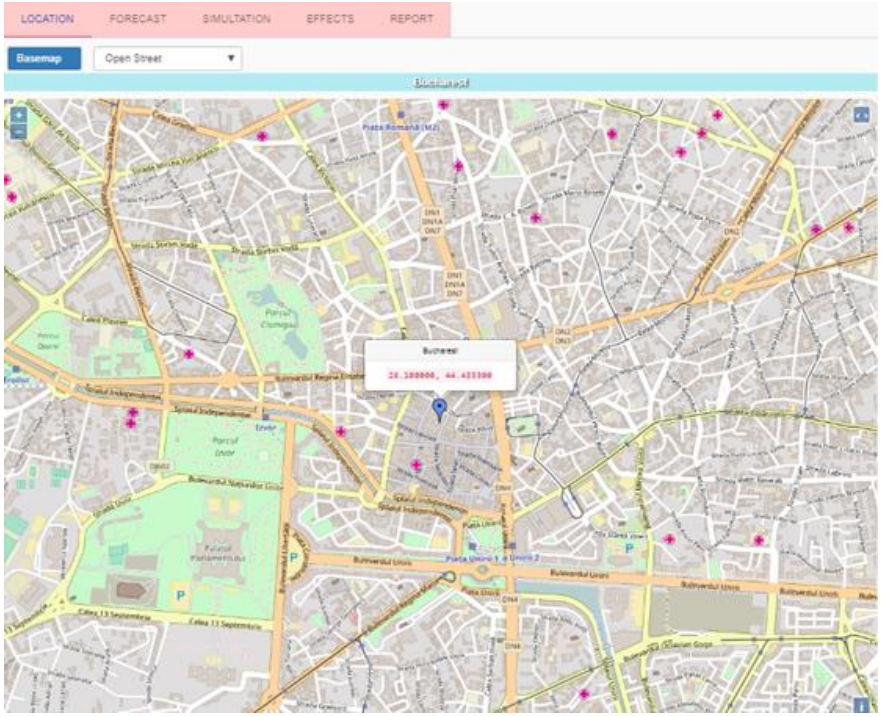
In cadrul raportului este implementata functionalitatea de interogare in mod interactiv a zonei afectata de explozia si de afisare a informatiilor legate de efectele exploziei la locatia interogata.

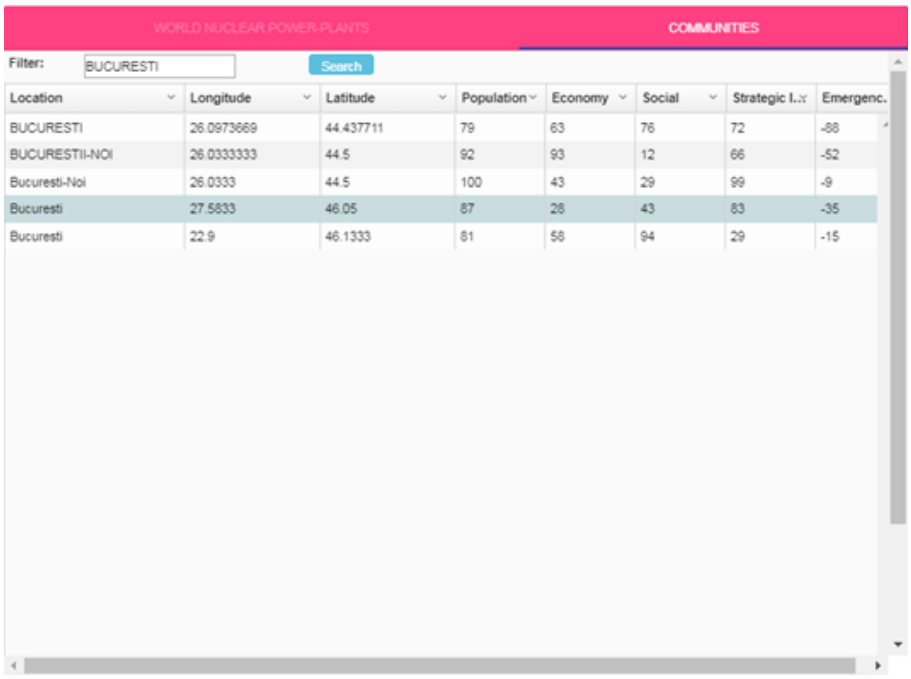


6.7. Modulul “Improvised explosive devices”

6.7.1. Selectarea locatiei

Aceasta functionalitate a fost descrisa in cadrul componentei de localizare. Ca particularitate, utilizatorul are la dispozitie atat lista utilitatilor nucleare, cat si lista comunitatilor, simularea referindu-se la un eveniment petrecut la nivelul unei locatii aleasa de utilizator.
Pentru locatia aleasa se vor afisa de asemenea in harta coordonatele locatiei.

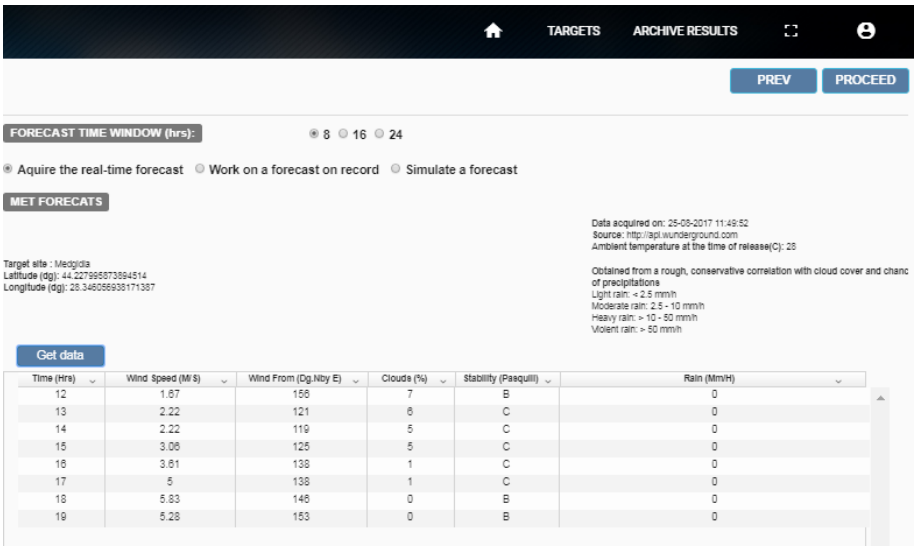




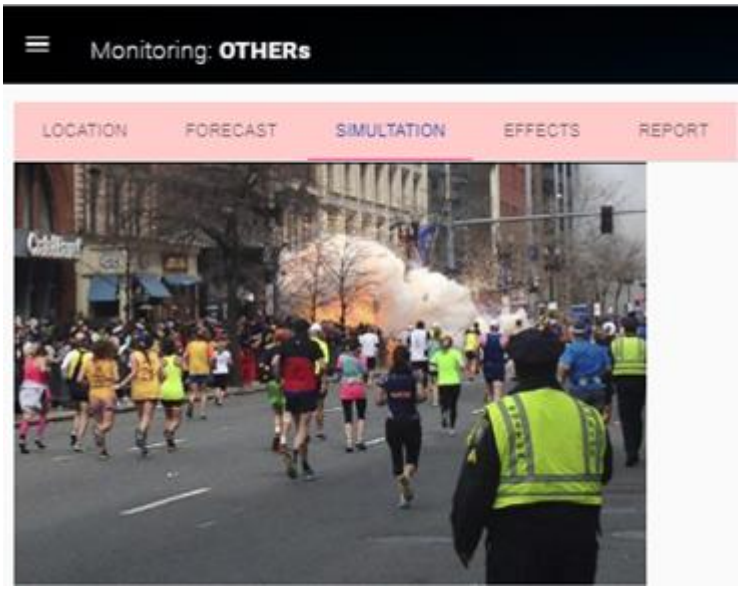
Location	Longitude	Latitude	Population	Economy	Social	Strategic I..	Emergenc.
BUCURESTI	26.0973669	44.437711	79	63	76	72	-88
BUCURESTII-NOI	26.0333333	44.5	92	93	12	66	-52
Bucuresti-Noi	26.0333	44.5	100	43	29	99	-9
Bucuresti	27.5833	46.05	87	28	43	83	-35
Bucuresti	22.9	46.1333	81	58	94	29	-15

6.7.2. Achizitia datelor meteo

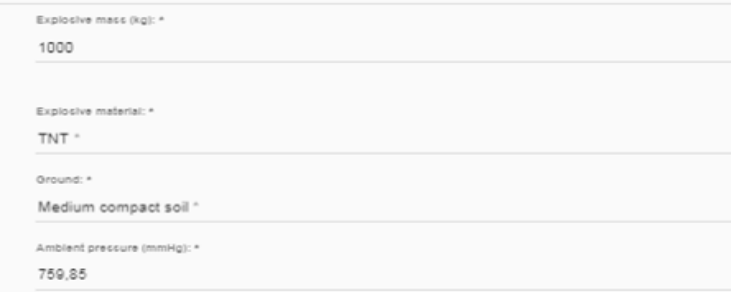
Aceasta functionalitate a fost descrisa in cadrul componentei achizitie a datelor meteo.



6.7.3. Parametrii simularii



Aceasta interfata ofera posibilitatea de a particulariza parametrii utilizat in explozie. Parametrii se refera la cantitatea de explozibil, tipul materialului exploziv, precum si parametrii referitori la mediu: presiune si tip de sol.



6.7.4. Efectele exploziei

In acesata etapa a simularii sunt afisate informatiile privind efectele exploziei asupra structurilor si respectiv asupra oamenilor.

EFFECTS ON STRUCTURES

Distance (M)	Overpressure (Kgf/...	Effects Expected
1	9319.5434	dP > 2.5 kg/cm2. Destruction of concrete steel constructions, bridges.
20	2.43967104	dP > 1.75 kg/cm2. Destruction or heavy damage to earthquake-proof steel reinforc...
24	1.63060176	dP > 1.0 kg/cm2. Full destruction of all buildings, except earthquake-proof steel rei...
31	0.95893748	dP > 0.65 kg/cm2. Collapse of steel framework buildings and light steel reinforced ...
38	0.64747668	dP > 0.25 kg/cm2. Significant damage to big city buildings.
67	0.2471019	dP > 0.15 kg/cm2. Partial collapse of buildings.
95	0.14811382	dP > 0.05 kg/cm2. Light damage to buildings, break of glass in windows.

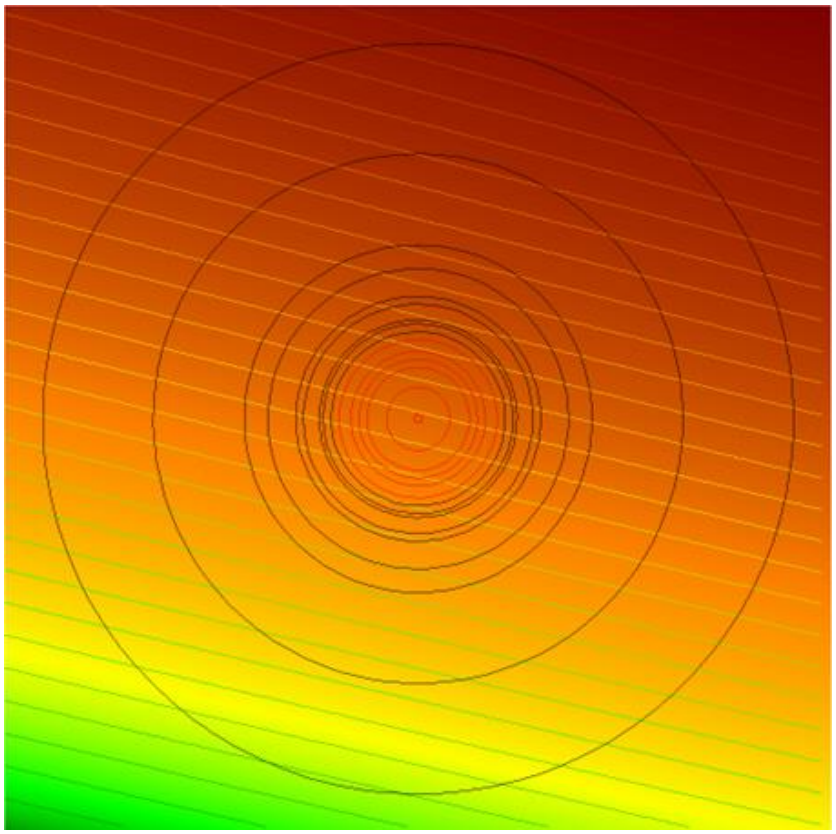
EFFECTS ON THE AVERAGE HUMAN

Distance (M)	Overpressure (Kgf/...	Effects Expected
1	9319.5434	dP > 26.0 kg/cm2. Instant death, full body disintegration.
8	23.97607746	dP > 8.0 kg/cm2. Instant death, body throw back, disintegration of body parts.
13	6.60900765	dP > 5.0 kg/cm2. Fatal damage, 99% chance of lethal outcome. Disintegration of b...
15	4.79002249	dP > 3.8 kg/cm2. Heavy damage, 75% chance of lethal outcome. In lucky case hos...
17	3.55170706	dP > 2.5 kg/cm2. Moderate damage, 10% risk of fatality or hospitalization for 1-2 m...
20	2.43967104	dP > 2.1 kg/cm2. Light injuries, hospitalization for 7-15 days.
22	1.97138112	dP > 1.6 kg/cm2. Disruption of neural system up to loss of consciousness.
25	1.4940882	dP > 1.1 kg/cm2. Rupture of tympanic membranes for average human.
29	1.0968294	dP > 0.5 kg/cm2. Minimal safe distance for artillery man.
44	0.49584754	dP > 0.35 kg/cm2. Minimal distance of possible rupture of tympanic membranes.

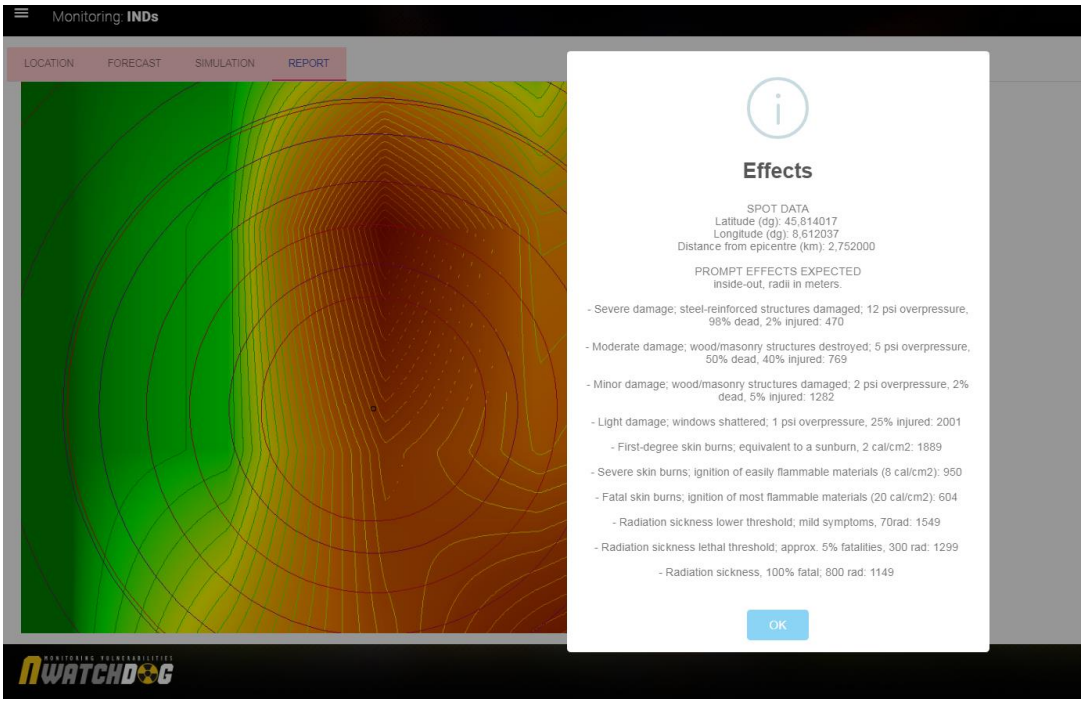
Valorile prezentate in cadrul tabelelor sunt structurate functie de distanta fata de epicentrul exploziei.

6.7.5. Generarea raportului

Raportul generat pe baza parametrilor introdusi este vizibil in interfata aferenta rapoartelor, alaturi de reprezentarea grafica a simularii efectuate.



In cadrul raportului este implementata functionalitatea de interogare in mod interactiv a zonei afectata de explozia si de afisare a informatiilor legate de efectele exploziei la locatia interogata.



Etapa 4. Activitatea 4.3. Definirea si testarea scenariilor de simulare a situatiilor de criza

Nota redactionala

In conditiile in care platforma N-WATCHDOG se recomanda drept ' *Sistem de alertare timpurie* si asistare computerizata a deciziilor, *bazat pe evaluarea anticipativa a dinamicii rapide a vulnerabilitatilor induse in teritoriu de obiectivele nucleare*', este evident ca scenariile de eveniment formeaza insusi obiectul nemijlocit de activitate al acestui suport de asistare a analizei si deciziei in pregatirea pentru situatii de urgenta radiologica si managementul acestora. In contextul special al proiectului, chestiunea scenariilor de eveniment a fost tratata dintr-o dubla perspectiva:

(a) *a surselor* de risc nuclear - centralele nuclearoelectrice, alte elemente ale ciclului combustibililor nucleari, precum si alte surse incidentale de emisie si dispersie in mediu a radioactivitatii - o abordare de tip *'top-down*' asumata de echipa Institutului national de cercetare-dezvoltare pentru fizica si inginerie nucleara 'Horia Hulubei'; si

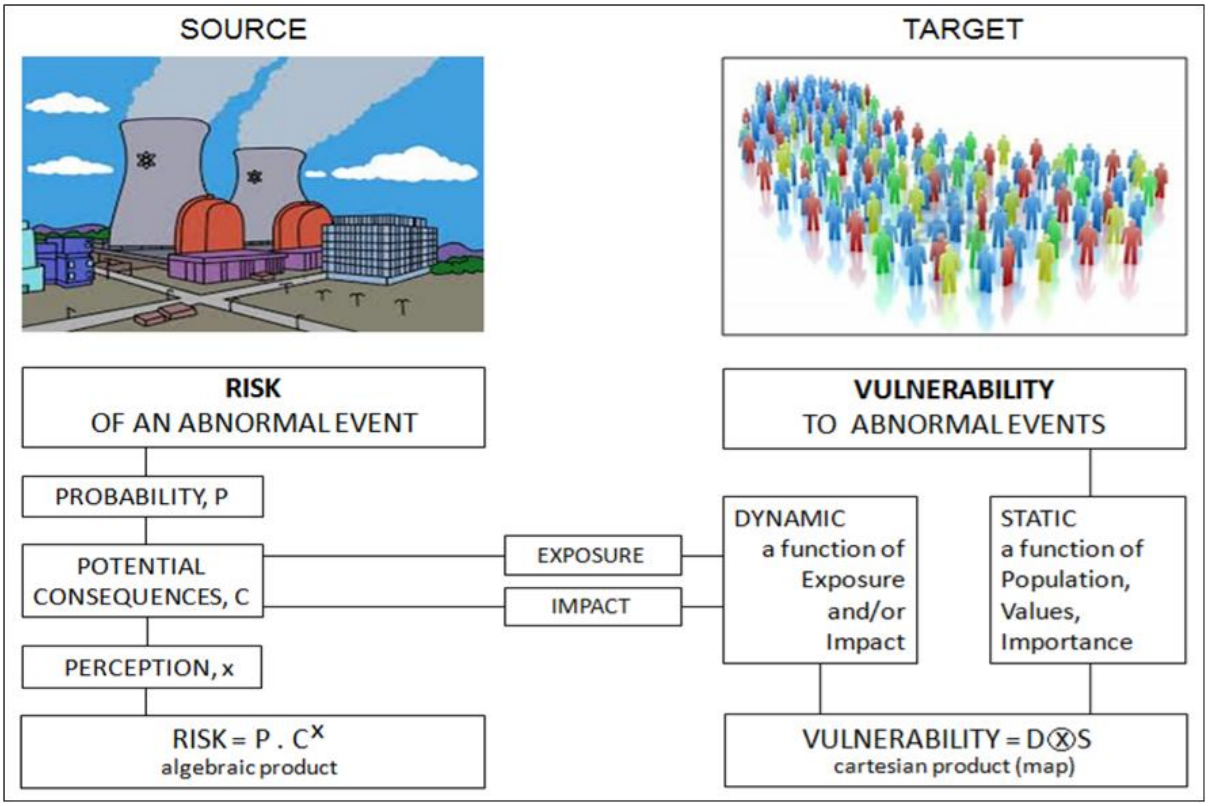
(b) *a tintelor* riscului nuclear - populatia si factorii mediului inconjurator conditionand viata, functionarea economiei si a societatii - o abordare de tip' *bottom-up'* asumata de echipa Universitatii Politehnica din Bucuresti.

Aceasta sectiune a Raportului ilustreaza cele doua abordari relevand deplina lor complementaritate precum si numeroase elemente de fertilizare reciproca a analizei intreprinse.

IFIN-HH UPB

Activitatea 4.3.1. Scenarii de simulare a situatiilor de criza
- o vedere 'top-down' -

> > > > > > > > > > > > > > >



IFIN-HH

1. Introducere

Intr-o abordare a situatiilor de urgenta nucleara orientata dinspre cauze spre efecte - sau dinspre originea riscurilor spre posibilele urmari ale 'amenintatrilor', daca acestea se manifesta, un 'scenariu de eveniment' poate fi inteles in mod natural drept *o colectie de informatii descriptive si date constitutive ale inputului cerut de codurile platformei de calcul, ce se apreciaza a fi suficiente pentru determinarea si caracterizarea ariei de influenta a unei emisii atmosferice radioactive; obtinerea de date dozimetrice pentru o diagnoza credibila a evenimentului; anticiparea contramasurilor - daca acestea se prezinta ca necesare; si evaluarea eventualelor efecte sanitare*.

N-WATCHDOG este proiectat spre a acoperi, sau simula, evenimente dintr-o serie virtual nelimitata de combinatii ale circumstantelor initiatoare si parametrilor de caracterizare ulterioara a crizelor nucleare, fie ca este vorba de emisii anormale ('neplanificate') de la obiective nucleare, de 'dispozitive de dispersie a radioactivitatii' (*Radioactive Dispersion Devices*, RDD), sau de 'dispozitive nucleare improvizate' (*Improvised Nuclear Devices*, IND) - acest termeni fiind eufemisme pentru mijloace din arsenalul terorismului nuclear. Analizand posibilitatile de alcatuire a unei taxonomii de prima evidenta si o decenta valoare informativa, se poate conveni asupra unei ontologii restranse la centralele nuclearo-electrice. Versiunea adoptata se prezinta in Figura 1.

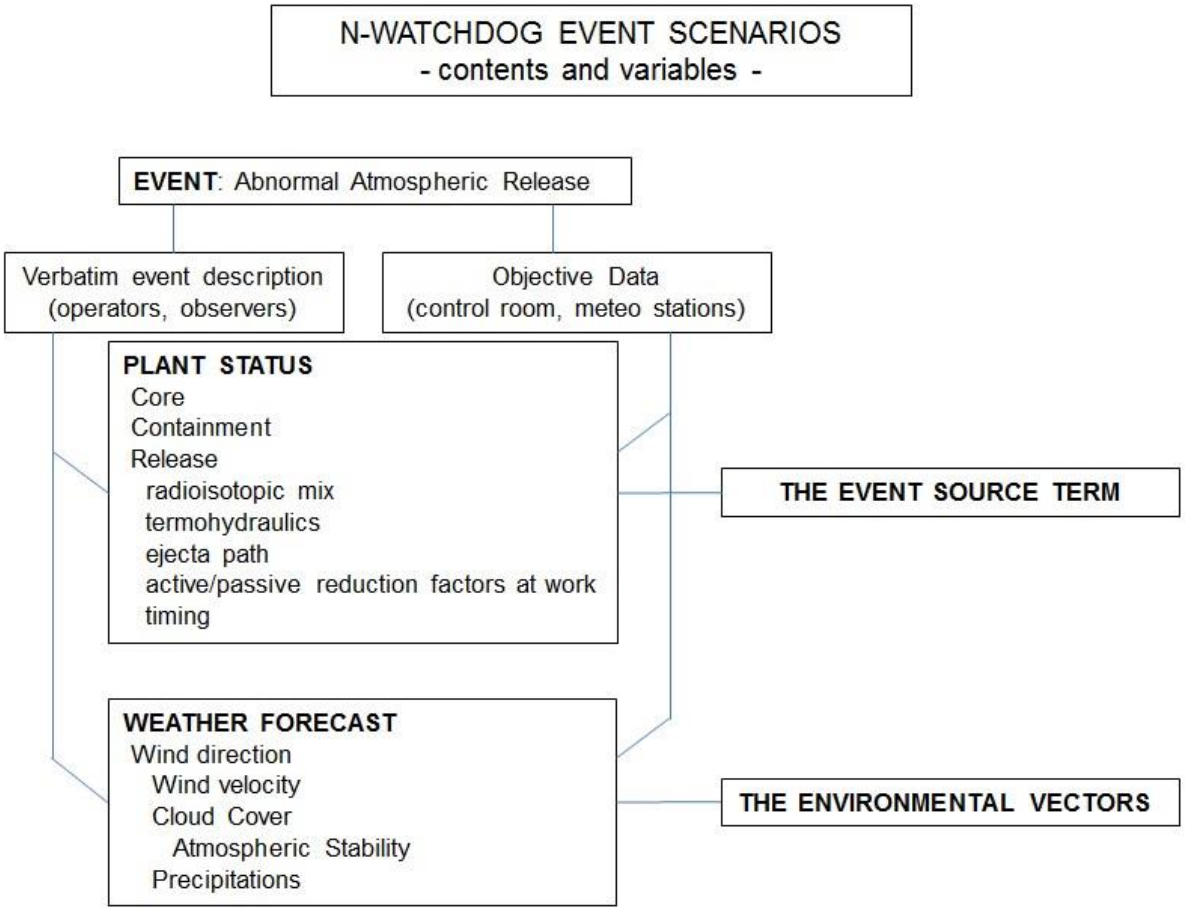


Fig.1. Ontologia adoptata in elaborarea colectiei de scenarii de simulare a situatiilor de criza. Generic business logics in building up NPP-event scenarios.

Argumentul hotarator in adoptarea acestei restrictii este ca, pentru centrale, institutiile de reglementare nationale precum si organisme internationale de inalta autoritate au elaborat si actualizeaza permanent o substantiala documentatie.

Pentru punerea in opera a logicii redate in Figura 1 a fost scrisa o aplicatie ancilara corespunzatoare, utilizand rutine ale codurilor de tip '!EVENT-Meteo', '!EVENT-Assessment' si '!EVENT-View' si racordata la librariile de date nucleare ale platformei. Pentru a accentua valoarea de instruire a acestui exercitiu, fiecare scenariu este insotit de o evaluare, pe o schema fixa de date de intrare care sa permita comparatia efectelor in expresie textuala si grafica (harta). Schema de lucru se reda in Figura 2.

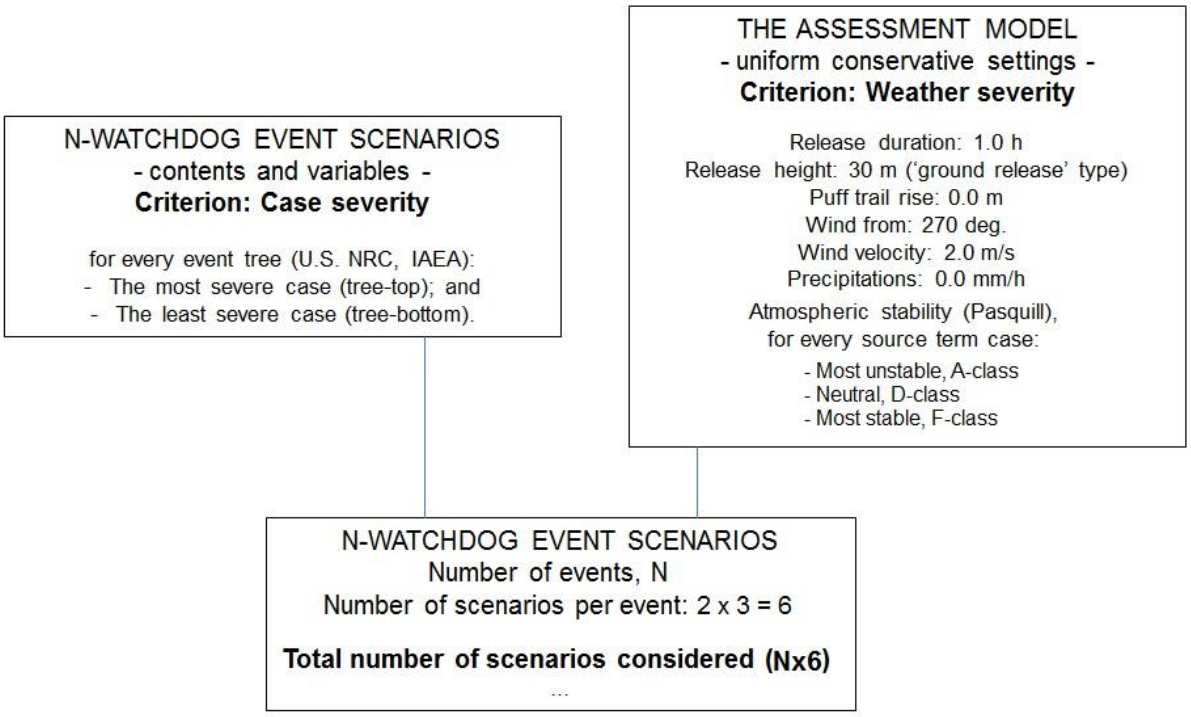


Fig.2. Generic business logics in assessing the NPP-event scenarios.

Lista scenariilor se prezinta in Tabelul 1. Scenariile se identifica prin numele celui mai semnificativ fisier - un 'Raport de situatie' (*SitRep*) ad hoc. In mod tipic, numele contine tipul de reactor, puterea (Mwe) si tipul incidentului/accidentului; literele A,B,…, F marcheaza clasa de stabilitate atmosferica (Pasquill) asumata. Lista contine si o serie de scenarii construite pe termeni sursa 'istorici', folositi in procesul testarii codurilor N-WATCHDOG.
In vederea asigurarii unui acces complet la scenarii, colectia a fost integrata ca sectiune distincta, interactiva, in *N-WATCHDOG e-Book* - cartea electronica ce a format obiectul activitatii A.4.5., *'Diseminarea rezultatelor N-WATCHDOG către comunitatea ştiinţifică şi către potenţialii beneficiari*', asupra careia se raporteaza in ultima sectiune a prezentului Raport.
Pentru ilustrare, se prezinta in continuare un scenariu complet, simuland un accident sever la un reactor tip BWR de 780 MWe, implicand emisie atmosferica de radioactivitate prin bazinul de supresie, intr-o atmosfera instabila (clasa Pasquill A). Pentru comparatie, se adauga si harta relevanta pentru atmosfera stabila (Pasquill F).

N-WATCHDOG NPP Accident Scenarios

Reference scenarios for nuclear power reactor accidents based on event trees (U.S. NRC Response Technical Manual series), or alternative literature on source terms. Nuclide mixes released under representative atmospheric conditions and their areas of influence.

Source Term Scenario

Recognize the event tree assumed by the scenario in the descriptive information following.

D-22

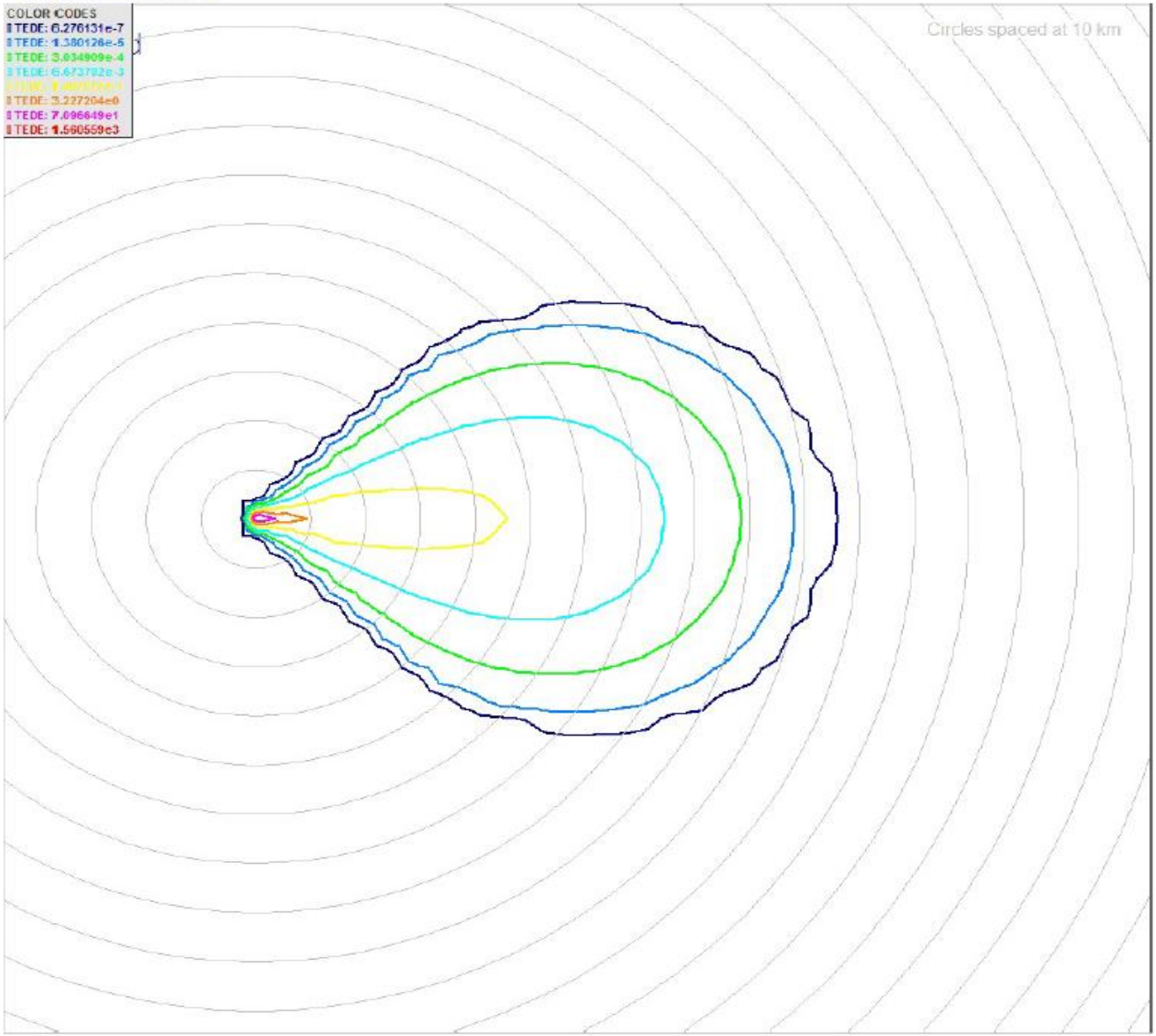
Containment Leakage Through Pool of Water
In-Vessel Core Melt

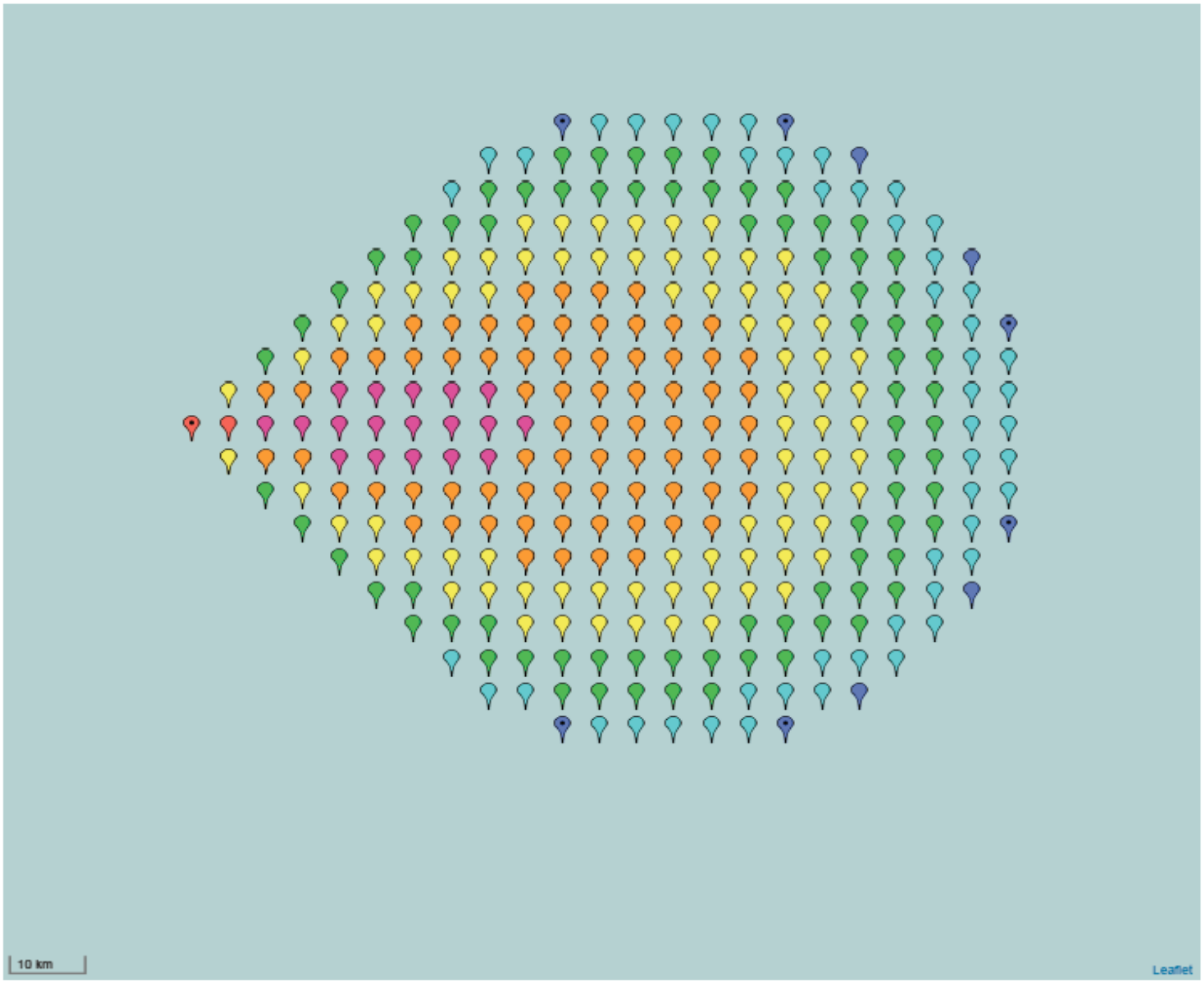
Core	Containment			Dose[b] mSv @ 1.5-2.0 k m			
Condition	Pool depth Sub-cooled	Hold up Time[a]	Leak Rate	TABD[c]	TEDE[d]	Thyroid[e]	
Core Melt Uncovered 30min	< 2 m	< 1 hr	100%/hr	9.6E+03	3.1E+04	4.2E+05	#1
		1-12 hr	100%/hr	4.0E+03	1.4E+04	1.9E+05	#2
			100%/day	1.6E+02	5.6E+02	7.6E+03	#3
			0.1%/day	1.4E-01	5.3E-01	7.6E+00	#4
		> 12 hr	100%/hr	3.3E+02	1.1E+03	1.3E+04	#5
			100%/day	1.3E+01	4.3E+01	5.4E+02	#6
			0.1%/day	<1.0E-01	3.9E-02	5.4E-01	#7
	> 2 m	< 1hr	100%/hr	2.0E+03	4.2E+03	4.2E+04	#8
		1-12 hr	100%/hr	7.7E+02	1.8E+03	1.9E+04	#9
			100%/day	3.1E+01	7.2E+01	7.6E+02	#10
			0.1%/day	1.7E-02	5.7E-02	7.6E-01	#11
		> 12 hr	100%/hr	1.0E+02	1.9E+02	1.3E+03	#12
			100%/day	4.2E+00	7.4E+00	5.4E+01	#13
			0.1%/day	<1.0E-02	<1.0E-02	5.4E-02	#14

a. Average time radioactive material release from core remains in containment before release.
b. Dose to an adult performing light activity from a 1 hour ground level release with average meteorological condition (D stability 2 m/s wind speed and no rain) with building wake.
c. TABD - Total acute bone dose - includes cloud shine, 2 days of dose following inhalation, and 7 days of ground shine.
d. TEDE - Total effective dose equivalent - includes cloud shine, CEDE from inhalation, and 7 days of ground shine.
e. Thyroid is CDE from inhalation of iodine only.

Source Term Impact Maps

Recognize the release terms assumed by the scenario in the descriptive information following.





Downloads

The files under these links requires Google Earth(TM) installed and your being online.
Click right the links, 'Save Target' on your system, then 'View Downloads'.
REMEMBER: always 'save target' with a .KML extension.

The Case Contour Map
The Case Spots Map

The I/O summary

Scenario documentation.

SOURCE TERM ASSESSMENT

Done Aug 22, 2016, 11:44:39

S O U R C E T E R M

Case: Containment leakage through pool of water, in-vessel core melt

Scenario: Fault Tree Branch #14

NUCLIDE . .	ACTIVITY (Ci)	Halflife (d)	DCFe,50 (mSv/h)/ [kBq/m3]	DCFbone (mSv/h)/ (kBq/m3)	DCFlung (mSv/h)/ [kBq/m3]	DCFthyd (mSv/h)/ (kBq/m3)	DCFgi (mSv/h)/ (kBq/m2)	DCFai (mSv/h)/ (kBq/m3)
Kr-85	0.41455936e-1	3.9e03	1.98e-07	0.00e00	0.00e00	0.00e00	0.00e00	9.17e-07
Kr-85m	1.7784	1.9e-01	1.26e-07	0.00e00	0.00e00	0.00e00	0.00e00	2.46e-05
Kr-87	3.48470189	5.3e-02	4.22e-07	0.00e00	0.00e00	0.00e00	0.00e00	1.42e-04
Kr-88	5.04681021	1.2e-01	1.01e-06	0.00e00	0.00e00	0.00e00	0.00e00	3.50e-4
Rb-86	0.000507	1.9e01	1.12e-03	2.17e-04	1.88e-03	0.00e00	6.01e-07	1.78e-05
Sr-89	0.22008646	5.1e01	7.32e-03	2.20e-04	3.92e-03	0.00e00	2.47e-07	1.57e-06
Sr-90	0.8664322e-2	1.1e04	4.32e-02	2.36e-04	3.30e-03	0.00e00	5.90e-09	3.54e-07
Sr-91	0.2574	4.00e-01	4.92e-04	0.00e00	0.00e00	0.00e00	2.62e-06	1.18e-04
Y-90	0.60713496e-3	2.70e00	1.80e-03	9.30e-05	4.52e-03	0.00e00	3.96e-07	2.85e-06
Y-91	0.01872	5.90e01	1.07e-02	9.90e-05	4.10e-03	0.00e00	2.69e-07	2.24e-06
Zr-95	0.0234	6.4e01	5.76e-03	2.05e-04	1.06e-03	0.00e00	2.53e-06	1.21e-04
Nb-95	0.0234	3.5e01	1.80e-03	7.00e-05	5.40e-04	0.00e00	2.62e-06	1.26e-04
Mo-99	0.09984	2.8e00	1.07e-03	1.24e-04	2.04e-03	0.00e00	6.41e-07	2.52e-05
Tc-99m	0.08736	2.5e-01	2.28e-05	3.62e-06	3.52e-05	0.00e00	4.10e-07	1.89e-05
Ru-103	0.06864	3.9e01	2.88e-03	6.10e-05	9.10e-04	0.00e00	1.62e-06	7.49e-05
Ru-105	0.44860535e-1	1.9e-01	2.04e-04	0.00e00	0.00e00	0.00e00	2.82e-06	1.28e-04
Ru-106	0.0156	3.7e02	3.36e-02	2.39e-04	9.80e-03	0.00e00	1.24e-6	3.82e-5
Sb-127	0.71464854e-1	1.8e-01	2.76e-04	0.00e00	0.00e00	0.00e00	4.93e-06	2.42e-04
Sb-129	0.38578368	3.9e-01	1.56e-04	0.00e00	0.00e00	0.00e00	3.71e-08	1.20e-06
Te-127	0.68935124e-1	1.1e02	8.88e-03	1.32e-04	1.57e-03	0.00e00	3.08e-08	4.03e-07
Te-127m	0.01287	4.8e-02	4.44e-05	0.00e00	0.00e00	0.00e00	4.10e-07	1.03e-05
Te-129	0.36364854	3.4e01	7.92e-03	2.72e-04	3.92e-03	0.00e00	2.05e-07	5.62e-06
Te-129m	0.61978368e-1	1.7e-02	3.36e-05	0.00e00	0.00e00	3.16e-03	1.71e-06	6.91e-05
Te-131m	0.1521	3.3e00	2.40e-03	9.90e-05	6.40e-04	3.00e-02	8.89e-06	4.21e-04
Te-132	1.404	6.0e01	6.12e-03	5.44e-06	8.50e-05	1.20e-01	1.13e-07	1.34e-06
I-131	2.32418894	9.6e-02	1.13e-04	1.68e-05	3.24e-04	1.68e-03	7.92e-06	3.78e-04
I-132	3.276	8.7e-01	1.80e-03	2.74e-05	8.64e-04	3.36e-02	2.22e-06	9.94e-05
I-133	4.641	3.7e-02	5.40e-05	7.32e-06	1.68e-04	3.12e-04	9.11e-06	4.39e-04
I-134	5.187	2.8e-01	3.84e-04	2.64e-05	5.18e-04	6.84e-03	5.29e-6	2.71e-4
I-135	4.095	1.2e01	0.00e00	0.00e00	0.00e00	0.00e00	0.00e00	1.33e-06
Xe-131m	0.0741	5.2e00	5.19e-07	0.00e00	0.00e00	0.00e00	0.00e00	5.00e-06
Xe-133	12.597	2.2e00	0.00e00	0.00e00	0.00e00	0.00e00	0.00e00	4.58e-06
Xe-133m	0.4446	3.8e-01	6.81e-07	0.00e00	0.00e00	0.00e00	0.00e00	4.00e-05
Xe-135	2.52340466	1.1e-02	0.00e00	0.00e00	0.00e00	0.00e00	0.00e00	6.67e-05
Xe-138	12.597	7.5e02	7.92e-03	2.01e-04	8.20e-04	0.00e00	5.33e-06	2.54e-04
Cs-134	0.1465135	8.4e08	8.28e-04	1.66e-05	2.02e-04	0.00e00	9.68e-11	3.42e-08
Cs-136	0.0585	1.1e04	5.52e-03	1.20e-04	8.60e-04	0.00e00	1.98e-06	9.18e-05
Cs-137	0.91702681e-1	2.2e-02	2.88e-05	0.00e00	0.00e00	0.00e00	8.14e-06	4.14e-04
Ba-140	0.4992	1.7e00	1.32e-03	2.16e-04	2.60e-03	0.00e00	7.78e-06	4.00e-04
La-140	0.02496	3.3e01	3.84e-03	2.21e-05	1.17e-03	0.00e00	2.49e-07	1.12e-05
Ce-141	0.117	2.8e02	4.32e-02	1.02e-04	8.90e-03	0.00e00	6.55e-7	1.23e-5
Ce-144	0.66405398e-1	1.2e-02	2.16e-05	0.00e00	0.00e00	0.00e00	5.87e-07	9.54e-06
Np-239	1.248	1.0e03	4.80e01	0.00e00	0.00e00	0.00e00	2.65e-09	1.68e-08
Pu-238	0.44481073e-4	8.8e06	6.00e01	7.90e-03	3.56e-01	0.00e00	1.02e-09	1.25e-08
Pu-239	0.1638e-4	2.4e06	6.00e01	7.90e-03	3.58e-01	0.00e00	2.16e-09	1.23e-08
Pu-240	0.1638e-4	5.3e03	1.08e00	1.06e-06	4.84e-05	0.00e00	6.19e-12	2.28e-10
Pu-241	0.26562155e-2	1.4e08	5.76e01	7.30e-03	3.38e-01	0.00e00	1.79e-09	1.04e-08

TOTAL Activity (Ci): 63.7555427

D. THE SCENARIO

Abnormal occurence type: R
specify from: R - Reactor accident
P - Spent Fuel Pool accident

Reactor type: 3
specify from: 1 - PWR large dry/subatmospheric containment
2 - PWR ice condenser-fetched containment
3 - BWR Mark-1
4 - BWR Mark-2
5 - BWR Mark-3
6 - VVER-440-V213

* In the sequel, coolant mass is relevant only in accidents involving coolant (as opposed to core) inventories.
** May be useful for core inventory corrections if, after an unscheduled shutdown core integrity is however maintained for up to one month. For a few hours, ignoring the shutdown correction is tolerable; otherwise the neglect would turn the estimation conservative by a factor of 1.5-3 or more, especially if short-lived isotopes prevail in the mix.
Since, overall, the issue is debatable change the 0.5 hrs default only you feel truly compelled to.

* * *

In consideration of the data above, the code issues the following

CORE DIAGNOSE WARNING: POSSIBLE CORE UNCOVERED! Subcooling margin: negative.
A RELEASE IS POSSIBLE!

WORKING ASSUMPTIONS

Temperature increment (C/s): 1
Time core-uncovered (minutes):10

RELEASE TERMS

Source strength (an activity multiplication factor): 1
Release duration (hrs): 1
Release mouth height (m AG): 30
Puff trail rise (m): 0

MET FORECAST

Day time, clear sky, low wind; most unstable atmosphere
Ambient temperature at the time of release (C): 20

Time (hrs)	Wind speed (m/s)	Wind from (dg.NbyE)	Clouds (%)	Stability (Pasquill)	Rain* (mm/h)	Met Station (simulation)
8am	2.0	270.0	0.0	A	0.0	x
9am	2.0	270.0	0.0	A	0.0	x
10am	2.0	270.0	0.0	A	0.0	x
11am	2.0	270.0	0.0	A	0.0	x
12am	2.0	270.0	0.0	A	0.0	x
1pm	2.0	270.0	0.0	A	0.0	x
2pm	2.0	270.0	0.0	A	0.0	x
3pm	2.0	270.0	0.0	A	0.0	x

◆ DISPERSION DATA

Time-dependent dispersion coefficients (Doury).

Time-range (s)	Ah	Kh	Av	Kv	
Strongest Diffusion (A-Pasquill)					
0	0.405	0.859	0.420	0.814	s1
240	0.135	1.130	1.000	0.685	s2
3280	0.135	1.130	20.00	0.500	s3
97000	0.463	1.000	20.00	0.500	s4
508000	6.500	0.824	20.00	0.500	s5
1300000	200000	0.500	20.00	0.500	s6

Weakest Diffusion (F-Pasquill)

0	0.405	0.859	0.200	0.500	w1
240	0.135	1.130	0.200	0.500	w2
3280	0.135	1.130	0.200	0.500	w3
97000	0.463	1.000	0.200	0.500	w4
508000	6.500	0.824	0.200	0.500	w5
1300000	200000	0.500	0.200	0.500	w6

Stability ()	Wind shear (mAG)	Inversion Cap (dd)	Sigma-Theta	
A	0.07	1600	25	kA
B	0.13	1200	20	kB
C	0.21	800	15	kC
D	0.34	560	10	kD
E	0.44	320	5	kE
F	0.44	200	2.5	kF

? MATERIAL DATA

Carrier type	Vdry	aRain	bRain
Aerosol	0.0010	0.0000800	0.8
I2	0.0100	0.0000800	0.6
CH3I	0.0005	0.0000008	0.6
Noble-gases	0.0000	0.0000000	0.0

? Iodine form (1-I2, 2-CH3I): 1

WORKING ASSUMPTIONS

Adjust defaults as deemed appropriate,
this including the dispersion coefficients

? Ground reflection fraction (0-1): 1
? Inversion lid reflection fraction (0-1): 1
? Terrain roughness correction exponent: 0.2

MAPPING PREFERENCES

? Palette (1-full color, 2-greyscale): 1

Puff time step* (s): 167.44186

* Inferred from release duration,
average wind velocity over the monitoring duration;
and the density of the output data grid.
Standing for process sampling time.

Terrain roughness, average (cm): 2427.94836
Roughness correction factor for vertical dispersion: 3.81613419

RESULTS COMPARED WITH

A. REFERENCE REGULATORY DOSE LEVELS
PAG - Protective Action Guide
mSv - miliSievert.

Doses unnoticeable or inconsequencial, TEDE less than 0.01 mSv
1-yr TEDE Constraint for unplanned irradiation to population, Romania: 0.01 mSv
1-yr TEDE Limit to population, from all sources, Romania: 1 mSv
Sheltering TEDE PAG, Romania: 3 mSv
Sheltering TEDE PAG, IAEA: 10 mSv
Evacuation TEDE PAG, Romania: 30 mSv
Evacuation TEDE PAG, IAEA: 50 mSv
Hot Intervention Zone TEDE PAG, Romania: 100 mSv

Sheltering THYD PAG, Romania: 30 mSv
Iodine prophylaxis THYD PAG, IAEA: 100 mSv
Evacuation and Iodine prophylaxis THYD PAG, Romania: 300 mSv
Hypothyroidism in 1 or more years, or 8.0e-3 risk of fatal thy.cancer THYD PAG IAEA: 5000 mSv

Vomiting in 1 day TABD PAG, IAEA: 500 mSv
Death in 1-2 month, or 0.1 risk of fatal cancer, TABD PAG, IAEA: 1000 mSv

Death in 2-12 month, or 0.05 risk of lung cancer, TALD PAG, IAEA: 6000 mSv

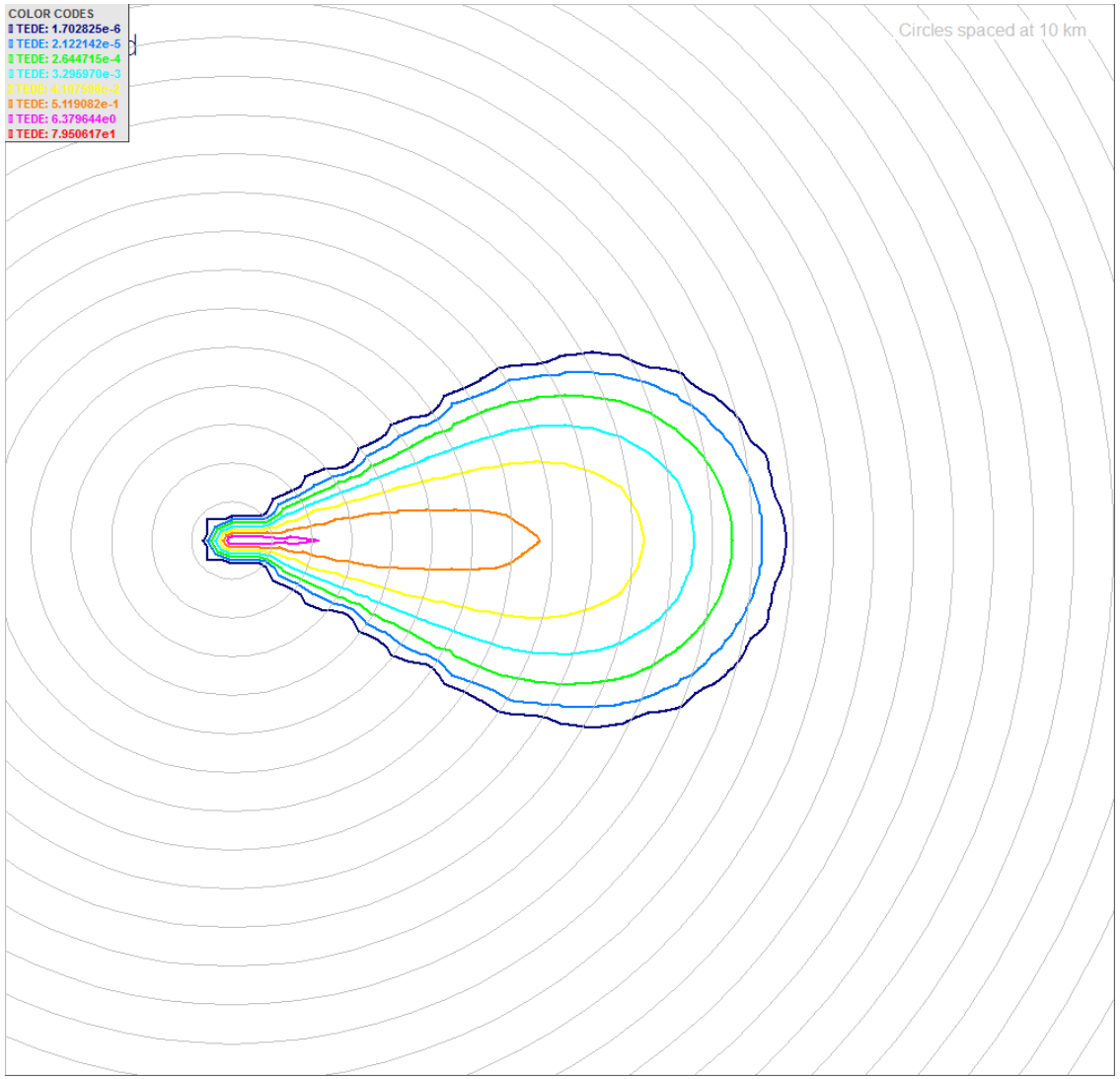
B. AVERAGE ANNUAL HUMAN EXPOSURE TO IONIZING RADIATION**,
in millisieverts (mSv)

Radiation source	World	USA	Japan	Remarks
Inhalation of air	1.26	2.28	0.40	mainly from radon, depends on indoor accumulation
Ingestion of food and water	0.29	0.28	0.40	(K-40, C-14, etc.)
Terrestrial radiation from ground	0.48	0.21	0.40	depends on soil and building material
Cosmic radiation from space	0.39	0.33	0.30	depends on altitude
Sub total (natural)	2.40	3.10	1.50	sizeable population groups receive 10-20 mSv
Medical	0.60	3.00	2.30	world-wide figure excludes radiotherapy; US: mostly CT scans and nuclear medicine.
Other	-	0.003	-	Industrial, security, medical, educational, and research
Sub total (artificial)	0.61	3.14	2.33	
Total	3.01	6.24	3.83	millisievert per year

[1] United Nations Scientific Committee on the Effects of Atomic Radiation (2008 (published 2010)).
Sources and effects of ionizing radiation. New York: United Nations. p. 4.
ISBN 978-92-1-142274-0. Retrieved 9 November 2012.
[2] Ionizing radiation exposure of the population of the United States. Bethesda, Md.
National Council on Radiation Protection and Measurements. 2009.
ISBN 978-0-929600-98-7. NCRP No. 160.
[3] Ministry of Education, Culture, Sports, Science, and Technology of Japan
'Radiation in environment' retrieved 2011-6-29.

** Compiled by Wikipedia (http://en.wikipedia.org/wiki/Background_radiation)

For comparison: Stable atmpsphere (Pasquill F)



Tabelul 1. Scenarii de simulare a situatiilor de criza.

BWR1-780Containment-bypass-gap-release_FTB-1-A-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-1-D-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-1-F-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-6-A-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-6-D-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-6-F-webLF.html
BWR1-780Containment-bypass-invessel-core-melt_FTB-1-A-webLF.html
BWR1-780Containment-bypass-invessel-core-melt_FTB-1-D-webLF.html
BWR1-780Containment-bypass-invessel-core-melt_FTB-1-F-webLF.html
. BWR1-780Containment-bypass-invessel-core-melt_FTB-6-A-webLF.html
. BWR1-780Containment-bypass-invessel-core-melt_FTB-6-D-webLF.html
. BWR1-780Containment-bypass-invessel-core-melt_FTB-6-F-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-A-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-D-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-F-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-A-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-D-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-F-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-1-A-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-1-D-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-1-F-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-14-A-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-14-D-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-14-F-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-1-A-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-1-D-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-1-F-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-14-A-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-14-D-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-14-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-1-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-1-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-1-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-4-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-4-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-4-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-1-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-1-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-1-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-4-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-4-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-4-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
. CANDU-Containment-Bypass-rev-A-webLF.html
. CANDU-Containment-Bypass-rev-D-webLF.html
. CANDU-Containment-Bypass-rev-F-webLF.html
. CANDU-LCD-H-rev-A-webLF.html
. CANDU-LCD-H-rev-D-webLF.html
. CANDU-LCD-H-rev-F-webLF.html
. CANDU-PCM-rev-A-webLF.html
. CANDU-PCM-rev-D-webLF.html
. CANDU-PCM-rev-F-webLF.html
. CANDU-STR-rev-A-webLF.html
. CANDU-STR-rev-D-webLF.html
. CANDU-STR-rev-F-webLF.html
. Fukushima-Unit2-InVesselMelt-thru-Pool-rev-A-webLF.html
. Fukushima-Unit2-InVesselMelt-thru-Pool-rev-D-webLF.html
. Fukushima-Unit2-InVesselMelt-thru-Pool-rev-F-webLF.html
. Fukushima-Unit3-Late-InVesselMelt-thru-Pool-rev-A-webLF.html
. Fukushima-Unit3-Late-InVesselMelt-thru-Pool-rev-D-webLF.html
. Fukushima-Unit3-Late-InVesselMelt-thru-Pool-rev-F-webLF.html
. Fukushima-Unit4-SpentFuelPool-Fire-rev-A-webLF.html
. Fukushima-Unit4-SpentFuelPool-Fire-rev-D-webLF.html
. Fukushima-Unit4-SpentFuelPool-Fire-rev-F-webLF.html
. Fukushima-Unit4-SpentFuelPool-Gap-rev-A-webLF.html
. Fukushima-Unit4-SpentFuelPool-Gap-rev-D-webLF.html

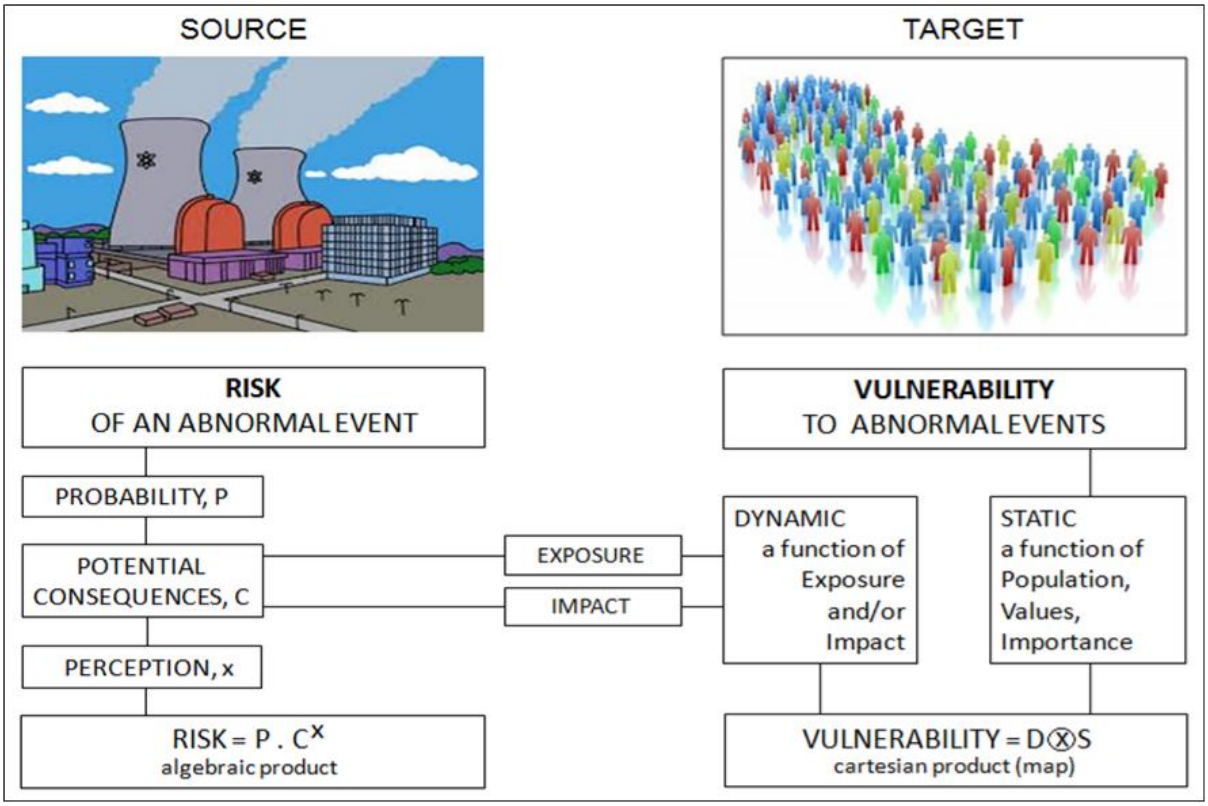
. Fukushima-Unit4-SpentFuelPool-Gap-rev-F-webLF.html
. Kozloduy-drill4-rev-A-webLF.html
. Kozloduy-drill4-rev-D-webLF.html
. Kozloduy-drill4-rev-F-webLF.html
. Mol-EFM-example-rev-A-webLF.html
. Mol-EFM-example-rev-D-webLF.html
. Mol-EFM-example-rev-F-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-1-A-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-1-D-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-1-F-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-6-A-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-6-D-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-6-F-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-1-A-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-1-D-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-1-F-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-5-A-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-5-D-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-5-F-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-A-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-D-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-F-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-A-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-D-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-F-webLF.html
. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-1-A-webLF.html
. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-1-D-webLF.html
. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-1-F-webLF.html
0. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-4-A-webLF.html
1. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-4-D-webLF.html
2. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-4-F-webLF.html
3. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-1-A-webLF.html
4. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-1-D-webLF.html
5. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-1-F-webLF.html
6. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-4-A-webLF.html
7. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-4-D-webLF.html
8. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-4-F-webLF.html
9. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
0. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
1. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
2. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
3. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
4. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
5. PWR-VVER3-1000Containment-bypass-gap-release_FTB-1-A-webLF.html
6. PWR-VVER3-1000Containment-bypass-gap-release_FTB-1-D-webLF.html
7. PWR-VVER3-1000Containment-bypass-gap-release_FTB-1-F-webLF.html
8. PWR-VVER3-1000Containment-bypass-gap-release_FTB-6-A-webLF.html
9. PWR-VVER3-1000Containment-bypass-gap-release_FTB-6-D-webLF.html
0. PWR-VVER3-1000Containment-bypass-gap-release_FTB-6-F-webLF.html
1. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-1-A-webLF.html
2. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-1-D-webLF.html
3. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-1-F-webLF.html
4. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-6-A-webLF.html
5. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-6-D-webLF.html
6. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-6-F-webLF.html
7. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-A-webLF.html
8. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-D-webLF.html
9. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-F-webLF.html
0. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-A-webLF.html
1. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-D-webLF.html
2. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-F-webLF.html
3. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-A-webLF.html
4. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-D-webLF.html
5. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-F-webLF.html
6. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-A-webLF.html
7. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-D-webLF.html
8. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-F-webLF.html
9. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-1-A-webLF.html
0. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-1-D-webLF.html
1. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-1-F-webLF.html
2. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-4-A-webLF.html
3. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-4-D-webLF.html
4. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-4-F-webLF.html
5. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-A-webLF.html
6. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-D-webLF.html

7. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-F-webLF.html
8. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-A-webLF.html
9. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-D-webLF.html
0. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-F-webLF.html
1. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
2. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
3. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
4. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
5. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
6. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
7. PWR1-1000Containment-bypass-gap-release_FTB-1-A-webLF.html
8. PWR1-1000Containment-bypass-gap-release_FTB-1-D-webLF.html
9. PWR1-1000Containment-bypass-gap-release_FTB-1-F-webLF.html
0. PWR1-1000Containment-bypass-gap-release_FTB-6-A-webLF.html
1. PWR1-1000Containment-bypass-gap-release_FTB-6-D-webLF.html
2. PWR1-1000Containment-bypass-gap-release_FTB-6-F-webLF.html
3. PWR1-1000Containment-bypass-invessel-core-melt_FTB-1-A-webLF.html
4. PWR1-1000Containment-bypass-invessel-core-melt_FTB-1-D-webLF.html
5. PWR1-1000Containment-bypass-invessel-core-melt_FTB-1-F-webLF.html
6. PWR1-1000Containment-bypass-invessel-core-melt_FTB-6-A-webLF.html
7. PWR1-1000Containment-bypass-invessel-core-melt_FTB-6-D-webLF.html
8. PWR1-1000Containment-bypass-invessel-core-melt_FTB-6-F-webLF.html
9. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-A-webLF.html
0. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-D-webLF.html
1. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-F-webLF.html
2. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-A-webLF.html
3. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-D-webLF.html
4. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-F-webLF.html
5. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-A-webLF.html
6. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-D-webLF.html
7. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-F-webLF.html
8. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-A-webLF.html
9. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-D-webLF.html
0. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-F-webLF.html
1. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-1-A-webLF.html
2. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-1-D-webLF.html
3. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-1-F-webLF.html
4. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-4-A-webLF.html
5. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-4-D-webLF.html
6. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-4-F-webLF.html
7. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-A-webLF.html
8. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-D-webLF.html
9. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-F-webLF.html
0. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-A-webLF.html
1. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-D-webLF.html
2. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-F-webLF.html
3. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
4. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
5. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
6. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
7. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
8. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
9. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-1-A-webLF.html
0. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-1-D-webLF.html
1. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-1-F-webLF.html
2. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-14-A-webLF.html
3. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-14-D-webLF.html
4. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-14-F-webLF.html
5. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
6. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
7. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
8. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
9. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
0. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
1. StandardMixLWR-12h-A-webLF.html
2. StandardMixLWR-12h-D-webLF.html
3. StandardMixLWR-12h-F-webLF.html
4. StandardMixLWR-15d-A-webLF.html
5. StandardMixLWR-15d-D-webLF.html
6. StandardMixLWR-15d-F-webLF.html
7. StandardMixLWR-1h-A-webLF.html
8. StandardMixLWR-1h-D-webLF.html
9. StandardMixLWR-1h-F-webLF.html
0. StandardMixLWR-24h-A-webLF.html
1. StandardMixLWR-24h-D-webLF.html

2. StandardMixLWR-24h-F-webLF.html
3. StandardMixLWR-30d-A-webLF.html
4. StandardMixLWR-30d-D-webLF.html
5. StandardMixLWR-30d-F-webLF.html
6. StandardMixLWR-3d-A-webLF.html
7. StandardMixLWR-3d-D-webLF.html
8. StandardMixLWR-3d-F-webLF.html
9. StandardMixLWR-6h-A-webLF.html
0. StandardMixLWR-6h-D-webLF.html
1. StandardMixLWR-6h-F-webLF.html
2. StandardMixLWR-7d-A-webLF.html
3. StandardMixLWR-7d-D-webLF.html
4. StandardMixLWR-7d-F-webLF.html
5. STUDY-2012-SourceTerm-A-webLF.html
6. STUDY-2012-SourceTerm-D-webLF.html
7. STUDY-2012-SourceTerm-F-webLF.html
8. ~BWR-REFERENCE-MIX-A-webLF.html
9. ~BWR-REFERENCE-MIX-D-webLF.html
0. ~BWR-REFERENCE-MIX-F-webLF.html
1. ~FBR-REFERENCE-MIX-A-webLF.html
2. ~FBR-REFERENCE-MIX-D-webLF.html
3. ~FBR-REFERENCE-MIX-F-webLF.html
4. ~GCR-REFERENCE-MIX-A-webLF.html
5. ~GCR-REFERENCE-MIX-D-webLF.html
6. ~GCR-REFERENCE-MIX-F-webLF.html
7. ~HWR-REFERENCE-MIX-A-webLF.html
8. ~HWR-REFERENCE-MIX-D-webLF.html
9. ~HWR-REFERENCE-MIX-F-webLF.html
0. ~PWR-REFERENCE-MIX-A-webLF.html
1. ~PWR-REFERENCE-MIX-D-webLF.html
2. ~PWR-REFERENCE-MIX-F-webLF.html
3. ~RBMK-REFERENCE-MIX-A-webLF.html
4. ~RBMK-REFERENCE-MIX-D-webLF.html
5. ~RBMK-REFERENCE-MIX-F-webLF.html

Activitatea 4.3.2. Scenarii de simulare a situatiilor de criza
- o vedere 'bottom-up' -

<<<<<<<<<<<<<<<



UPB

			Proiecte colaborative de cercetare aplicativă			
21	PN-II-PT-PCCA-2013-4-0262	SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR,BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE	Vasile Dan	Vamanu	INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA " HORIA HULUBEI " - IFIN - HH	SIVECO ROMANIA SA; UNIVERSITATEA POLITEHNICA DIN BUCURESTI

Domeniul 8: Spaţiu şi securitate
Direcţia de cercetare 8.5. Sisteme şi infrastructura de securitate
Tematica de cercetare 8.5.3. Sisteme pentru asigurarea unui management eficient al situaţiilor de criză şi al intervenţiilor în cazul dezastrelor, sisteme de detecţie, prevenire şi alertă.
Aprobat: Ordinul MEN nr. 298/23.06.2014
Contract Nr. 298

SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR, BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE

Etapa 4
01/01/2017 – 30/09/2017

Dezvoltarea, testarea si livrarea Modelului experimental N-WATCHDOG EM.

Scenarii de test pentru simularea situatiilor de criza

RAPORT

Responsabil: Universitatea POLITEHNICA din Bucuresti	Contact: anca.ionita@upb.ro
Autori:	Prof.dr.ing. Anca Daniela IONITA, UPB Prof.dr.ing. Ilie Constantin PRISECARU, UPB Prof.dr.ing. Mariana MOCANU, UPB S.l.dr.ing. Adriana OLTEANU, UPB S.l.dr.ing. Andrei BUDU, UPB Drd.ing. Dominic Eugeniu MORARU, UPB

Universitatea POLITEHNICA din Bucuresti

1. Introducere

Definirea scenariilor de testare este o etapă cheie pentru succesul şi utilitatea finală a proiectului din punctul de vedere al utilizatorilor finali. In cele ce urmeaza, scenariile sunt definite semi-formal şi simuleaza situaţii de criză asociate cu zone de vulnerabilitate radio-nucleară specifice ţării noastre, şi care implică mai mulţi utilizatori şi funcţionalităţi transversale. Procesele de luare a deciziilor şi furnizare de asistenţă în situaţii critice sunt, de asemenea, simulate, pentru demonstraţie şi în scopuri educaţionale. Ele reprezinta o bază pentru demonstrarea efectivă a performanţelor N-WATCHDOG şi sugereaza criterii de evaluare a acestuia.

Realizarea acestui livrabil se bazeaza in mod deosebit pe rezultatele obtinute de catre consortiu, si in special de catre coordonator. Executarea scenariilor a fost posibila datorita disponibilitatii programului Proof of Concept implementat de catre IFIN-HH, intitulat N-WATCHDOG_pB, care a asimilat feedback-ul pe parcursul intregului proiect si a fost in mod vizibil perfectionat. Aceasta activitate succede celei de testere tehnica a PoC in cadrul partenerilor proiectului, si isi propune sa se axeze mai putin pe aspectele tehnice, si mai mult pe elemente care sunt de interes pentru validarea sistemului de catre utilizatorii finali. De altfel, scenariile de test pentru simularea situatiilor de criza definite in acest livrabil sunt clasificate in functie de nivelul de risc perceput de catre populatie, delimitand astfel simpla constientizare de preventie, protectie si de raspuns in caz de urgenta.

Scenariile sunt descrise in cele ce urmeaza in mai multe forme :

- *In forma narativa* – pentru analiza sistemului ce este dezvoltat si intelegerea mai profunda a nevoilor utilizatorilor ;
- *In forma de modele specifice domeniului de management al hazardului* – ca succesiune de activitati, asociate actorilor care utilizeaza sistemul ;
- *Ca secventa de cazuri de test* - considerand maparea pe cazurile definite in Etapa 3. Testarea in-house si evaluarea Demonstratorului N-WATCHDOG, precum : CT.INFO.001 – Informare asupra dozelor de radiatii , CT.INFO.002 – Informare asupra efectului radiatiilor asupra omului, CT.INFO.003 – Informare asupra protectiei populatiei, CT.INFO.004 – Date prognoza meteo, CT.INFO.005 – Date pentru termenii sursa, CT.INFO.006 – Date nucleare, CT.INFO.007 – Date parc nuclear, CT.INFO.008 – Date comunitati, CT.SIM.002 – Simulare accident la centrala de la Cernavoda, Romania, CT.SIM.003 – Simulare dispozitiv de dispersie radiologica exploziv, CT.SIM.004 – Simulare dispozitiv de dispersie radiologica incendiar, CT.SIM.005 – Simulare dispozitive nucleare improvizate.
- *Ca proces modelat intr-un limbaj standard* - pentru secventa decizionala corespondenta scenariilor de protectie, preventie si raspuns.

In plus, scenariile definite anterior au fost utilizate pentru a extinde componenta de constientizare a populatiei, implementata in modulul educational N-WatchWiki, care a fost de asemenea testat, conform unui procedeu similar celui aplicat pana acum pentru PoC.

Prezentul livrabil este organizat dupa cum urmeaza. In Capitolul 2 se descrie cadrul general al testarii bazate pe scenarii si se evidentiaza rolul scenariilor in etapele dezvoltarii. Modelarea situatiilor de criza este gandita initial independent de tipul hazardului, urmand apoi modelarea unor scenarii specifice N-WATCHDOG, astfel : *Scenariu privind informarea populatiei asupra vulnerabilitatilor nucleare* (in Capitolul 3) *; Scenariu privind preventia fata de vulnerabilitati nucleare cu risc scazut* (in Capitolul 4) ; *Scenariu privind protectia populatiei in conditiile existentei unor vulnerabilitati nucleare cu risc substantial* (in Capitolul 5) si *Scenariu privind raspunsul in caz de urgenta, in cazul receptionarii unor doze de radiatii* (in Caitolul 6). Capitolul 7 descrie modulul N-WatchWiki de simulare a fragmentelor de scenarii ce includ suport decizional, iar anexele prezinta multiple exemple de executie a acestor scenarii, pentru diferite variante ale acestora.

2. Definirea unui ansamblu de scenarii

2.1. Testarea bazata pe scenarii

2.1.1. Rolul scenariilor in etapele dezvoltarii

In afara de etapa de testare, dezvoltarea unui program trebuie sa contina o validare din partea utilizatorilor potentiali; aceasta poate fi realizata fie direct, de catre acestia, fie indirect, prin introducerea unor seturi de date si a unor scenarii care sa fie concepute din punctul lor de vedere. Astfel, spre deosebire de testele obisnuite, care verifica daca au fost implementate specificatiile si daca programul functioneaza corect din punct de vedere tehnic, testele de acceptare includ si o latura subiectiva, precum si aspecte legate de modul de utilizare si de asteptarile persoanelor carora le este dedicat programul. Una din metodele de a verifica criteriile de acceptare este de a imagina si de a specifica in detaliu o serie de exemple concrete de utilizare a programului, prin identificarea unor scenarii care sa arate comportamentul sistemului in anumite situatii. Acesta este un progres fata de abordarea in care scenariile sunt specificate in etapa de analiza, dar nu sunt apoi valorificate si mai tarziu, la verificarea si validarea sistemului.

Asa cum defineste C. Kaner [1], un scenariu de test trebuie sa aiba in spate o poveste credibila, care sa arate motivatia utilizatorului de a apela la acel program intr-o mariera complexa, bazata pe un set de date complex, si conducand la rezultate care sunt usor de evaluat.

Scenariile de test pot fi realizate pe baza celor elaborate in etapa de specificare a cerintelor, pentru a descrie diferite cazuri de utilizare a sistemului, asociate diferitelor tipuri de utilizatori (identificate in functie de rolul jucat vis-à-vis de sistemul software). In contextul modelarii sistemelor bazate intensiv pe software, un scenariu este corelat cu un caz de utilizare, adica o secventa de interactiuni dintre sistem si un anumit actor - un utilizator sau un alt sistem extern, privite prin prisma rolului jucat pe parcursul interactiunii. Astfel, scenariul cuprinde tocmai secventa de interactiuni dintre acestia, fie ca ele sunt efective (concrete) sau doar posibile [2].

Se observa de asemenea ca specificarea scenariilor cu scopul testarii presupune o identificare clara a unui set de date de intrare si a rezultatelor care trebuie obtinute. Acest aspect le diferentiaza si fata de proiectarea bazata pe scenarii, descrisa de Rosson si Carroll [3], in care primordiale sunt: aspectul narativ, motivatiile, cunostintele si abilitatile potentialilor utilizatori, precum si succesiunea de interactiuni dintre acestia si sistemul de programe. Proiectarea bazata pe scenarii este prin excelenta orientata catre identificarea activitatilor implicate si a diferitelor alternative posibile, ceea ce asigura o perspectiva mai larga decat simpla orientare catre atingerea unor scopuri.

2.1.2. Legatura intre scenarii, modele si teste

Exprimarea formala a unor scenarii ale cazurilor de utilizare poate facilita o trasabilitate pe tot parcursul dezvoltarii [4]. Astfel, folosind Enterprise Architect, este posibil sa se specifice: actorul implicat, secventa de pasi care reprezinta calea principala a scenariului, cai alternative determinate de erori de utilizare sau pur si simplu de anumite alegeri. Existenta unei asemenea specificatii structurate constituie baza generarii unor diagrame care sa fie utilizate pentru o dezvoltare bazata pe modele, cum ar fi diagrame de activitati care sa ilustreze grafic procesul urmat in scenariul respectiv, evidentiind actiunile, deciziile, si ramificarea fluxului de control. Mai mult decat atat, este posibila generarea automata a unor cazuri de test care sa tina cont de toate alternativele descrise.

Pentru definirea unor teste de acceptare automate se pot specifica scenarii de granularitate mica, pentru care se identifica starea initiala a sistemului de programe, se lanseaza programul in executie, si se examineaza starea rezultata. In acest caz este important sa se evite interdependenta intre mai multe scenarii si sa se adopte un sistem de numire relevant si sugestiv. Numele trebuie sa fie concis, sa permita intelegerea fara a fi necesara

lectura tuturor detaliilor legate de pasii ce trebuie parcursi, si sa fie valabil si pe parcursul evolutiei programului catre versiuni ulterioare [5].

Ca un pas inainte spre formalizare, scenariile de test definite de utilizatori pot sta la baza specificarii unor modele care sa fie folosite pentru a genera automat diferite cazuri de test [6]. In modelele comportamentale ale unui sistem de programe sunt modelate starile acestuia, precum si operatiile sau evenimentele care determina tranzitia de la o stare la alta. Astfel, modelele pot fi rafinate in mod succesiv, pana cand se ajunge ca ele sa corespunda unor scenarii suficient de complexe pentru generarea unor cazuri de test cuprinzatoare. In plus, exista si posibilitatea de a genera chiar scenariile de test, pornind de la grafuri care sa redea fluxuri de evenimente si relatiile de precedenta intre acestea [7]. Aceasta metoda se bazeaza pe identificarea a 8 tipuri de erori posibile: ramificarea catre mai multe evenimente, prin conditii logice de tip “XOR”, “OR”, “AND”; negarea; reunirea controlului de la mai multe evenimente, prin conditii logice de tip “XOR”, “OR”, “AND”; sincronizarea. In cadrul acestor grafuri se pot de asemenea identifica diferite cai: bazate pe o secventa de evenimente neconcurente (de baza, ciclice sau partiale) si bazate pe evenimente concurente.

Generarea scenariilor de test este posibila daca se tine cont de criteriile de acoperire a unor asemenea grafuri. Ideea aceasta este valoroasa prin capabilitatea de a genera automat testele, dar ea are o precursoare in metoda SCENT propusa de Ryser si Glinz in [2], prin care scenariile, redate initial in forma narativa, in limbaj natural, sunt utilizate pentru a extrage o serie de diagrame de stare ierarhice, prin maparea unui pas din scenariu pe o tranzitie intre stari. Transformarea este in acest caz manuala si se realizeaza in mod iterativ, prin parcurgerea repetata a scenariului si completarea reprezentarii prin diagrame de stari.

2.1.3. Abordarea proiectului

Trebuie mai intai precizat ca exista o diferenta intre cazurile de test si scenarii [8]. Un caz de test preconizeaza clar care sunt conditiile in care se executa, pentru a se putea verifica daca programul se comporta asa cum a fost stabilit in specificatia de cerinte. Un scenariu presupune insa o multitudine de combinatii posibile ale conditiilor initiale, motiv pentru care nu se poate realiza o testare exhaustiva. Tinand cont de necesitatea de a verifica daca programul furnizeaza cu adevarat beneficiile asteptate de client, un scenariu de test poate fi compus de fapt din mai multi pasi, corespunzand unui set de cazuri de utilizare.

Pentru scopul acestui studiu vom asimila abordarea prin care unui scenariu de test ii sunt asociate mai multe cazuri de test, definite prin premize initiale, o succesiune de activitati, un set de date de intrare si rezultatele asteptate.

2.2. Factori determinanti pentru scenariile situatiilor de urgenta nucleara si radiologica

2.2.1. Mărimi folosite in stabilirea criteriilor generice si operaționale

MĂRIMI CONCEPTUALE

Pentru dezvoltarea criteriilor de luare a deciziilor in ceea ce priveste masurile de protectie exista diferite tipuri de concepte de doza relevante pentru pregătirea si răspunsul la urgenta:

- *Doza proiectata* - doza care se anticipează a fi încasata in cazul in care nu sunt întreprinse acțiuni de protectie si care ar putea fi prevenita sau redusa prin intermediul acțiunilor de protectie urgente de prevenire;
- *Doza reziduala* - doza care se anticipează a fi încasata fie după încheierea acțiunilor de protectie, fie in absenta unor astfel de acțiuni;
- *Doza evitabila* – doza care a fost primita, si pe baza căreia se pot decide acțiuni imediate cum ar fi asistenta medicala.

MARIMI DE RADIOPROTECTIE

- *Doza absorbita mediata* AD_T - produsul dintre media dozei absorbite intr-un organ sau țesut si eficacitatea biologica relativa (RBE). Este folosita pentru evaluarea efectelor deterministice rezultate in urma expunerii unui organ sau țesut;
- *Doza echivalenta* H_T- debitul dozei echivalente in țesutul sau organul T care va fi primita de un organism in urma unei incorporări de substanțe radioactive. Este folosita pentru evaluarea efectelor stocastice rezultate in urma expunerii unui organ sau țesut;
- *Doza efectiva* E - este suma dozelor echivalente ponderate absorbite de toate țesuturile si organele organismului din expunere interna si externa.

MĂRIMI OPERAȚIONALE

- *Echivalentul de doza personal* - Hp(d) – este doza echivalenta intr-un tesut moale pentru un punct specificat al corpului, la o anumita adâncime (d). Este folosit pentru monitorizarea expunerii externe a unui individ;
- *Echivalentul de doza ambiental* - H*(d) – doza echivalenta intr-un punct specificat in câmpul de radiație care ar fi produs de câmpul expandat si aliniat corespunzător in sfera ICRU (International Commission on Radiation Units), la o adâncime d, pe raza ce se opune câmpului aliniat. Este folosit pentru monitorizarea câmpului de radiații in zona unde urgenta s-a produs.

2.2.2. Procedeul aplicat înainte de eliberarea materialelor radioactive

In cazul unei situații de urgenta radiologica sau nucleara, in faza identificării situației de urgenta, pentru ca efectele deterministice sa fie evitate, strategia de protectie trebuie sa se bazeze pe acțiuni automate de protectie a populației cum ar fi, evacuarea, administrarea KI sau adăpostirea. In aceasta faza, procesul decizional urmărește factori cu o anumita incertitudine, si consta in identificarea unor parametri, care au fost stabiliți in avans, ca fiind indicatori critici in declanșarea acțiunilor automate de protecție. Acești parametrii indica:

- Starea instalației nucleare sau radiologice in cauza,
- Starea funcțiilor de securitate ale instalației.

Tot pentru aceasta faza, ar trebui determinate in avans zonele pentru care acțiunile de protectie se implementează imediat, fara a urma un proces decizional care sa implice factori de natura economica, sociala, etc. Aceste zone se numesc:

- zone de planificare a acțiunilor preventive, determinate cu scopul de a lua masuri astfel incat daca o eliberare a materialelor radioactive ar avea loc, efectele deterministice sa fie evitate;
- zone de planificare a acțiunilor urgente, determinate cu scopul de a lua masuri astfel incit daca o eliberare a materialelor radioactive ar avea loc, efectele stocastice sa fie minimizate.

Calculul acestor zone se face cu ajutorul codurilor de calcul ce folosesc modele de dispersie atmosferica si ținând cont de diverse ipoteze; se folosește o matrice de evaluare care arata toate combinațiile posibile dintre:

- Termenul sursa pentru cea mai severa situație de accident posibila,
- Modelele de dispersie atmosferica disponibile (modelul gaussian, Laplace, Lagrange)
- Prognoza numerica la scara regionala a parametrilor meteorologici (direcția vântului, viteza vântului, temperatura, umiditate, etc)
- Durata eliberărilor radioactive
- Calea de eliberare a materialelor radioactive
- Termenul sursa pentru diferite stări finale (core damage state) ale evoluției accidentului

Criteriile stabilite in tabelul de mai jos comparate cu rezultatele rulărilor pot da dimensiunea zonelor de planificare a acțiunilor preventive, de evitare a efectelor deterministice.

Tabelul 1. Criterii generice pentru dozele primite intr-o perioada scurta de timp pentru care se așteaptă sa se adopte in orice circumstanțe acțiuni de protectie si alte acțiuni de raspuns pentru a evita sau a minimiza efecte deterministe severe

		Masurile care se iau in cazul îndeplinirii criteriilor generice sunt următoarele
Expunere acuta externa (< 10 ore)		*Pentru doza proiectata:* -Implementarea actiunilor de preventie-urgente (chiar si in conditii dificile) - Informarea si comunicarea publica - Decontaminarea *Pentru doza incasata* - screening medical si aplicarea tratamentului oficial - controlul contaminarii - realizarea decorporarii [g] (daca este cazul) - inregistrarea pentru urmarirea medicala pe termen lung - asigurarea consilierii psihologice
AD $_{Maduva\ rosie}$[a]	1 Gy	
AD $_{Fetus}$	0.1[b] Gy	
AD $_{Tesut}$[c]	25 Gy la 0.5 cm	
AD $_{Skin}$[d]	10 Gy la 100 cm^2	
Expunere acuta interna (Δ = 30 zile[e])		
AD(Δ)$_{Maduva\ rosie}$	0.2 Gy pentru radionuclizii cu numar atomic $Z \geq 90$[f]	
AD(Δ) $_{Tiroida}$	2 Gy pentru radionuclizii cu numar atomic $Z \leq 89$[f] Gy 2 Gy	
AD(Δ) $_{Plaman}$[h]	2 Gy 30 Gy	
AD(Δ) $_{Colon}$	20 Gy	
AD(Δ') $_{Fetus}$[i]	0.1 Gy[b]	

a) $AD_{Maduva\ rosie}$ reprezinta doza absorbita ponderata pentru eficacitatea biologica relativa (RBE) de catre maduva rosie, in urma expunerii externe acute (t<10 ore) cu radiatii penetrante X (inclusiv brehmstrallung) si/sau gamma si/sau neutroni. In cazul expunerii acute externe in campuri uniforme de radiatii puternic penetrante, valoarea lui $AD_{Maduva\ rosie}$ este folosita si ca valoare a dozei medii absorbite ponderate pentru eficacitatea biologica relativa de catre oricare din celelalte tesuturi si organe interne, inclusiv tiroida si cristalinul. Pentru toate organele si tesuturile mentionate, RBE la iradierea externa este 1 pentru radiatia X si gamma si 3 pentru neutroni. La stabilirea PAZ, valoarea de 10 ore utilizata pentru definirea expunerii acute poate fi modificata, dupa necesitati, pana la 24 ore.
b) La 0.1 Gy probabilitatea efectelor deterministice severe asupra fetusului este foarte mica si aceasta numai in anumite perioade post conceptie (intre 8 si 15 saptamani) si numai daca doza este incasata la debite foarte mari. In timpul altor perioade post conceptie sau la debite de doza mai mici, fetusul este mai putin sensibil. Probabilitatea efectelor deterministe asupra fetusului devine mare la 1 Gy. De aceea, 1 Gy este folosit ca criteriu generic pentru doze acute ale fetusului:

i. in analiza de hazard pentru identificarea instalatiilor si a activitatilor, a ariilor pe amplasament, a ariilor din afara amplasamentului si a locatiilor pentru care o urgenta nucleara sau radiologica ar putea justifica actiuni preventive urgente de protectie pentru a evita sau a minimiza efectele deterministice severe;
ii. pentru identificarea situatiilor de expunere care sunt 'daunatoare sanatatii'; si
iii. pentru a face aranjamente pentru implementarea eficace a deciziilor privind actiuni urgente de protectie si alte actiuni de raspuns ce urmeaza a fi intreprinse in afara amplasamentului pentru a evita sau minimiza aparitia de efecte deterministice severe (de exemplu, stabilirea PAZ).

c) Doza livrata unei suprafete de 100 cm^2 la o adancime de 0.5 cm sub suprafata corpului in tesut datorita contactului apropiat cu o sursa radioactive (de exemplu, o sursa purtata in mana sau buzunar).
d) Doza este livrata unei 100 cm^2 de derma (structuri ale pielii la o adancime de 40 mg/cm^2 (sau 0,4 mm) sub suprafata).
e) Criteriul generic pentru AD(Δ) este doza absorbita ponderata pentru RBE livrata pe o perioada de 30 zile de incorporarea (I_{05}) care va conduce la efecte deterministe severe pentru 5% din indivizii expusi.
f) Sunt utilizate criterii generice diferite, pentru a tine cont de faptul ca actinidele au procese biocinetice diferite de ceilalti radionuclizi, si ca urmare dinamici diferite de formare a dozei, datorate expunerii interne, in maduva rosie. Diferentele privind $AD(\Delta)_{Maduva\ rosie}$ al radionuclizilor (actinide fata de ceilalti radionuclizi) pot ajunge la un factor de 50, in timp ce diferentele in interiorul grup nu depasesc un factor de 3. De aceea radionuclizii au fost impartiti in cele 2 grupuri. Aceasta a permis evitarea superconservatismului reprezentat de alegerea unui singur criteriu generic, stabilit la nivelul minim.

g) Pentru scopul acestui criteriu generic 'plaman' inseamna regiunea alveolar-interstitiala a tractului respirator.
h) Pentru acest caz particular, '∆' inseamna perioada dezvoltarii in uter a embrionului sau fetusului.
i) Decorporarea este acțiunea proceselor biologice, facilitate de agenți chimici sau biologici, prin intermediul cărora radionuclizii incorporați sunt indepartati din corpul omenesc. Criteriul generic pentru decorporare se bazează pe doza proiectata in absenta decorporarii.

Criteriile stabilite in tabelele de mai jos comparate cu rezultatele rulărilor conduc la dimensionarea zonelor de planificare a acțiunilor urgente, de minimizare a apariției efectelor stocastice.

Tabelul 2. Criterii generic pentru acțiuni urgente si timpurii de protecție si alte acțiuni in scopul reducerii riscurilor de apariție a efectelor stocastice in faza imediata a urgentei

Marimea dozimetrica	Nivelul de doza	Acțiuni de protecție
$H_{tiroida}$	50 mSv[a] in primele 7 zile	Blocarea tiroidei cu Iod (ITB)
E^b	100 mSv in primele 7 zile	Adăpostire, evacuare, prevenirea ingestiei, restricții de alimente si apa, restricții pentru bunuri, controlul contaminării, decontaminarea, înregistrarea, informarea publicului
H_{fetus}^c	100 mSv in primele 7 zile	

Tabelul 3. Criterii generice pentru acțiuni de protectie timpurii si alte acțiuni in scopul reducerii riscurilor de apariție a efectelor stocastice in faza intermediara a urgentei

Marimea dozimetrica	Nivelul de doza	Acțiuni de protectie
E^b	100 mSv in primul an	Relocarea temporara, restricții de alimente si apa, restricții pentru bunuri, controlul contaminării, decontaminarea, înregistrarea, informarea publicului
H_{fetus}^c	100 mSv in primul an	

Tabelul 4. Criterii generice pentru actiuni de protectie si alte actiuni in scopul oferirii de suport medical

Marimea dozimetrica	Nivelul de doza	Actiuni de protectie
E^b	100 mSv in prima luna	*Screening* medical, inregistrare, consiliere; Consiliere pentru a permite luarea deciziilor cu privire la fetus.
H_{fetus}^c	100 mSv pe toata perioada dezvoltarii in uter	

a. *Acest criteriu se aplica doar pentru administrarea de pastile de Iodura pentru blocarea tiroidei. Aceasta este o actiune urgenta de protectie si se ia:*
   i. *daca exista posibilitatea expunerii la iod radioactive;*
   ii. *inainte sau imediat dupa eliberarea iodului radioactive in atmosfera;*
   iii. *numai inainte sau imediat dupa incorporarea iodului radioactiv.*
b. *Doza efectiva.*
c. *Doza echivalenta pentru fetus.*

2.2.3. Procedeul aplicat după eliberarea materialelor radioactive

Suportul decizional pentru acțiunile de protectie ce trebuie implementate in aceasta faza, după eliberarea materialelor radioactive, se bazează pe măsurătorile de radioactivitate si anume, pe matimile operaționale, echivalentul de doza ambiental. Aceste valori identificate se compara cu valorile precalculate ale nivelurilor operaționale de intervenție.

Pentru a lua decizii pe baza maturatorilor trebuie sa fie disponibile următoarele date:

- Masuratori ale <u>debitului de doza ambiental</u> (H_{arie}*) la 1 m deasupra solului, efectuate de rețelele de detectori proveniți de la stațiile de monitorizare a radioactivității fixe
- Masuratori ale <u>debitului de doza ambiental</u> la 1 m deasupra solului, efectuate de către echipele mobile din teren

- Masuratori ale debitului de doza ambiental la 1 m deasupra solului, efectuate prin sondaje aeriene sau cu ajutorul vehiculelor
- Calitatea caracterizării teritoriului (incertitudinea fiind permisibila) ar trebui sa depindă de:
    - In interiorul ariei – ar trebui sa se realizeze cel puțin o masuratoare pe 2500 m^2
    - In exteriorul ariei – ar trebui sa se realizeze cel putin o masuratoare pe 10000 m^2

Rezultatele compararii datelor monitorizate cu datele precalculate ne indica:

I. Daca H_{arie}* depaseste 1 µSv/h, aria va fi clasificata ca fiind una in care acțiunile de protectie din tabel, pentru teritoriile in care OIL3 este depășit, vor fi implementate.
II. Daca H_{arie}* depaseste 100 µSv/h, aria va fi clasificata ca fiind una in care acțiunile de protectie din tabel, pentru teritoriile in care OIL2 si OIL3 sunt depășite, vor fi implementate.
III. Daca H_{arie}*depaseste 1000 µSv/h, aria va fi clasificata ca fiind una in care acțiunile din tabel, pentru teritoriile in care OIL1, OIL2 si OIL3 sunt depășite, vor fi implementate

Tabelul 5. Valorile implicite ale nivelului operațional de intervenție pentru măsurătorile din teren

OIL	Valoare OIL	Actiunile de raspuns (adecvate) daca OIL sunt depasite
Masuratori de mediu		
OIL1	Gamma (γ) 1000 µSv/h la 1 m de suprafața sau sursa	• Evacuarea imediata sau asigurarea unui adăpost substanțial • Asigurarea decontaminării persoanelor evacuate • Reducerea ingestiei neglijente • Stoparea consumului de produse locale, a apei de ploaie, precum si a laptelui provenit de la animalele din zona • Efectuarea de examinări medicale si înregistrarea persoanelor evacuate • Efectuarea de examinări medicale in cazul in care o persoana a manipulat o sursa cu un debit de doza egala sau mai mare de 1000 Sv/h la o distanta de 1m
OIL2	Gamma (γ) 100 µSv/h la 1 m de suprafața sau sursa	• Stoparea consumului de produse locale, a apei de ploaie si a laptelui provenit de la animalele din zona pana când acestea vor fi ecranate • Relocarea temporara a locuitorilor; înaintea relocării se asigura reducerea ingestiei neglijente. Înregistrarea si estimarea dozei încasate a celor din zona înaintea relocării pentru a determina daca ecranarea medicala este garantata. Relocarea ariilor cu potențialul cel mai ridicat de expunere ar trebui sa înceapă in câteva zile • Efectuarea de examinări medicale in cazul in care o persoana a manipulat o sursa cu un debit de doza egala sau mai mare de 100 Sv/h la o distanta de 1m. Orice femeie însărcinata care a manipulat o astfel de doza ar trebui sa primească consultare medicala imediata si o evaluare a dozei.
OIL3	Gamma (γ) 1 µSv/h la 1 m de suprafața	• Stoparea consumului produselor locale neesențiale, a apei de ploaie si a laptelui provenit de la animalele din zona pana când acestea vor fi ecranata • Ecranarea produselor locale, a apei de ploaie si a laptelui provenit de la animalele din zona pe o arie de cel puțin de 10 ori mai mare decât cea la care OIL3 este depășita • Luarea in considerare a punerii la dispoziție de tablete de KI pentru saturarea tiroidei daca înlocuitoarele produselor locale sau lapte nu sunt disponibile imediat

- Estimarea dozelor încasate de cei ce ar fi consumat lapte, alimente sau apa de ploaie din ariile unde restrictii au fost implementate pentru a determina daca ecranarea medicala este garantata.

Procesul decizional pentru o situatie de criza radiologica si nucleara se bazează pe factori cu o anumita incertitudine, pana când măsurătorile de radioactivitate sunt disponibile. Acești factori sunt cel puțin:

a) condițiile observate la instalația nucleara sau radiologica,
b) zonele de planificare pentru implementare a acțiunilor preventive si urgente,
c) prognoza meteorologica.

După ce măsurătorile radiologice sunt disponibile, procesul decizional pe langa factorii economici, sociali, psihologici, de mediu, etc ia in calcul valorile de radioactivitate măsurate, comparate cu valorile prestabilite nivelurile operaționale de intervenție (OIL) si condițiile meteorologice.Situatii de criza

2.2.4. Modelarea situatiilor de criza independent de tipul hazardului

In cadrul proiectului au fost efectuate studii pentru modelarea tuturor aspectelor semnificative ale sistemelor de management de hazard, independent de tipul acestuia. Pentru aceasta, pe langa detaliile de proiectare ale sistemului N-WATCHDOG, au fost investigate alte elemente legate de:

- sisteme pentru diseminarea informatiei in situatii de urgenta [9], incluzand alerte publice integrate [10], alerte pe dispozitive mobile [11] si transmisiuni radio-TV [12],
- sisteme pentru alertare timpurie cu privire la:
  - conditii meteo extreme [13],
  - hazarduri multiple la nivel regional [14],
  - protectia populatiei cu suportul unor agentii aerospatiale [15],
- proiecte europene pentru :
  - actiuni multinationale de raspuns la dezastre [16],
  - pregatire pentru a face fata in caz de acte de terorism *CBRN* [17],
  - evaluarea aspectelor de securitate legate de accidentele de mediu [18],
- articole stiintifice ce trateaza:
  - noi abordari de proiectare ale sistemelor cibernetico – fizice [19],
  - cadrul integrat al sistemelor de alertare timpurie [20],
  - logistica informatiilor pentru alertarea timpurie [21],
  - arhitecturi de referinta pentru integrarea informatiilor obtinute prin *crowdsourcing* [22],
  - stadiul actual al sistemelor de alertare timpurie [23].

Metoda de cercetare adoptata in cadrul proiectului este ilustrata in Figura 1 si a fost descrisa intr-un articol pentru diseminarea proiectului[1], prezentat la INTED 2017. Se porneste de la o analiza generala a domeniului situatiilor de criza, si se aleg mai multe exemple semnificative de sisteme, pentru elaborarea unor studii de caz mai detaliate. Pornind de la acestea, se extrag conceptele considerate definitorii pentru fiecare exemplu concret studiat, apoi se realizeaza o reprezentare a acestora folosind un limbaj de modelare orientat pe obiecte, Unified Modeling Language (UML) [24]. Folosind aceste reprezentari, se trece la dezbateri in echipa, in care au fost antrenati si studenti de master, se analizeaza aspectele comune ale acestor concepte, si se selecteaza cele generice, la un nivel inalt de abstractie, care pot fi utilizate pentru a modela orice tip de sistem de management al hazardurilor.

[1] A.D. Ionita, Research Experience of Master's Students for Modeling Hazard Management Systems, Proceedings of INTED2017 Conference 6th-8th March 2017, Valencia, Spain, pp. 8865-8860.

Abordarea noastra in continuare s-a bazat pe utilizarea unui mediu generic de metamodelare, Generic Modeling Environment (GME) [25]. Acesta a fost folosit in felul urmator: conceptele identificate ca elemente de referinta pentru domeniul studiat au fost reprezentate in GME intr-o serie de diagrame care reprezinta metamodelul, sau sintaxa abstracta a unui limbaj de modelare nou, realizat pentru scopul proiectului, si specific pentru managementul hazardului.

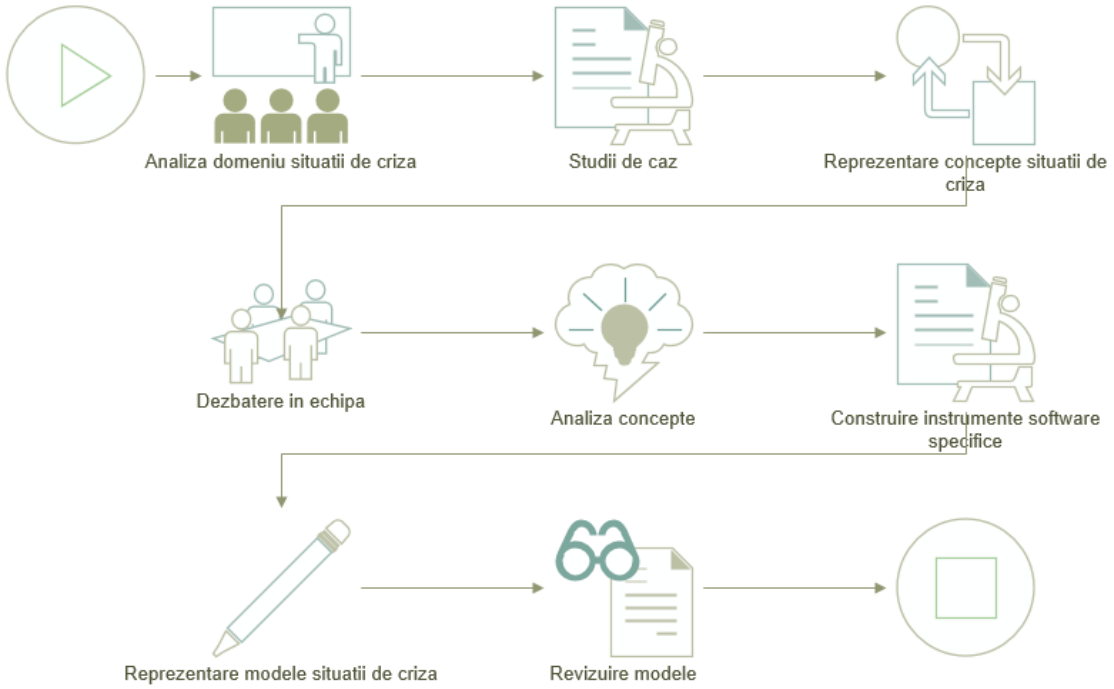


Fig. 1 Metoda de analiza pentru metamodelare

La acestea a fost adaugata o sintaxa concrata a limbajului, prin introducerea unui set de icoane realizate special pentru conceptele domeniului si prin asocierea lor cu conceptele din sintaxa abstracta. Metamodelul rezultat a fost interpretat in GME, obtinandu-se astfel un editor de modele specific, care a fost ulterior utilizat pentru a reprezenta diferite modele de situatii de criza. Aceste modele au fost revizuite pentru toate sistemele de management al hazardului care au facut obiectul studiilor de caz, dar si pentru multiple versiuni de metamodel care au fost realizate.

Metamodelul contine mai multe aspecte, pentru a reprezenta separat : (i) elementele legate de hazardul propriu-zis, (ii) tratarea situatiilor de criza, si (iii) detaliile caracteristice geolocatiei. Ele au fost descrise in detaliu intr-un alt articol pentru diseminarea proiectului[2], in cadrul ICSOFT 2017. Figura 2 prezinta o parte din sintaxa abstracta a acestui metamodel, realizata cu GME, in care sunt identificate elemente de modelare pentru: avertizare (dispozitive, software dedicat si, in particular, notificari), actori implicati si organizatiile de care acestia apartin, precum si activitati reglementate de catre autoritati, care pot fi chiar compozite, adica pot sa contina la randul lor o succesiune de activitati care sa fie prestabilita.

Limbajul GME utilizat in diagrama din Figura 2 are ca notiuni de baza: *Atom* (indivizibil), *Model* (care poate contine alte elemente, fapt specificat prin liniile terminate cu romb) si *Connection* (care permite trasarea unor conexiuni intre diferite instante, pentru a realiza modele de tip graf, care reprezinta in mod obisnuit structura unui sistem).

[2] A.D. Ionita, M. Mocanu, Metamodeling Approach for Hazard Management Systems, the 12th International Conference on Software Technologies, 24-26 July, 2017, Madrid, Spain.

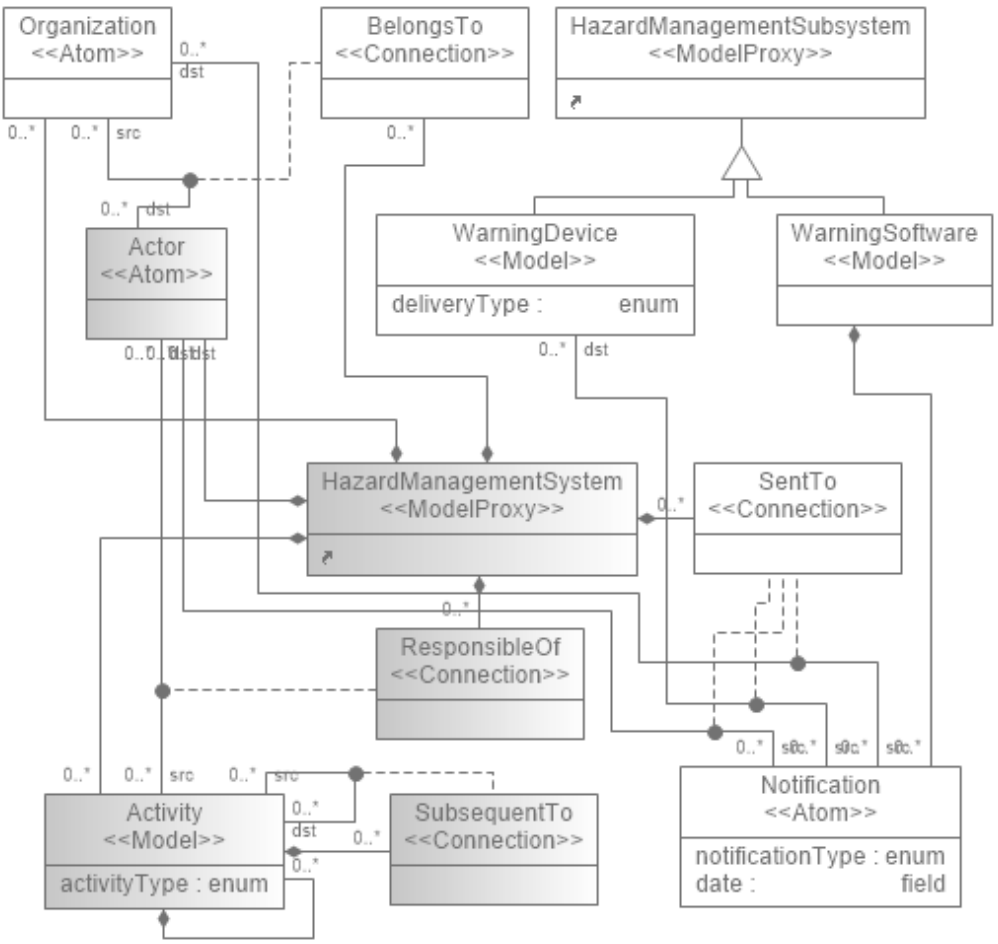


Fig 1. Fragment din metamodel pentru modelarea situatiilor de criza

Tabelul 1 Participare si prezentare la ICSOFT 2017

ICSOFT 2017

12th International Conference on Software Technologies

24 - 26 July, 2017 // Madrid, Spain

PRIMORIS Contacts FAQs

Actions
- On-line Registration
  - Registration Fees
  - Deadlines and Policies
- Submit Paper
  - Guidelines
  - Templates
  - Glossary
- Author's Login
- Reviewer's Login

Information
- Conference Details
  - Important Dates
  - Technical Program
  - Social Event
  - Call for Papers
  - Program Committee
  - Event Chairs
  - Keynote Lectures
  - Best Paper Awards
- Satellite Events
  - Workshops
  - Special Sessions

Call for Papers

Scope | Conference Areas | Keynote Lectures | Paper Submission
Publications | Important Dates | Secretariat | Venue
Conference Chair | Program Chair | Program Committee

ICSOFT is sponsored by INSTICC – Institute for Systems and Technologies of Information, Control and Comm

SCOPE

The purpose of the ICSOFT 2017, the 12th International Conference on Software Technologies, is to bring toc engineers and practitioners interested on software technologies. The conference areas are "Software Engineering", and Applications" and "Software Paradigm Trends".
Papers describing original work are invited in any of the areas listed below. Accepted papers, presented at the confere authors, will be published in the Proceedings of ICSOFT with an ISBN. Acceptance will be based on quality, relevance a full research reports and work-in-progress reports are welcome. There will be both oral and poster sessions.
Special sessions, dedicated to case-studies and commercial presentations, as well as tutorials dedicated to technical/ also envisaged: companies interested in presenting their products/methodologies or researchers interested in holding a or special session are invited to contact the conference secretariat or visit the conference website.

CONFERENCE AREAS

Each of these topic areas is expanded below but the sub-topics list is not exhaustive. Papers may address one or mor topics, although authors should not feel limited by them. Unlisted but related sub-topics are also acceptable, provide the following main topic areas:

1. SOFTWARE ENGINEERING

ICSOFT17-1B: Oral Presentations

Monday, July 24th, 2017

16:30 - 18:00

Room 103

CHAIR:

Oksana Nikiforova

PRESENTATIONS:

Using Runtime State Analysis to Decide Applicability of Dynamic Software Updates
Speaker: Oleg Šelajev — Software Engineering

Metamodeling Approach for Hazard Management Systems
Speaker: Anca Daniela Ionita — Software Engineering

Model-based Tool Support for the Development of Visual Editors - A Systematic Mapping Study
Speaker: Francisco Pérez Blanco — Software Engineering

An End-to-end Formal Verifier for Parallel Programs
Speaker: Soumyadip Bandyopadhyay — Software Engineering

ICSOFT 2017

12th International Conference on Software Technologies

24 - 26 July, 2017 // Madrid, Spain

Schedule Papers

Anca Daniela Ionita - Chair, Speaker, Author

NAME: Anca Daniela Ionita

AFFILIATION: University Politehnica of Bucharest - Romania

BRIEF INFO: Anca Daniela Ionita is a full professor with University Politehnica of Bucharest,

Room 103

ICSOFT17-RP-22: Short Paper **20min**

Metamodeling Approach for Hazard Management Systems

ABSTRACT

The management of natural and human-caused hazards is performed by reuniting a large variety of stakeholders, non-homogeneous collections of data, and systems that may not have been conceived for interoperability. The interdependency between hazards and the need of coordinated response also lead to the necessity to develop multi-hazard solutions, resulting in systems with a high complexity. This paper presents a metamodeling approach for hazard management systems, and a specific modeling environment, which considers the hazard, emergency, and geospatial views. The use of the model editor is exemplified on a system for early warning in case of accidental water pollution.

KEYWORDS

Metamodeling, Modeling Environments, Hazard Management.

TOPICS

Domain-Specific Languages; Metamodeling; Modeling Languages;

AUTHORS

Anca Daniela Ionita
University Politehnica of Bucharest - Romania

Mariana Mocanu
University Politehnica of Bucharest - Romania

Metamodeling Approach for Hazard Management Systems

Anca Daniela Ionita, Mariana Mocanu
University Politehnica of Bucharest

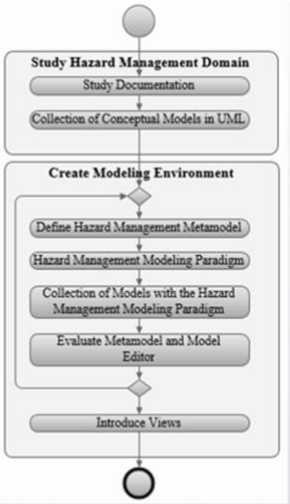
University Politehnica of Bucharest ICSOFT 2017, Madrid, 24-26 July, 2017 1

Requirements that increase complexity

- Generation of large scale data that have to be processed in real time
- Necessity to use numerous and sometimes expensive physical artifacts
  - E.g. sensors, spectrometers, satellites
- Severe time constraints for getting a successful feedback
  - complex actions performed by various devices and humans
  - multiple organizations
- Necessity of a previously prepared coordination even in case of highly improbable events

Research Method

- Collection of Conceptual Models in UML
- Hazard Management Metamodel
- Collection of Models with the Hazard Management Modeling Paradigm
- Evaluate Metamodel and Model Editor
- Introduce Views



Conclusion

- A large variety of systems to manage natural or human-caused hazards
  - monitoring the environment
  - transmitting notifications
- Manage multiple types of hazards
- Metamodel
  - **Hazard**, **Emergency**, and **GIS** views
  - Encapsulation

2.2.5. Modelarea unor scenarii specifice N-WATCHDOG

Întotdeauna vor exista incertitudini in ceea ce priveste factorii care stau la baza luării deciziilor in timpul unei situații de urgenta. Cu toate acestea, acțiunile de protectie trebuie sa fie luate, in cele mai multe cazuri, înainte ca aceste incertitudini sa fie reduse semnificativ, prin analizele specifice. De asemenea, este necesara definirea unei strategii de protectie, chiar daca se bazează si pe incertitudini, care sa permită luarea deciziilor in timpul potrivit in ceea ce priveste acțiunile necesare.

Acțiunile de protectie si alte acțiuni de raspuns pentru protecția populației nu se bazează doar pe atribute referitoare la protecția împotriva radiațiilor. Decidenții ar trebui sa ia in considerare diverși factori precum factorii umani, economici, sociali, de mediu si psihologici, înainte de a decide acțiunile de protectie.

Principalele obiective ale unui raspuns la o urgenta nucleara si/sau radiologica sunt:

a) evitarea efectelor deterministe prin introducerea de acțiuni de protectie pentru limitarea dozelor individuale sub pragul apariției acestora;
b) minimizarea riscului apariției efectelor stocastice; ar trebui limitat prin introducerea de acțiuni de protectie care sa permită obținerea unui beneficiu net pozitiv pentru grupul de indivizi implicați;
c) minimizarea apariției efectelor non-radiologice (efecte sociale, economice si psihologice).

Efectele deterministe sunt caracterizate de o relație de cauzalitate determinista intre doza si efect. Aceste efecte (ex.: cataracta, eriteme, pierderea parului, sterilitate) apar atunci când doza încasata depaseste o valoare prag. Valoarea prag pentru un anumit efect biologic variază de la un individ la altul si depinde de condițiile expunerii.

Efectele stocastice sunt caracterizate de o relație probabilista doza - efect. In urma expunerii la radiații, efectele stocastice (ex.: cancere, maladii ereditare) apar aparent aleator, la anumiți indivizi din grupul afectat. Pentru aceasta categorie de efecte nu exista o valoare prag a dozei, ele sunt întotdeauna întârziate fata de momentul expunerii, iar severitatea efectului este independenta de valoarea dozei încasate.

Au fost imaginate mai multe scenarii tipice, care pot fi de interes pentru utilizatori potentiali, precum turisti, rezidenti aflati in proximitatea unei centrale nucleare, responsabili cu securitatea ai diferitilor agenti industriali, agenti imobiliari, sau personalul administrativ din primarii si alte institutii ale autoritatilor locale, regionale sau centrale. Nu in ultimul rand, aceste scenarii pot fi de interes pentru studentii care studiaza in cadrul unui program legat de protectia mediului sau de producerea energiei electrice (vezi Figura 3).

Pentru scopul acestui proiect au fost considerate si detaliate urmatoarele patru scenarii :

- Scenariu de informare
- Scenariu de preventie
- Scenariu de protectie
- Scenariu de raspuns la urgenta.

Acestea au fost identificate considerand intai situatia in care nu exista niciun risc, iar programul este utilizat strict cu scopul de informare, la care s-au adaugat scenarii corespunzatoare celor trei niveluri de risc rezultate din documentatiile IAEA si luate in calcul in faza precedenta, la proiectarea suportului decizional :

- L2 - Doza evitabila
- L1 - Doza prognozata (risc substantiala de receptionare a dozei)
- L0 - Doza receptionata.

Aceste scenarii au fost modelate cu ajutorul limbajului creat in GME si descris in subcapitolul 2.2.1 (vezi Figura 3). Cu ajutorul aceluiasi editor specializat au fost reprezentate si succesiunile de activitati din interiorul acestor scenarii, astfel: informare (Figura 4), preventie (Figura 5), protectie (Figura 6) si raspuns la urgenta (Figura 7). Pe baza acestor modele au fost sintetizate scenariile de test (in subcapitolul 2.3.), iar pentru fiecare dintre acestea au fost numite si detaliate secventele de cazuri de test care rezulta din model, in capitolele 3, 4, 5 si 6.

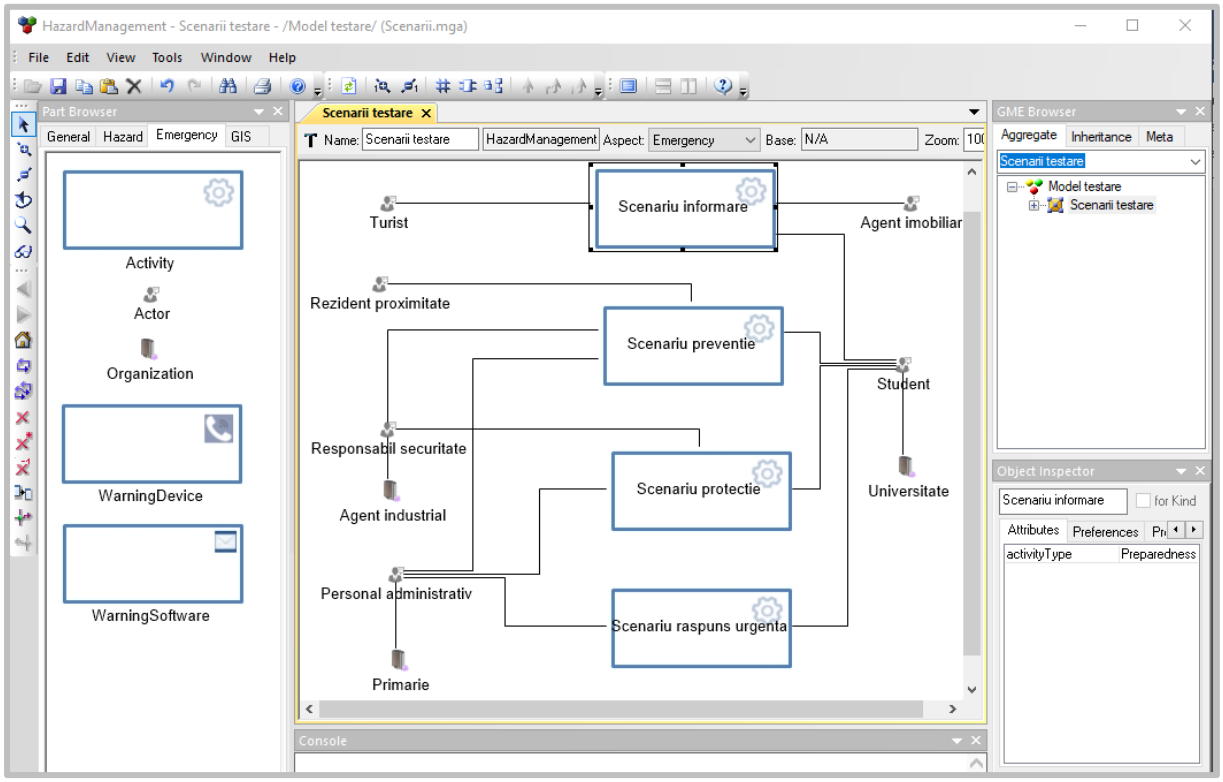


Fig. 3. Modelarea scenariilor de testare folosind limbajul specific definit in GME

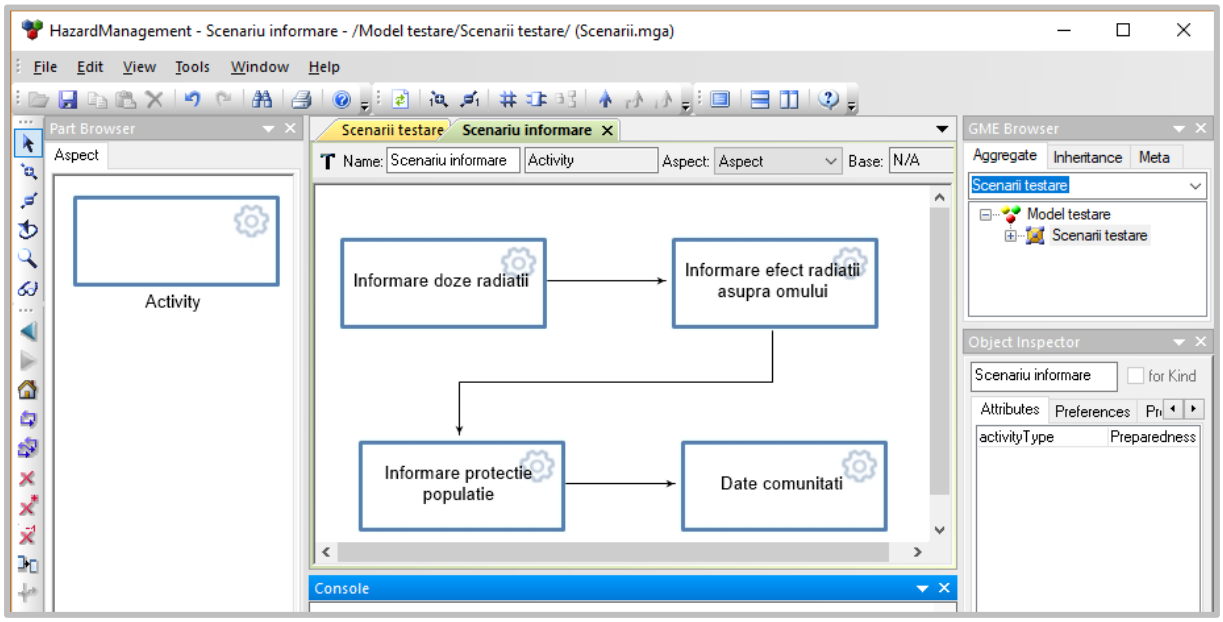


Fig. 4. Modelarea in GME a scenariului de informare

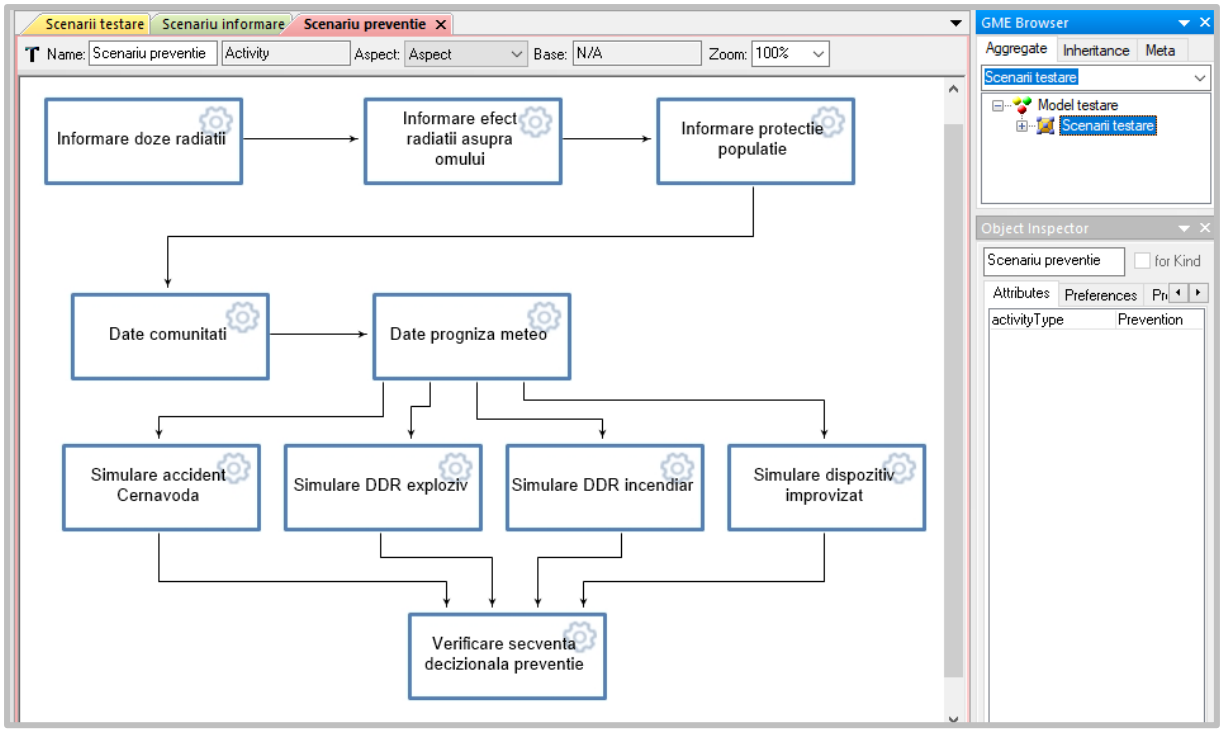


Fig. 5. Modelarea in GME a unui scenariu de preventie

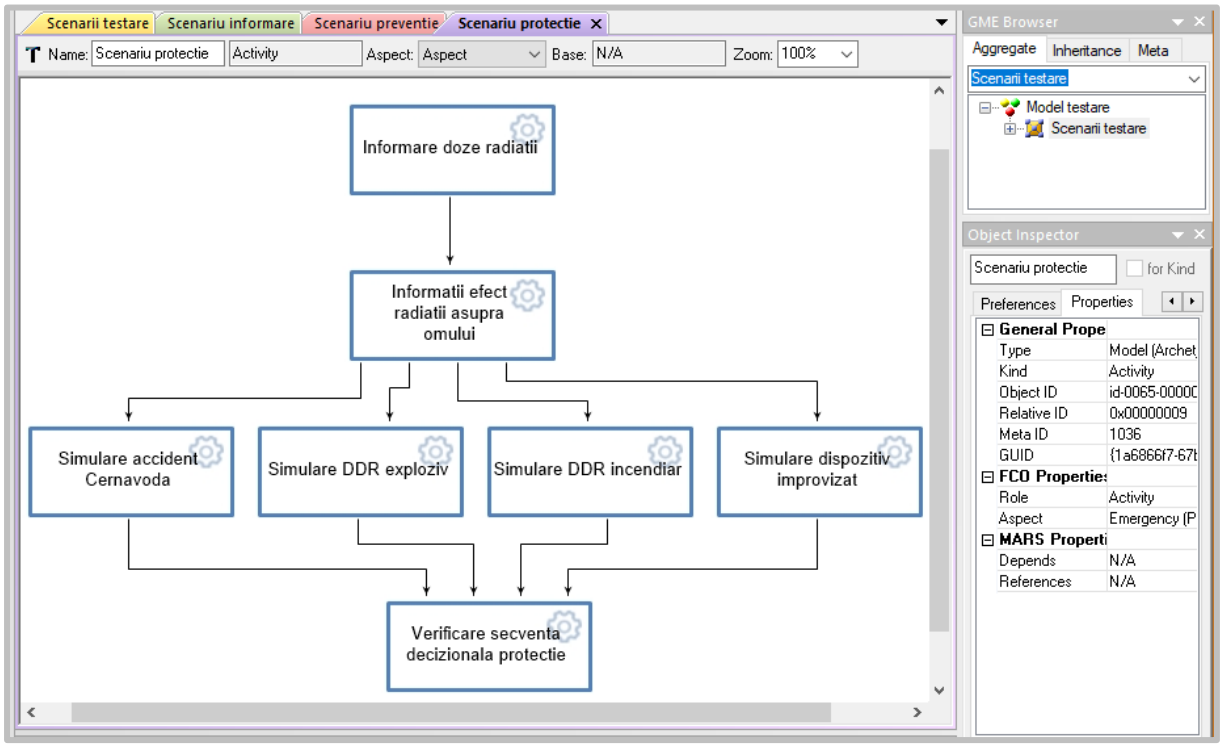


Fig. 6. Modelarea in GME a unui scenariu de protectie

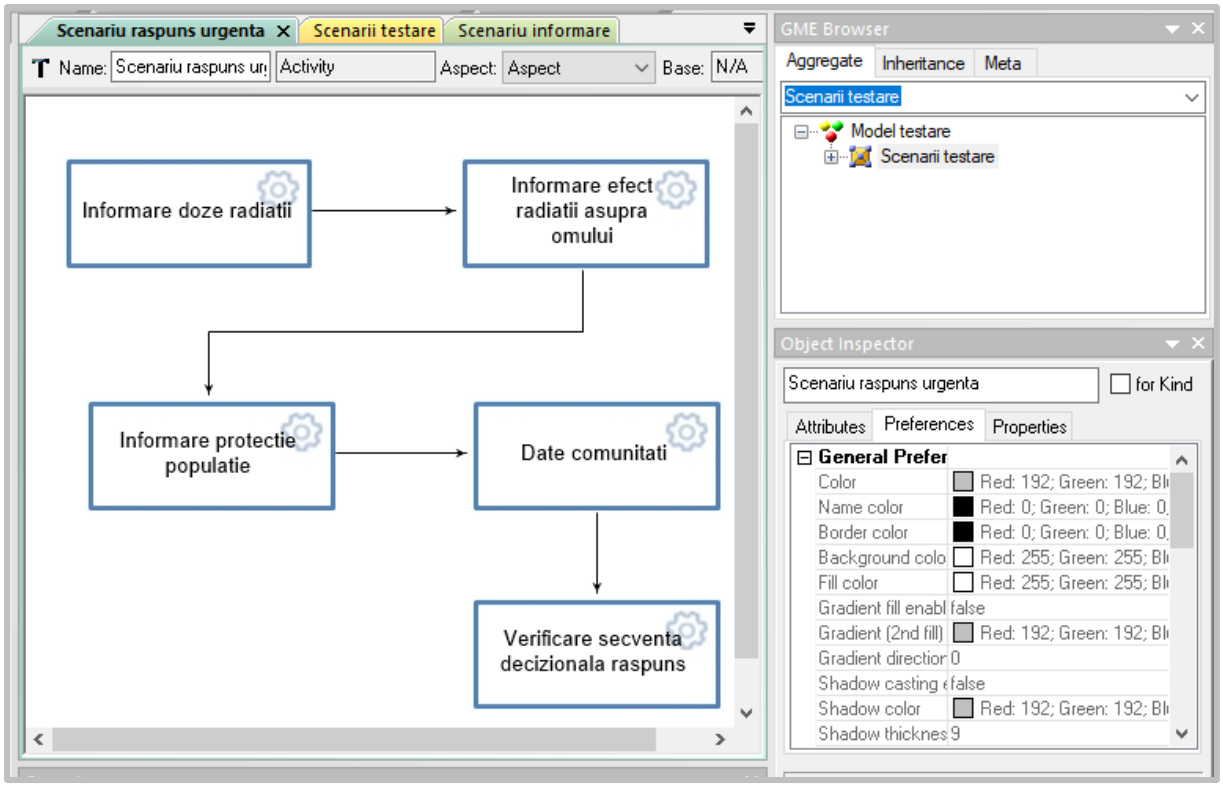


Fig. 7. Modelarea in GME a unui scaneriu de raspuns la urgenta

2.3. Scenarii de test

Pornind de la cele patru scenarii modelate in GME in subcapitolul 2.2.2., au fost stabilite patru scenarii care sa fie efectiv folosite in testarea programului N-WATCHDOG-pB, pentru care au fost de asemenea introduse variante de executie, in functie de patru tipuri de evenimente posibile:

- *Accident la o centrala nucleara,*
- *Incendierea unui dispozitiv cu dispersie radiologica,*
- *Explozia unui dispozitiv de dispersie radiologica, sau*
- *Declansarea unui dispozitiv nuclear improvizat*.

Tabelul 7 prezinta un rezumat al acestor scenarii, dar si un sistem de numire care este ulterior utilizat in anexe, acolo unde sunt documentate exemple de executie a scenariilor.

Tabelul 6. Versiunea N-WATCHDOG-pB testata in aceasta activitate

Versiune	**N-WATCHDOG-pB 1.4.**
Data preluarii	27 aprilie 2017
Caracteristici	Detalii despre particularitatile versiunii N-WATCHDOG-pB 1.4. sunt furnizate in raportarea realizata de IFIN-HH cu privire la activitatea A.4.1. Integrarea feedbackului si finalizarea unei versiuni de referinta PoC pentru a servi la specificatiile produsului final EM si la dezvoltare, Partea a II-a

Pentru scenariile SC2, SC3 si SC4 s-au testat de asemenea secventele decizionale de preventie, protectie, respectiv de raspuns in caz de urgenta. Din acest motiv, descrierile detaliate ale acestora, din capitolele 4, 5 si 6, cuprind si modele ale procesului decizional rezultat din proiectarea realizata in faza precedenta a proiectului. Aceste procese necesita

mai multe detalii tehnice decat scenariile (modelate cu limbajul specific sistemelor de management al hazardurilor, bazat pe GME). Prin urmare, in cele ce urmeaza se va mai folosi un alt limbaj, care este un standard in modelarea proceselor, adoptat de catre Object Management Group : Business Process Modeling Notation (BPMN) [26].

Tabelul 7.. Scenarii de test pentru simularea situatiilor de criza

Nr. Crt.	Nivel risc	ID	Denumire scenariu	Variante
1	-	SC1	Informarea populatiei asupra vulnerabilitatilor nucleare	
2	L0	SC2	Preventia si constientizarea populatiei fata de vulnerabilitati nucleare cu risc scazut	SC2.V1. Accident la o centrala nucleara SC2.V2. Incendierea unui dispozitiv cu dispersie radiologica SC2.V3. Explozia unui dispozitiv de dispersie radiologica SC2.V4. Declansarea unui dispozitiv nuclear improvizat
3	L0			
4	L0			
5	L0			
6	L1	SC3	Evolutia catre o situatie de criza si protectia populatiei	SC3.V1. Accident la o centrala nucleara SC3.V2. Incendierea unui dispozitiv cu dispersie radiologica SC3.V3. Explozia unui dispozitiv de dispersie radiologica SC3.V4. Declansarea unui dispozitiv nuclear improvizat
7	L1			
8	L1			
9	L1			
10	L2	SC4	Raspunsul in caz de urgenta, in cazul receptionarii unor doze de radiatii	

3. Scenariu privind informarea populatiei asupra vulnerabilitatilor nucleare

Informarea populatiei asupra vulnerabilitatilor nucleare este un pas important spre intelegerea tipurilor de pericole si efectele acestora, care pot surveni aposteori unui incident/ accident nuclear. Pentru informarea corecta in aceasta directie se recomanda parcurgerea unei documentatii de baza, prezentata structurat, in cadrul unor documente cu caracter de norme in domeniul nuclear. Aceasta documentatie poate fi accesata in cadrul programului N-Watchdog_pB.

3.1. Secventa de cazuri de test pentru scenariul SC1

CAZURI DE TEST:

CT.INFO.001 – Informare asupra dozelor de radiatii
CT.INFO.002 – Informare asupra efectului radiatiilor asupra omului
CT.INFO.003 – Informare asupra protectiei populatiei
CT.INFO.008 – Date comunitati

SECVENTA DE CAZURI DE TEST:

CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008

Un exemplu de executie al acestui scenariu este prezentat in Anexa 1.

4. Scenariu privind preventia fata de vulnerabilitati nucleare cu risc scazut

Vulnerabilitatile nucleare cu risc scazut sunt catalogate astfel in principal datorita termenului sursa, care prin valoarea sa diminuata va cauza efecte in randul populatiei de cateva ordine de marime mai reduse.

4.1. Secventa de cazuri de test pentru scenariul SC2

CAZURI DE TEST :
CT.INFO.001 – Informare asupra dozelor de radiatii
CT.INFO.002 – Informare asupra efectului radiatiilor asupra omului
CT.INFO.003 – Informare asupra protectiei populatiei
CT.INFO.008 – Date comunitati
CT.SIM.002 – Simulare accident la centrala de la Cernavoda, Romania
CT.SIM.003 – Simulare dispozitiv de dispersie radiologica exploziv
CT.SIM.004 – Simulare dispozitiv de dispersie radiologica incendiar
CT.SIM.005 – Simulare dispozitive nucleare improvizate
CT.INFO.004 – Date prognoza meteo
CT.DEC.001 – Verificare secventa decizionala pentru preventie

Varianta 1 - SC2.V1
EVENIMENT : Accident centrala nucleara
SUCCESIUNE DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.001

Varianta 2 – SC2.V2
EVENIMENT: Incendiu dispozitiv de dispersie radiologica
SUCCESIUNE DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.001

Varianta 3 -SC2.V3
EVENIMENT: Explozie dispozitiv de dispersie radiologica
SUCCESIUNE DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001

Varianta 4 – SC2.V4
EVENIMENT: Declansare dispozitiv nuclear improvizat
SUCCESIUNE DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.005 → CT.INFO.004 → CT.DEC.001

Pentru evidentierea acestora scenarii au fost analizate doua cazuri de dispersie radiologica, pentru un dispozitiv incendiar (SC2.V2), respectiv exploziv (SC2.V3). Locatia aleasa pentru simularea acestor evenimente este capitala, acesta avand cea mai mare densitate de populatie din tara. Descrierea celor doua simulari se afla in Anexa 2 si Anexa 3.

Se pot realiza simulari care sa contina un termen sursa redus si pentru o centrala nucleara sau un dispozitiv nuclear improzivat, insa probabilitatea realizarii unui astfel de eveniment este mai scazuta.

4.2. Secventa decizionala de preventie

- ✓ Se masoara $H_{Tiroida}$. Daca $H_{Tiroida}$ este mai mare sau egal cu 50 mSv, se realizeaza profilaxie cu iod si decontaminare urgenta.
- ✓ Daca interval de timp scurs de la eveniment este de doua zile se masoara E_T. Daca E_T este mai mare sau egal cu 10 mSv, se va efectua adapostirea.
- ✓ Daca intervalul de timp este de ordinul zilelor se masoara $H_{Piele.}$ Daca valoarea rezultata este mai mare sau egala cu 10 mSv se recomanda decontaminarea discretionara, iar daca depaseste 0.1 Sv se va efectua controlul contaminarii si se va realiza decontaminarea de urgenta.
- ✓ Daca intervalul este de o saptamana se masoara E_T. Daca este mai mare sau egal cu 50 mSv, se va proceda prin evacuare, decontaminare urgenta si aplicarea unor restrictii asupra consumului de hrana, lapte si apa.
- ✓ Daca interval de la petrecerea evenimentului este de o luna se masoara din nou E_T. Daca E_T este mai mare sau egal cu 30mSv, se vor efectua relocarea temporara si decontaminarea discretionara.
- ✓ Daca intervalul este de un an se repeta masuratoarea de E_T. Daca E_T este aproximativ egal cu 5 mSv se vor inlocui hrana, laptele si apa.
- ✓ Pe durata vietii, daca E_T este mai mare sau egal cu 1 Sv se va aplica solutia relocarii permanente.

Aceasta secventa decizionala este modelata in BPMN in Figura 8.

Scenariu privind protectia populatiei in conditiile existentei unor vulnerabilitati nucleare cu risc substantial

Impactul generat de de un incident de tipul unui accident la o centrala nucleara sau detonarea unui dispozitiv nuclear improvizat este mare, iar masurile referitoare la populatie trebuie luate pe o scara mult mai extinsa. Acesta actiune este dictata de valoarea termenului sursa si de complexitatea acestuia, care contine o vastitate de nuclee radioactive ce pot fi antrenate pe suprafete extinse.

4.3. Secventa de cazuri de test pentru scenariul SC3

CAZURI DE TEST:
CT.INFO.001 – Informare asupra dozelor de radiatii
CT.INFO.002 – Informare asupra efectului radiatiilor asupra omului
CT.SIM.002 – Simulare accident la centrala de la Cernavoda, Romania
CT.SIM.003 – Simulare dispozitiv de dispersie radiologica exploziv
CT.SIM.004 – Simulare dispozitiv de dispersie radiologica incendiar
CT.SIM.005 – Simulare dispozitive nucleare improvizate
CT.DEC.002 – Verificare secventa decizionala pentru protectie

Varianta 1 - SC3.V1

EVENIMENT: Accident centrala nucleara

SUCCESIUNE DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.SIM.002 → CT.DEC.002

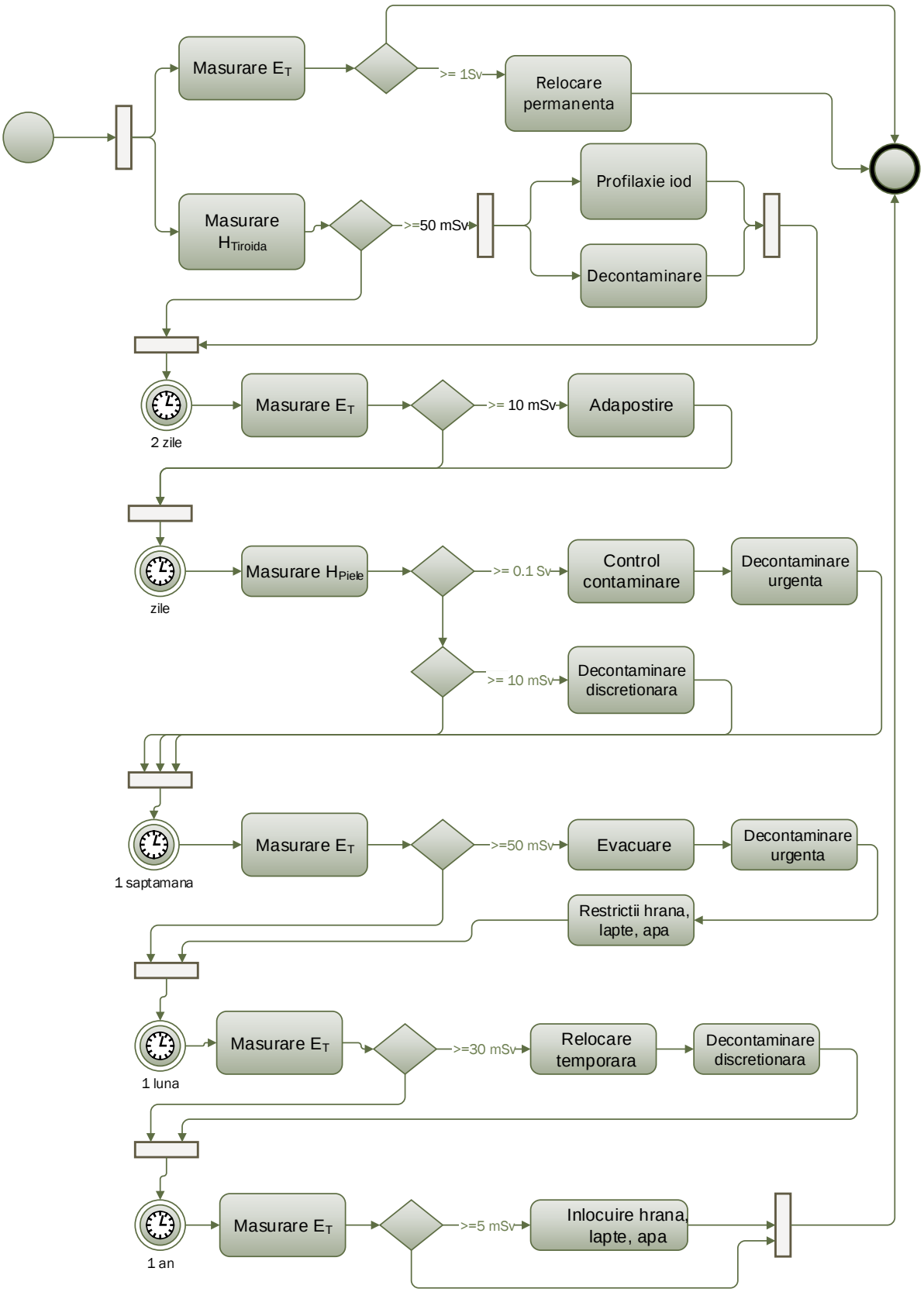


Fig. 8. Modelarea BPMN a unui proces pentru secventa decizionala de preventie

Varianta 2 – SC3.V2

EVENIMENT: Incendiu dispozitiv de dispersie radiologica

SUCCESIUNE DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.SIM.003 → CT.DEC.002

Varianta 3 – SC3.V3

EVENIMENT: Explozie dispozitiv de dispersie radiologica

SUCCESIUNE DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.SIM.004 → CT.DEC.002

Varianta 4 – SC3.V4

EVENIMENT: Declansare dispozitiv nuclear improvizat

SUCCESIUNE DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.SIM.005 → CT.DEC.002

Pentru a putea evalua modul in care trebuie intervenit in cazul aparitiei unor vulnerabilitati nucleare cu risc substantial s-a optat pentru simularea a doua cazuri ale caror termeni sursa au valori ridicate. Simularile au fost efectuate pentru un interval de 8 ore post-incident, interval considerat critic in cazul unui astfel de incident.

Exemplele de executie a scenariilor corespunzatoare acestor doua evenimente pot fi gasite in Anexa 4. (pentru SC3.V1) si Anexa 5 (pentru SC3.V4).

4.4. Secventa decizionala de protectie

- ✓ Daca $H_{Tiroida}$ este mai mare sau egal cu 50 mSv, se aplica restrictii asupra consumului de hrana, lapte si apa pentru precautie, si se realizeaza informarea si avertizarea populatiei.
- ✓ Daca AD depaseste 1 Gy-Eq pentru trunchi, 0.1 Gy-Eq pentru făt, 25 Gy-Eq la nivel de tesut sau 10 Gy-Eq la nivel de piele, se trece la actiuni de protectie pentru a mentine doza sub nivelul de referinta, si se furnizeaza informatii publice si de avertizare.
- ✓ Daca interval scurs de la eveniment este de un an, se masoara E_T, H la nivel de tiroida si de alte organe, precum si la nivel de fat (daca este cazul).
- ✓ Daca se determina valori E_T ce depasesc 10 mSv se trece la decontaminarea limitata la o anumita arie, sau la anumite obiecte. De asemenea, se aplica restrictii limitate asupra consumului de hrana, lapte si apa, si se efectueaza informarea publica. La fel se procedeaza daca H pentru orice alt organ depaseste 0.1 Sv, daca pentru fat depaseste 0.1 Sv, sau daca la nivel de tiroida este mai mare sau egal cu 50 mSv.

Aceasta secventa este modelata in BPMN in Figura 9.

Scenariu privind raspunsul in caz de urgenta, de receptionare a unor doze de radiatii

Raspunsul in caz de urgenta, in cazul receptionarii unor doze de radiatii, este proportional cu magnitudinea evenimentului, respectiv cu valoarea densitatii de populatie din zona proxima. Astfel in cazul unui eveniment cu risc scazut sunt luate masuri de adapostire in cadrul locuintei/ adaposturilor locale, iar proportional cu magnitudinea evenimentului se poate ajunge pana la evacuarea, respectiv relocarea temporara sau permanenta a populatiei care este afectata.

Pentru a putea cuantifica modul in care dozele de radiatii afecteaza tesuturile, respectiv ce tipuri de radiatii pot fi ecranate cu usurinta si modul in care acestea sunt dispersate in atmosfera este necesara parcurgerea unor materiale de baza aflate in cadrul programului N-Watchdog.

4.5. Secventa de cazuri de test pentru scenariul SC4

CAZURI DE TEST:
CT.INFO.001 – Informare asupra dozelor de radiatii
CT.INFO.002 – Informare asupra efectului radiatiilor asupra omului
CT.INFO.003 – Informare asupra protectiei populatiei
CT.INFO.008 – Date comunitati
CT.DEC.003 – Verificare secventa decizionala pentru raspuns

SECVENTA DE CAZURI DE TEST: CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.DEC.003

Un exemplu de executie a acestui scenariu este prezentat in Anexa 6.

4.6. Secventa decizionala de raspuns in caz de urgenta

- ✓ Se efectueaza masuratori ale AD(Δ) la nivel de : maduva rosie, tiroida, plaman, colon si fat (daca este cazul).
- ✓ Se verifica atingerea unor niveluri critice, astfel : 0.2 Gy-Eq pentru maduva rosie, 2 Gy-Eq pentru tiroida, 30 Gy-Eq pentru plamani, 20 Gy-Eq pentru colon sau 0.1 Gy-Eq pentru fat.
- ✓ Daca se depaseste cel putin una dintre aceste valori critice, se efectueaza examinarea medicala, consultarea si prescrierea tratamentului adecvat, se controleaza contaminarea, se trece imediat la decontaminare si decorporare (daca este posibil), se prescrie iod stabil (daca este posibil), se realizeaza inregistrarea persoanelor pentru urmarirea medicala pe termen lung, si se asigura consilierea psihologica comprehensiva.
- ✓ Daca intervalul scurs este de o luna si E_T depaseste 0.1 Sv sau $H_{Tiroida}$ depaseste 50 mSv, se realizeaza screening bazat pe doze individuale, se dau sfaturi si se asigura o consiliere de baza.
- ✓ La interval de cateva luni, daca H la nivel de fat depaseste 0.1 Sv, se dau de asemenea sfaturile necesare si se asigura o consiliere de baza.
- ✓ Daca interval scurs de la eveniment este de un an, se masoara E_T, H la nivel de tiroida si de alte organe, precum si la nivel de fat (daca este cazul).
- ✓ Daca se determina valori E_T ce depasesc 10 mSv se trece la decontaminarea limitata la o anumita arie, sau la anumite obiecte. De asemenea, se aplica restrictii limitate asupra consumului de hrana, lapte si apa, si se efectueaza informarea publica. La fel se procedeaza daca H pentru orice alt organ depaseste 0.1 Sv, daca pentru fat depaseste 0.1 Sv, sau daca la nivel de toroida este mai mare sau egal cu 50 mSv.

Aceasta secventa este modelata in BPMN in Figura 10.

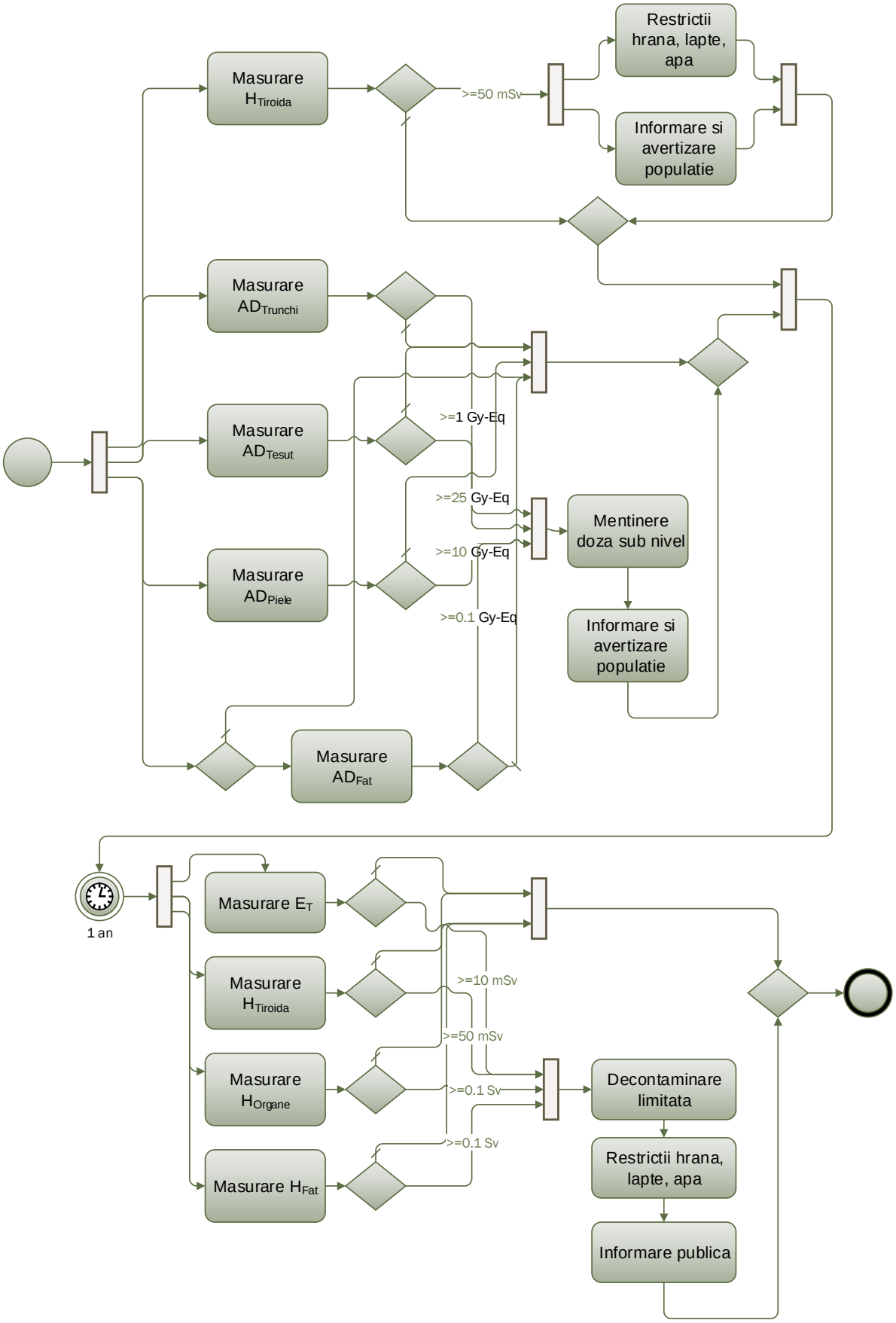


Fig. 9. Modelarea BPMN a unui proces pentru secventa decizionala de protectie

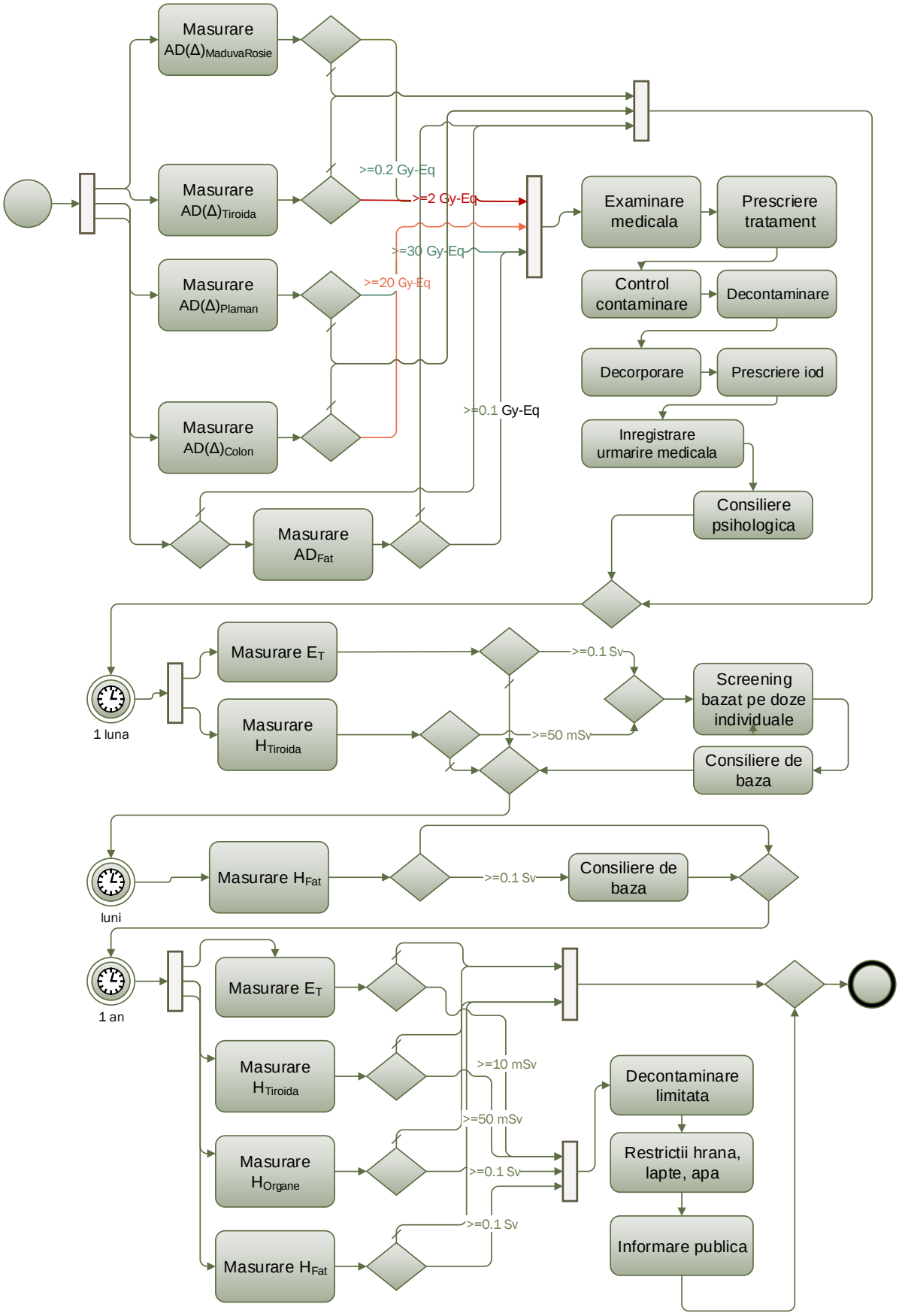


Fig. 10. Modelarea BPMN a unui proces pentru secventa decizionala de raspuns

5. Modul N-WatchWiki de simulare a scenariilor ce includ suport decizional

5.1. Dezvoltare simulator scenarii decizionale

Simulatorul de scenarii decizionale este inclus in N-WatchWiki si este disponibil pentru publicul larg, fara autentificare, la adresa: http://nwatchwiki.aii.pub.ro/tiki-index.php?page=Decizie. Rolul acestuia este strict de constientizare si informare, fara a se putea considera ca o implementare a suportului decizional. Astfel, se asuma rolul UPB de creare a suportului pentru cercul exterior – conform definirii sale din propunerea de proiect: *„Cercul exterior, sau anvelopa, cu misiunea de a asigura platforma şi resursele de continuitate necesare tranziţiei de la Demonstratorul dezvoltat de Cercul Interior la Modelul Experimental avut în vedere ca produs final, asigurând în acest scop (i) organizarea şi efectuarea testării independente şi evaluării Demonstratorului; (ii) structurarea şi echiparea soluţiilor finale de interacţiune sistem/client, cu accent special pe componentele formative şi educaţionale; şi (iii) un nivel corespunzător de rigoare IT-profesională produsului final, printr-o infuzie substanţială de cunoaştere expertă şi soluţii din Ştiinţele Formale ale Informaţiei.*" Software-ul de suport decizional dedicat specialistilor in domeniu (cercului interior) este exclusiv inclus in programul N-Watchdog, atat in varianta sa de Proof of Concept (dezvoltata de IFIN-HH), cat si in produsul realizat de SIVECO.

Tabelul 2 Simulator scenarii decizionale inclus in N-WatchWiki

N-WatchWiki

Log in

HOME | NUCLEAR WATCH | TERMINOLOGY | N-WATCHDOG | DECIZIE | ABOUT | CONTACT

Preventie

Secventa decizionala pentru preventie este formata din urmatorii pasi:

- Se masoara HTiroida. Daca HTiroida este mai mare sau egal cu 50 mSv, se realizeaza profilaxie cu iod si decontaminare urgenta.
- Daca intervaull de timp scurs de la eveniment este de doua zile se masoara Et. Daca Et este mai mare sau egal cu 10 mSv, se va efectua adapostirea.
- Daca intervalul de timp este de ordinul zilelor se masoara HPiele. Daca valoarea rezultata este mai mare sau egala cu 10 mSv se recomanda decontaminarea discretionara, iar daca depaseste 0.1 Sv se va efectua controlul contaminarii si se va realiza decontaminarea de urgenta.
- Daca intervalul este de o saptamana se masoara Et. Daca este mai mare sau egal cu 50 mSv, se va proceda prin evacuare, decontaminare urgenta si aplicarea unor restrictii asupra consumului de hrana, lapte si apa.
- Daca interval de la petrecerea evenimentului este de o luna se masoara din nou Et. Daca Et este mai mare sau egal cu 30mSv, se vor efectua relocarea temporara si decontaminarea discretionara.
- Daca intervalul este de un an se repeta masuratoarea de Et. Daca Et este aproximativ egal cu 5 mSv se vor inlocui hrana, laptele si apa.
- Pe durata vietii, daca Et este mai mare sau egal cu 1 Sv se va aplica solutia relocarii permanente.

Bibliografie:

1. IAEA-TECDOC-1432, "Development of an extended framework for emergency response criteria", Interim report for comments jointly sponsored by IAEA and WHO, January 2005.

NWatchDog | Preventie

nwatchwiki.aii.pub.ro/tiki-index.php?page=Preventie

Simulator

Data evenimentului

Data masuratorii

Hpiele

Htiroida

Et

Evalueaza

July 2017

Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

N-WatchWiki

Log in

HOME | NUCLEAR WATCH | TERMINOLOGY | N-WATCHDOG | DECIZIE | ABOUT | CONTACT

Protectie

Secventa decizionala pentru protectie este formata din urmatorii pasi:

- Daca HTiroida este mai mare sau egal cu 50 mSv, se aplica restrictii asupra consumului de hrana, lapte si apa pentru precautie, si se realizeaza informarea si avertizarea populatiei.
- Daca AD depaseste 1 Gy-Eq pentru trunchi, 0.1 Gy-Eq pentru făt, 25 Gy-Eq la nivel de tesut sau 10 Gy-Eq la nivel de piele, se trece la actiuni de protectie pentru a mentine doza sub nivelul de referinta, si se furnizeaza informatii publice si de avertizare.
- Daca interval scurs de la eveniment este de un an, se masoara Et, H la nivel de tiroida si de alte organe, precum si la nivel de fat (daca este cazul).
- Daca se determina valori Et ce depasesc 10 mSv se trece la decontaminarea limitata la o anumita arie, sau la anumite obiecte. De asemenea, se aplica restrictii limitate asupra consumului de hrana, lapte si apa, si se efectueaza informarea publica. La fel se procedeaza daca H pentru orice alt organ depaseste 0.1 Sv, daca pentru fat depaseste 0.1 Sv, sau daca la nivel de tiroida este mai mare sau egal cu 50 mSv.

Bibliografie

1. IAEA-TECDOC-1432, "Development of an extended framework for emergency response criteria", Interim report for comments jointly sponsored by IAEA and WHO, January 2005.

Simulator

NWatchDog | Protectie

nwatchwiki.aii.pub.ro/tiki-index.php?page=Protectie

Simulator

Data evenimentului		
Data masuratorii		
Htiroida		(mSv)
ADtrunchi		(Gy-Eq)
ADtesut	Doza absorbita mediate la nivel de trunchi: Produsul dintre media dozei absorbite in trunchi si eficacitatea biologica relativa (RBE).	
ADpiele		
ADfat		(Gy-Eq)
Et		(mSv)
Horgane		(mSv)
Hfat		(mSv)

Evalueaza

N-WatchWiki

Log in

HOME | NUCLEAR WATCH | TERMINOLOGY | N-WATCHDOG | DECIZIE | ABOUT | CONTACT

Raspuns

Secventa decizionala pentru raspuns in caz de urgenta este formata din urmatorii pasi:

- Se efectueaza masuratori ale AD(Δ) la nivel de : maduva rosie, tiroida, plaman, colon si fat (daca este cazul).
- Se verifica atingerea unor niveluri critice, astfel : 0.2 Gy-Eq pentru maduva rosie, 2 Gy-Eq pentru tiroida, 30 Gy-Eq pentru plamani, 20 Gy-Eq pentru colon sau 0.1 Gy-Eq pentru fat.
- Daca se depaseste cel putin una dintre aceste valori critice, se efectueaza examinarea medicala, consultarea si prescrierea tratamentului adecvat, se controleaza contaminarea, se trece imediat la decontaminare si decorporare (daca este posibil), se prescrie iod stabil (daca este posibil), se realizeaza inregistrarea persoanelor pentru urmarirea medicala pe termen lung, si se asigura consilierea psihologica comprehensiva.
- Daca intervalul scurs este de o luna si Et depaseste 0.1 Sv sau HTiroida depaseste 50 mSv, se realizeaza screening bazat pe doze individuale, se dau sfaturi si se asigura o consiliere de baza.
- La interval de cateva luni, daca H la nivel de fat depaseste 0.1 Sv, se dau de asemenea sfaturile necesare si se asigura o consiliere de baza.
- Daca interval scurs de la eveniment este de un an, se masoara Et, H la nivel de tiroida si de alte organe, precum si la nivel de fat (daca este cazul).
- Daca se determina valori Et ce depasesc 10 mSv se trece la decontaminarea limitata la o anumita arie, sau la anumite obiecte. De asemenea, se aplica restrictii limitate asupra consumului de hrana, lapte si apa, si se efectueaza informarea publica. La fel se procedeaza daca H pentru orice alt organ depaseste 0.1 Sv, daca pentru fat depaseste 0.1 Sv, sau daca la nivel de toroida este mai mare sau egal cu 50 mSv.

NWatchDog | Raspuns

nwatchwiki.aii.pub.ro/tiki-index.php?page=Raspuns

Simulator

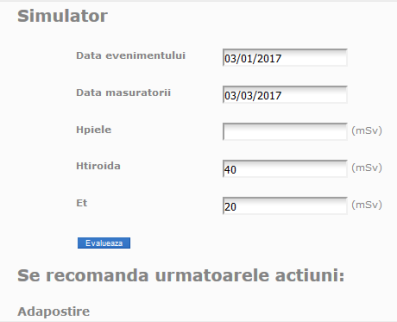
Data evenimentului		
Data masuratorii		
AD(D)maduvarosie		(Gy-Eq)
AD(D)tiroida		(Gy-Eq)
AD(D)plaman		(Gy-Eq)
AD(D)colon		(Gy-Eq)
ADfat		(Gy-Eq)
Et		(mSv)
Htiroida		(mSv)
		(mSv)
		(mSv)

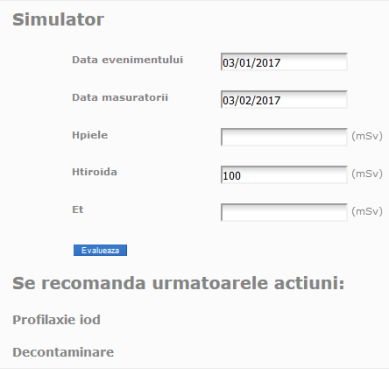
Doza echivalenta pentru tiroida: Debitul dozei echivalente receptata de tiroida unei persoane, in urma expunerii la substante radioactive.

Evalueaza

5.2. Testare modul suport decizional

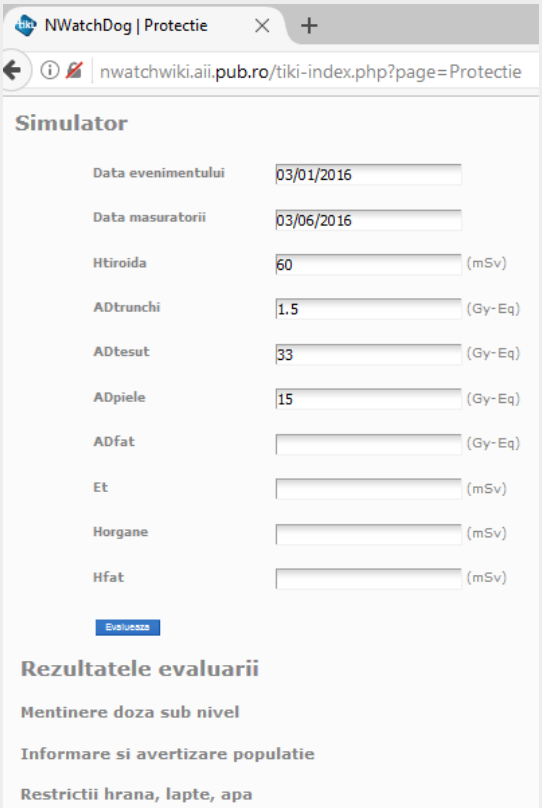
5.2.1. CT.DEC.001 – Verificare secventa decizionala pentru preventia populatiei

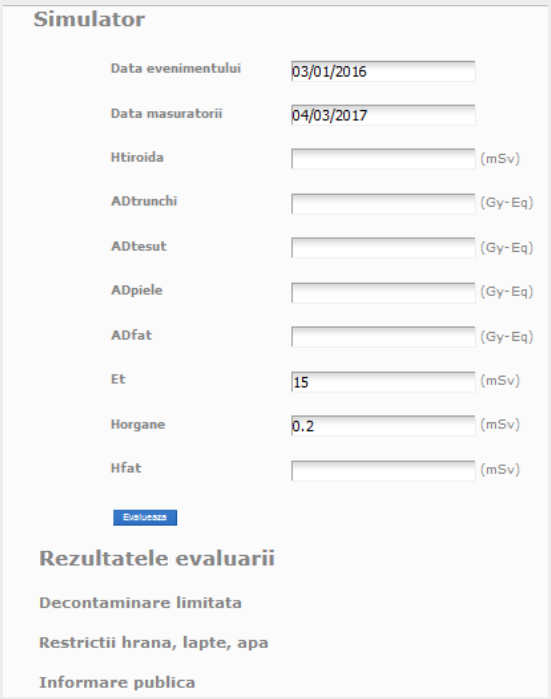
Denumire CT	Verificare secventa decizionala pentru preventia populatiei	
ID	CT.DEC.001	
Tip	Manual	
Actor	Monitor de testare / Adriana Olteanu	
Versiune testata	N-WatchWiki 1.2.	
Modul testat	Simulator scenarii decizionale / Preventie	
Descriere	Modulul este accesibil la adresa http://nwatchwiki.aii.pub.ro/tiki-index.php?page=Preventie Este necesar ca utilizatorul sa aleaga doua date: cea a producerii evenimentului si cea a prelevarii masuratorilor. Utilizatorul neinregistrat poate introduce valorile masuratorilor in campurile editabile corespunzatoare. Nu este obligatorie completarea tuturor campurilor. Pentru a cunoaste semnificatia marimilor fizice pentru care s-au efectuat masuratori, se pozitioneaza mouse-ul deasupra etichetei corespunzatoare. Modulul evalueaza si afiseaza care este scenariul decizional tipic, conform recomandarilor specificate de catre IAEA.	
Premise	Se presupune ca au fost efectuate masuratori pentru: $H_{Tiroida}$ - Doza echivalenta pentru tiroida *Debitul dozei echivalente receptata de tiroida unei persoane, in urma expunerii la substante radioactive* E_t - Doza efectiva *Suma dozelor echivalente ponderate absorbite de toate țesuturile si organele organismului din expunere interna si externa*	
Secventa parcursa	Actiuni si date	Rezultate
	Data evenimentului: 1 martie 2017 Data masuratorii: 3 martie 2017 $H_{Tiroida}$ = 40 mSv E_t = 20 mSv *Observatii:* *Masuratori efectuate la 2 zile dupa producerea evenimentului* *$H_{Tiroida}$ in limitele normale (< 100 mSv)* *E_t depaseste limitele normale (> 10 mSv).*	

	Data evenimentului: 1 martie 2017 Data masuratorii: 2 martie 2017 $H_{Tiroida}$ = 100 mSv *Observatii:* *Masuratori efectuate la 1 zi dupa producerea evenimentului* *$H_{Tiroida}$ depaseste limitele normale pentru preventie (100 mSv).*	

5.2.2. CT.DEC.002 – Verificare secventa decizionala pentru protectia populatiei

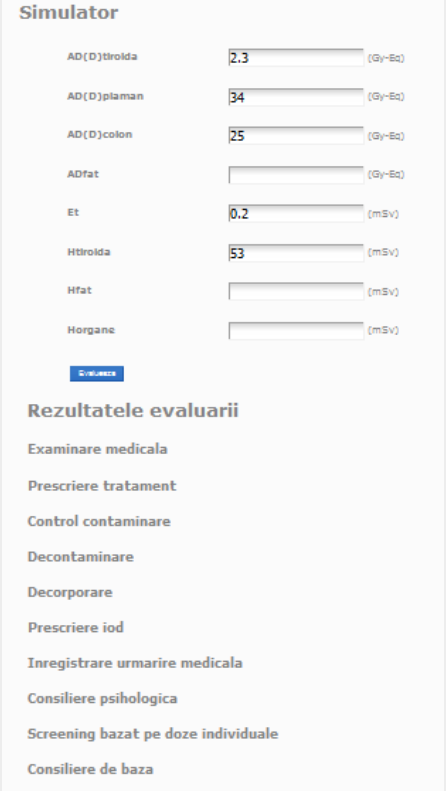
Denumire CT	Verificare secventa decizionala pentru protectia populatiei
ID	CT.DEC.002
Tip	Manual
Actor	Monitor de testare / Adriana Olteanu
Versiune testata	N-WatchWiki 1.2.
Modul testat	Simulator scenarii decizionale / Protectie
Descriere	Modulul este accesibil la adresa http://nwatchwiki.aii.pub.ro/tiki-index.php?page=Protectie Este necesar ca utilizatorul sa aleaga doua date: cea a producerii evenimentului si cea a prelevarii masuratorilor. Utilizatorul neinregistrat poate introduce valorile masuratorilor in campurile editabile corespunzatoare. Nu este obligatorie completarea tuturor campurilor. Pentru a cunoaste semnificatia marimilor fizice pentru care s-au efectuat masuratori, se pozitioneaza mouse-ul deasupra etichetei corespunzatoare. Modulul evalueaza si afiseaza care este scenariul decizional tipic, conform recomandarilor specificate de catre IAEA.
Premise	Se presupune ca au fost efectuate masuratori pentru: $H_{Tiroida}$, H_{Organ} - Doza echivalenta pentru tiroida / un organ *Debitul dozei echivalente receptata de tiroida / organul unei persoane, in urma expunerii la substante radioactive* AD $_{Trunchi}$ - Doza absorbita mediate la nivel de trunchi *Produsul dintre media dozei absorbite in trunchi si eficacitatea biologica relativa (RBE)* AD $_{Tesut}$ - Doza absorbita mediate la nivel de tesut *Doza livrata unei suprafete de 100 cm^2 la o adancime de 0.5 cm sub suprafata corpului in tesut datorita contactului apropiat cu o sursa radioactiva (de exemplu, o sursa purtata in mana sau buzunar)* AD $_{Piele}$ - Doza absorbita mediate la nivel de piele *Doza livrata unei suprafete de 100 cm^2 de derma (structuri ale pielii la o adancime de 0,4 mm sub suprafata)* E_t - Doza efectiva

	Suma dozelor echivalente ponderate absorbite de toate țesuturile si organele organismului din expunere interna si externa	
Secventa parcursa	Actiuni si date	Rezultate
	Data evenimentului: 1 martie 2016 Data masuratorii: 6 martie 2016 $H_{Tiroida}$ = 60 mSv AD $_{Trunchi}$ = 1.5 Gy-Eq AD $_{Tesut}$ = 33 Gy-Eq AD $_{Piele}$ = 15 Gy-Eq *Observatii:* *Masuratori efectuate la 5 zile dupa producerea evenimentului.* *$H_{Tiroida}$ depaseste limitele normale pentru protectie (< 50 mSv)* *AD depaseste limitele normale pentru nivelul de risc de protectie, reprezentate de:* *- 1 Gy-Eq pentru trunchi* *- 25 Gy-Eq la nivel de tesut* *- 10 Gy-Eq la nivel de piele*	

	Data evenimentului: 1 martie 2016 Data masuratorii: 4 martie 2017 E_T = 15 mSv H_{Organe} = 0.2 mSv *Observatii:* *Masuratori efectuate la 1 an dupa producerea evenimentului.* E_T *depaseste limitele normale pentru protectie (10 mSv la 1 an dupa eveniment)* H_{Organe} *nu depaseste limitele normale (0.1 Sv = 200 mSv)*	

5.2.3. CT.DEC.003 – Verificare secventa decizionala pentru raspuns in caz de urgenta

Denumire CT	Verificare secventa decizionala pentru raspuns in caz de urgenta
ID	CT.DEC.003
Tip	Manual
Actor	Monitor de testare / Adriana Olteanu
Versiune testata	N-WatchWiki 1.2.
Modul testat	Simulator scenarii decizionale / Raspuns
Descriere	Modulul este accesibil la adresa http://nwatchwiki.aii.pub.ro/tiki-index.php?page=Raspuns Este necesar ca utilizatorul sa aleaga doua date: cea a producerii evenimentului si cea a prelevarii masuratorilor. Utilizatorul neinregistrat poate introduce valorile masuratorilor in campurile editabile corespunzatoare. Nu este obligatorie completarea tuturor campurilor. Pentru a cunoaste semnificatia marimilor fizice pentru care s-au efectuat masuratori, se pozitioneaza mouse-ul deasupra etichetei corespunzatoare. Modulul evalueaza si afiseaza care este scenariul decizional tipic, conform recomandarilor specificate de catre IAEA.
Premise	Se presupune ca au fost efectuate masuratori pentru: $AD(\Delta)_{Tiroida}$, $AD(\Delta)_{Plaman}$, $AD(\Delta)_{Colon}$, $AD(\Delta)_{Fat}$, E_T, $H_{tiroida}$, H_{fat}, H_{organ}.

Secventa parcursa	Actiuni si date	Rezultate asteptate
	$AD(\Delta)_{Tiroida}$ = 2.3 Gy-Eq $AD(\Delta)_{Plaman}$ = 34 Gy-Eq $AD(\Delta)_{Colon}$ = 25 Gy-Eq E_T = 0.2 mSv $H_{tiroida}$ = 53 mSv *Observatii:* *Toate masuratorile efectuate depasesc limitele normale.*	

Bibliografie

[1] C. Kaner, “An Introduction to Scenario Testing”, 2013, Available at: http://www.testingeducation.org/BBST/testdesign/Kaner_ScenarioIntroVer5.pdf

[2] J. Ryser & M. Glinz, “A Scenario-Based Approach to Validating and Testing Software Systems Using Statecharts”, 12th International Conference on Software and Systems Engineering and their Applications ICSSEA'99. Proceedings: CNAM, Paris, France

[3] M. B. Rosson and J. M. Carroll, “Scenario-Based Design”, Chapter 53 in J. Jacko & A. Sears (Eds.), The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications. Lawrence Erlbaum Associates, 2002, pp. 1032-1050.

[4] Sparx Systems, “Writing Use Case Scenarios for Model Driven Development”, 2010, Disponibil la http://www.sparxsystems.com.au/downloads/quick/writing-structured-use-case-scenarios-mdd.pdf

[5] M. Wynne, A. Hellesoy, “Behaviour-Driven Development for Testers and Developers”, in *The Cucumber Book*, J. Carter Ed., Pragmatic Programmers, 2012

[6] Q. A. Malik, J. Lilius and L. Laibinis, Fast Abstract: Generating Test cases from Scenario-based Formal Development,

[7] Generating Test Scenarios and Test Cases From an Event-Flow Model, Chapter 5, pp. 99-132

[8] Software Testing Class, “What is difference between Test Cases vs Test Scenarios?”, 2014, Disponibil la: http://www.softwaretestingclass.com/what-is-difference-between-test-cases-vs-test-scenarios/

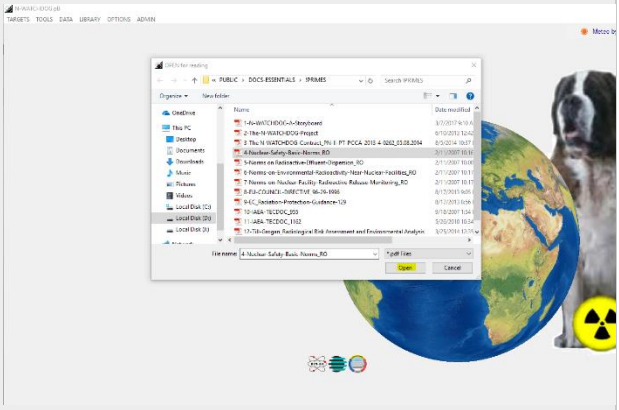
[9] Federal Communications Commission, “Strengthening the Emergency Alert System (EAS): Lessons Learned from the Nationwide EAS test”, Washington, April 2013.

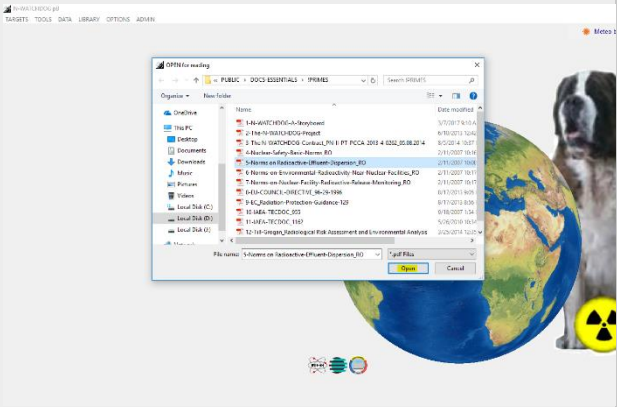
[10] Federal Emergency Management Agency (FEMA), “Integrated Public Alert and Warning System (IPAWS)”, Available at

https://web.archive.org/web/20120702011804/http://www.fema.gov/emergency/ipaws/index.shtm, Retrieved January 11, 2017
[11] S.H. Park, J.R. Choi, J. Seo, “A Pragmatic Media-Sharing Device for ATSC Mobile DTV Broadcasting”, *International Journal of Advances in Soft Computing and Its Applications*, vol. 6, no. 3, pp. 72-81, 2014.
[12] K. Shogen, Y. Ito, H. Hamazumi, M. Taguchi, “Implementation of Emergency Warning Broadcasting System in the Asia Pacific Region“, *ITU/ESCAP Disaster Communications Workshop*, Thailand, 2006.
[13] The Network of the European National Weather Services (EUMETNET), *Meteoalarm – Alerting Europe for extreme weather*, http://www.meteoalarm.eu, Retrieved January 11, 2017.
[14] *Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES)*, http://www.rimes.int, Retrieved January 11, 2017.
[15] K. Kakua, A. Heldb, “Sentinel Asia: A space-based disaster management support system in the Asia-Pacific region”, *International Journal of Disaster Risk Reduction*, Elsevier, vol. 6, pp. 1–17, 2013.
[16] IDIRA Project, *Interoperability of data and procedures in large-scale multinational disaster response actions*, http://www.idira.eu/, Retrieved January 11, 2017.
[17] PRACTICE Project, *Preparedness and Resilience against CBRN Terrorism using Integrated Concepts and Equipment PRACTICE*, http://www.practice-fp7-security.eu, Retrieved January 11, 2017.
[18] SECURENV Project, *Assessment of environmental accidents from a security perspective*, http://www.securenv.eu, Retrieved January 11, 2017.
[19] A. Camedo, J.H. Richter, “Architectural Design Space Exploration of Cyber-Physical Systems using the Functional Modeling Compiler”, *Procedia CIRP 21, 24th CIRP Design Conference*, pp. 46-51, 2014.
[20] B. Balis, M. Kasztelnik, M. Bubak, T. Bartynski, T. Gubała, P. Nowakowski, J. Broekhuijsen, “The UrbanFlood Common Information Space for Early Warning Systems”, *Procedia Computer Science 4, International Conference on Computational Science, ICCS 2011*, pp. 96–105, 2011.
[21] M. Lendhold, M. Hammitzsch, “Towards an Integrated Information Logistics for Multi Hazard Early Warning Systems”, *The Open Environmental Engineering Journal*, vol. 5, pp. 27-43, 2012.
[22] U. Meissen, F. Fuchs-Kittowski, “Towards a reference architecture of crowdsourcing integration in early warning systems”, *Proceedings of the 11th International ISCRAM Conference*, May 2014, S.R. Hiltz, M.S. Pfaff, L. Plotnick, and P.C. Shih, eds, pp. 334-338, 2014.
[23] M. Apel, J. Biskup, U. Flegel, M. Meier, “Towards Early Warning Systems – Challenges, Technologies and Architecture”, *Critical Information Infrastructures Security*, vol. 6027, Lecture Notes in Computer Science, Springer, pp. 151-164, 2010.
[24] OMG, OMG Unified Modeling Language (OMG UML), Superstructure, Version 2.3. (2010).
[25] *Generic Modeling Environment*, http://w3.isis.vanderbilt.edu/Projects/gme/, Retrieved January 11, 2017.
[26] OMG, Business Process Model and Notation (BPMN), Version 2.0., Object Management Group, 2011.

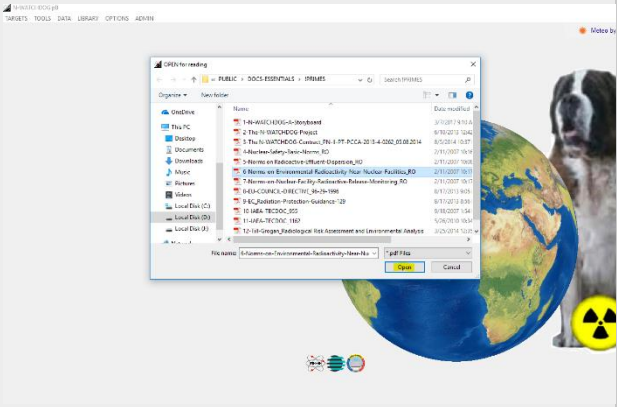
Anexa 1. Exemplu de executie a scenariului privind informarea populatiei asupra vulnerabilitatilor nucleare

SCENARIU	SC1. Informarea populatiei asupra vulnerabilitatilor nucleare
Succesiune de cazuri de test	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008
Monitor de testare	Dominic Eugeniu Moraru
Versiune testata	N-WATCHDOG-pB 1.4.

SC1.CT.INFO.001	CT.INFO.001	Informare asupra dozelor de radiatii	
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008		
	DESCRIERE	Prezentarea unor notiuni de informare referitoare la dozele de radiatii.	
	PREMISE	Pentru a putea avea un ordin de marime referitor la impactul pe care il are incidentul/ accidentul simulat ulterior.	
	ACTIUNI SI DATE		REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY		
	Intrare in sectiunea READINGS -> YES		
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”		
	Selectarea „4-Nuclear-Safety-Basic-Norms_RO” -> Open		
SC1.CT.INFO.002	CT.INFO.002	Informare asupra efectului radiatiilor asupra omului	
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008		
	DESCRIERE	Prezentarea metodei de calcul a dispersiei efluentilor radioactivi evacuati in mediu de instalatiile nucleare	
	PREMISE	Pentru a putea constientiza modul in care tesuturile vii sunt afectate de cantitatea de radiatii ionizante.	
	ACTIUNI SI DATE		REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY		

	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „5-Norms on Radioactive-Effluent-Dispersion_RO” -> Open	

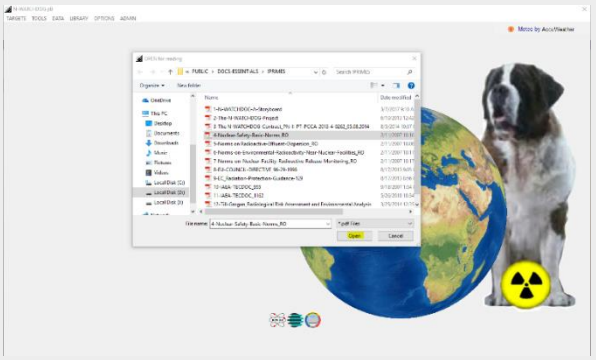
SC1.CT.INFO.003	CT.INFO.003	Informare asupra protectiei populatiei
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008	
	DESCRIERE	Prezentare a modului in care se realizaeaza monitorizarea radioactivitatii mediului in vecinatatea unei instalatii nucleare sau radiologice
	PREMISE	Pentru a putea evalua modul in care sunt monitorizate caile potentiale de expunere la radiatii ale populatiei

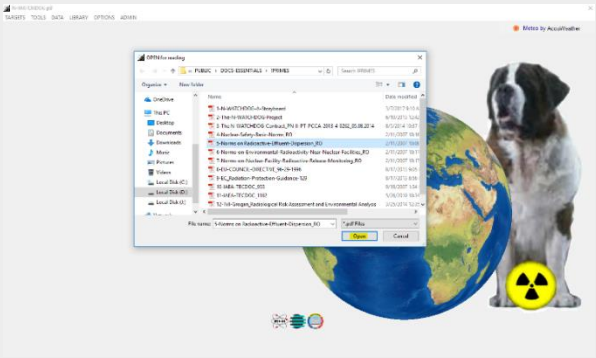
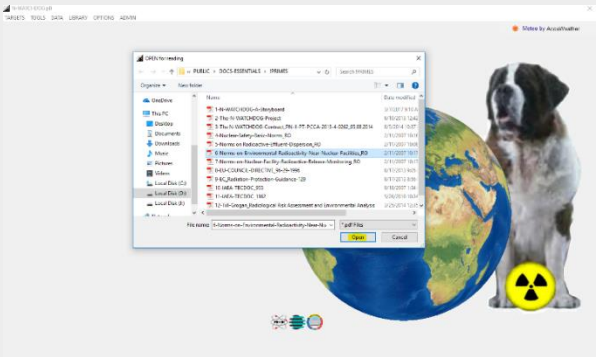
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „6-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO” -> Open	

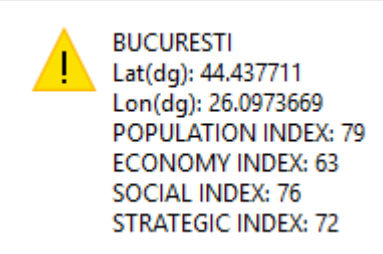
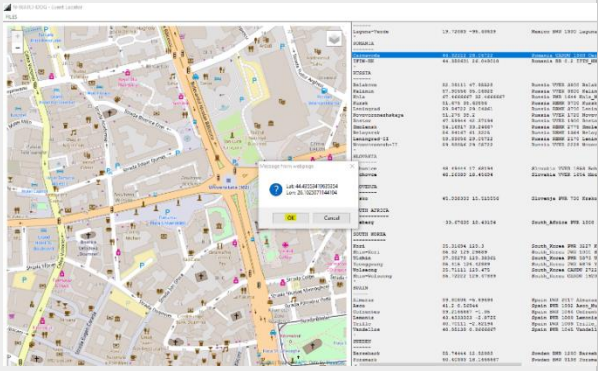
SC1.CT.INFO.008	CT.INFO.008	Date comunitati
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008	

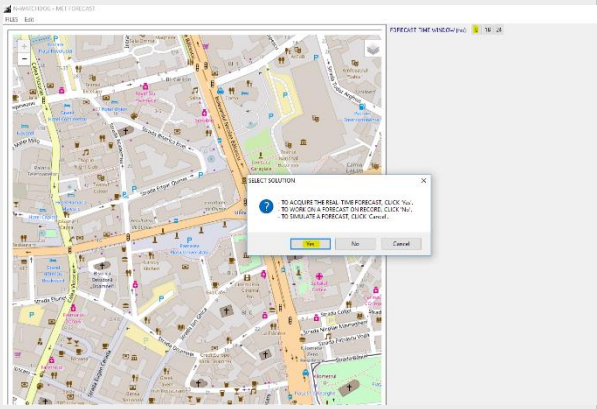
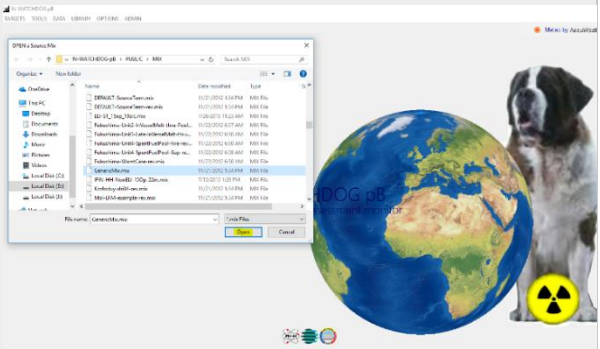
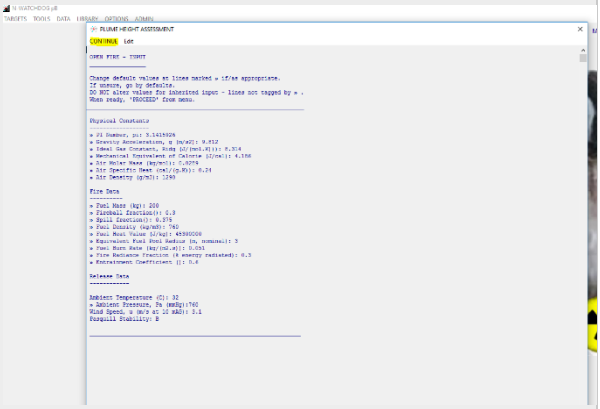
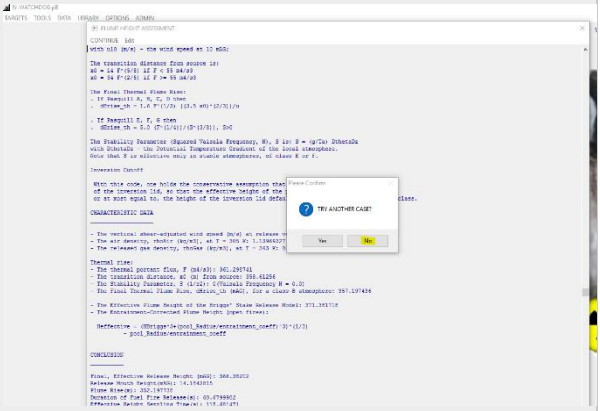
	DESCRIERE	Evaluarea privind comunitatea afectata folosind date provenite de la ultimul recensamant.
	PREMISE	Pentru a putea incadra intr-un mod corect tipul de interventie necesara sunt necesare date referitoare la numarul locuitorilor care sunt afectati de respectivul incident / accident.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Interogarea plin click pe harta interactiva generata la final in cadrul raportului de situatie a zonei in care a avut loc incidentul / accidentul. (ex: Bucuresti)	BUCURESTI Lat(dg): 44.437711 Lon(dg): 26.0973669 POPULATION INDEX: 79 ECONOMY INDEX: 63 SOCIAL INDEX: 76 STRATEGIC INDEX: 72

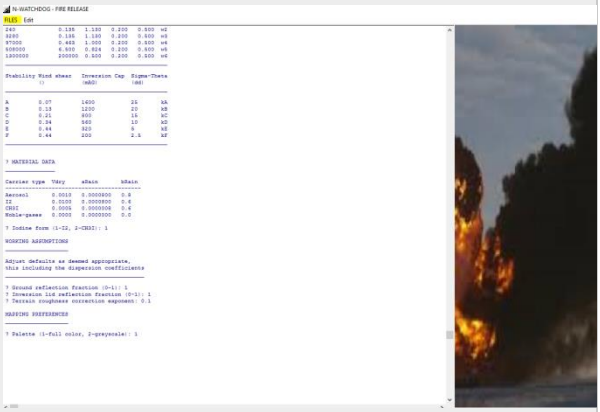
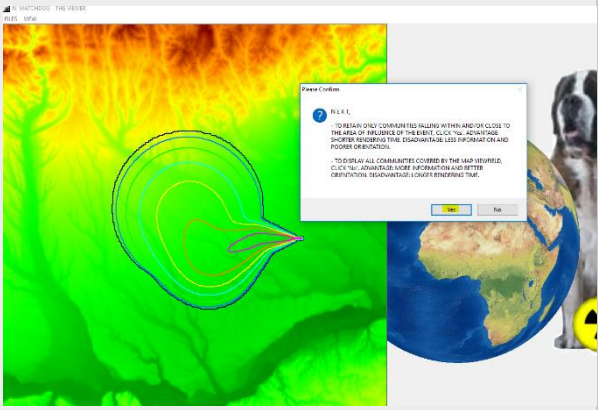
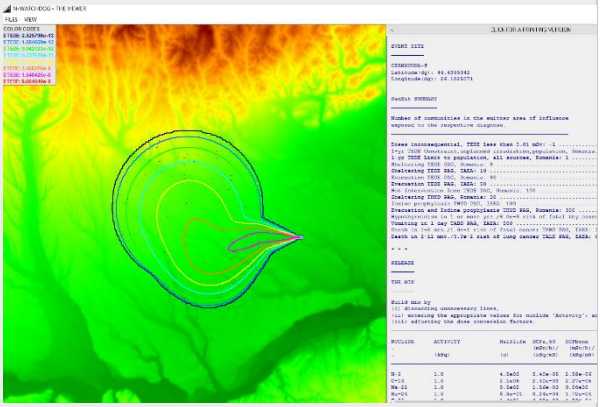
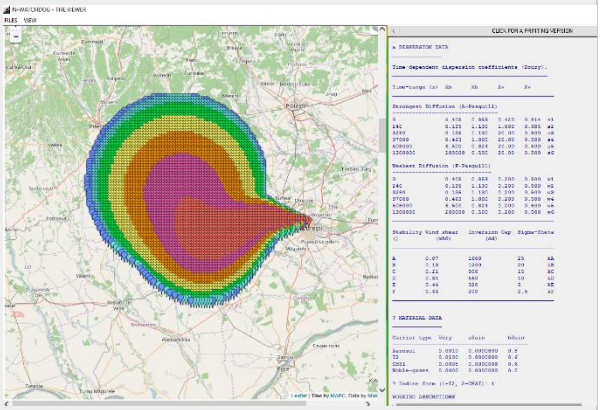
Anexa 2. Exemplu de executie a scenariului privind preventia si constientizarea populatiei fata de vulnerabilitati nucleare cu risc scazut cauzate de incendierea unui dispozitiv cu dispersie radiologica

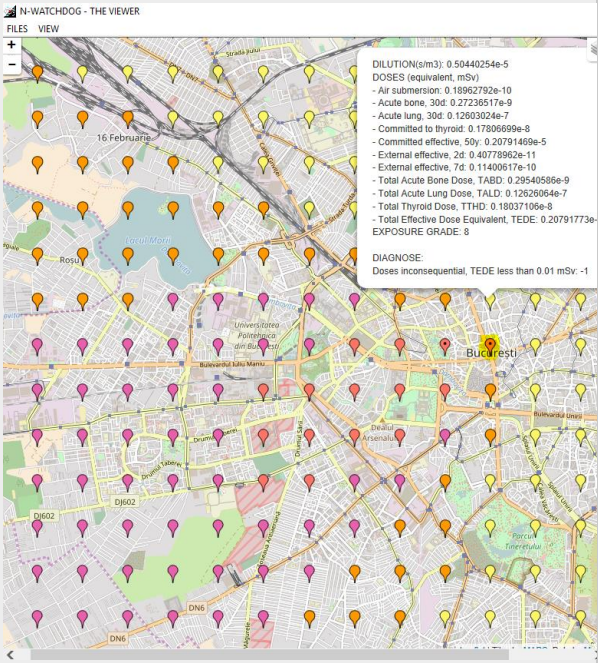
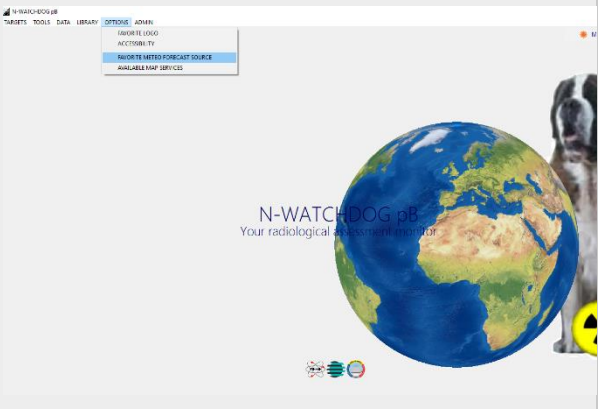
SCENARIU	**SC2. Preventia si constientizarea populatiei fata de vulnerabilitati nucleare cu risc scazut**	
Varianta	SC2.V2. Incendierea unui dispozitiv cu dispersie radiologica	
Succesiune de cazuri de test	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
Monitor de testare	Dominic Eugeniu Moraru	
Versiune testata	N-WATCHDOG-pB 1.4.	
SC2.V2.CT.INFO.001	CT.INFO.001	Informare asupra dozelor de radiatii
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Prezentarea unor notiuni de informare referitoare la dozele de radiatii.
	PREMISE	Pentru a putea avea un ordin de marime referitor la impactul pe care il are incidentul/ accidentul simulat ulterior.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „4-Nuclear-Safety-Basic-Norms_RO” -> Open	
SC2.V2.CT.INFO.002	CT.INFO.002	Informare asupra efectului radiatiilor asupra omului
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Prezentarea metodei de calcul a dispersiei efluentilor radioactivi evacuati in mediu de instalatiile nucleare

	PREMISE	Pentru a putea constientiza modul in care tesuturile vii sunt afectate de cantitatea de radiatii ionizante.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „5-Norms on Radioactive-Effluent-Dispersion_RO” -> Open	
SC2.V2.CT.INFO.003	CT.INFO.003	Informare asupra protectiei populatiei
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Prezentare a modului in care se realizaeaza monitorizarea radioactivitatii mediului in vecinatatea unei instalatii nucleare sau radiologice
	PREMISE	Pentru a putea evalua modul in care sunt monitorizate caile potentiale de expunere la radiatii ale populatiei
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „6-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO” -> Open	
S C2	CT.INFO.008	Date comunitati

	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Evaluarea privind comunitatea afectata folosind date provenite de la ultimul recensamant.
	PREMISE	Pentru a putea incadra intr-un mod corect tipul de interventie necesara sunt necesare date referitoare la numarul locuitorilor care sunt afectati de respectivul incident / accident.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Interogarea prin click pe harta interactiva generata la final in cadrul raportului de situatie a zonei in care a avut loc incendierea dispozitivului	
SC2.V2.CT.SIM.004	CT.SIM.004	Simulare accident la centrala de la Cernavoda, Romania
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Simulare dispozitiv de dispersie radiologica incendiar
	PREMISE	Pentru a putea evalua impactul unui eveniment in care un dispozitiv incendiar este declansat in centrul capitalei Romaniei.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniul top TARGETS -> INCENDIARY RADIOACTIVE DISPERSION DEVICES -> Yes -> OK -> selectare pe harta a locului incendiului (Bucuresti, Universitate M2) -> click -> OK -> Yes Lat: 44.43771 Lon: 26.0973	

	Alegerea modului de lucru:on-line pentru achizita datelor meteo reale pentru un interval de 8 ore „TO ACQUIRE THE REAL-TIME FORECAST” -> Yes -> 8 hrs -> Yes	
	Alegerea termenului sursa pentru tipul de accident simulat din biblioteca N-Watchdog FILES -> OPEN A SOURCE TERM ON RECORD - > Select GenericMix.mix -> Open -> Multiplication Factor 1 -> OK -> OPEN – 1 -> OK - > OK	
	Definirea datelor pentru calculul incendiului in functie de cantitatea de combustibil si tipul acestuia CONTINUE -> PROCEED » Fuel Mass (kg): 200 » Fireball fraction(): 0.3 » Spill fraction(): 0.375 » Fuel Density (kg/m3): 760 » Fuel Heat Value (J/kg): 45300000 » Equivalent Fuel Pool Radius (m, nominal): 3 » Fuel Burn Rate (kg/(m2.s)): 0.051 » Fire Radiance Fraction (% energy radiated): 0.3 » Entrainment Coefficient (): 0.6	
	-> TRY ANOTHER CASE? -> No	

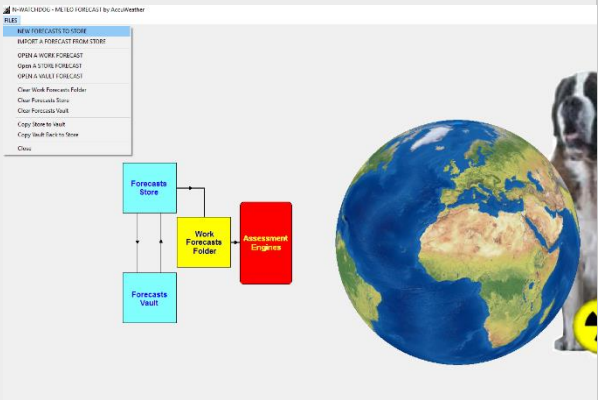
	N-WATCHDOG – FIRE RELEASE -> FILES-> PROCEED	
	Realizarea calculului pentru termenul sursa GenericMix din cadrul bibliotecii N-WATCHDOG	
	Selectarea afisarii comunitatilor afectate doar in interiorul penei de dispersie N-WATCHDOG – THE VIEWER -> Yes	
	Generararea raportului final si verificarea ordinului de marime al expunerii pentru a putea activa planul de interventie corespunzator.	
		

	Evaluarea dozelor incasate de populatie pentru termenul sursa folosit	
SC2.V2.CT.INFO.004	CT.INFO.004 — Date prognoza meteo	
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Achizita in mod on-line a datelor meteorologice
	PREMISE	Pentru a putea aplica modelul de calcul pentru emisiile si deplasarea norului radioactiv, sunt necesare date meteorologice cat mai precise. Astfel, se recomanda folosirea unor date meteo de la momentul incidentului/accidentului.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a optiunii DATA -> METEO FORECASTS -> YES -> Yes /No	

Selectarea optiunii dorite in functie de tipul de date meteo care se doresc a fi folosite

In cazul acestei simulari s-au folosit date on-line preluate de la Accuweather:

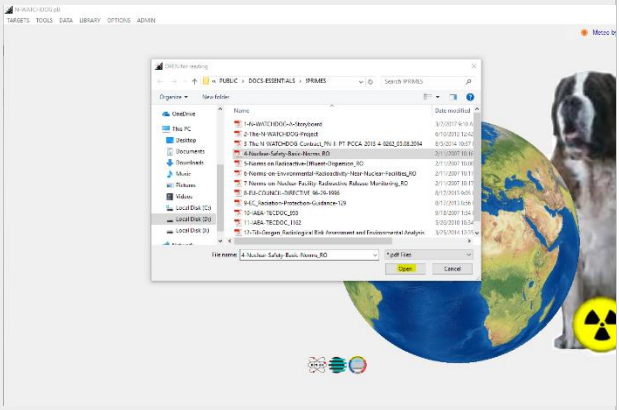
Time (hrs)	Wind speed (m/s)	Wind from (dg.NbyE)	Clouds (%)	Stability (Pasquill)	Rain* (mm/h)	Met Station (AccuWeather)
5pm	1.1	67.5	54%	B	0.0	
6pm	1.7	67.5	49%	B	0.0	
7pm	1.1	45	47%	E	0.0	
8pm	1.1	45	11%	F	0.0	
9pm	1.1	22.5	11%	F	0.0	
10pm	1.9	135	11%	F	0.0	
11pm	1.7	135	11%	F	0.0	
12am	1.7	157.5	11%	F	0.0	

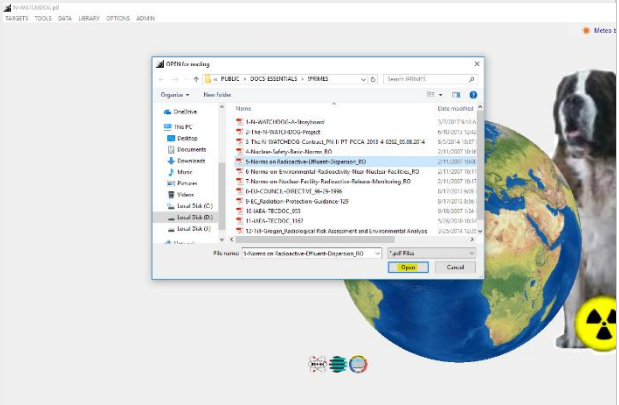


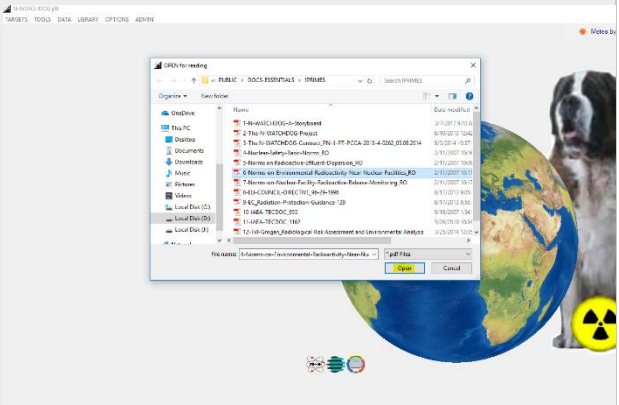
SC2.V2.CT.IDEC.001

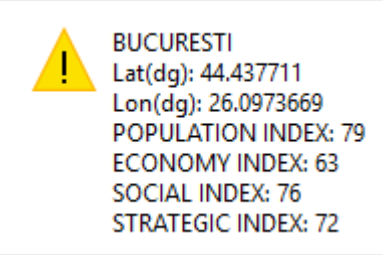
CT.DEC.001	Verificare secventa decizionala pentru preventie
CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
OBSERVATIE	Executia acestui caz de test a fost prezentata in Subcapitolul 0

Anexa 3. Exemplu de executie a scenariului privind preventia si constientizarea populatiei fata de vulnerabilitati nucleare cu risc scazut cauzate de explozia unui dispozitiv de dispersie radiologica

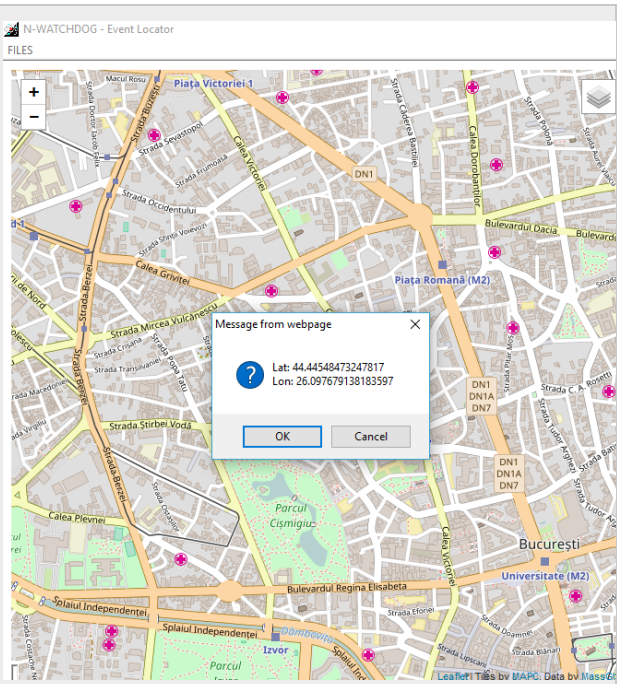
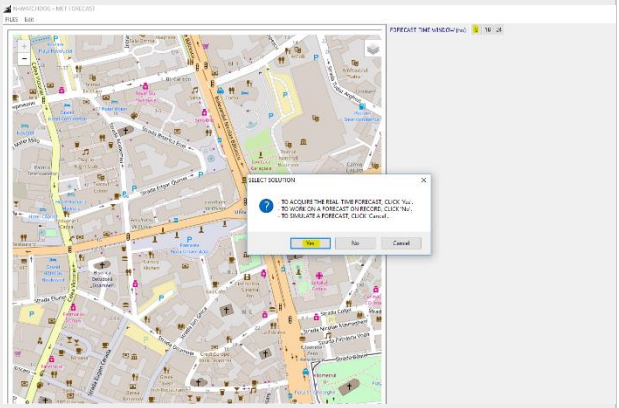
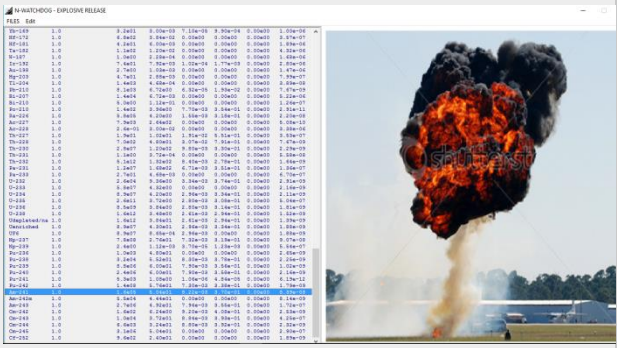
SCENARIU	**SC2. Preventia si constientizarea populatiei fata de vulnerabilitati nucleare cu risc scazut**	
Varianta	SC2.V3. Explozia unui dispozitiv de dispersie radiologica	
Succesiune de cazuri de test	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.001	
Monitor de testare	Dominic Eugeniu Moraru	
Versiune testata	N-WATCHDOG-pB 1.4.	
SC2.V3.CT.INFO.001	CT.INFO.001	Informare asupra dozelor de radiatii
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.004 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Prezentarea unor notiuni de informare referitoare la dozele de radiatii.
	PREMISE	Pentru a putea avea un ordin de marime referitor la impactul pe care il are incidentul/ accidentul simulat ulterior.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „4-Nuclear-Safety-Basic-Norms_RO” -> Open	
SC2.V3.CT.INFO.002	CT.INFO.002	Informare asupra efectului radiatiilor asupra omului
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.001	

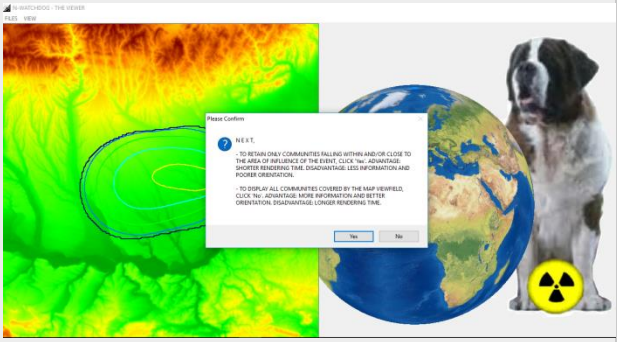
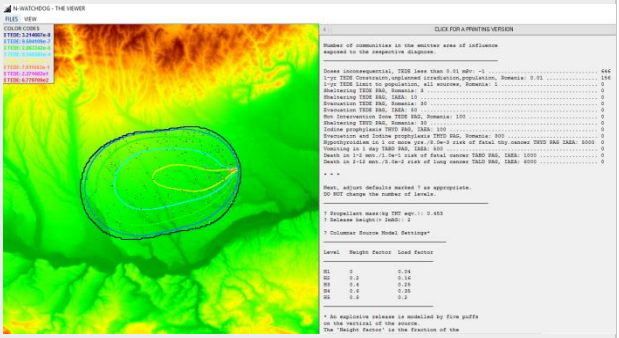
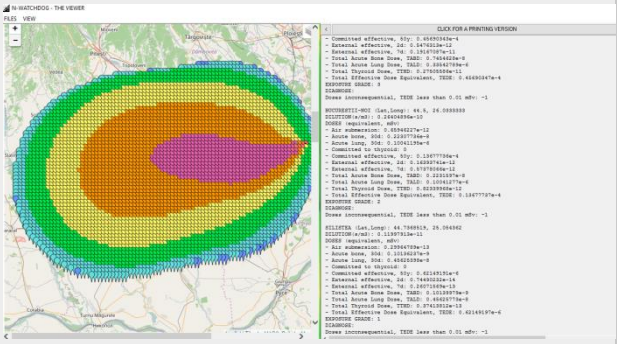
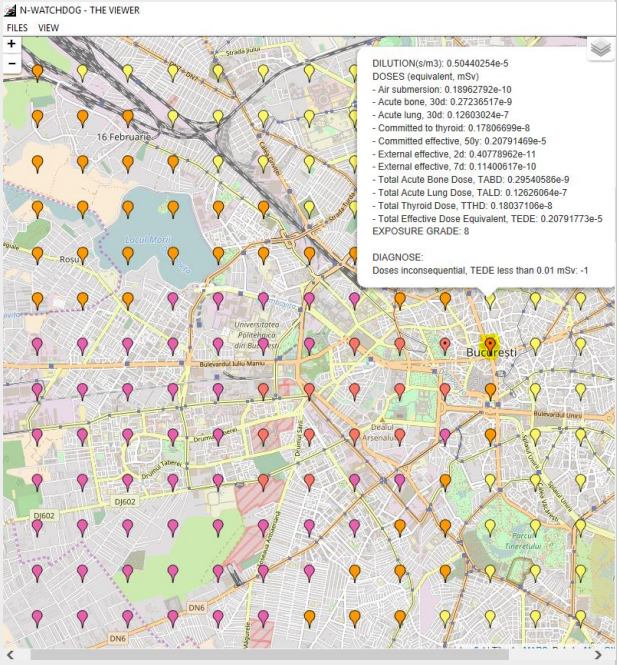
	DESCRIERE	Prezentarea metodei de calcul a dispersiei efluentilor radioactivi evacuati in mediu de instalatiile nucleare
	PREMISE	Pentru a putea constientiza modul in care tesuturile vii sunt afectate de cantitatea de radiatii ionizante.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „5-Norms on Radioactive-Effluent-Dispersion_RO” -> Open	
SC2.V3.CT.INFO.003	CT.INFO.003	Informare asupra protectiei populatiei
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Prezentare a modului in care se realizeaza monitorizarea radioactivitatii mediului in vecinatatea unei instalatii nucleare sau radiologice
	PREMISE	Pentru a putea evalua modul in care sunt monitorizate caile potentiale de expunere la radiatii a populatiei
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	

	Selectarea „6-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO” -> Open	

SC2.V3.CT.INFO.008	CT.INFO.008	Date comunitati
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Evaluarea privind comunitatea afectata folosind date provenite de la ultimul recensamant.
	PREMISE	Pentru a putea incadra intr-un mod corect tipul de interventie necesara sunt necesare date referitoare la numarul locuitorilor care sunt afectati de respectivul incident / accident.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Interogarea prin click pe harta interactiva generata la final in cadrul raportului de situatie a zonei in care a avut loc incendierea dispozitivului	

SC2.V3.CT.SIM.003	CT.SIM.003	Simularea unei explozii a unui dispozitiv de dispersie radiologica
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.001	
	DESCRIERE	Simulare dispozitiv de dispersie radiologica explozibil
	PREMISE	Pentru a putea evalua impactul unui eveniment in care un dispozitiv explozibil este declansat in centrul capitalei Romaniei.
	ACTIUNI SI DATE	REZULTATE OBTINUTE

	Selectarea din meniul top TARGETS -> EXPLOSIVE RADIOACTIVE DISPERSION DEVICES -> Yes -> OK -> selectare pe harta a locului incendiului (Bucuresti, Piata Romana M2) -> click -> OK -> Yes Lat: 44.4454 Lon: 26.0976	
	Alegerea modului de lucru: on-line pentru achizita datelor meteo reale, pentru un interval de 8 ore „TO ACQUIRE THE REAL-TIME FORECAST” -> Yes -> 8 hrs -> Yes	
	Alegerea termenului sursa OK -> Alegerea „Am 241” -> Files -> PROCEED -> Files -> PROCEED -> Yes -> Files -> PROCEED -> Files -> PROCEED -> Files -> PROCEED ->	
	Realizarea calculului pentru termenul sursa GenericMix din cadrul bibliotecii N-WATCHDOG	

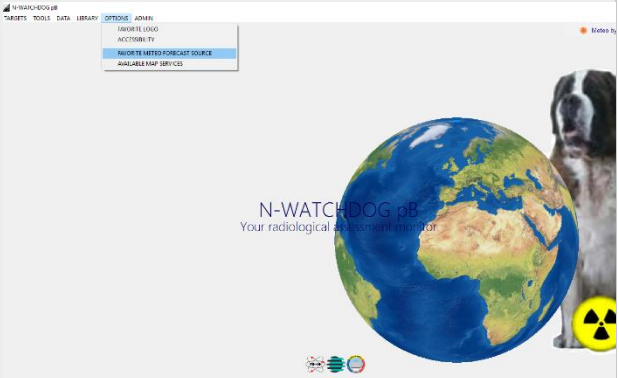
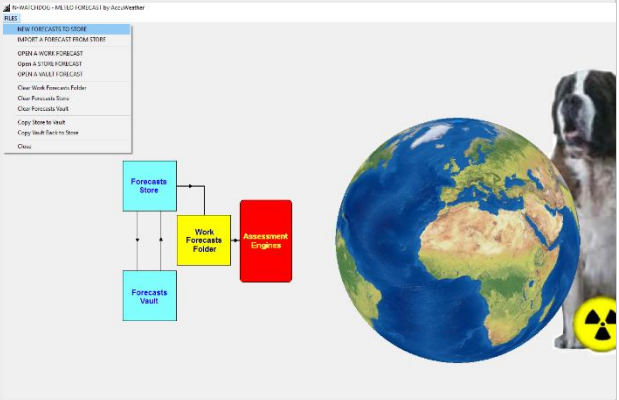
	Selectarea afisarii comunitatilor afectate doar in interiorul penei de dispersie N-WATCHDOG – THE VIEWER -> Yes	
	Generararea raportului final si verificarea ordinului de marime al expunerii, pentru a putea activa planul de interventie corespunzator.	
		
	Evaluarea dozelor incasate de populatie pentru termenul sursa folosit	

SC2.V3.CT.INFO.004

CT.INFO.004	Date prognoza meteo

CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.001

DESCRIERE	Achizitia in mod on-line a datelor meteorologice
PREMISE	Pentru a ptuea aplica modelul de calcul pentru emisiile si deplasarea norului radioactiv sunt necesare date meteorologice cat mai precise. Astfel, se recomanda folosirea unor date meteo de la momentul incidentului/accidentului.

ACTIUNI SI DATE	REZULTATE OBTINUTE
Selectarea din meniu a optiunii DATA -> METEO FORECASTS -> YES -> Yes /No	
Selectarea optiunii dorite in functie de tipul de date meteo care se doresc a fi folosite In cazul acestei simulari s-au folosit date on-line preluate de la Accuweather: Time (hrs) / Wind speed (m/s) / Wind from (dg.NbyE) / Clouds (%) / Stability (Pasquill) / Rain* (mm/h) / Met Station (AccuWeather) 5pm 1.1 67.5 54% B 0.0 6pm 1.7 67.5 49% B 0.0 7pm 1.1 45 47% E 0.0 8pm 1.1 45 11% F 0.0 9pm 1.1 22.5 11% F 0.0 10pm 1.9 135 11% F 0.0 11pm 1.7 135 11% F 0.0 12am 1.7 157.5 11% F 0.0	

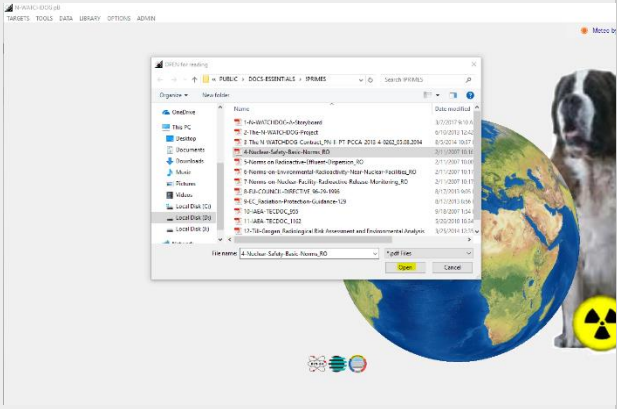
SC2.V3.CT.IDEC.001

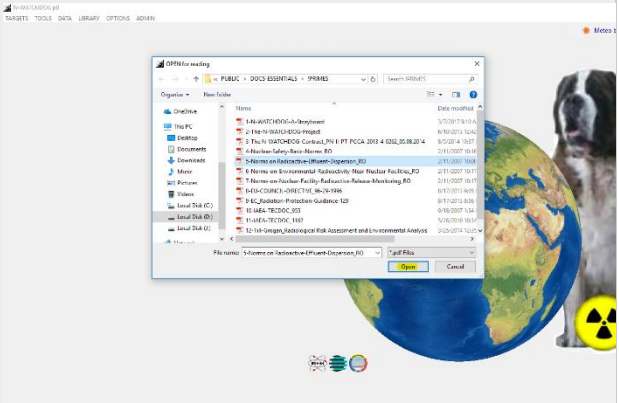
CT.DEC.001	Verificare secventa decizionala pentru preventie

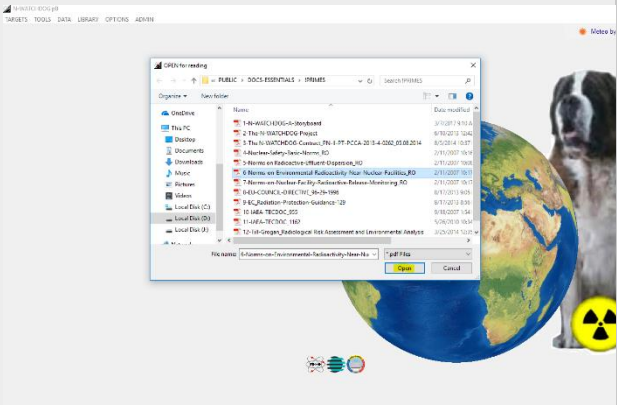
CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.001

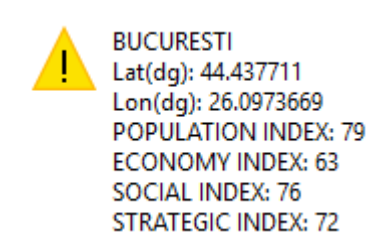
OBSERVATIE	Executia acestui caz de test a fost prezentata in subcapitolul 0.

Anexa 4. Exemplu de executie a scenariului privind evolutia catre o situatie de criza si protectia populatiei in conditiile unui accident la o centrala nucleara

SCENARIU	**SC3. Evolutia catre o situatie de criza si protectia populatiei**	
Varianta	SC3.V1. Accident la o centrala nucleara	
Succesiune de cazuri de test	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.002	
Monitor de testare	Dominic Eugeniu Moraru	
Versiune testata	N-WATCHDOG-pB 1.4.	
SC3.V1.CT.INFO.001	CT.INFO.001	Informare asupra dozelor de radiatii
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Prezentarea unor notiuni de informare referitoare la dozele de radiatii.
	PREMISE	Pentru a putea avea un ordin de marime referitor la impactul pe care il are incidentul/ accidentul simulat ulterior.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „4-Nuclear-Safety-Basic-Norms_RO” -> Open	
SC3.V1.CT.INFO.002	CT.INFO.002	Informare asupra efectului radiatiilor asupra omului
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Prezentarea metodei de calcul a dispersiei efluentilor radioactivi evacuati in mediu de instalatiile nucleare

	PREMISE	Pentru a putea constientiza modul in care tesuturile vii sunt afectate de cantitatea de radiatii ionizante.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „5-Norms on Radioactive-Effluent-Dispersion_RO” -> Open	
SC3.V1.CT.INFO.003	CT.INFO.003	Informare asupra protectiei populatiei
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Prezentare a modului in care se realizaeaza monitorizarea radioactivitatii mediului in vecinatatea unei instalatii nucleare sau radiologice
	PREMISE	Pentru a putea evalua modul in care sunt monitorizate caile potentiale de expunere la radiatii a populatiei
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	

	Selectarea „6-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO” -> Open	

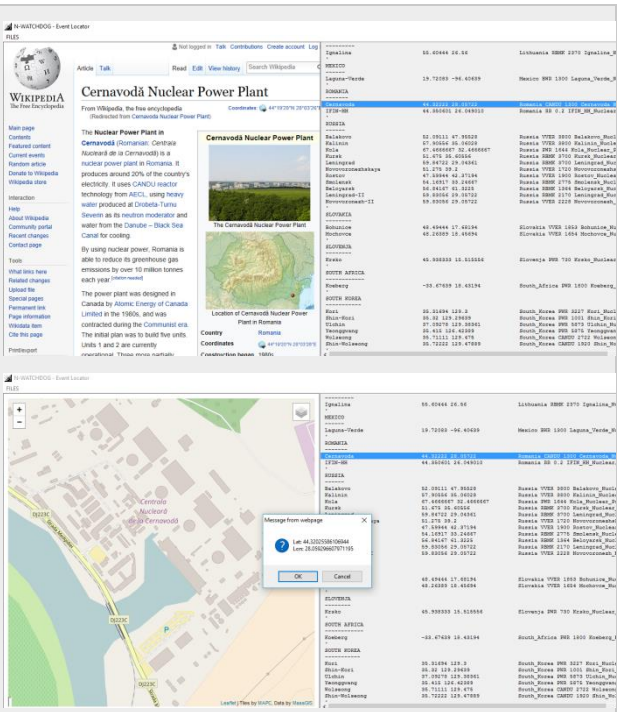
SC3.V1.CT.INFO.008	CT.INFO.008	Date comunitati
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Evaluarea privind comunitatea afectata folosind date provenite de la ultimul recensamant.
	PREMISE	Pentru a putea incadra intr-un mod corect tipul de interventie, sunt necesare date referitoare la numarul locuitorilor care sunt afectati de respectivul incident / accident.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Interogarea prin click pe harta interactiva generata la final in cadrul raportului de situatie a zonei in care a avut loc incendierea dispozitivului	

SC3.V1.CT.SIM.002	CT.SIM.002	Simularea unei explozii a unui dispozitiv de dispersie radiologica
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Simulare accident la centrala de la Cernavoda, Romania
	PREMISE	Pentru a putea evalua impactul unui eveniment in care are loc un accident la centrala nucleara de la Cernavoda
	ACTIUNI SI DATE	REZULTATE OBTINUTE

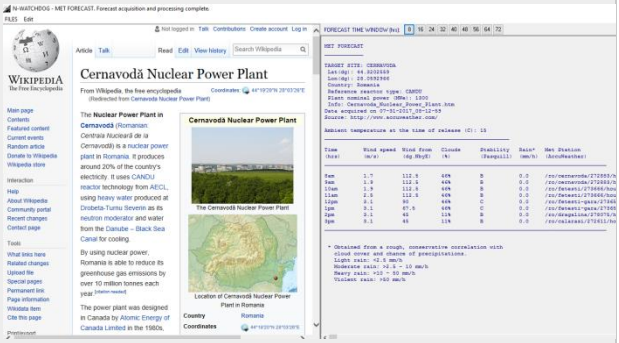
Selectarea din meniul top TARGETS -> MY PLANT -> Yes -> OK -> selectare din lista a centralei de la Cernavoda -> FILES -> LOCATE RELEASE SOURCE -> Click pe harta pe anvelopa unitatii 1 -> OK -> Yes -> 1 SINGLE ANALYTIC ASSESSMENT

Lat: 44.3202

Lon: 28.0592

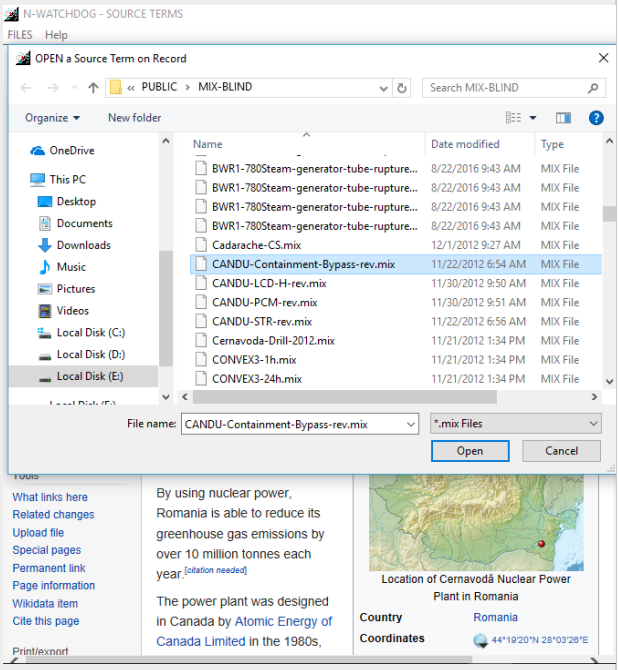


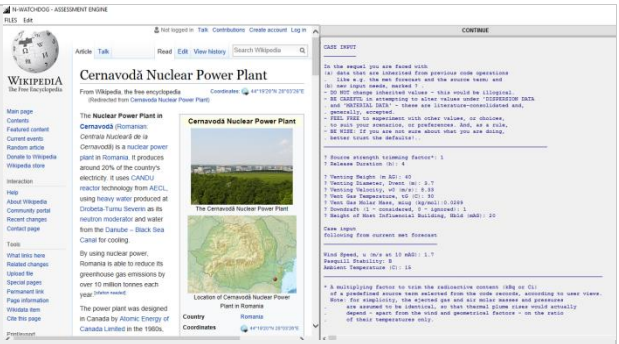
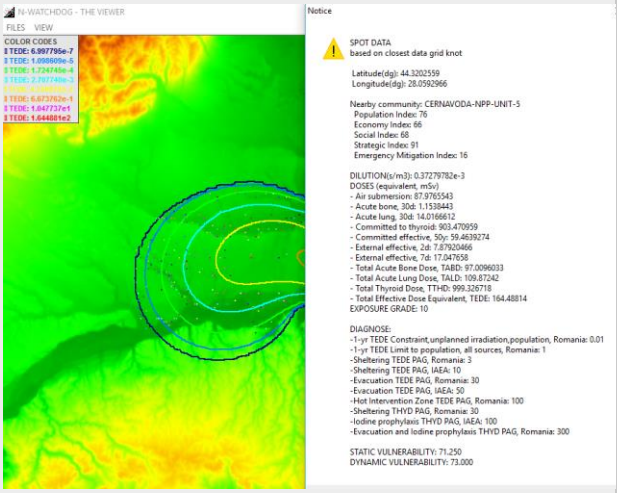
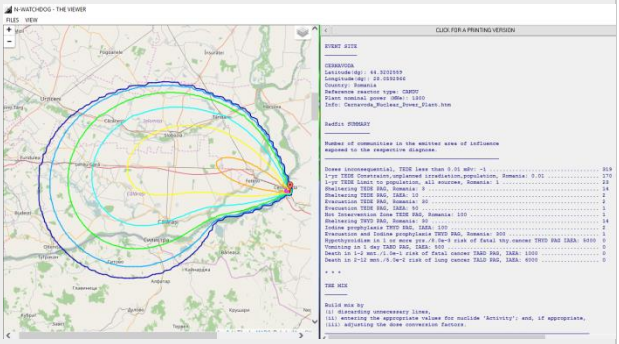
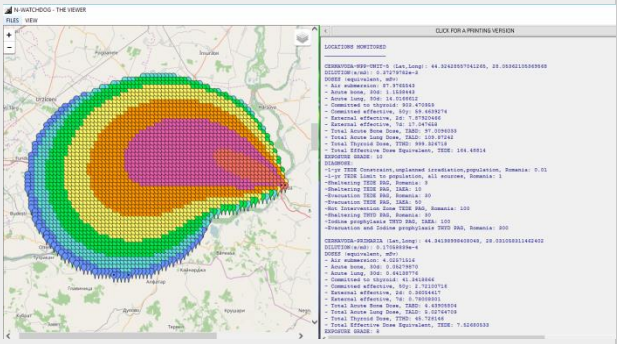
Alegerea modului de lucru: on-line pentru achizita datelor meteo reale pentru un interval de 8 ore „TO ACQUIRE THE REAL-TIME FORECAST" -> Yes -> 8 hrs -> Yes

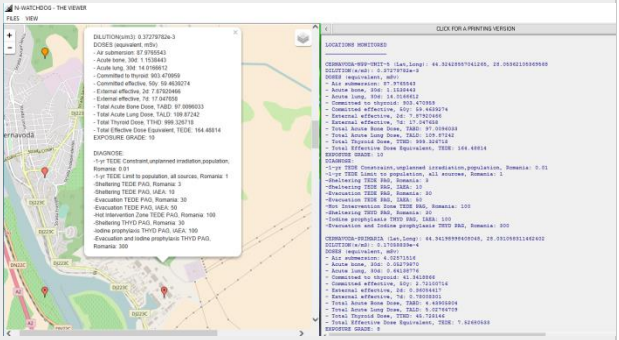


Selectarea termenului sursa din biblioteca N-Watchdog

OK -> FILES -> OPEN A SOURCE TERM ON RECORD -> Selectarea termenului „CANDU-Containment-Bypass-rev.mix" -> Open -> Yes -> CONTINUE -> CONTINUE -> CONTINUE

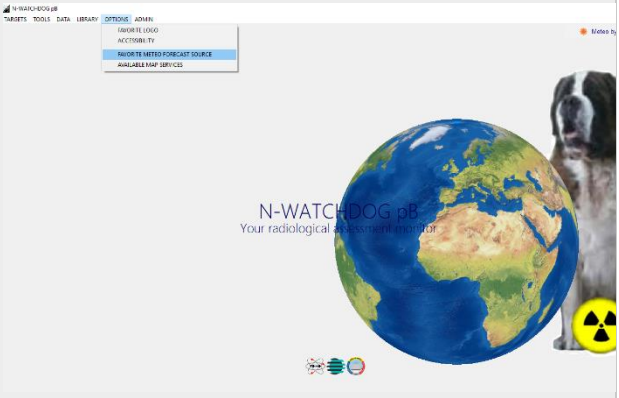
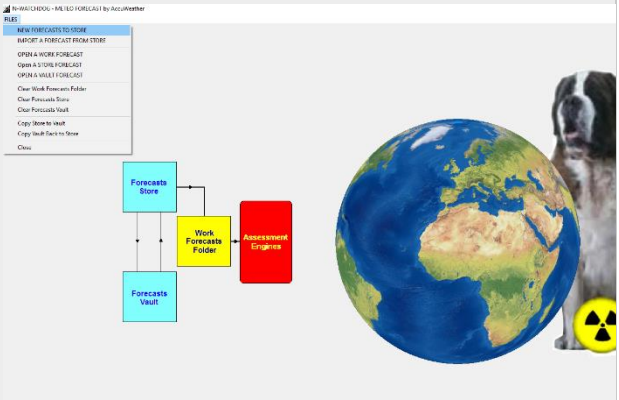


		
	Realizarea calculului pentru termenul sursa GenericMix din cadrul bibliotecii N-WATCHDOG	
	Selectarea afisarii comunitatilor afectate doar in interiorul penei de dispersie N-WATCHDOG – THE VIEWER -> Yes	
	Generararea raportului final si verificarea ordinului de marime al expunerii pentru a putea activa planul de interventie corespunzator.	
		

	Evaluarea dozelor incasate de populatie pentru termenul sursa folosit	

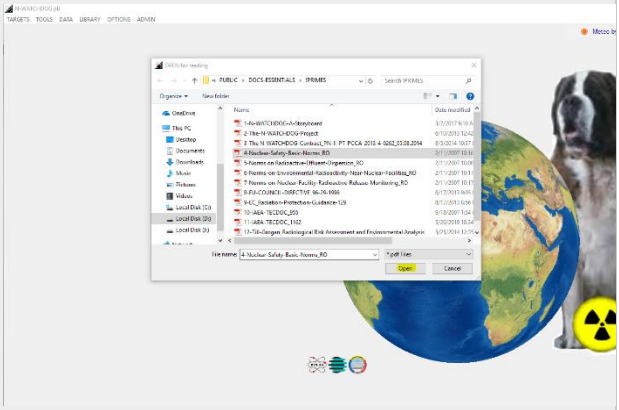
SC3.V1.CT.INFO.004

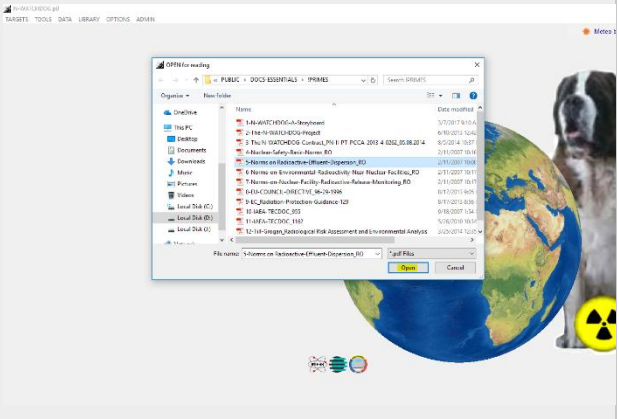
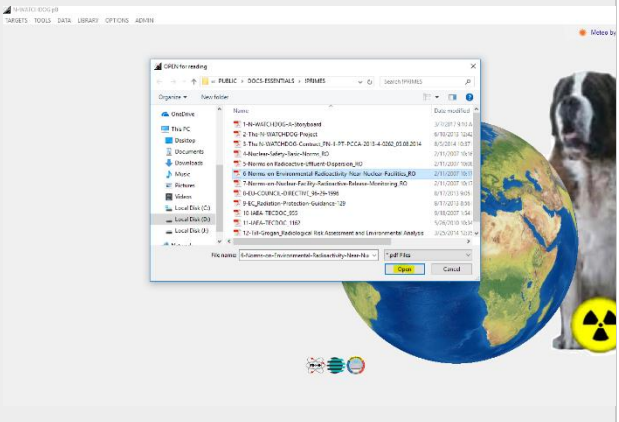
CT.INFO.004	Date prognoza meteo
CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.002	
DESCRIERE	Achizitia in mod on-line a datelor meteorologice
PREMISE	Pentru a ptuea aplica modelul de calcul pentru emisiile si deplasarea norului radioactiv, sunt necesare date meteorologice cat mai precise. Astfel, se recomanda folosirea unor date meteo de la momentul incidentului/accidentului.

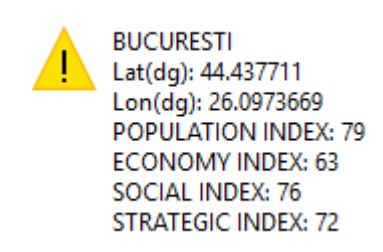
ACTIUNI SI DATE	REZULTATE OBTINUTE
Selectarea din meni a optiunii DATA -> METEO FORECASTS -> YES -> Yes /No	
Selectarea optiunii dorite in functie de tipul de date meteo care se doresc a fi folosite In cazul acestei simulari s-au folosit date on-line preluate de la Accuweather: Time (hrs) / Wind speed (m/s) / Wind from (dg.NbyE) / Clouds (%) / Stability (Pasquill) / Rain* (mm/h) / Met Station (AccuWeather) 5pm 1.7 112.5 46% B 0.0 6pm 1.9 112.5 46% B 0.0 7pm 1.9 112.5 46% B 0.0 8pm 2.5 112.5 46% B 0.0 9pm 3.1 90 46% C 0.0 10pm 3.1 67.5 46% C 0.0 11pm 3.1 45 11% B 0.0	

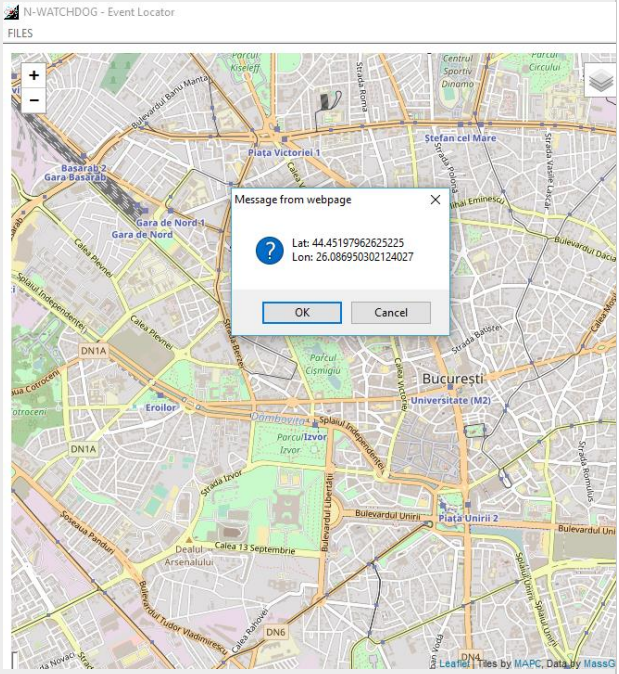
	12am	3.1	45	11%	B	0.0	
SC2.V3.CT.IDEC.002	CT.DEC.002	Verificare secventa decizionala pentru preventie					
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.003 → CT.INFO.004 → CT.DEC.002						
	DESCRIERE	Executia acestui caz de test a fost prezentata in subcapitolul 0.					

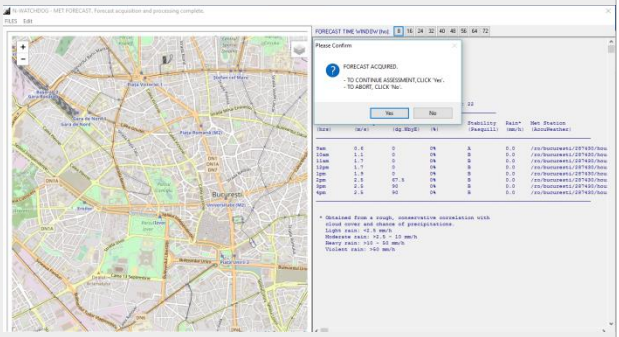
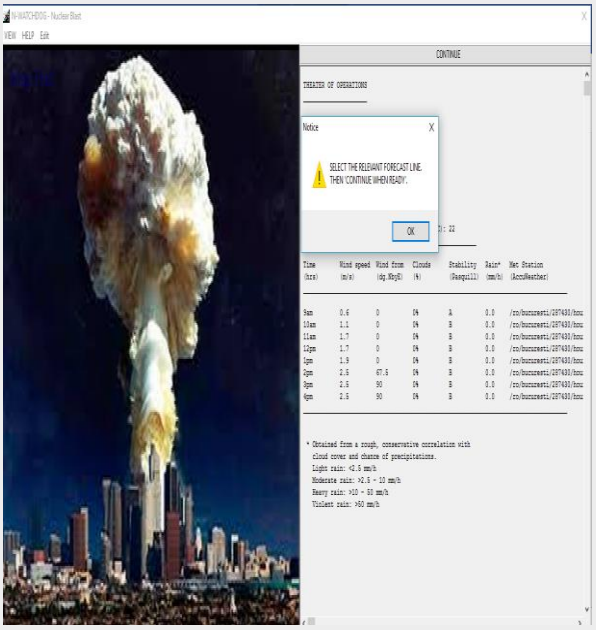
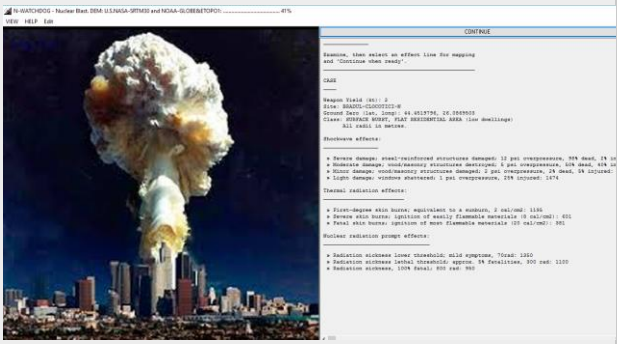
Anexa 5. Exemplu de executie a scenariului privind evolutia catre o situatie de criza si protectia populatiei in conditiile declansarii unui dispozitiv nuclear improvizat

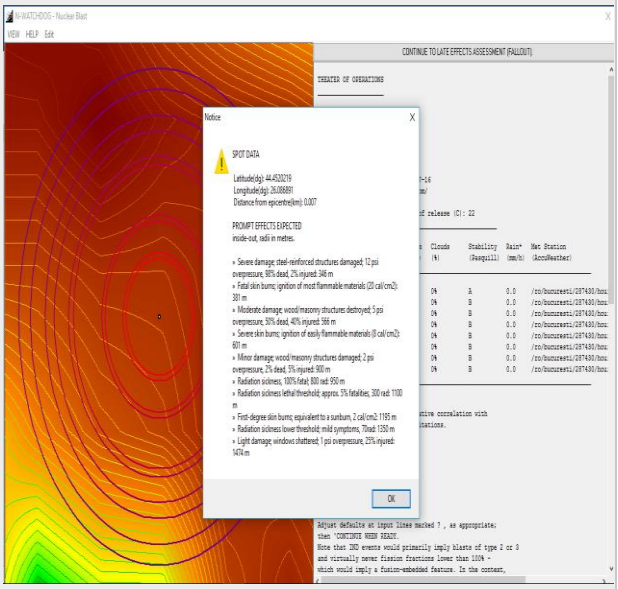
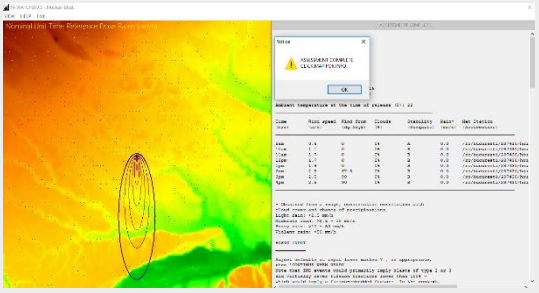
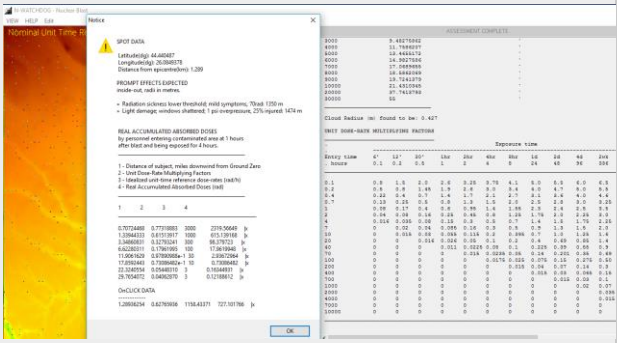
SCENARIU	**SC3. Evolutia catre o situatie de criza si protectia populatiei**	
Varianta	SC3.V4. Declansarea unui dispozitiv nuclear improvizat	
Succesiune de cazuri de test	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.005 → CT.INFO.004 → CT.DEC.002	
Monitor de testare	Dominic Eugeniu Moraru	
Versiune testata	N-WATCHDOG-pB 1.4.	
SC3.V4.CT.INFO.001	CT.INFO.001	Informare asupra dozelor de radiatii
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.002 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Prezentarea unor notiuni de informare referitoare la dozele de radiatii.
	PREMISE	Pentru a putea avea un ordin de marime referitor la impactul pe care il are incidentul/ accidentul simulat ulterior.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „4-Nuclear-Safety-Basic-Norms_RO” -> Open	
SC3.V4.CT.INFO.002	CT.INFO.002	Informare asupra efectului radiatiilor asupra omului
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.005 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Prezentarea metodei de calcul a dispersiei efluentilor radioactivi evacuati in mediu de instalatiile nucleare

	PREMISE	Pentru a putea constientiza modul in care tesuturile vii sunt afectate de cantitatea de radiatii ionizante.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „5-Norms on Radioactive-Effluent-Dispersion_RO” -> Open	
SC3.V4.CT.INFO.003	CT.INFO.003	Informare asupra protectiei populatiei
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.005 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Prezentare a modului in care se realizaeaza monitorizarea radioactivitatii mediului in vecinatatea unei instalatii nucleare sau radiologice
	PREMISE	Pentru a putea evalua modul in care sunt monitorizate caile potentiale de expunere la radiatii ale populatiei
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „6-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO” -> Open	

SC3.V4.CT.INFO.008		
	CT.INFO.008	Date comunitati
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.005 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Evaluarea privind comunitatea afectata folosind date provenite de la ultimul recensamant.
	PREMISE	Pentru a putea incadra intr-un mod corect tipul de interventie, sunt necesare date referitoare la numarul locuitorilor care sunt afectati de respectivul incident / accident.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Interogarea prin click pe harta interactiva generata la final in cadrul raportului de situatie a zonei in care a avut loc deflagratia dispozitivului	

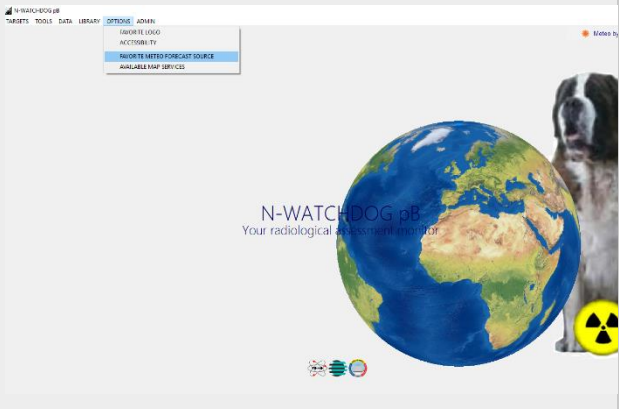
SC3.V4.CT.SIM.005		
	CT.SIM.005	Simularea unei explozii a unui dispozitiv de dispersie radiologica
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.005 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Declansare dispozitiv nuclear improvizat
	PREMISE	Pentru a putea evalua impactul unui eveniment in care are deflagratia unui dispozitiv nuclear improvizat
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniul top TARGETS -> IMPROVISED NUCLEAR DEVICES -> Yes -> OK -> selectare din lista a localitatii de interes „Bucuresti” -> OK- > Yes-> Lat: 44.4519 Lon: 26.0869	

	Alegerea modului de lucru: on-line pentru achizita datelor meteo reale pentru un interval de 8 ore „TO ACQUIRE THE REAL-TIME FORECAST” -> Yes -> 8 hrs -> Yes	
	Generarea tipului de dispozitiv improvizat cu ajutorul interfetei OK -> CONTINUE -> CONTINUE	 
	Realizarea calculului pentru termenul sursa din cadrul bibliotecii N-WATCHDOG	

	Afisarea hartii interactive cu rezultatele simularii N-WATCHDOG – NUCLEAR BLAST -> CONTINUE TO LATE EFFECTS ASSESMENT (FALLOUT)	
	Afisarea dozelor de radiatii pe harta interactiva	
	Evaluarea dozelor incasate de populatie pentru termenul sursa folosit	

SC3.V4.CT.INFO.004	CT.INFO.004	Date prognoza meteo
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.005 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Achizita datelor in mod on-line a datelor meteorologice
	PREMISE	Pentru a ptuea aplica modelul de calcul pentru emisiile si deplasarea norului radioactiv sunt necesare date meteorologice cat mai precise, astfel se recomanda folosirea unor date meteo de la momentul incidentului/accidentului.
	ACTIUNI SI DATE	REZULTATE OBTINUTE

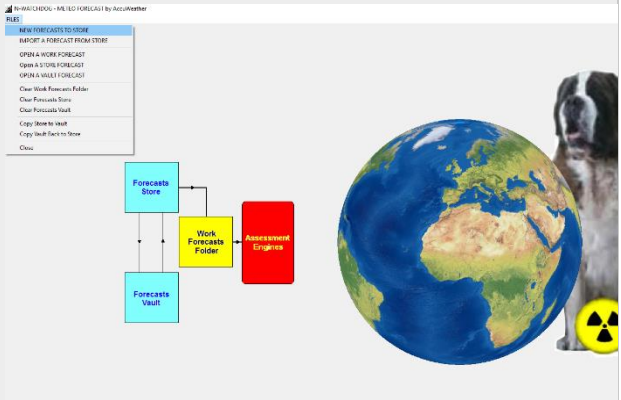
Selectarea din meniu a optiunii DATA -> METEO FORECASTS -> YES -> Yes /No



Selectarea optiunii dorite in functie de tipul de date meteo care se doresc a fi folosite

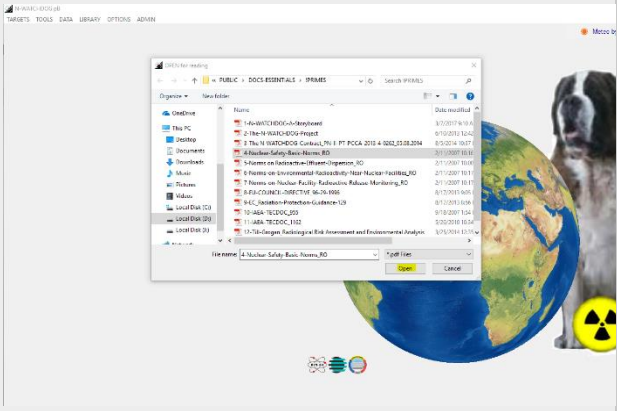
In cazul acestei simulari s-au folosit date on-line preluate de la Accuweather:

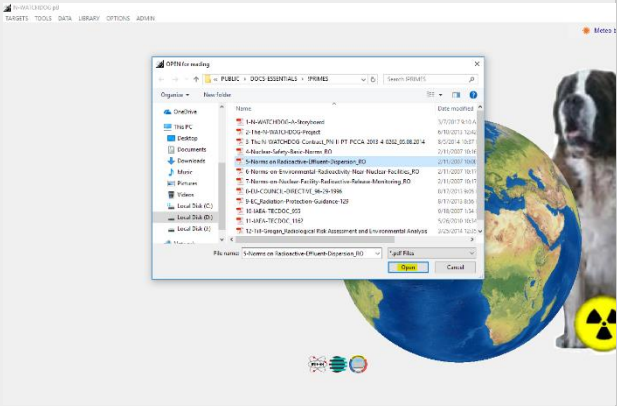
Time (hrs)	Wind speed (m/s)	Wind from (dg.NbyE)	Clouds (%)	Stability (Pasquill)	Rain* (mm/h)	Met Station (AccuWeather)
9pm	0.6	0	0%	A	0.0	
10pm	1.1	0	0%	B	0.0	
11pm	1.7	0	0%	B	0.0	
12pm	1.7	0	0%	B	0.0	
13pm	1.9	0	0%	B	0.0	
14pm	2.5	67.5	0%	B	0.0	
15pm	2.5	90	0%	B	0.0	
16am	2.5	90	0%	B	0.0	

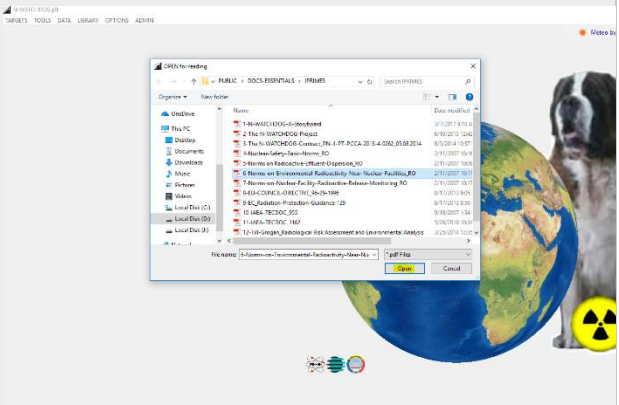


SC3.V4.CT.IDEC.002	CT.DEC.002	Verificare secventa decizionala pentru protectie
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.SIM.005 → CT.INFO.004 → CT.DEC.002	
	DESCRIERE	Executarea acestui caz de test a fost prezentata in subcapitolul 0

Anexa 6. Exemplu de executie a scenariului privind raspunsul in caz de urgenta, in cazul receptionarii unor doze de radiatii

SCENARIU	**SC4. Raspunsul in caz de urgenta, in cazul receptionarii unor doze de radiatii**	
Succesiune de cazuri de test	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.DEC.003	
Monitor de testare	Dominic Eugeniu Moraru	
Versiune testata	N-WATCHDOG-pB 1.4.	
SC4.CT.INFO.001	CT.INFO.001	Informare asupra dozelor de radiatii
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.DEC.003	
	DESCRIERE	Prezentarea unor notiuni de informare referitoare la dozele de radiatii.
	PREMISE	Pentru a putea avea un ordin de marime referitor la impactul pe care il are incidentul/ accidentul simulat ulterior.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „4-Nuclear-Safety-Basic-Norms_RO” -> Open	
SC4.CT.INFO.002	CT.INFO.002	Informare asupra efectului radiatiilor asupra omului
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.DEC.003	
	DESCRIERE	Prezentarea metodei de calcul a dispersiei efluentilor radioactivi evacuati in mediu de instalatiile nucleare
	PREMISE	Pentru a putea constientiza modul in care tesuturile vii sunt afectate de cantitatea de radiatii ionizante.
	ACTIUNI SI DATE	REZULTATE OBTINUTE

	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „5-Norms on Radioactive-Effluent-Dispersion_RO” -> Open	

SC4.CT.INFO.003	CT.INFO.003	Informare asupra protectiei populatiei
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.DEC.003	
	DESCRIERE	Prezentare a modului in care se realizaeaza monitorizarea radioactivitatii mediului in vecinatatea unei instalatii nucleare sau radiologice
	PREMISE	Pentru a putea evalua modul in care sunt monitorizate caile potentiale de expunere la radiatii ale populatiei
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Selectarea din meniu a sectiunii LIBRARY	
	Intrare in sectiunea READINGS -> YES	
	Click pe „ESSENTIAL READINGS: The Project, the Law, and a few Basics”	
	Selectarea „6-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO” -> Open	

SC4.CT.INFO.008	CT.INFO.008	Date comunitati
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.DEC.003	

	DESCRIERE	Evaluarea privind comunitatea afectata folosind date provenite de la ultimul recensamant.
	PREMISE	Pentru a putea incadra intr-un mod corect tipul de interventie necesara sunt necesare date referitoare la numarul locuitorilor care sunt afectati de respectivul incident / accident.
	ACTIUNI SI DATE	REZULTATE OBTINUTE
	Interogarea prin click pe harta interactiva generata la final in cadrul raportului de situatie a zonei in care a avut loc incidentul / accidentul. (ex: Bucuresti)	BUCURESTI Lat(dg): 44.437711 Lon(dg): 26.0973669 POPULATION INDEX: 79 ECONOMY INDEX: 63 SOCIAL INDEX: 76 STRATEGIC INDEX: 72
SC2.V3.CT.IDEC.003	CT.DEC.003	Verificare secventa decizionala pentru raspuns
	CT.INFO.001 → CT.INFO.002 → CT.INFO.003 → CT.INFO.008 → CT.DEC.003	
	DESCRIERE	Executarea acestui caz de test a fost prezentata in subcapitolul 0

Etapa 4. Activitatea 4.4. Importanta implementarii N-WATCHDOG pentru diverse entitati si potentiale beneficii

SIVECO

1. Introducere

O componenta esentiala in cadrul oricarui proiect de cercetare aplicativa este reprezentata de valorificarea rezultatelor obtinute in timpul dezvoltarii si realizarii modulului experimental. Aceasta valorificare consta in identificare anumitor domenii de aplicabilitate pentru care rezultatele cercetarii intreprinse sa aduca un aport seminificativ.

In stransa legatura cu domeniile tinta pentru implementarea rezultatelor se afla categoriile de utilizatori carora se adreseaza sistemul dezvoltat.

Principalele categorii de utilizatori identificate carora se adreseaza sistemul de alertare timpurie si asistare computerizata a deciziilor, denumit N-Watchdog sunt urmatoarele:

- populatie civila;
- medii de cercetare si invatamant superior;
- forurile de decizie superioare;

Dintre domeniile in care se observa beneficii din utilizarea unui sistem de alertare timpurie amintim:

- sisteme de preventie si protectie;
- managementul dezastrelor;
- elaborarea strategiilor privind protectia mediului;

2. Constientizarea de catre Societatea Civila a pericolului radiatiilor nucleare

Sistemul dezvoltat poate contribui la cresterea nivelului de informare în materie al Societatii Civile. Radiaţiile nucleare pot avea consecinţe extrem de grave asupra sănătăţii omului, putând chiar provoca decesul în câteva ore. Efectele radiaţiilor nucleare asupra omului depind de câţiva factori foarte importanţi: cantitatea de radiaţii primită de victimă, locul care a fost iradiat şi vârsta persoanei expuse.

Sievert este unitatea de măsură a dozei de radiaţii absorbită de ţesutul uman. Un sievert corespunde la o mie de milisieverţi. În Franţa, doza medie primită de o persoană într-un an de zile este de sub 4 milisieverţi - e vorba de radiaţii provenite fie din natură unde există radon de exemplu dar şi razele cosmice, fie de la diverse diagnostice medicale - radigrafii, scanere, etc. În cazul unor accidente nucleare, persoanele în contact cu reactorul pot fi contaminate cu mai mulţi sieverţi - la Cernobâl, muncitorii care au lucrat pe şantierul catastrofei au fost iradiaţi cu 6 sieverţi dar după o lună au şi murit. La centrala japoneză de la Fukushima, dozele nu sunt pentru moment cuprinse decât între 30 şi 400 de milisievert.

În caz de doză mare - 6 sieverţi la Cernobâl - decesul este o consecinţă sigură. Între 4 şi 4,5 sieverti, jumătate din persoane mor. Radiaţiile ard pielea, distrug sistemul nervos central, măduva osoasă şi celulele digestive. În plus, întregul sistem imunitar se prăbuşeşte. Încă de la o expunere de peste un Sievert, apar primele simptome: greţuri, vomă, hemoragii interne. Toate aceste efecte sunt cauzate de moartea celulelor.

Dacă iradierea este medie, celule reuşesc să supravieţuiască dar se alterează ADN-ul lor, lucru care poate declanşa apariţia unor cancere la cativa ani sau chiar zeci de ani după expunerea la radiaţii. Cele mai frecvente forme de cancer sunt leucemia, cancerul de tiroidă şi mai târziu, cel de plămâni sau de piele care pot apărea şi la 40 de ani după iradiere. Pentru moment nu s-a demonstrat că ar exista un risc ereditar via o alterare a spermatozoizilor sau a ovocitelor.

În sfârşit, impactul unor doze mici de radiaţii - sub 0,3 Sievert - este greu de măsurat, nu se poate spune obiectiv cum îi răspunde organismul uman. În afară de posibilitatea de a face cancer, se mai evocă cataractele, bolile cardiovasculare şi dereglarea sistemului central nervos.

3. Avantajele oferite in cadrul mediilor de cercetare si invatamantului superior in general

Avand in vedere capacitatea de realizare a analizelor spatiale functie de datele meteorologice preluate in timp real, previzionate sau simulate, trebuie subliniata si exploatata aceasta caracteristica primara a modulului dezvoltat de a simula imprastierea substantelor cu risc ridicat purtate pe calea aerului.

Baza teoretica ampla a modulele dezvoltate in cadrul cercetarii realizate poate constitui un punct de plecare pentru imbunatatirea conceptului existent. Totodata, in aceste circumstante se poate valorifica aportul semnificativ pe care il poate avea pentru o astfel de aplicatie, participarea mediului de cercetare si a invatamantului superior in general.

Alte perspective de cercetare pot viza dezvoltare de aplicatii care se bazeaza pe datele furnizate de sistemul dezvoltat pentru a crea servicii ce pot da plus valoare aplicatiei dezvoltate.

Avand o structura modulara, aplicatia dezvoltata poate fi imbunatatita prin adaugarea de module complementare care deservesc acelasi scop primar si anume de a crea un instrument complet pentru asigurarea unui management eficient al situaţiilor de criză şi al intervenţiilor în cazul dezastrelor, sisteme de detecţie, prevenire şi alertă.

Un prim pas in acest sens a fost demarat in cadrul proiectului prezent prin implementarea unui modul destinat simularii incidentelor in cazul utilizarii unor dispozitive explozibile improvizate. Cercetarea si dezvoltarea intreprinsa in cadrul acestui modul s-a realizat in lumina ultimelor evenimente de factura terorista desfasurate la nivel mondial, ce au ridicat totodata si nivelul de constientizare al pericolului existent.

Alti potentiali beneficiari din domeniul cercetarii, ce pot aduce la randul lor contributii in dezvoltarea eficienta a unui astfel de sistem de avertizare, pot fi:

Institutul de cercetari nucleare Pitesti (ICN). A avut si are ca principala misiune mentinerea si dezvoltarea suportului stiintific si tehnologic pentru programul energetic nuclear national, componenta vitala in asigurarea energiei electrice durabile, curata si sigura, pentru cetatenii Romaniei. Programul energetic nuclear din Romania prevede operarea in conditii de siguranta si competitivitate a Unitatilor 1 si 2 de la Cernavoda, finalizarea Unitatilor 3 si 4, construirea unei noi centrale nucleare, promovarea pe termen mediu si lung a reactorilor avansati de generatia IV, depozitarea in conditii de siguranta a combustibilului ars si a deseurilor radioactive. Institutul asigura operarea, dezvoltarea si utilizarea infrastructurii necesare pentru desfasurarea programelor de cercetare - dezvoltare, educatia si pregatirea specialistilor, precum si o cooperare internationala sustinuta, ca elemente esentiale pentru un sector energetic nuclear durabil. De asemenea ICN promoveaza dezvoltarea si aplicarea tehnologiilor nucleare in medicina, industrie sau agricultura adaugand o contributie importanta la cresterea standardului de viata in beneficiul cetatenilor.

Acceptarea de catre societate a riscurilor asociate cu radiatiile este, in mod firesc, conditionata de beneficiile nete pe care aceasta le poate obtine prin utilizarea tehnologiilor nucleare sau a materialelor radioactive. Pe masura ce tehnologiile nucleare au patruns in domenii vitale pentru dezvoltarea civilizatiei umane precum energetica sau sanatatea, cunoscand o dezvoltare continua, problema protejarii persoanelor si a mediului inconjurator a devenit din ce in ce mai importanta.

Succesul in exploatarea unei instalatii nucleare depinde de mai multi factori. Un factor important este stabilirea si mentinerea unui ansamblu de masuri de radioprotectie eficiente. In acest sens, pentru ICN exista doua obiective principale:

- asigurarea masurilor de radioprotectie si protectia mediului pentru propriile instalatii nucleare si
- sustinerea unui program de cercetare-dezvoltare pentru cresterea eficientei protectiei omului si mediului inconjurator impotriva riscurilor asociate radiatiilor.

Pentru realizarea celor doua obiective, in ICN exista Laboratorul de Radioprotectie, Protectia Mediului si Protectie Civila.

Infrastructura:

- echipamente fixe si mobile pentru monitorizarea campurilor de radiatii si a contaminarii aerului
- laborator mobil si echipamente pentru prelevarea probelor de efluenti si mediu
- laborator de preparare a probelor, radiochimie si radiotoxicologie
- Spectrometrie gama (inclusiv in situ), alfa si beta LSC

4. Identificarea potentialilor beneficiari in randul oficialitatilor cu caracter de foruri decizionale superioare

O alta utilizare a aplicatiei dezvoltate se naste din obligativitatea de raportare periodica catre diferite comisii nationale sau internationale care au un rol in reglementarea si controlul activitatilor in ceea ce priveste folosirea materialului radioactiv in special si nu numai.

Lista potentialilor beneficiari ai unui astfel de sistem de simulare si management al actiunilor in cazul situatiilor de criza poate include entitati din randul comisiilor nationale, precum Comisia Nationala pentru Controlul Activitatilor Nucleare (CNCAN), sau din randul comisiilor existente la nivelul Uniunii Europene sau Organizatiei Natiunilor Unite (International Atomic Energy Agency – IAEA).

Dintre potentialii beneficiari din randul oficialitatior, atat la nivel national , cat si international amintim:

1. Agentia Nucleara pentru Deseuri Radioactive. Misiunea principala a Agentiei Nucleare pentru Deseuri Radioactive este reprezentata de acordarea de asistenta tehnica de specialitate Guvernului in procesul de elaborare si adoptare a politicilor de promovare, dezvoltare si monitorizare a aplicatiilor exclusiv pasnice ale energiei nucleare, energetice si neenergetice, depozitarea definitiva in siguranta a deseurilor radioactive si coordonarea la nivel national a procesului de gospodarire a deseurilor radioactive si a procesului de dezafectare a instalatiilor nucleare.

Functii indeplinite:

- strategie, prin care se asigura elaborarea si actualizarea Strategiei Nationale de Dezvoltare a Domeniului Nuclear (SNDDN) si a Programului Nuclear National (PNN)
- monitorizare, prin care se asigura monitorizarea gradului de realizare a activitatilor nucleare din PNN, in concordanta cu obiectivele SNDDN
- promovare, prin care se asigura promovarea si sustinerea pe plan national si international a intereselor domeniului nuclear romanesc
- coordonare, prin care se asigura coordonarea la nivel national a actiunilor privind promovarea, dezvoltarea si monitorizarea activitatilor nucleare in Romania, precum si a activitatilor de gospodarire in siguranta a combustibilului nuclear uzat si a deseurilor radioactive
- depozitare, prin care se asigura depozitarea definitiva, in conditii de siguranta, a deseurilor radioactive rezultate din ciclul combustibilului nuclear si a deseurilor radioactive rezultate din aplicatiile tehnicilor si tehnologiilor nucleare in industrie, medicina, agricultura si in alte domenii de interes socioeconomic, inclusiv a celor rezultate din dezafectarea instalatiilor nucleare si radiologice
- administrare, prin care se asigura gestionarea resurselor financiare destinate gospodaririi in siguranta a deseurilor radioactive si a resurselor financiare destinate dezafectarii instalatiilor nucleare si radiologice
- reprezentare, prin care asigura, in domeniul sau de activitate, reprezentarea pe plan intern si extern a statului roman

2. Comisia Nationala pentru Controlul Activitatilor Nucleare (CNCAN). Reprezinta autoritatea nationala in domeniul reglementarii, autorizarii si al controlului activitatilor nucleare din Romania. CNCAN are personalitate juridica si se afla in subordinea Primului Ministru.

CNCAN detine o experienta bogata, de peste 30 de ani, in domeniul sau de competente, si detine rol important in asigurarea respectarii cu strictete a cerintelor de securitate nucleara si de radioprotectie in Romania. CNCAN urmareste indeplinirea prevederilor Legii 111/1996 privind desfasurarea in siguranta a activitatilor nucleare, cu completarile ulterioare. Conform legii, CNCAN are in sfera sa de competente urmatoarele domenii:

- Legislatia si reglementarile in domeniul desfasurarii in siguranta a activitatilor nucleare in Romania;
- Securitatea nucleara;
- Protectia la radiatii;
- Managementul calitatii in domeniul nuclear;
- Garantiile nucleare;
- Planurile de urgenta si interventii la accident nuclear sau radiologic;
- Protectia fizica a obiectivelor si a instalatiilor nucleare;
- Raspunderea civila in caz de daune nucleare;
- Transportul materialelor radioactive, materialelor nucleare si/sau de interes nuclear, surselor si generatoarelor de radiatii ionizante;
- Gospodarirea deseurilor radioactive;
- Autorizarea personalului operator;
- Importul/exportul materialelor radioactive, materialelor nucleare si/sau de interes nuclear, surselor si generatoarelor de radiatii ionizante;
- Tranzitul pe teritoriul Romaniei a materialelor radioactive, materialelor nucleare si/sau de interes nuclear, surselor si generatoarelor de radiatii ionizante;
- Tratatele si Conventiile Internationale;
- Acordurile bilaterale in domeniu;
- Interfata cu organizatiile si organismele internationale in domeniu;
- Armonizarea legislatiei si a reglementarilor nationale din domeniul nuclear cu legislatia si reglementarile similare din Uniunea Europena;
- Indeplinirea criteriilor de aderare a Romaniei la UE privind securitatea nucleara, radioprotectia si garantiile nucleare;

CNCAN asigura expertiza tehnica si interfata de specialitate, in relatiile Romaniei cu organismele si organizatiile internationale (AIEA, CE, WENRA, OECD/NEA etc.). De asemenea, CNCAN asigura cooperarea cu autoritatile similare din alte tari, pentru implementarea Acordurilor Guvernamentale, in sfera de competente ale reglementatorului pentru sectorul nuclear. La nivel national, CNCAN este responsabil cu elaborarea Raportului National pentru Conventia de Securitate Nucleara si prezentarea acestuia in fata comunitatii internationale, precum si cu elaborarea Strategiei de Securitate Nucleara a Romaniei.

3. Reţeaua Naţională de Supraveghere a Radioactivităţii Mediului (RNSRM). Face parte din sistemul integrat de supraveghere a poluării mediului pe teritoriul Romaniei, aflată în subordinea Ministerului Mediului şi Schimbarilor Climatice (MMSC).

RNSRM a fost înfiinţată în anul 1962 şi constituie o componentă specializată a sistemului naţional de radioprotecţie, care realizeaza supravegherea şi controlul respectării prevederilor legale privind radioprotecţia mediului şi asigura îndeplinirea responsabilităţilor MMP privind detectarea unor niveluri crescute de radioactivitate, avertizarea şi alarmarea factorilor de decizie în cazul unor evenimente cu impact radiologic asupra mediului.

RNSRM funcţionează cu un număr de 37 de Staţii de Supraveghere a Radioactivităţii Mediului din cadrul Agenţiilor pentru Protecţia Mediului. Coordonarea ştiinţifică, tehnică şi metodologică a RNSRM este asigurata de Laboratorul Naţional de Referinţă pentru Radioactivitate (LNRR) din cadrul ANPM.

Sistemul Naţional de Avertizare/Alarmare pentru Radioactivitatea Mediului (SNAARM) cuprinde în prezent 88 staţii automate de monitorizare a debitului dozei gama în aer şi 5 staţii automate de monitorizare a radioactivităţii apei. Dintre cele 88 staţii automate de monitorizare a debitului dozei gama în aer 15 sunt amplasate în zona de influenţă a CNE Kozlodui, 33 în zona de influenţă a CNE Cernavodă, 2 staţii de fond (amplasate la Babele şi Toaca), iar restul

sunt distribuite uniform pe teritoriul ţării, în reşedinţele de judeţ. Staţiile automate locale sunt concepute să permită funcţionarea şi monitorizarea radioactivităţii mediului în zonele în care au fost montate, într-o manieră continuă, fără necesitatea intervenţiei umane (operare automată), în condiţiile de mediu existente în regiunile de amplasare. SNAARM este coordonat de la un centru de comandă aflat în cadrul Laboratorul de Radioactivitate, ANPM.

4. Agenţia Internaţională pentru Energie Atomică (AIEA). Organizație creată ca parte a sistemului ONU, în 1957, şi acționează ca punct focal global pentru cooperarea internațională în domeniul nuclear, asistând statele membre în planificarea şi utilizarea științei şi tehnologiei nucleare în scopuri pașnice şi facilitând transferul de tehnologii pentru susținerea dezvoltării economice şi sociale a statelor membre. AIEA este condusă de un Director general, în prezent ambasadorul Yukiya Amano, care a fost reales, în septembrie 2013, pentru un nou mandat de 4 ani. Organele de decizie ale AIEA sunt Conferința Generală şi Consiliul Guvernatorilor.

România a devenit stat membru al Agenției Internaționale pentru Energie Atomică din aprilie 1957. Din 1972, a intrat în vigoare Acordul comprehensiv de garanții cu AIEA, consolidat prin semnarea Protocolului Adițional, în 2000. România a început implementarea sistemului integrat de garanții AIEA din iunie 2007.

România are un profil foarte activ în cadrul AIEA, a făcut parte din Consiliul Guvernatorilor în perioada 2008-2010 şi a deținut funcția de Președinte al Conferinței Generale în 2011. Prezenţa în Consiliul Guvernatorilor şi deținerea funcției de Președinte al Conferinței Generale au presupus o implicare sporită a României în activitățile AIEA şi participarea la procesul decizional privind activitatea curentă şi orientările de viitor ale Agenției.

5. Inspectoratul General pentru Situaţii de Urgenţă (IGSU). Până în anul 2004, măsurile de protecție civilă și stingere a incendiilor se realizau de către Inspectoratul General al Corpului Pompierilor Militari și Comandamentul Protecției Civile, instituții aflate sub coordonarea Ministerului de Interne.

Pentru a se adapta la creșterea exponențială a riscurilor nonmilitare, pe fondul accelerării tendințelor de globalizare, al schimbărilor climatice radicale, al diversificării activităților economice și producerii de dezastre, cele două instituții menționate fuzionează în decembrie 2004, luând astfel ființă Inspectoratul General pentru Situaţii de Urgenţă (IGSU).

Obiectivul fundamental al activității desfășurate de IGSU vizează eficientizarea acțiunilor de prevenire și gestionare a situațiilor de urgență, în vederea menținerii sub control a riscurilor și asigurării stării de normalitate a vieții comunităților umane și este atins prin multitudinea de activități de prevenire și intervenție pentru stingerea incendiilor, descarcerare și prim-ajutor SMURD, salvarea persoanelor și limitarea pagubelor produse de inundații, alunecări de teren, mișcări seismice, epidemii, epizootii, înzăpeziri, secetă, asistența persoanelor aflate în situații critice, intervenția la accidente tehnologice, radiologice, nucleare, biologice sau alte tipuri de calamități naturale sau antropice.

Inspectoratul general și structurile județene au în componență 43 de centre operaționale și 280 subunități operative, cu peste 3.500 mijloace tehnice de intervenție.

Cele apropape 30.000 de cadre încadrează în proporție de 97% unitățile operative și 3% structurile administrative: instituții de învățământ, studii și cercetare, baze, ateliere și depozite de asigurare tehnică, logistică și de reparații.

Necesarul de personal se asigură prin instituțiile de formare dedicate: Academia de poliție "Alexandru Ioan Cuza" București - Facultatea de Pompieri și Școala de Subofițeri Pompieri și Protecție Civilă "Pavel Zăgănescu" Boldești.

În calitate de integrator al Sistemului Național de Management al Situațiilor de Urgență, creat în 2004, IGSU coordonează acțiunile instituțiilor implicate în managementul situațiilor de urgență, asigurând și funcția de punct național de contact în relația cu organizațiile internaționale guvernamentale și neguvernamentale cu responsabilități în domeniu.

Sistemul Național de Management al Situațiilor de Urgență a fost creat premergător aderării României la Uniunea Europeană și reprezintă o rețea de comunicare permanentă între autoritățile administrației publice și structurile abilitate în managementul situațiilor de urgență, constituite pe niveluri și domenii de competență, și care dispun de infrastructura și resursele

necesare pentru reducerea pierderilor de vieți omenești și intervenția la diferitele tipuri de situații de urgență.

Sistemul National are în compunere:

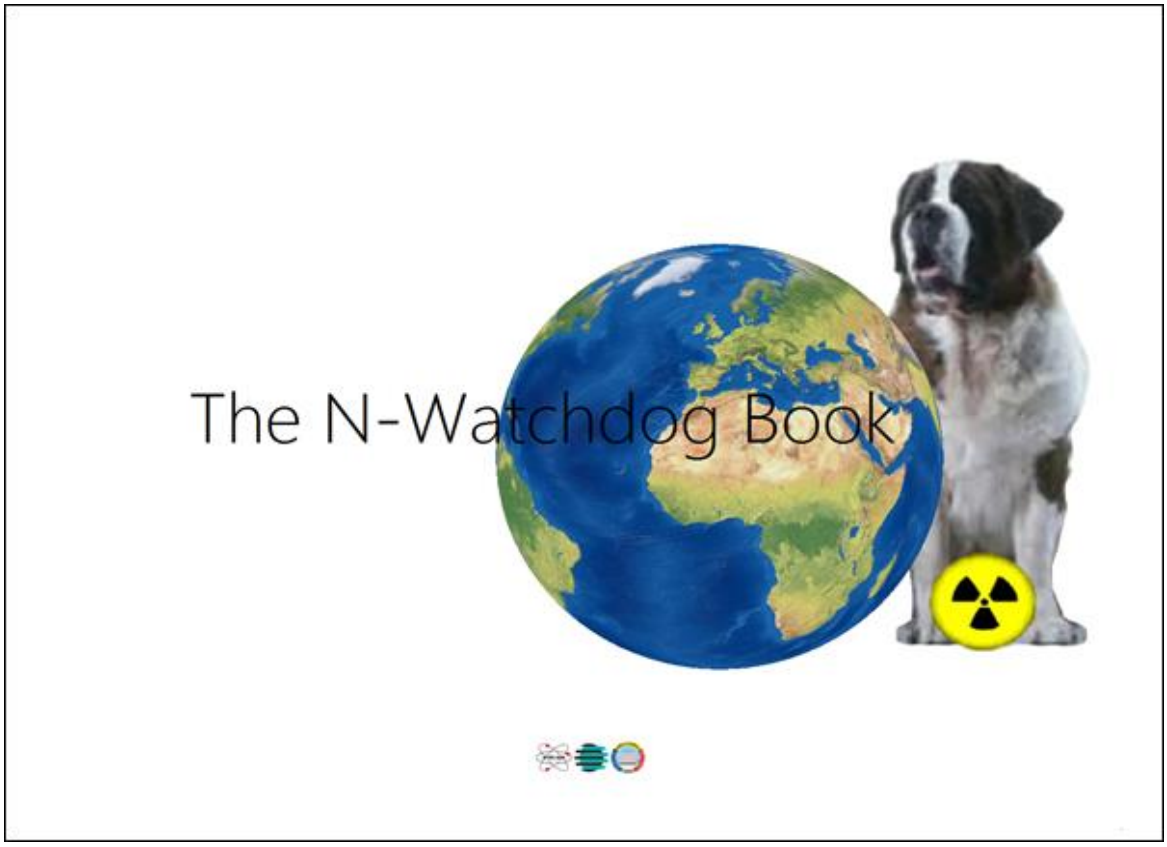
- Comitete pentru situații de urgență (la nivel național, ministerial, al municipiului București, județean și local);
- Inspectoratul General pentru Situații de Urgență (rol integrator - asigură transmiterea deciziilor luate de Guvern sau de către Comitetul Național către autpritățile administrației publice centrale și locale);
- Servicii publice comunitare profesioniste pentru situații de urgență (inspectorate județene pentru situații de urgență);
- Centre operative pentru situații de urgență (permanente sau temporare - se constituie în cadrul ministerelor și celorlalte instituții din cadrul sistemului, pentru a asigura fluxul de informații anterior sau în momentul producerii unei situații de urgență);
- Comandantul acțiunii (asigură coordonarea unitară la locul producerii evenimentului excepțional).

Pentru gestionarea situațiilor de urgență, IGSU și structurile județene îndeplinesc misiuni de:

- monitorizare, evaluare, cercetare a cauzelor producerii situațiilor de urgență;
- informare și educare preventivă a populației și avertizare a acesteia, înștiințare a autorităților administrației publice, despre posibilitatea/iminența producerii situațiilor de urgență;
- căutare, descarcerare și salvare a persoanelor;
- evacuare a persoanelor, populației sau bunurilor periclitate, prin asigurarea măsurilor de evacuare, instalarea taberelor de sinistrați, participarea la transportul populației și al unor categorii de bunuri;
- distrugere a zăpoarelor de gheață sau degajare a cursurilor de apă;
- acordare a asistenței medicale de urgență prin module SMURD din cadrul serviciilor de urgență profesioniste;
- asigurare logistică a intervenției structurilor proprii și punere la dispoziția altor structuri, a unor categorii de tehnică, materiale și echipamente;
- stingere a incendiilor;
- decontaminare a populației, cu mijloace specializate și/sau a punctelor de decontaminare personal, tehnică și echipament recunoscute din timp în profil teritorial
- neutralizare a efectelor materialelor periculoase prin acțiuni de asanare a muniției neexplodate din timpul conflictelor militare.

———

Etapa 4. Activitatea 4.5. Diseminarea rezultatelor N-WATCHDOG către comunitatea ştiinţifică şi către potenţialii beneficiari



IFIN-HH

1. Introducere

Pe parcursul executiei Proiectului partenerii au manifestat preocupare fata de diseminarea problematicii si a rezultatelor către comunitatea ştiinţifică şi potenţialii beneficiari. Printr-o contributie exceptionala in aceasta directie s-a remarcat Partenerul 3 - Universitatea Politehnica din Bucuresti, a carei echipa a excelat in activitatea de publicare de articole reflectand rezultate ale cercetarilor proprii sau intreprinse in cooperare, in reviste stiintifice de larga circulatie, precum si in organizarea de manifestari stiintifice internationale de profil [1]

Pentru Etapa a IV-a, concluziva, a Proiectului s-a avut in vedere *realizarea unei carti electronice cuprinzatoare*, menita sa confere rezultatelor efortului comun al partenerilor o vizibilitate comparabila, sau superioara aceleia a produselor realizate - N-WATCHDOG EX, Model Experimental; si N-N-WATCHDOG pB, Demonstrator de concept, a caror popularitate se va inregistra probabil, cu precadere, in mediile profesionale cu misiuni in domeniul Securitatii Nucleare.

In conceptia autorilor, *The N-Watchdog Book* este

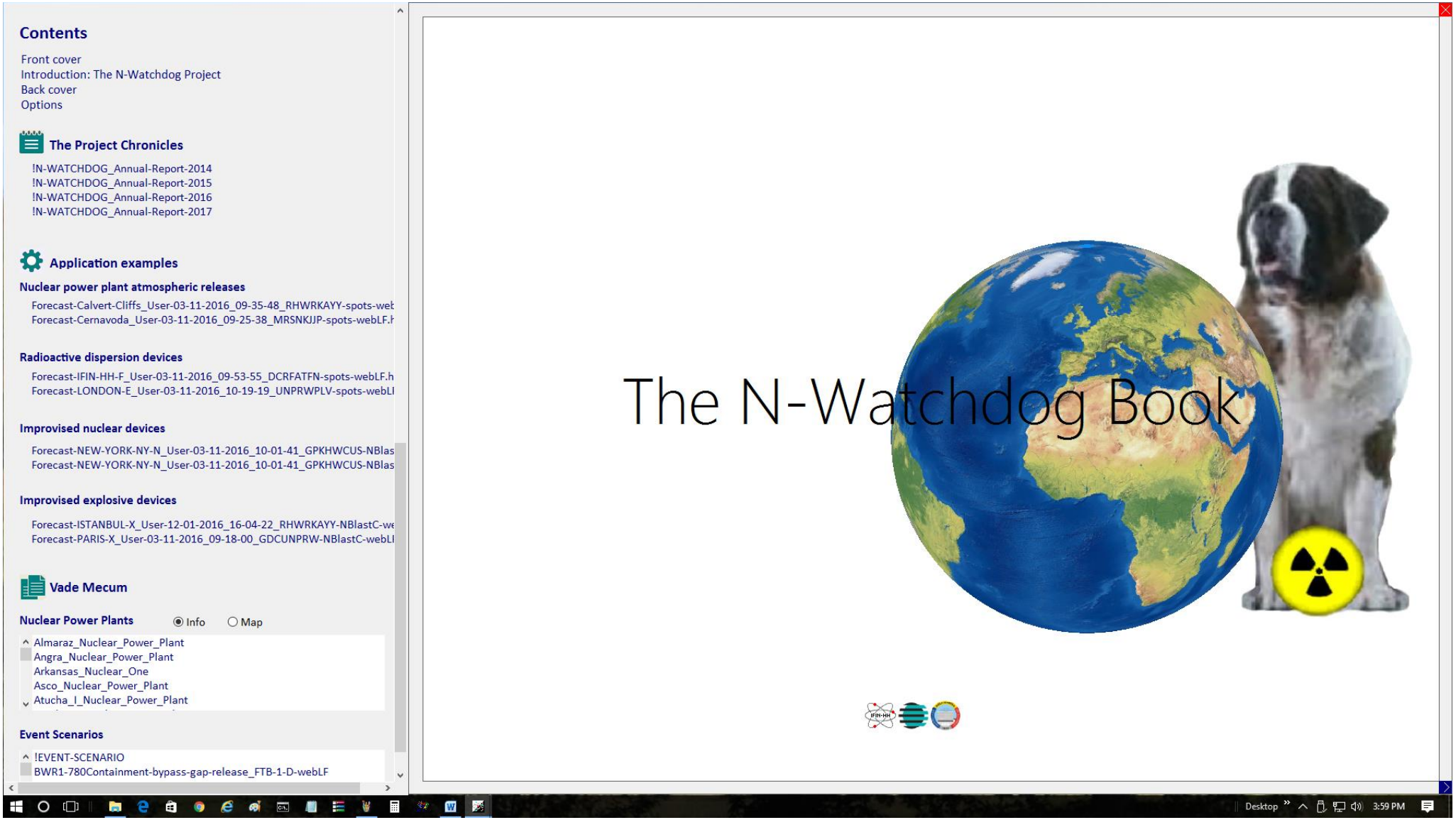
- ✓ *o cronica a Proiectului*, reflectand toate etapele si activitatile intreprinse;
- ✓ *o platforma de diseminare a bazei de cunostinte si date* de prima relevanta in pregatirea pentru situatii de accident nuclear sau urgenta radiologica; precum si
- ✓ *o platforma minimala de demonstrare practica* a functiunilor, solutiilor de abordare si rezultatelor platformei software N-WATCHDOG, de familiarizare cu problematica domeniului a 'cititorilor', pentru care *interactivitatea* ce a fost conferita *e-Book* poate reprezenta o folositoare si placuta provocare intelectuala.

Pornind de la convingerea ca o carte trebuie *citita* - si nu *explicata* - aceasta sectiune se constituie ca o ilustrare a continutului cartii electronice. Cartea in sine este, de fapt, *un obiect software* - un program livrat intr-un pachet de instalare propriu, ce poate fi expandat pe orice laptop sau desktop de clasa PC, dotat cu sistem de operare *MS Windows* 7, 8, sau, preferabil, 10, conexiune Internet si un browser compatibil HTML5.

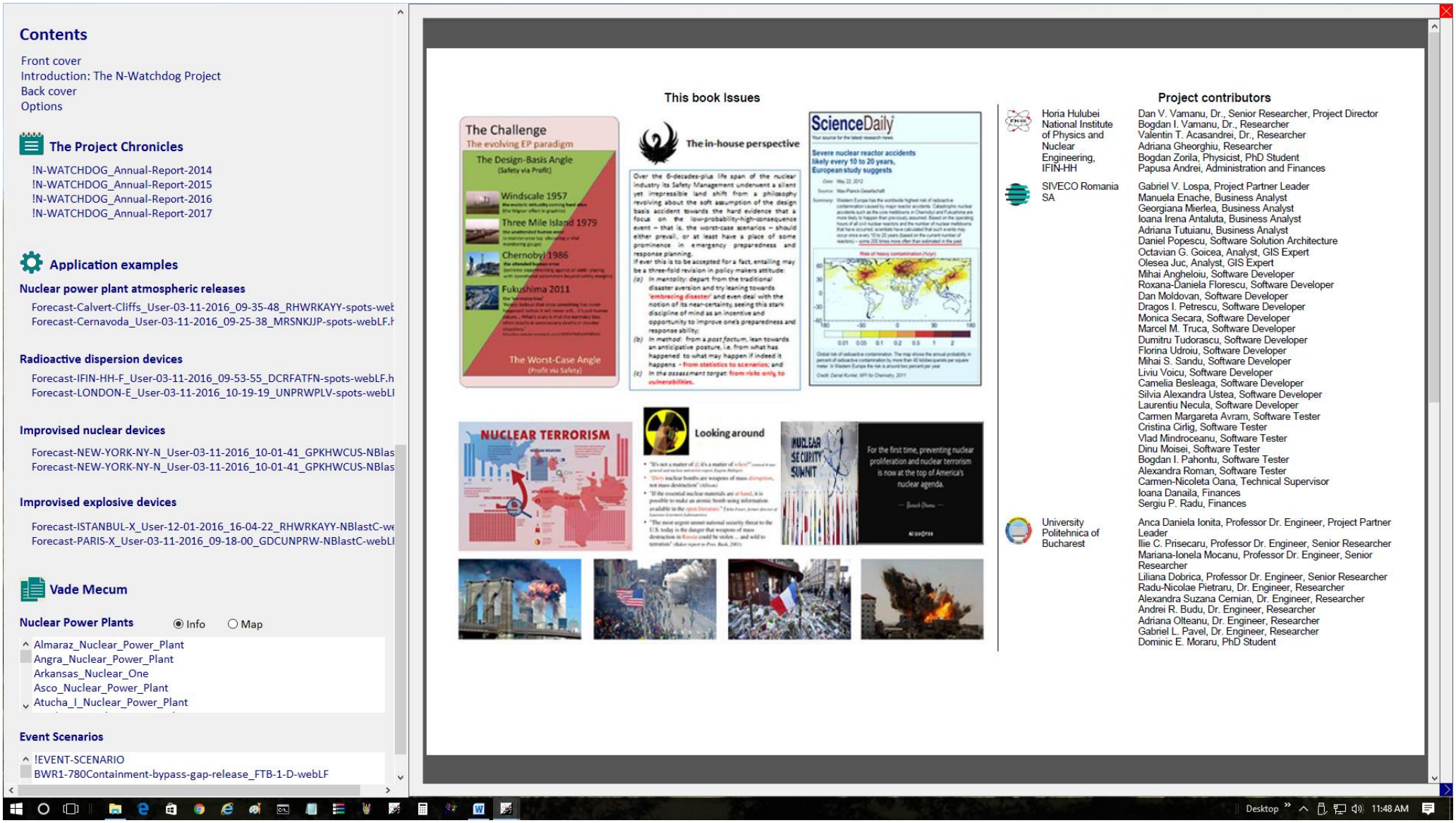
The N-Watchdog Book este redactata in limba oficiala a produselor Proiectului - limba engleza.

Ca operatie ce excede sarcinile asumate de Proiect, *difuzarea* cartii electronice constituie o problema distincta, supusa exigentelor legale in materie de *copyright* asupra materialelor *3rd party* ce abunda in grafica si continutul produsului.

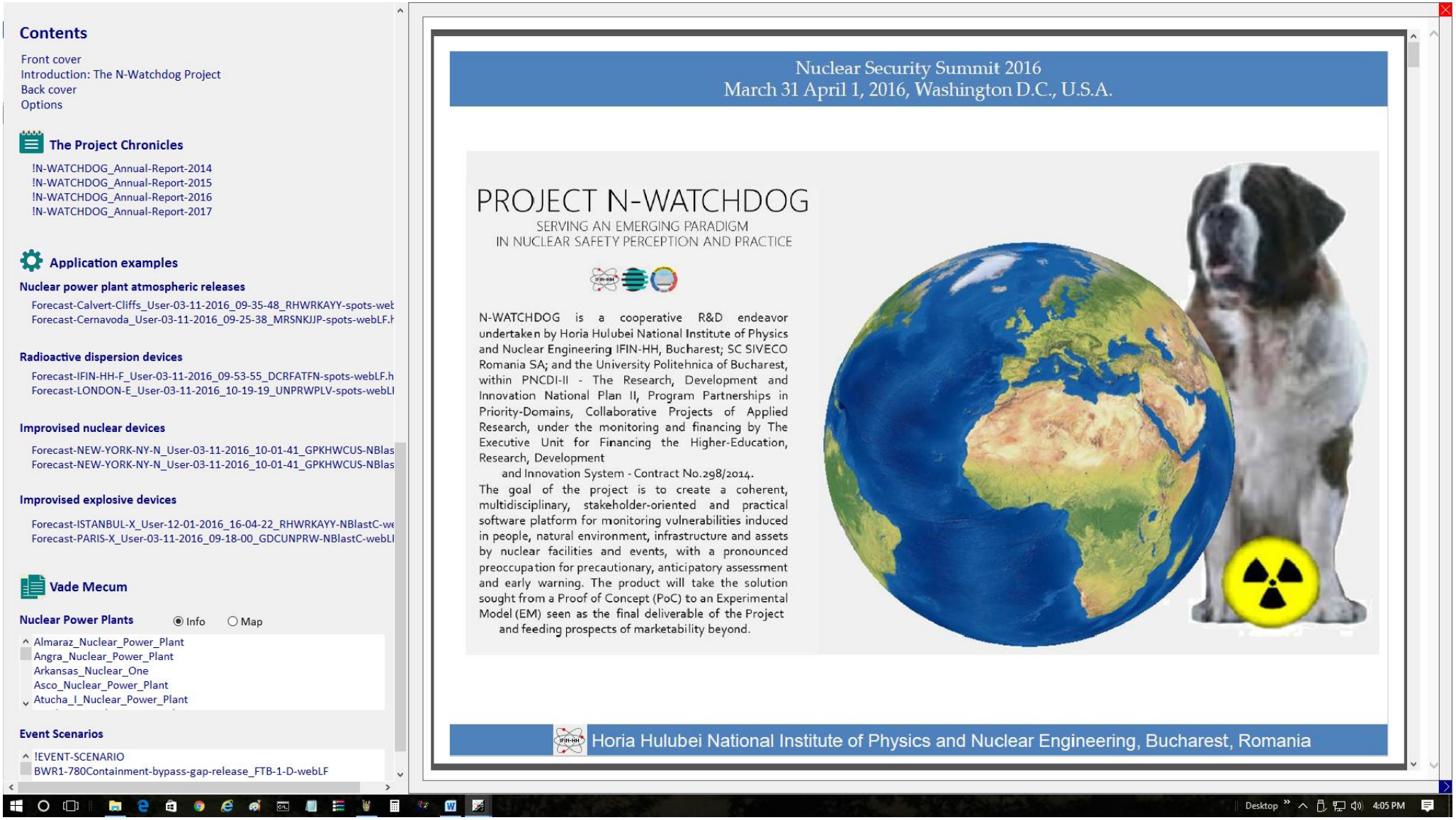
The Cover

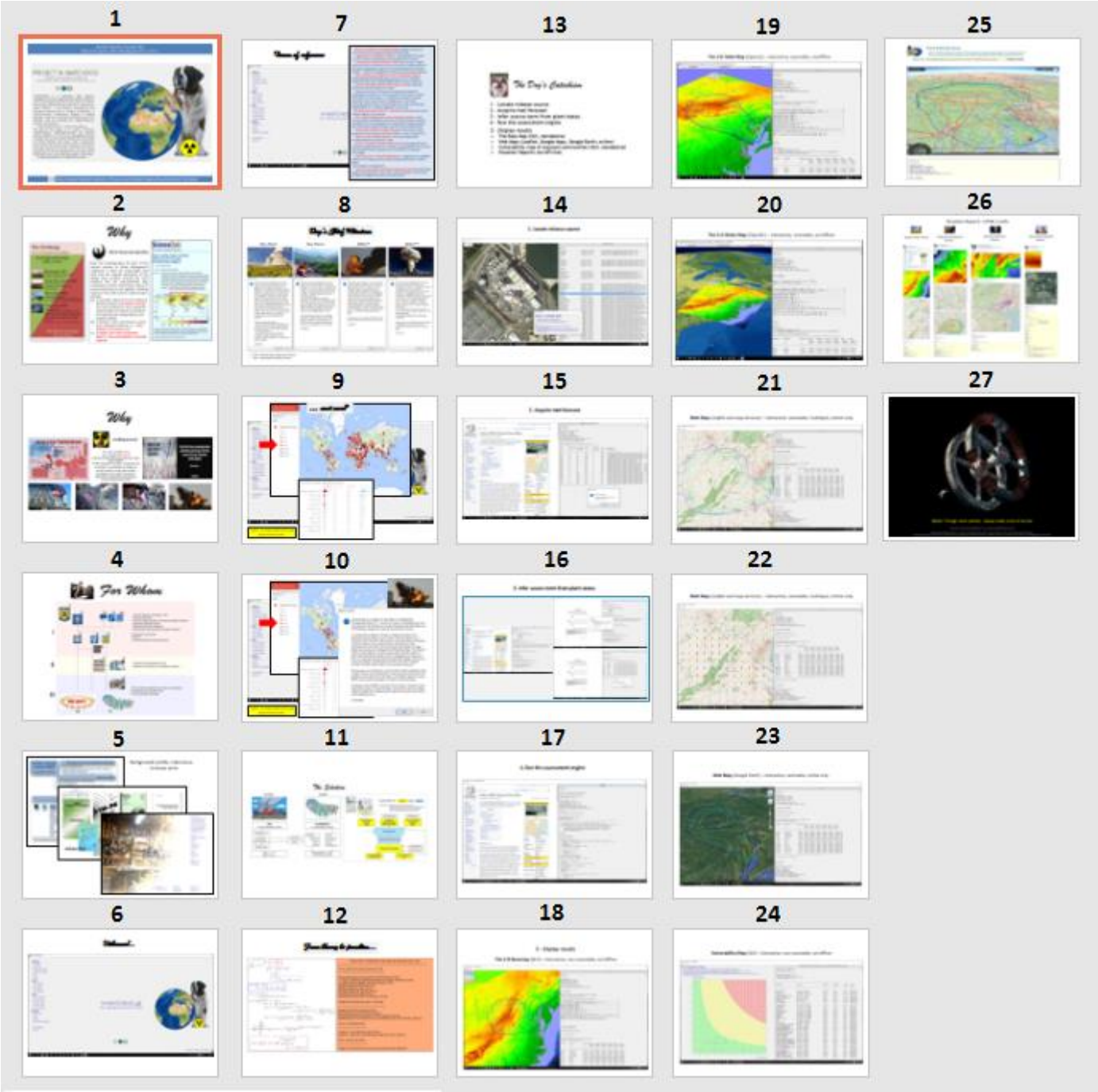

Contents
Front cover
Introduction: The N-Watchdog Project
Back cover
Options
The Project Chronicles
!N-WATCHDOG_Annual-Report-2014
!N-WATCHDOG_Annual-Report-2015
!N-WATCHDOG_Annual-Report-2016
!N-WATCHDOG_Annual-Report-2017
Application examples
Nuclear power plant atmospheric releases
Forecast-Calvert-Cliffs_User-03-11-2016_09-35-48_RHWRKAYY-spots-web
Forecast-Cernavoda_User-03-11-2016_09-25-38_MRSNKJJP-spots-webLF.h
Radioactive dispersion devices
Forecast-IFIN-HH-F_User-03-11-2016_09-53-55_DCRFATFN-spots-webLF.h
Forecast-LONDON-E_User-03-11-2016_10-19-19_UNPRWPLV-spots-webLI
Improvised nuclear devices
Forecast-NEW-YORK-NY-N_User-03-11-2016_10-01-41_GPKHWCUS-NBlas
Forecast-NEW-YORK-NY-N_User-03-11-2016_10-01-41_GPKHWCUS-NBlas
Improvised explosive devices
Forecast-ISTANBUL-X_User-12-01-2016_16-04-22_RHWRKAYY-NBlastC-we
Forecast-PARIS-X_User-03-11-2016_09-18-00_GDCUNPRW-NBlastC-webLI
Vade Mecum
Nuclear Power Plants
Info
Map
Almaraz_Nuclear_Power_Plant
Angra_Nuclear_Power_Plant
Arkansas_Nuclear_One
Asco_Nuclear_Power_Plant
Atucha_I_Nuclear_Power_Plant
Event Scenarios
!EVENT-SCENARIO
BWR1-780Containment-bypass-gap-release_FTB-1-D-webLF
The N-Watchdog Book
Desktop
3:59 PM

The Back Cover



Introduction




1
7
13
19
25
2
8
14
20
26
3
9
15
21
27
4
10
16
22
5
11
17
23
6
12
18
24

Contents
Front cover
Introduction: The N-Watchdog Project
Back cover
Options
The Project Chronicles
!N-WATCHDOG_Annual-Report-2014
!N-WATCHDOG_Annual-Report-2015
!N-WATCHDOG_Annual-Report-2016
!N-WATCHDOG_Annual-Report-2017
Application examples
Nuclear power plant atmospheric releases
Forecast-Calvert-Cliffs_User-03-11-2016_09-35-48_RHWRKAYY-spots-web
Forecast-Cernavoda_User-03-11-2016_09-25-38_MRSNKJJP-spots-webLF.h
Radioactive dispersion devices
Forecast-IFIN-HH-F_User-03-11-2016_09-53-55_DCRFATFN-spots-webLF.h
Forecast-LONDON-E_User-03-11-2016_10-19-19_UNPRWPLV-spots-webLI
Improvised nuclear devices
Forecast-NEW-YORK-NY-N_User-03-11-2016_10-01-41_GPKHWCUS-NBlas
Forecast-NEW-YORK-NY-N_User-03-11-2016_10-01-41_GPKHWCUS-NBlas
Improvised explosive devices
Forecast-ISTANBUL-X_User-12-01-2016_16-04-22_RHWRKAYY-NBlastC-we
Forecast-PARIS-X_User-03-11-2016_09-18-00_GDCUNPRW-NBlastC-webLI

Vade Mecum

Nuclear Power Plants ◉ Info ○ Map

- Almaraz_Nuclear_Power_Plant
- Angra_Nuclear_Power_Plant
- Arkansas_Nuclear_One
- Asco_Nuclear_Power_Plant
- Atucha_I_Nuclear_Power_Plant

Event Scenarios

- !EVENT-SCENARIO
- BWR1-780Containment-bypass-gap-release_FTB-1-D-webLF
- BWR1-780Containment-bypass-gap-release_FTB-1-F-webLF
- BWR1-780Containment-bypass-gap-release_FTB-6-A-webLF
- BWR1-780Containment-bypass-gap-release_FTB-6-D-webLF

Data

- The N-Watchdog Operational Data
- General Nuclear Emergency Data, by Feature
- General Nuclear Emergency Data, by Nuclide
- Good Practice and Regulatory Info

Readings

- 1-Nuclear-Safety-Basic-Norms_RO
- 2-Norms-on-Radioactive-Effluent-Dispersion_RO
- 3-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO
- 4-Norms-on-Nuclear-Facility-Radioactive-Release-Monitoring_RO
- 5-EU-COUNCIL-DIRECTIVE_96-29-1996

Links

- European Commission
- European Radiological Data Exchange Platform
- Government of Romania
- IAEA Incident and Emergency Centre
- International Atomic Energy Agency

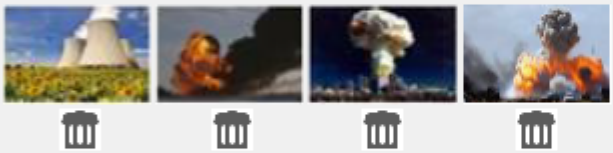
Media

- Meltdown at Three Mile Island
- Nuclear Energy Explained
- Nuclear power for the future
- Nuclear Power Future
- Nuclear Power Plant Safety Systems

Playground

- MY PLANT - forecasting NPP land footprints
- MY PLACE - forecasting your personal exposure
- RDD - simulating a Radioactive Dispersion Device event
- IND - simulating an Improvised Nuclear Device event
- IED - simulating an Improvised Explosive Device hit

Your recent work



- YOU ARE NOW IN ONLINE MODE. _

If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.

TO GET BACK IN ONLINE MODE, click again.

		Proiecte colaborative de cercetare aplicativa					
21	PN-II-PT-PCCA-2013-4-0262	SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR,BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE	Vasile Dan	Vamanu	INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA " HORIA HULUBEI " - IFIN - HH	SIVECO ROMANIA SA; UNIVERSITATEA POLITEHNICA DIN BUCURESTI	

Domeniul 8: Spaţiu şi securitate
Direcţia de cercetare 8.5. Sisteme şi infrastructura de securitate
Tematica de cercetare 8.5.3. Sisteme pentru asigurarea unui management eficient al situaţiilor de criză şi al intervenţiilor în cazul dezastrelor, sisteme de detecţie, prevenire şi alertă.
Aprobat: Ordinul MEN nr. 298/23.06.2014
Contract Nr. 298

SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR, BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE

Etapa 1
Proiectarea Demonstratorului funcţional de concept N-WATCHDOG (PoC)

RAPORT STIINTIFIC SI TEHNIC
- Sinteza -

Nota editoriala

Acest document articuleaza forme abreviate ale Rapoartelor tehnice reprezentand livrabile ale Activitatilor prevazute in Planul de realizare a Proiectului, amendat prin efectul Ordinului MEN Nr.558/2014, astfel:

Activitatea 1.1. Documentarea cunostintelor de Fizica; a datelor si modelelor specifice, adaptate proceselor PoC-executabile; si a bibliotecilor de date. Solutii de implementare IT.
Raport Tehnic #1 (182 pagini), IFIN-HH

Activitatea 1.2. Proiectul structurii modulare a PoC.
Raport Tehnic #2 (128 pagini), IFIN-HH

Activitatea1.3. Analiza Sistemului Informatic (IT System Analysis).
Raport Tehnic #3 (10 pagini), SIVECO & UPB

Activitatea 1.4. Dezvoltarea software si implementarea structurii modulare a Demonstratorului N-WATCHDOG si a inventarelor de date structurate, Partea I.
Raport Tehnic #4 (26 pagini), IFIN-HH

Rapoartele *in extenso* sunt disponibile pentru consultare, la adresa http://www.nipne.ro/research/projects/

Contact: dvamanu@yahoo.com

Institutul National de Cercetare-Dezvoltare pentru Fizica si Inginerie Nucleara 'Horia Hulubei'	SIVECO	Universitatea Politehnica din Bucuresti

		Proiecte colaborative de cercetare aplicativa					
21	PN-II-PT-PCCA-2013-4-0262	SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR,BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE	Vasile Dan	Vamanu	INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA " HORIA HULUBEI " - IFIN - HH	SIVECO ROMANIA SA; UNIVERSITATEA POLITEHNICA DIN BUCURESTI	

Domeniul 8: Spaţiu şi securitate
Direcţia de cercetare 8.5. Sisteme şi infrastructura de securitate
Tematica de cercetare 8.5.3. Sisteme pentru asigurarea unui management eficient al situaţiilor de criză şi al intervenţiilor în cazul dezastrelor, sisteme de detecţie, prevenire şi alertă.
Aprobat: Ordinul MEN nr. 298/23.06.2014
Contract Nr. 298

SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR, BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE

Etapa 2
01/01/2015 – 31/12/2015
Dezvoltarea software si implementarea Demonstratorului N-WATCHDOG (PoC)

RAPORT STIINTIFIC SI TEHNIC

Nota editoriala
Acest document asambleaza Rapoartele tehnice ale partenerilor privind rezultatele Etapei a II-a a proiectului, specificate conform Planului de realizare, astfel:

1. Demonstratorul functional al conceptului N-WATCHDOG (PoC), Partea a II-a: Platforma integrala de referinta (IFIN-HH).
2. Software, subsisteme educationale pentru asigurarea tranzitiei de la PoC la livrabilul final N-WATCHDOG, Model Experimental (EM) (Raport tehnic, SIVECO, UPB)
3. Termeni de referinta si repere tehnice ale asimilarii PoC in EM (Raport tehnic, UPB).
4. Articole si lucrari stiintifice (Raport de diseminare, UPB)
5. Suport decizional pentru asigurarea tranzitiei de la PoC la livrabilul final N-WATCHDOG, Partea I (Raport tehnic, UPB)

Institutul National de Cercetare-Dezvoltare pentru Fizica si Inginerie Nucleara 'Horia Hulubei'	SIVECO	Universitatea Politehnica din Bucuresti

SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR, BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE

Etapa 3
01/01/2016 – 31/12/2016
Testarea in-house si evaluarea Demonstratorului N-WATCHDOG.
Dezvoltarea Modelului experimental N-WATCHDOG (EM), PARTEA I

RAPORT STIINTIFIC SI TEHNIC

Nota editoriala
Acest document asambleaza Rapoartele tehnice ale partenerilor privind rezultatele Etapei a III-a a proiectului, specificate conform Planului de realizare, astfel:

I. Suport decizional pentru asigurarea tranzitiei de la PoC la livrabilul final N-WATCHDOG, Model experimental (EM) (Raport tehnic, UPB) Partea a II-a.

II. Raport de evaluare privind testarea Demonstratorului de concept N-WATCHDOG, PoC (Raport tehnic, UPB).

III. Versiunea de referinta post-testare, a Demonstratorului N-WATCHDOG, PoC (IFIN-HH, SIVECO) Partea I.

IV. Platforma N-WATCHDOG, Model Experimental , EM (SIVECO), PARTEA I – Proiectarea si realizarea intefetei de comanda a platformei, asimilarea si instalarea resurselor de date.

Proiecte colaborative de cercetare aplicativa

21	PN-II-PT-PCCA-2013-4-0262	SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR, BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE	Vasile Dan	Vamanu	INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE PENTRU FIZICA SI INGINERIE NUCLEARA "HORIA HULUBEI" - IFIN - HH	SIVECO ROMANIA SA; UNIVERSITATEA POLITEHNICA DIN BUCURESTI

Domeniul 8: Spaţiu şi securitate
Direcţia de cercetare 8.5. Sisteme şi infrastructura de securitate
Tematica de cercetare 8.5.3. Sisteme pentru asigurarea unui management eficient al situaţiilor de criză şi al intervenţiilor în cazul dezastrelor, sisteme de detecţie, prevenire şi alertă.
Aprobat: Ordinul MEN nr. 298/23.06.2014
Contract Nr. 298

SISTEM DE ALERTARE TIMPURIE SI ASISTARE COMPUTERIZATA A DECIZIILOR, BAZAT PE EVALUAREA ANTICIPATIVA A DINAMICII RAPIDE A VULNERABILITATILOR INDUSE IN TERITORIU DE OBIECTIVELE NUCLEARE

Etapa 4
01/01/2017 – 30/09/2017
Dezvoltarea, testarea si livrarea Modelului experimental N-WATCHDOG EM.

RAPORT STIINTIFIC SI TEHNIC

Nota editoriala
Acest document asambleaza Rapoartele tehnice ale partenerilor privind rezultatele Etapei a IV-a a proiectului, specificate conform Planului de realizare, astfel:

1. Platforma N-WATCHDOG, Model Experimental, EM (SIVECO), PARTEA II - realizarea si integrarea in platforma a modulelor executabile ale aplicatiilor, testarea si finalizarea produsului.

2. Scenarii de test pentru simularea situatiilor de criza (IFIN-HH, UPB).

3. Raport cu privire la functionalitatile sistemului N-WATCHDOG si la potentialele beneficii ale implementarii unui astfel de sistem (Raport tehnic SIVECO)

4. N-WATCHDOG e-book (IFIN-HH, UPB)

Institutul National de Cercetare-Dezvoltare pentru Fizica si Inginerie Nucleara "Horia Hulubei" | SIVECO | Universitatea Politehnica din Bucuresti

APPLICATION EXAMPLES: Nuclear power plant atmospheric releases

Contents

Front cover
Introduction: The N-Watchdog Project
Back cover
Options

The Project Chronicles

!N-WATCHDOG_Annual-Report-2014
!N-WATCHDOG_Annual-Report-2015
!N-WATCHDOG_Annual-Report-2016
!N-WATCHDOG_Annual-Report-2017

Application examples

Nuclear power plant atmospheric releases

Forecast-Calvert-Cliffs_User-03-11-2016_09-35-48_RHWRKAYY-spots-web
Forecast-Cernavoda_User-03-11-2016_09-25-38_MRSNKJJP-spots-webLF.h

Radioactive dispersion devices

Forecast-IFIN-HH-F_User-03-11-2016_09-53-55_DCRFATFN-spots-webLF.h
Forecast-LONDON-E_User-03-11-2016_10-19-19_UNPRWPLV-spots-webLI

Improvised nuclear devices

Forecast-NEW-YORK-NY-N_User-03-11-2016_10-01-41_GPKHWCUS-NBlas
Forecast-NEW-YORK-NY-N_User-03-11-2016_10-01-41_GPKHWCUS-NBlas

Improvised explosive devices

Forecast-ISTANBUL-X_User-12-01-2016_16-04-22_RHWRKAYY-NBlastC-we
Forecast-PARIS-X_User-03-11-2016_09-18-00_GDCUNPRW-NBlastC-webLI

Vade Mecum

Nuclear Power Plants ◉ Info ○ Map

Almaraz_Nuclear_Power_Plant
Angra_Nuclear_Power_Plant
Arkansas_Nuclear_One
Asco_Nuclear_Power_Plant
Atucha_I_Nuclear_Power_Plant

Event Scenarios

!EVENT-SCENARIO
BWR1-780Containment-bypass-gap-release_FTB-1-D-webLF

N-WATCHDOG SitReps

Situation Reports forecasting territorial vulnerability induced by nuclear facilities, or events, as of Mar 11, 2016, 09:43:37.
Notice: GIS data are simulated. Radiological data and info reflect user assumptions on the source terms, and real meteorological forecasts at the date and time of events.

Not logged in Talk Contributions Create account Log in

Article Talk Read Edit View history Search

WIKIPEDIA
The Free Encyclopedia

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store

Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page

Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item
Cite this page

Print/export
Create a book
Download as PDF
Printable version

Languages

Calvert Cliffs Nuclear Power Plant

From Wikipedia, the free encyclopedia

Coordinates: 38°25'55"N 76°26'32"W

The **Calvert Cliffs Nuclear Power Plant** (CCNPP) is a nuclear power plant located on the western shore of the Chesapeake Bay near Lusby, Calvert County, Maryland in the Mid-Atlantic United States.

Contents

1 Overview
2 Surrounding population
3 Risks and concerns
3.1 Security
3.2 Proximity to LNG plant
3.3 Seismic risk
3.4 Environmental concerns
4 2000 renewal of operating license
5 Proposal to add a third reactor
6 Reactor data
7 See also
8 References
9 External links

Calvert Cliffs Nuclear Power Plant

Aerial view of Calvert Cliffs Nuclear Power Plant

Location of Calvert Cliffs Nuclear Power Plant in Maryland

Country	United States
Location	Calvert County, near Lusby, Maryland
Coordinates	38°25'55"N 76°26'32"W
Status	Operational
Commission date	Unit 1: 1975 Unit 2: 1977
Owner(s)	CENG

Overview [edit]

The plant, owned and operated by CENG, a joint venture between Exelon and Électricité de France, has two 2737 megawatt thermal (MWth) Combustion Engineering Generation II two-loop pressurized water reactors. Each generating plant (CCNPP 1&2) produces

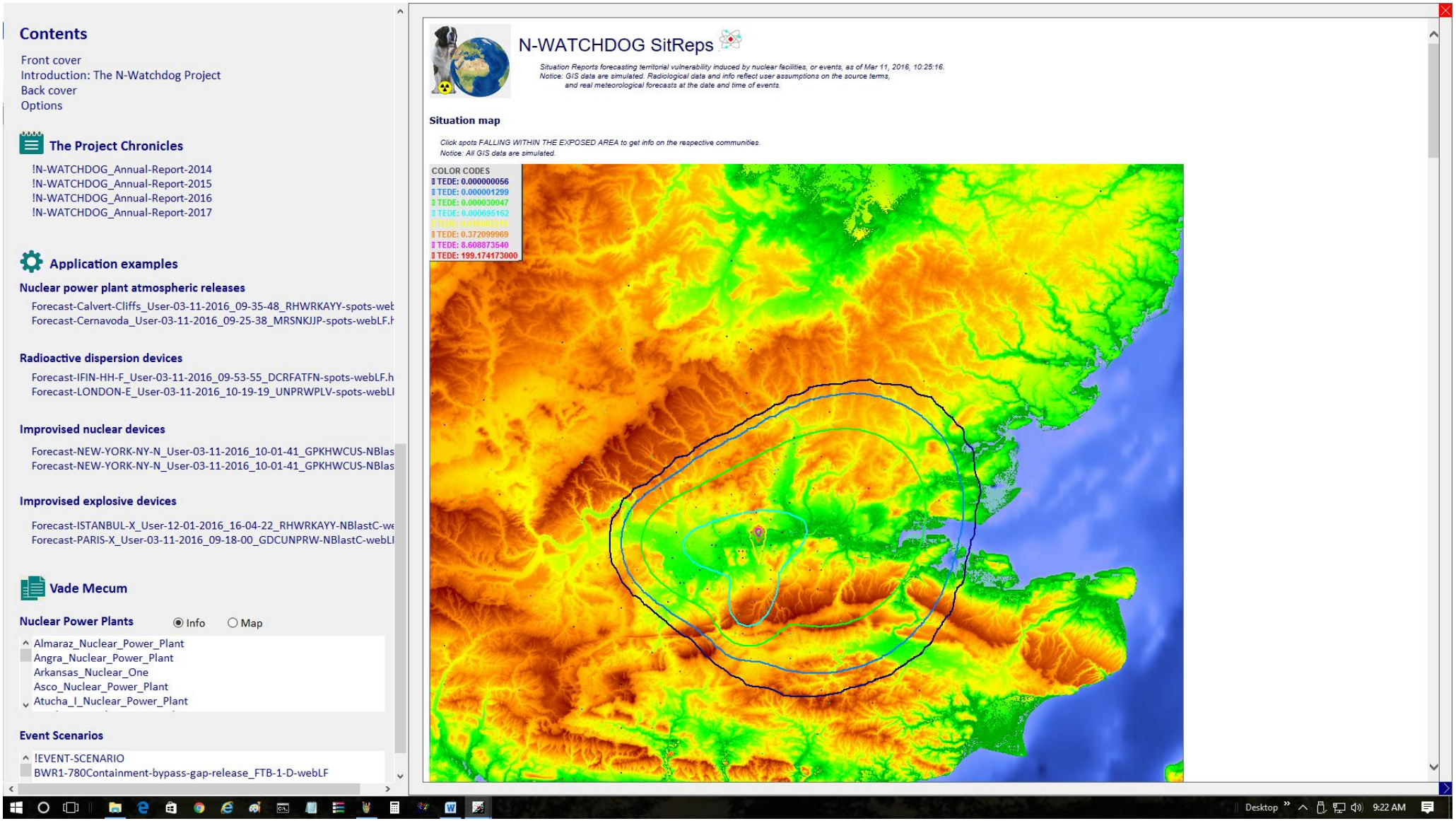
Situation map

Click spots FALLING WITHIN THE EXPOSED AREA to get info on the respective communities.
Notice: All GIS data are simulated.

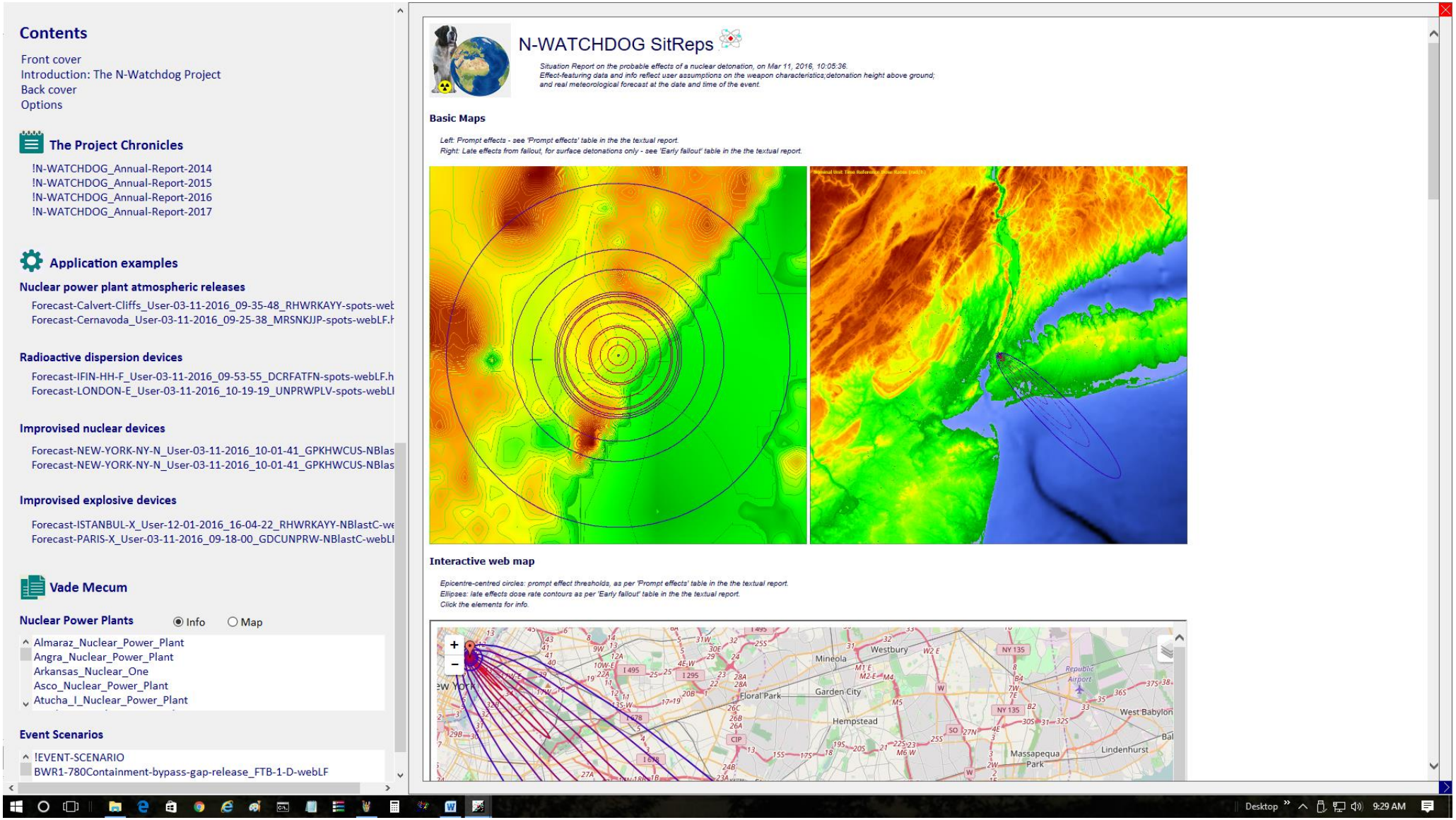
COLOR CODES
TEDE: 0.000000000
TEDE: 0.000000000

Desktop 9:20 AM

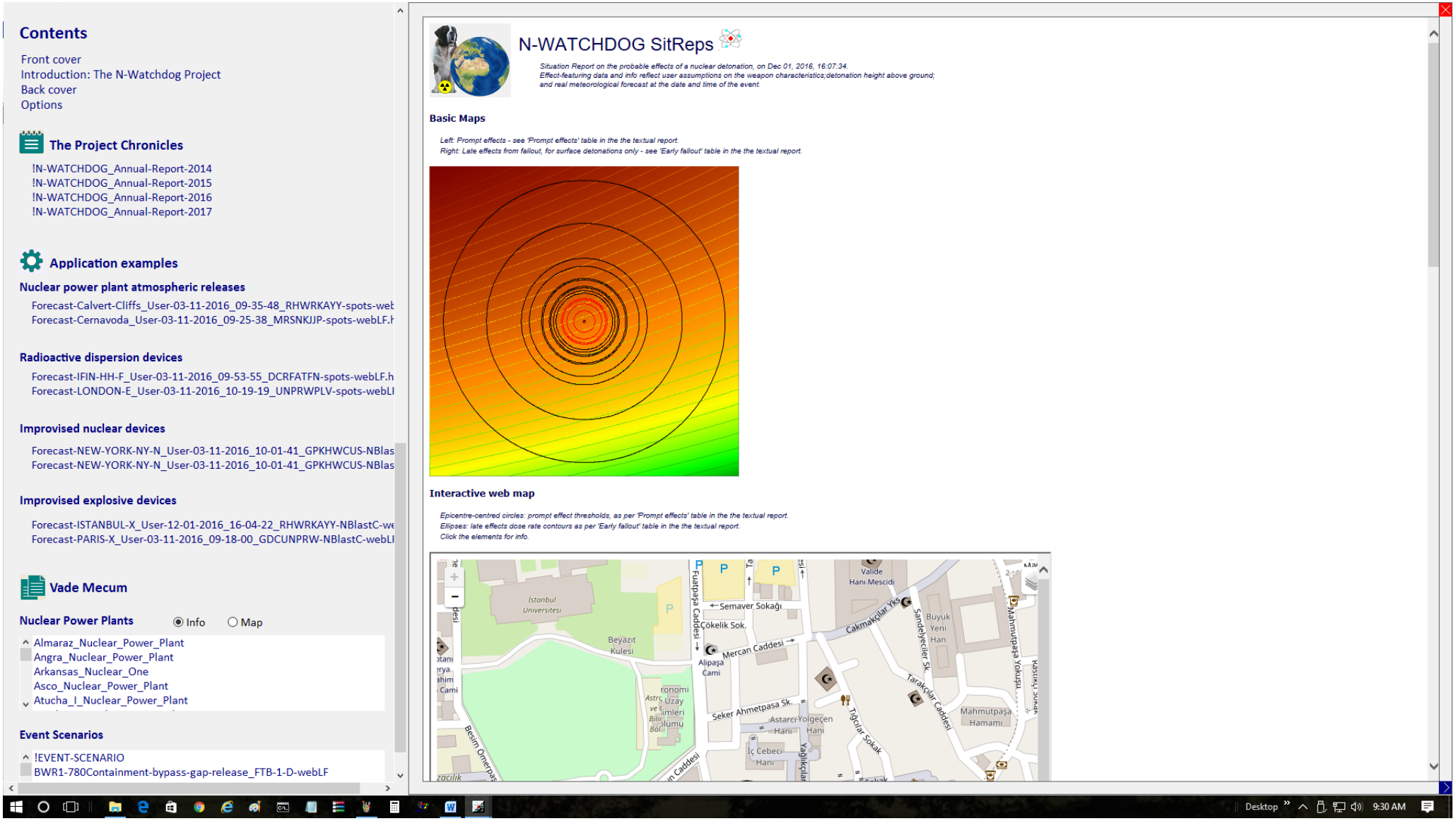
Radioactive Dispersion Devices



Improvised Nuclear Devices (IND)



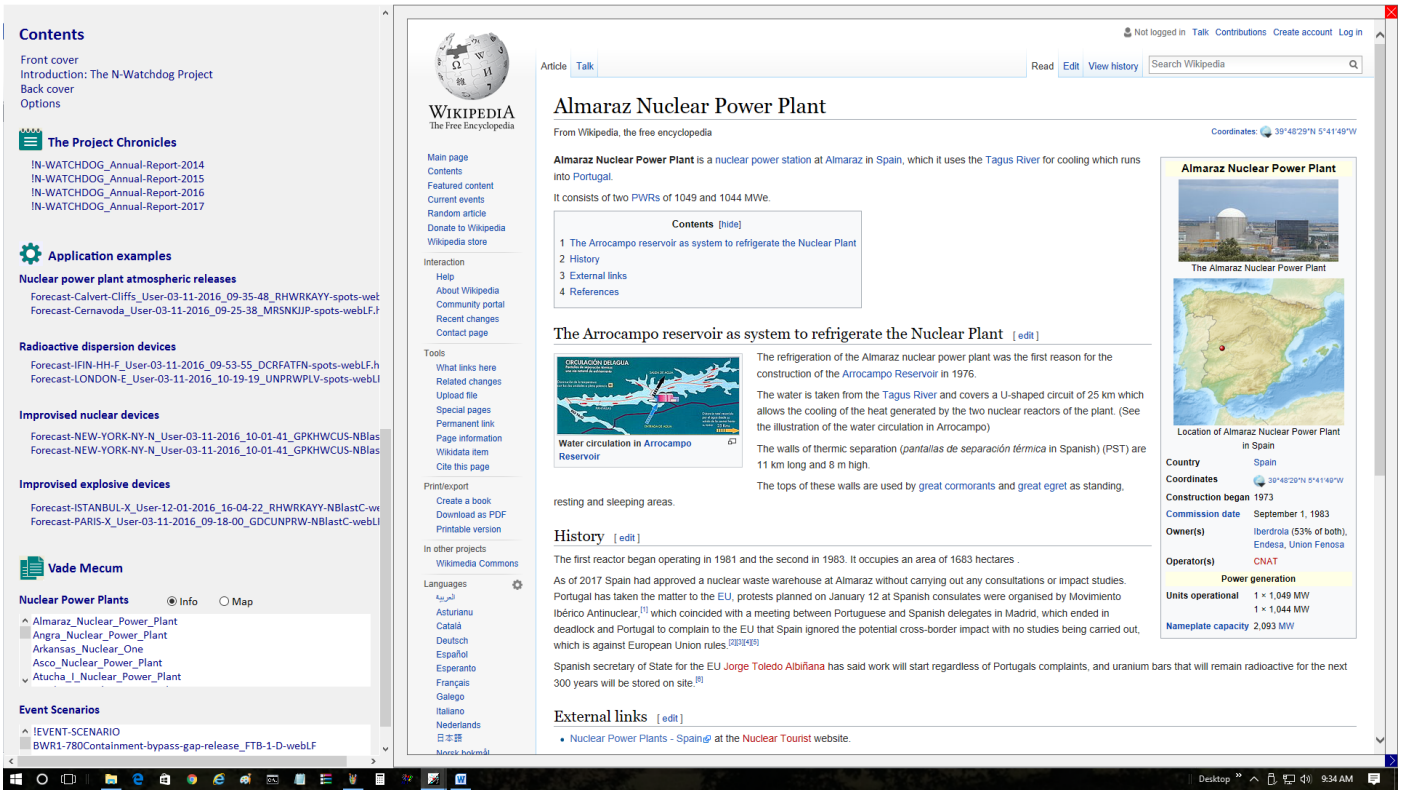
Improvised Explosive Devices (IED)



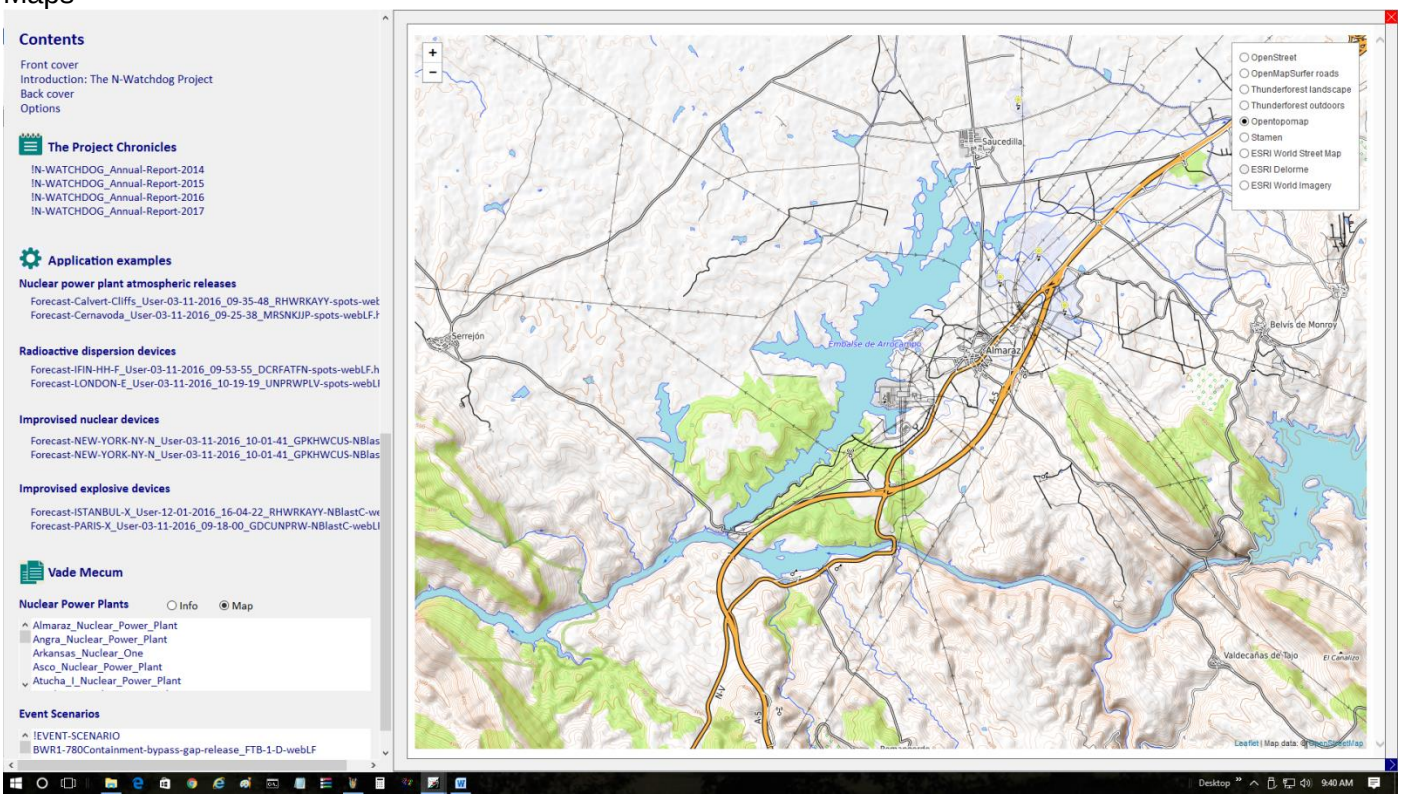
Vade Mecum

❖Nuclear Power Plants

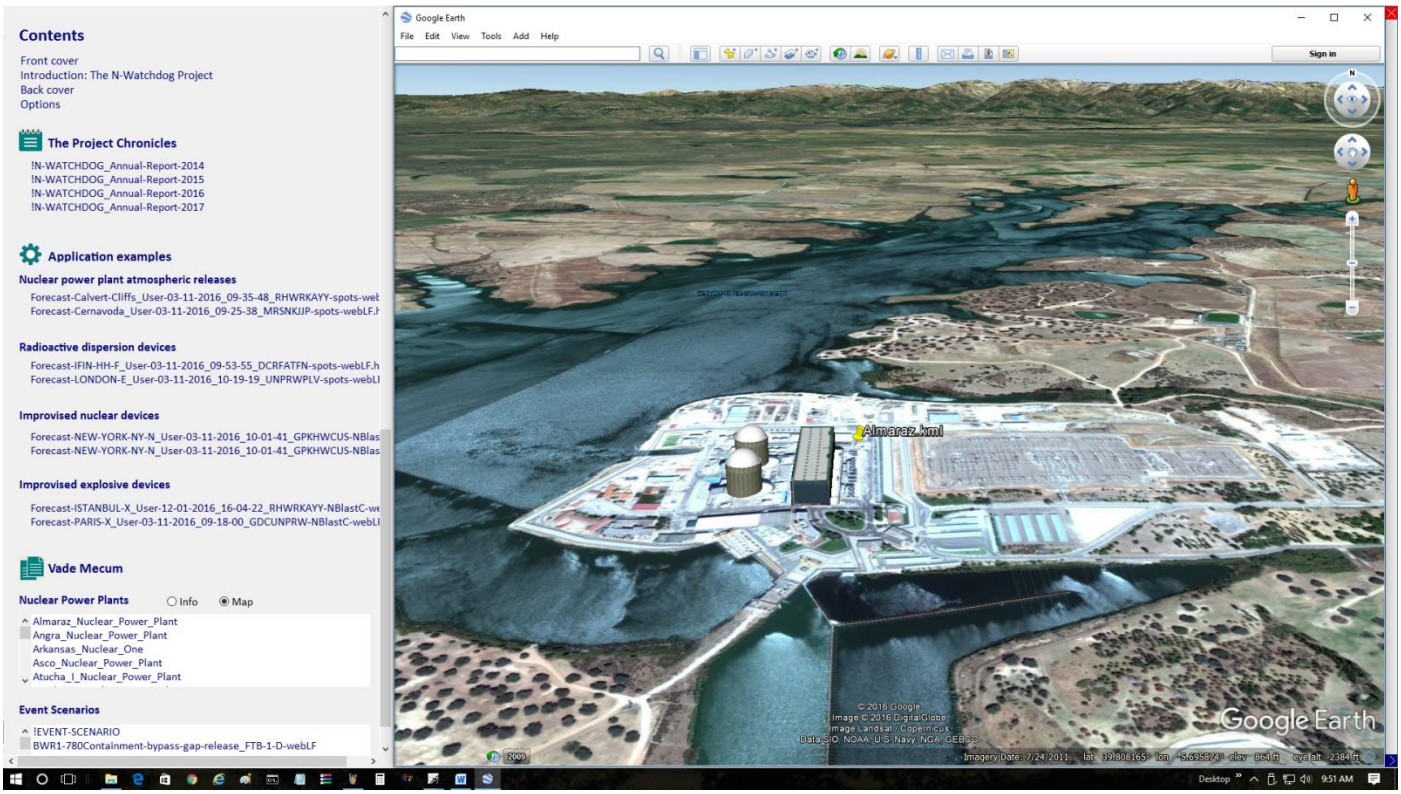
Info

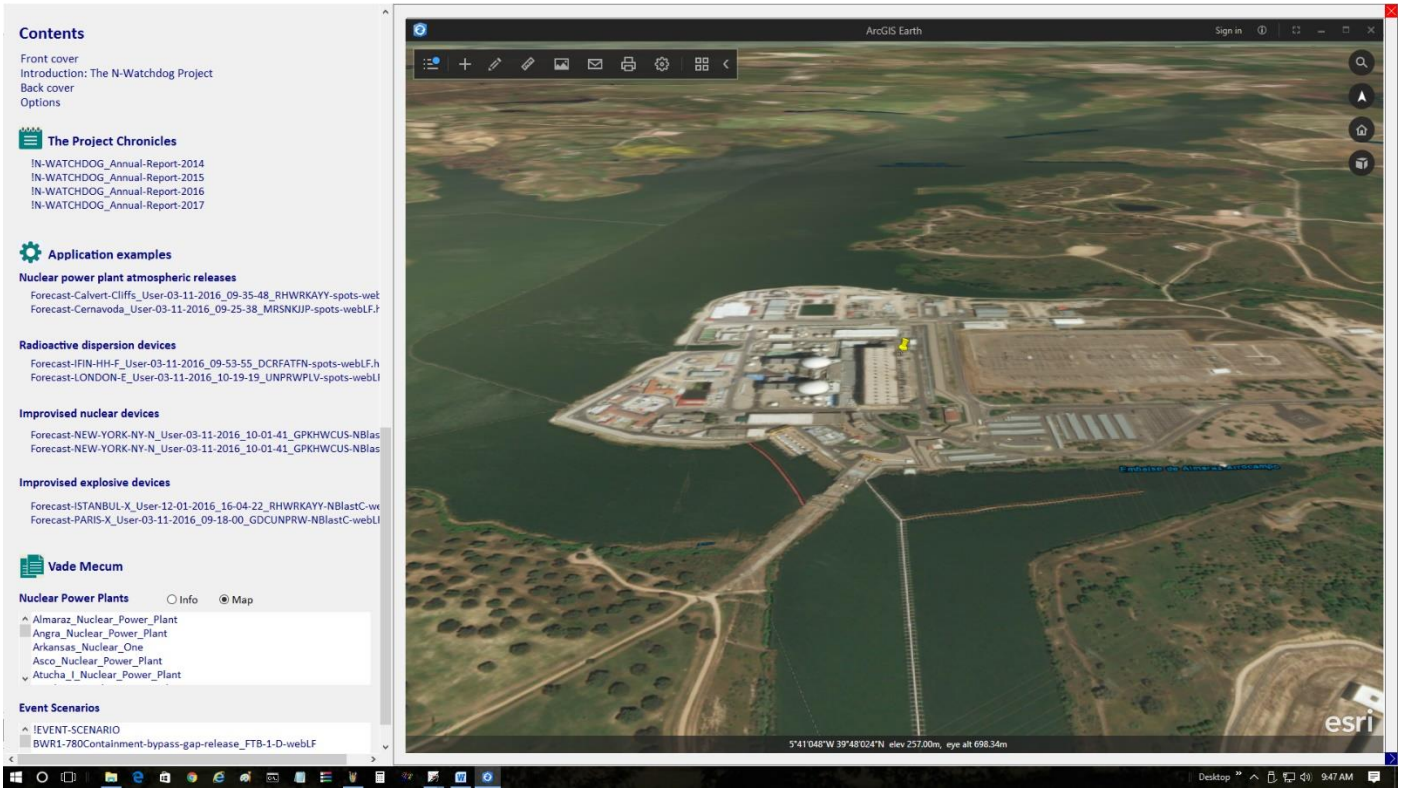


Maps



Scenes ('worlds')





❖Event Scenarios

Almaraz_Nuclear_Power_Plant
Angra_Nuclear_Power_Plant
Arkansas_Nuclear_One
Asco_Nuclear_Power_Plant
Atucha_I_Nuclear_Power_Plant

Event Scenarios

!EVENT-SCENARIO
BWR1-780Containment-bypass-gap-release_FTB-1-D-webLF
BWR1-780Containment-bypass-gap-release_FTB-1-F-webLF
BWR1-780Containment-bypass-gap-release_FTB-6-A-webLF
BWR1-780Containment-bypass-gap-release_FTB-6-D-webLF

Data

The N-Watchdog Operational Data
General Nuclear Emergency Data, by Feature
General Nuclear Emergency Data, by Nuclide
Good Practice and Regulatory Info

Readings

1-Nuclear-Safety-Basic-Norms_RO
2-Norms-on-Radioactive-Effluent-Dispersion_RO
3-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO
4-Norms-on-Nuclear-Facility-Radioactive-Release-Monitoring_RO
5-EU-COUNCIL-DIRECTIVE_96-29-1996

Links

European Commission
European Radiological Data Exchange Platform
Government of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency

Media

Chernobyl Nuclear - Surviving Disaster
Chernobyl Uncensored
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima

Playground

MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit

BUILDING EVENT SCENARIOS - ASSUMPTIONS AND VARIABLES

In the sense adopted in N-WATCHDOG, an *Event Scenario* is an amount of descriptive and quantitative information (data) that would be sufficient for determining - via running the code's applications on such input - the area of influence of a radioactive atmospheric release and provide the expected dosimetric data supporting a defendable event diagnose; set of coutermeasures if appropriate; and information on the health effects possible - if any. While it follows from the above that a scenario will depend on the type of event considered - a nuclear plant release, a radioactive dispersion device or an improvised nuclear device detonation - a basic level of N-WATCHDOG knowledge would indicate that a method *can* however be devised to allow a relevant treatment of various types of events on a footing that would enable a meaningful comparison of various typical situations.

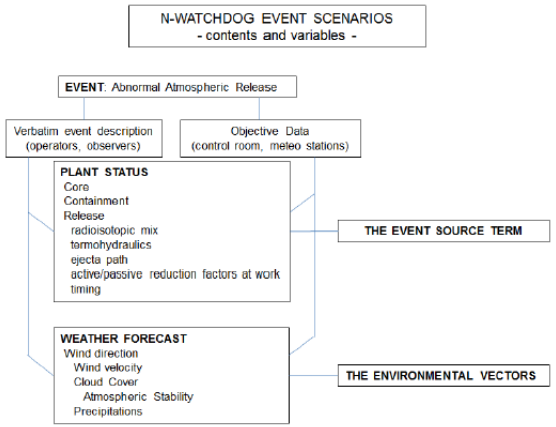


Fig.1. Generic business logics in building up NPP-event scenarios.

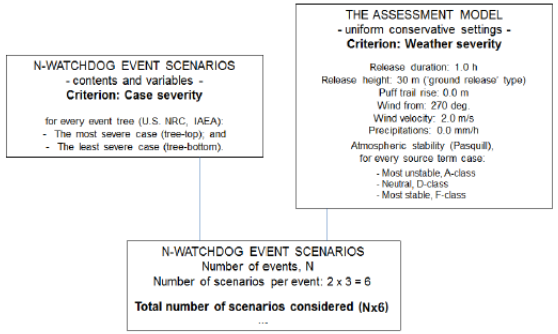
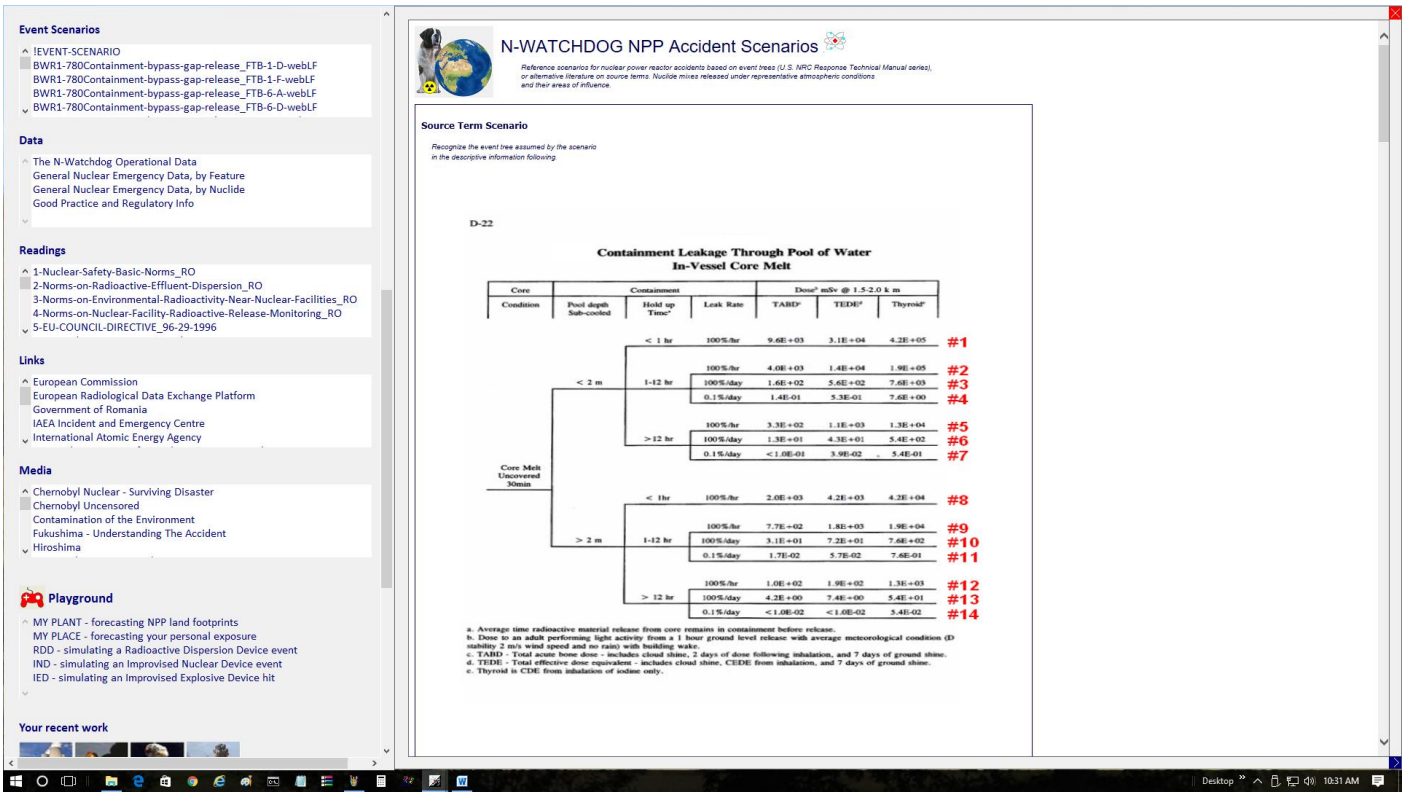


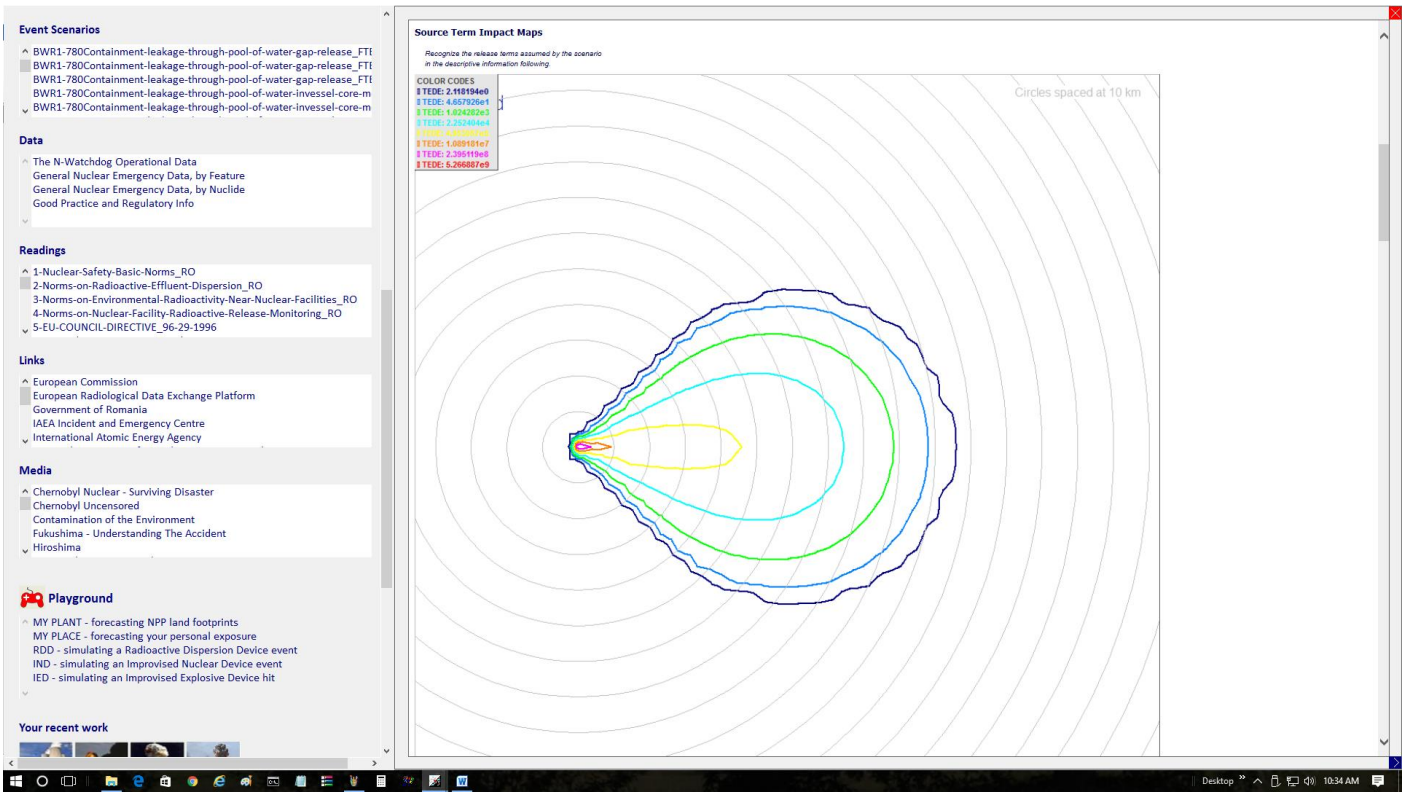
Fig.2. Generic business logics in assessing the NPP-event scenarios.

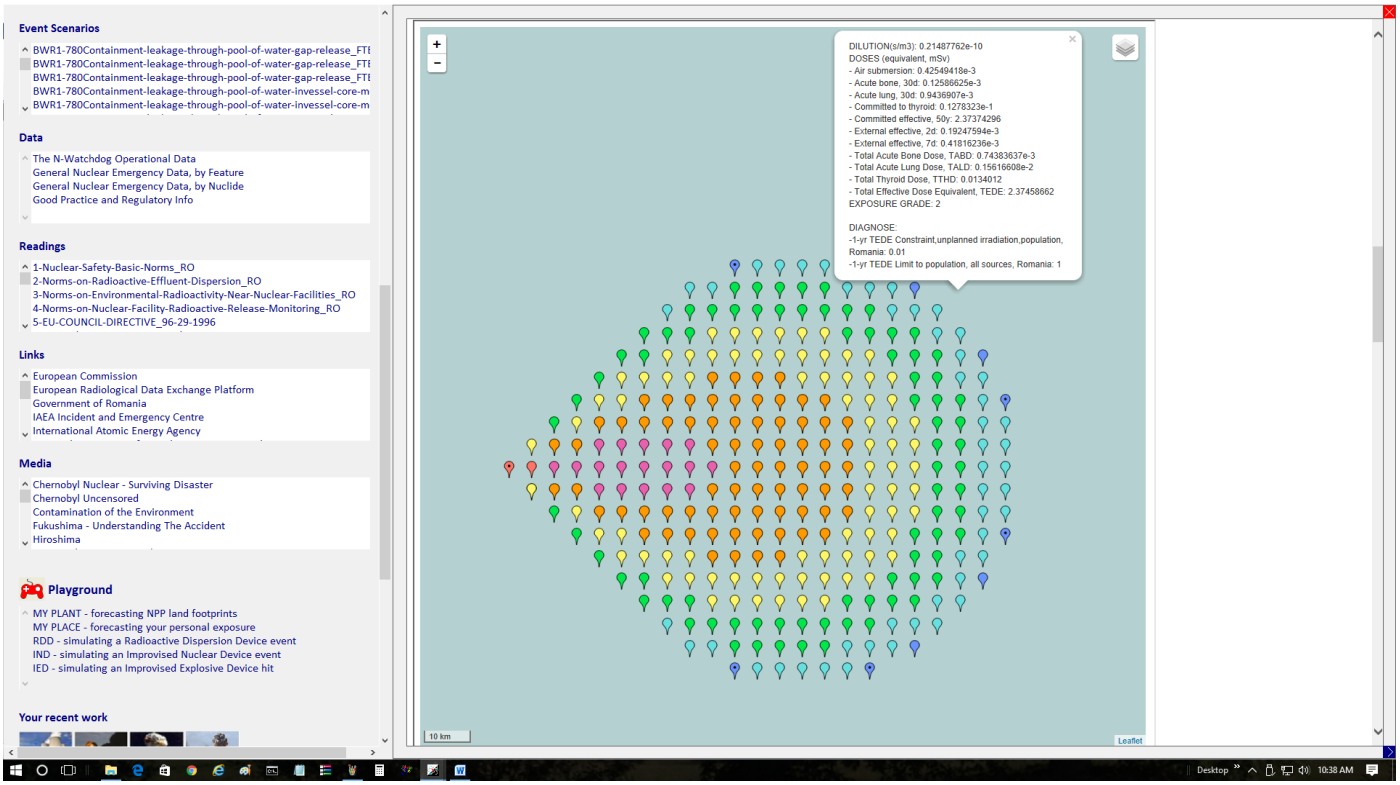
This observation is particularly favored in the case of events relating to nuclear power plants, for which authoritative national regulators and international organizations have issued a comprehensive documentation. It is for this reason that the endeavor to provide a telling collection of scenarios that may prove supportive in users' understanding and handling N-WATCHDOG was confined to the nuclear reactors only - while it is only fair to indicate that the platform itself is always ready to address any scenario that may be reasonably imagined.

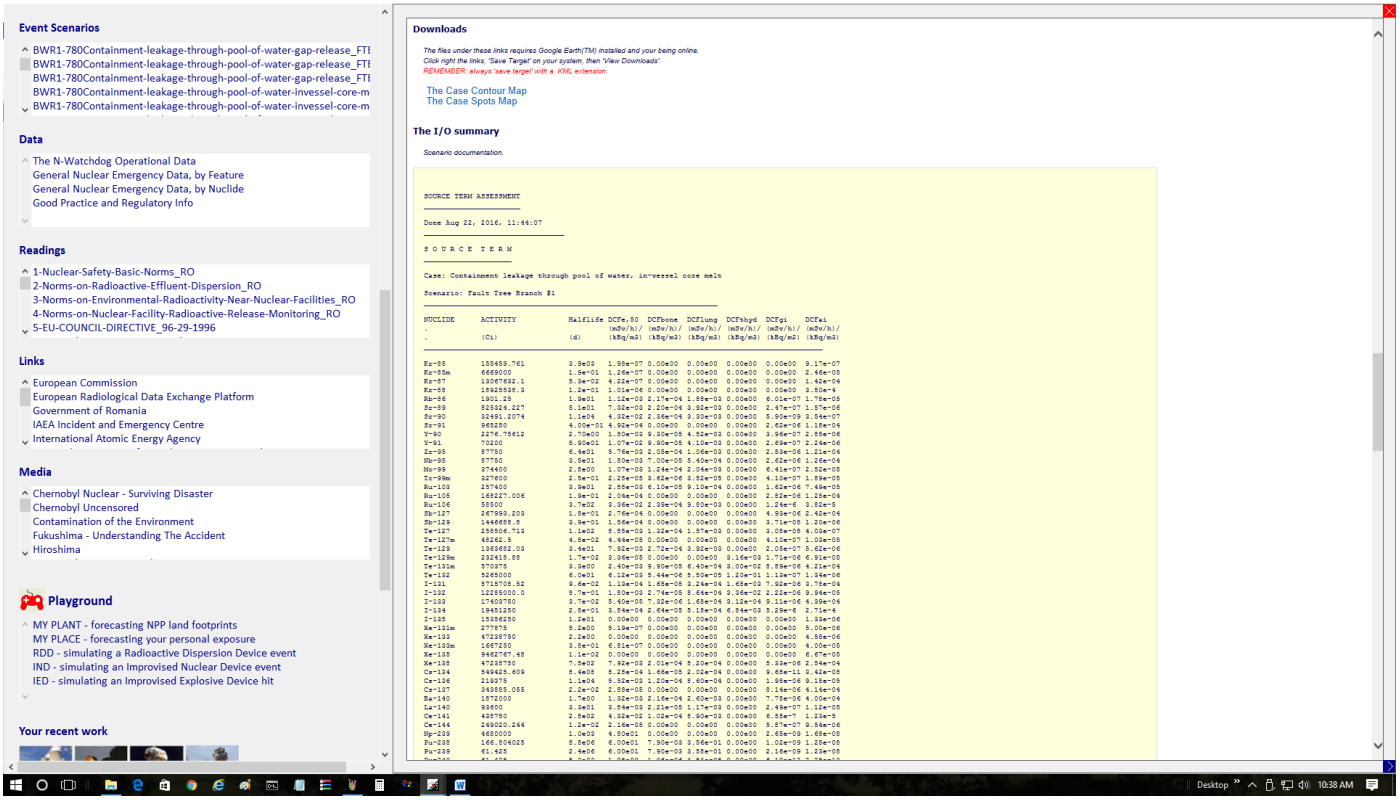
The executive flow in building up the scenario library is rendered in figures 1 and 2. To access scenarios and interact with their assessment, select from the list, next .

Scenario File - an Example









Scenario List

```
BWR1-780Containment-bypass-gap-release_FTB-1-A-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-1-D-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-1-F-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-6-A-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-6-D-webLF.html
BWR1-780Containment-bypass-gap-release_FTB-6-F-webLF.html
```

BWR1-780Containment-bypass-invessel-core-melt_FTB-1-A-webLF.html
BWR1-780Containment-bypass-invessel-core-melt_FTB-1-D-webLF.html
BWR1-780Containment-bypass-invessel-core-melt_FTB-1-F-webLF.html
. BWR1-780Containment-bypass-invessel-core-melt_FTB-6-A-webLF.html
. BWR1-780Containment-bypass-invessel-core-melt_FTB-6-D-webLF.html
. BWR1-780Containment-bypass-invessel-core-melt_FTB-6-F-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-A-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-D-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-F-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-A-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-D-webLF.html
. BWR1-780Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-F-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-1-A-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-1-D-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-1-F-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-14-A-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-14-D-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-gap-release_FTB-14-F-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-1-A-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-1-D-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-1-F-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-14-A-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-14-D-webLF.html
. BWR1-780Containment-leakage-through-pool-of-water-invessel-core-melt_FTB-14-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-1-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-1-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-1-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-4-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-4-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-gap-release_FTB-4-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-1-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-1-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-1-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-4-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-4-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-invessel-core-melt_FTB-4-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
. BWR1-780Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
. CANDU-Containment-Bypass-rev-A-webLF.html
. CANDU-Containment-Bypass-rev-D-webLF.html
. CANDU-Containment-Bypass-rev-F-webLF.html
. CANDU-LCD-H-rev-A-webLF.html
. CANDU-LCD-H-rev-D-webLF.html
. CANDU-LCD-H-rev-F-webLF.html
. CANDU-PCM-rev-A-webLF.html
. CANDU-PCM-rev-D-webLF.html
. CANDU-PCM-rev-F-webLF.html
. CANDU-STR-rev-A-webLF.html
. CANDU-STR-rev-D-webLF.html
. CANDU-STR-rev-F-webLF.html
. Fukushima-Unit2-InVesselMelt-thru-Pool-rev-A-webLF.html
. Fukushima-Unit2-InVesselMelt-thru-Pool-rev-D-webLF.html
. Fukushima-Unit2-InVesselMelt-thru-Pool-rev-F-webLF.html
. Fukushima-Unit3-Late-InVesselMelt-thru-Pool-rev-A-webLF.html
. Fukushima-Unit3-Late-InVesselMelt-thru-Pool-rev-D-webLF.html
. Fukushima-Unit3-Late-InVesselMelt-thru-Pool-rev-F-webLF.html
. Fukushima-Unit4-SpentFuelPool-Fire-rev-A-webLF.html
. Fukushima-Unit4-SpentFuelPool-Fire-rev-D-webLF.html
. Fukushima-Unit4-SpentFuelPool-Fire-rev-F-webLF.html
. Fukushima-Unit4-SpentFuelPool-Gap-rev-A-webLF.html
. Fukushima-Unit4-SpentFuelPool-Gap-rev-D-webLF.html
. Fukushima-Unit4-SpentFuelPool-Gap-rev-F-webLF.html
. Kozloduy-drill4-rev-A-webLF.html
. Kozloduy-drill4-rev-D-webLF.html
. Kozloduy-drill4-rev-F-webLF.html
. Mol-EFM-example-rev-A-webLF.html
. Mol-EFM-example-rev-D-webLF.html
. Mol-EFM-example-rev-F-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-1-A-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-1-D-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-1-F-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-6-A-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-6-D-webLF.html
. PWR-VVER1-440Containment-bypass-gap-release_FTB-6-F-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-1-A-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-1-D-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-1-F-webLF.html

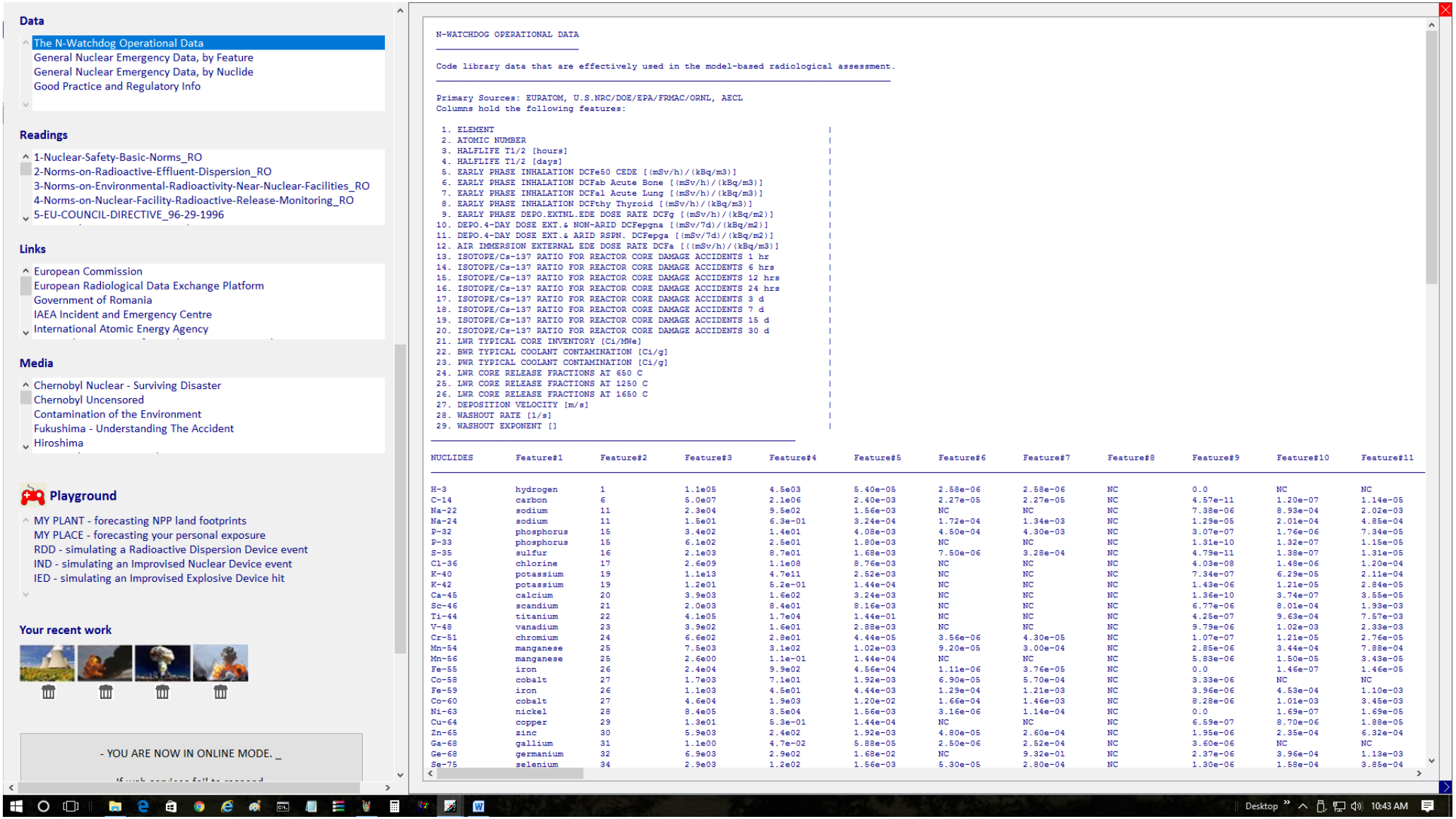
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-5-A-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-5-D-webLF.html
. PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-5-F-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-A-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-D-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-F-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-A-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-D-webLF.html
. PWR-VVER1-440Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-F-webLF.html
. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-1-A-webLF.html
. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-1-D-webLF.html
. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-1-F-webLF.html
0. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-4-A-webLF.html
1. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-4-D-webLF.html
2. PWR-VVER1-440Steam-generator-tube-rupture-gap-release_FTB-4-F-webLF.html
3. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-1-A-webLF.html
4. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-1-D-webLF.html
5. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-1-F-webLF.html
6. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-4-A-webLF.html
7. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-4-D-webLF.html
8. PWR-VVER1-440Steam-generator-tube-rupture-invessel-core-melt_FTB-4-F-webLF.html
9. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
0. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
1. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
2. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
3. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
4. PWR-VVER1-440Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
5. PWR-VVER3-1000Containment-bypass-gap-release_FTB-1-A-webLF.html
6. PWR-VVER3-1000Containment-bypass-gap-release_FTB-1-D-webLF.html
7. PWR-VVER3-1000Containment-bypass-gap-release_FTB-1-F-webLF.html
8. PWR-VVER3-1000Containment-bypass-gap-release_FTB-6-A-webLF.html
9. PWR-VVER3-1000Containment-bypass-gap-release_FTB-6-D-webLF.html
0. PWR-VVER3-1000Containment-bypass-gap-release_FTB-6-F-webLF.html
1. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-1-A-webLF.html
2. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-1-D-webLF.html
3. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-1-F-webLF.html
4. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-6-A-webLF.html
5. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-6-D-webLF.html
6. PWR-VVER3-1000Containment-bypass-invessel-core-melt_FTB-6-F-webLF.html
7. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-A-webLF.html
8. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-D-webLF.html
9. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-F-webLF.html
0. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-A-webLF.html
1. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-D-webLF.html
2. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-F-webLF.html
3. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-A-webLF.html
4. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-D-webLF.html
5. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-F-webLF.html
6. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-A-webLF.html
7. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-D-webLF.html
8. PWR-VVER3-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-F-webLF.html
9. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-1-A-webLF.html
0. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-1-D-webLF.html
1. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-1-F-webLF.html
2. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-4-A-webLF.html
3. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-4-D-webLF.html
4. PWR-VVER3-1000Steam-generator-tube-rupture-gap-release_FTB-4-F-webLF.html
5. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-A-webLF.html
6. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-D-webLF.html
7. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-F-webLF.html
8. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-A-webLF.html
9. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-D-webLF.html
0. PWR-VVER3-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-F-webLF.html
1. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
2. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
3. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
4. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
5. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
6. PWR-VVER3-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
7. PWR1-1000Containment-bypass-gap-release_FTB-1-A-webLF.html
8. PWR1-1000Containment-bypass-gap-release_FTB-1-D-webLF.html
9. PWR1-1000Containment-bypass-gap-release_FTB-1-F-webLF.html
0. PWR1-1000Containment-bypass-gap-release_FTB-6-A-webLF.html
1. PWR1-1000Containment-bypass-gap-release_FTB-6-D-webLF.html
2. PWR1-1000Containment-bypass-gap-release_FTB-6-F-webLF.html
3. PWR1-1000Containment-bypass-invessel-core-melt_FTB-1-A-webLF.html
4. PWR1-1000Containment-bypass-invessel-core-melt_FTB-1-D-webLF.html
5. PWR1-1000Containment-bypass-invessel-core-melt_FTB-1-F-webLF.html
6. PWR1-1000Containment-bypass-invessel-core-melt_FTB-6-A-webLF.html
7. PWR1-1000Containment-bypass-invessel-core-melt_FTB-6-D-webLF.html
8. PWR1-1000Containment-bypass-invessel-core-melt_FTB-6-F-webLF.html

9. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-A-webLF.html
0. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-D-webLF.html
1. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-1-F-webLF.html
2. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-A-webLF.html
3. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-D-webLF.html
4. PWR1-1000Containment-leakage-dry-or-with-spray-gap-release_FTB-14-F-webLF.html
5. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-A-webLF.html
6. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-D-webLF.html
7. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-1-F-webLF.html
8. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-A-webLF.html
9. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-D-webLF.html
0. PWR1-1000Containment-leakage-dry-or-with-spray-invessel-core-melt_FTB-14-F-webLF.html
1. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-1-A-webLF.html
2. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-1-D-webLF.html
3. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-1-F-webLF.html
4. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-4-A-webLF.html
5. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-4-D-webLF.html
6. PWR1-1000Steam-generator-tube-rupture-gap-release_FTB-4-F-webLF.html
7. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-A-webLF.html
8. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-D-webLF.html
9. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-1-F-webLF.html
0. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-A-webLF.html
1. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-D-webLF.html
2. PWR1-1000Steam-generator-tube-rupture-invessel-core-melt_FTB-4-F-webLF.html
3. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
4. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
5. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
6. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
7. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
8. PWR1-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
9. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-1-A-webLF.html
0. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-1-D-webLF.html
1. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-1-F-webLF.html
2. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-14-A-webLF.html
3. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-14-D-webLF.html
4. PWR2-1000Containment-leakage-through-ice-gap-release_FTB-14-F-webLF.html
5. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-A-webLF.html
6. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-D-webLF.html
7. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-1-F-webLF.html
8. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-A-webLF.html
9. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-D-webLF.html
0. PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-4-F-webLF.html
1. StandardMixLWR-12h-A-webLF.html
2. StandardMixLWR-12h-D-webLF.html
3. StandardMixLWR-12h-F-webLF.html
4. StandardMixLWR-15d-A-webLF.html
5. StandardMixLWR-15d-D-webLF.html
6. StandardMixLWR-15d-F-webLF.html
7. StandardMixLWR-1h-A-webLF.html
8. StandardMixLWR-1h-D-webLF.html
9. StandardMixLWR-1h-F-webLF.html
0. StandardMixLWR-24h-A-webLF.html
1. StandardMixLWR-24h-D-webLF.html
2. StandardMixLWR-24h-F-webLF.html
3. StandardMixLWR-30d-A-webLF.html
4. StandardMixLWR-30d-D-webLF.html
5. StandardMixLWR-30d-F-webLF.html
6. StandardMixLWR-3d-A-webLF.html
7. StandardMixLWR-3d-D-webLF.html
8. StandardMixLWR-3d-F-webLF.html
9. StandardMixLWR-6h-A-webLF.html
0. StandardMixLWR-6h-D-webLF.html
1. StandardMixLWR-6h-F-webLF.html
2. StandardMixLWR-7d-A-webLF.html
3. StandardMixLWR-7d-D-webLF.html
4. StandardMixLWR-7d-F-webLF.html
5. STUDY-2012-SourceTerm-A-webLF.html
6. STUDY-2012-SourceTerm-D-webLF.html
7. STUDY-2012-SourceTerm-F-webLF.html
8. ~BWR-REFERENCE-MIX-A-webLF.html
9. ~BWR-REFERENCE-MIX-D-webLF.html
0. ~BWR-REFERENCE-MIX-F-webLF.html
1. ~FBR-REFERENCE-MIX-A-webLF.html
2. ~FBR-REFERENCE-MIX-D-webLF.html
3. ~FBR-REFERENCE-MIX-F-webLF.html
4. ~GCR-REFERENCE-MIX-A-webLF.html
5. ~GCR-REFERENCE-MIX-D-webLF.html
6. ~GCR-REFERENCE-MIX-F-webLF.html
7. ~HWR-REFERENCE-MIX-A-webLF.html
8. ~HWR-REFERENCE-MIX-D-webLF.html
9. ~HWR-REFERENCE-MIX-F-webLF.html

0. ~PWR-REFERENCE-MIX-A-webLF.html
1. ~PWR-REFERENCE-MIX-D-webLF.html
2. ~PWR-REFERENCE-MIX-F-webLF.html
3. ~RBMK-REFERENCE-MIX-A-webLF.html
4. ~RBMK-REFERENCE-MIX-D-webLF.html
5. ~RBMK-REFERENCE-MIX-F-webLF.html

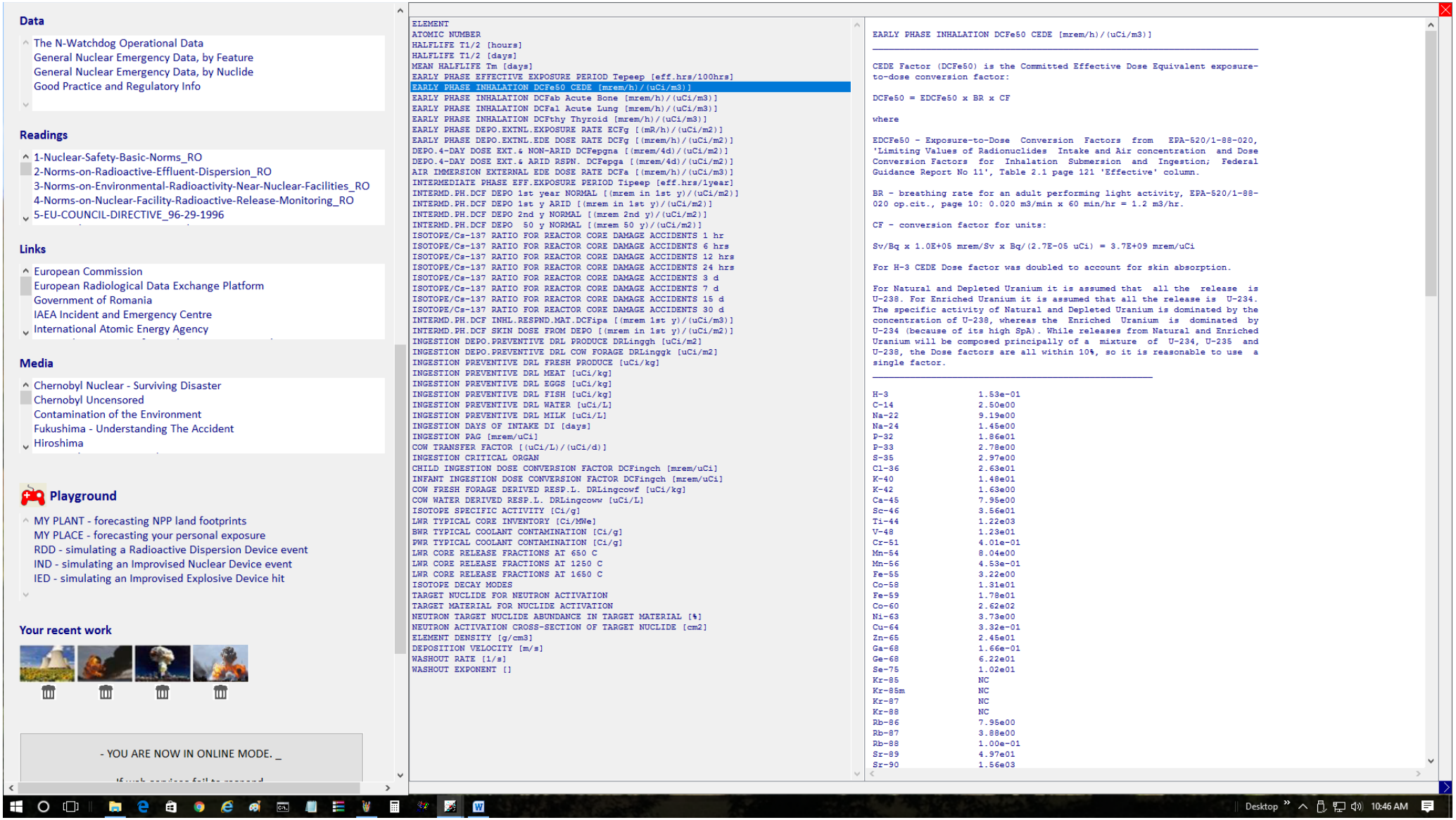
❖Data

The N-Watchdog Operational Data



NUCLIDES	Feature#1	Feature#2	Feature#3	Feature#4	Feature#5	Feature#6	Feature#7	Feature#8	Feature#9	Feature#10	Feature#11
H-3	hydrogen	1	1.1e05	4.5e03	5.40e-05	2.58e-06	2.58e-06	NC	0.0	NC	NC
C-14	carbon	6	5.0e07	2.1e06	2.40e-03	2.27e-05	2.27e-05	NC	4.57e-11	1.20e-07	1.14e-05
Na-22	sodium	11	2.3e04	9.5e02	1.56e-03	NC	NC	NC	7.38e-06	8.93e-04	2.02e-03
Na-24	sodium	11	1.5e01	6.3e-01	3.24e-04	1.72e-04	1.34e-03	NC	1.29e-05	2.01e-04	4.85e-04
P-32	phosphorus	15	3.4e02	1.4e01	4.08e-03	4.50e-04	4.30e-03	NC	3.07e-07	1.76e-06	7.34e-05
P-33	phosphorus	15	6.1e02	2.5e01	1.80e-03	NC	NC	NC	1.31e-10	1.32e-07	1.15e-05
S-35	sulfur	16	2.1e03	8.7e01	1.68e-03	7.50e-06	3.28e-04	NC	4.79e-11	1.38e-07	1.31e-05
Cl-36	chlorine	17	2.6e09	1.1e08	8.76e-03	NC	NC	NC	4.03e-08	1.48e-06	1.20e-04
K-40	potassium	19	1.1e13	4.7e11	2.52e-03	NC	NC	NC	7.34e-07	6.29e-05	2.11e-04
K-42	potassium	19	1.2e01	5.2e-01	1.44e-04	NC	NC	NC	1.43e-06	1.21e-05	2.84e-05
Ca-45	calcium	20	3.9e03	1.6e02	3.24e-03	NC	NC	NC	1.36e-10	3.74e-07	3.55e-05
Sc-46	scandium	21	2.0e03	8.4e01	8.16e-03	NC	NC	NC	6.77e-06	8.01e-04	1.93e-03
Ti-44	titanium	22	4.1e05	1.7e04	1.44e-01	NC	NC	NC	4.25e-07	9.63e-04	7.57e-03
V-48	vanadium	23	3.9e02	1.6e01	2.88e-03	NC	NC	NC	9.79e-06	1.02e-03	2.33e-03
Cr-51	chromium	24	6.6e02	2.8e01	4.44e-05	3.56e-06	4.30e-05	NC	1.07e-07	1.21e-05	2.76e-05
Mn-54	manganese	25	7.5e03	3.1e02	1.02e-03	9.20e-05	3.00e-04	NC	2.85e-06	3.44e-04	7.88e-04
Mn-56	manganese	25	2.6e00	1.1e-01	1.44e-04	NC	NC	NC	5.83e-06	1.50e-05	3.43e-05
Fe-55	iron	26	2.4e04	9.9e02	4.56e-04	1.11e-06	3.76e-05	NC	0.0	1.46e-07	1.46e-05
Co-58	cobalt	27	1.7e03	7.1e01	1.92e-03	6.90e-05	5.70e-04	NC	3.33e-06	NC	NC
Fe-59	iron	26	1.1e03	4.5e01	4.44e-03	1.29e-04	1.21e-03	NC	3.96e-06	4.53e-04	1.10e-03
Co-60	cobalt	27	4.6e04	1.9e03	1.20e-02	1.66e-04	1.46e-03	NC	8.28e-06	1.01e-03	3.45e-03
Ni-63	nickel	28	8.4e05	3.5e04	1.56e-03	3.16e-06	1.14e-04	NC	0.0	1.69e-07	1.69e-05
Cu-64	copper	29	1.3e01	5.3e-01	1.44e-04	NC	NC	NC	6.59e-07	8.70e-06	1.88e-05
Zn-65	zinc	30	5.9e03	2.4e02	1.92e-03	4.80e-05	2.60e-04	NC	1.95e-06	2.35e-04	6.32e-04
Ga-68	gallium	31	1.1e00	4.7e-02	5.88e-05	2.50e-06	2.52e-04	NC	3.60e-06	NC	NC
Ge-68	germanium	32	6.9e03	2.9e02	1.68e-02	NC	9.32e-01	NC	2.37e-06	3.96e-04	1.13e-03
Se-75	selenium	34	2.9e03	1.2e02	1.56e-03	5.30e-05	2.80e-04	NC	1.30e-06	1.58e-04	3.85e-04

General Nuclear Emergency Data, by Feature



General Nuclear Emergency Data, by Nuclide

Data

- The N-Watchdog Operational Data
- General Nuclear Emergency Data, by Feature
- General Nuclear Emergency Data, by Nuclide
- Good Practice and Regulatory Info

Readings

- 1-Nuclear-Safety-Basic-Norms_RO
- 2-Norms-on-Radioactive-Effluent-Dispersion_RO
- 3-Norms-on-Environmental-Radioactivity-Near-Nuclear-Facilities_RO
- 4-Norms-on-Nuclear-Facility-Radioactive-Release-Monitoring_RO
- 5-EU-COUNCIL-DIRECTIVE_96-29-1996

Links

- European Commission
- European Radiological Data Exchange Platform
- Government of Romania
- IAEA Incident and Emergency Centre
- International Atomic Energy Agency

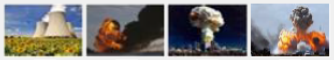
Media

- Chernobyl Nuclear - Surviving Disaster
- Chernobyl Uncensored
- Contamination of the Environment
- Fukushima - Understanding The Accident
- Hiroshima

Playground

- MY PLANT - forecasting NPP land footprints
- MY PLACE - forecasting your personal exposure
- RDD - simulating a Radioactive Dispersion Device event
- IND - simulating an Improvised Nuclear Device event
- IED - simulating an Improvised Explosive Device hit

Your recent work



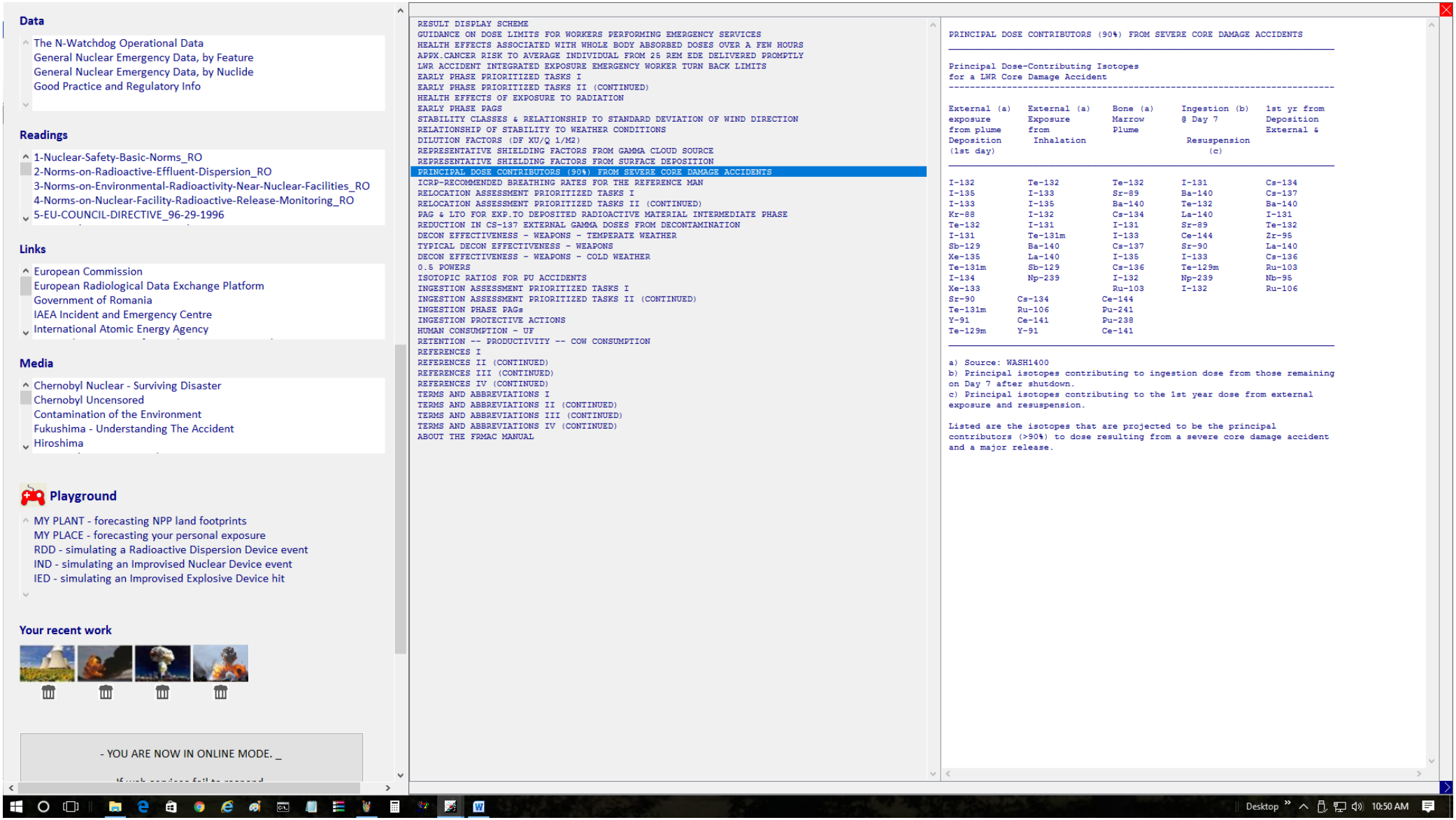
- YOU ARE NOW IN ONLINE MODE. _

Sr-90	strontium	38
Sr-91	strontium	38
Y-90	yttrium	39
Y-91	yttrium	39
Y-91m	yttrium	39
Zr-93	zirconium	40
Zr-95	zirconium	40
Nb-94	niobium	41
Nb-95	niobium	41
Mo-99	molybdenum	42
Tc-99	technetium	43
Tc-99m	technetium	43
Ru-103	ruthenium	44
Ru-105	ruthenium	44
Rh-106	rhodium	45
Ru-106	ruthenium	44
Ag-110m	silver	47
Cd-109	cadmium	48
Cd-113m	cadmium	48
In-114m	indium	49
Sn-113	tin	50
Sn-123	tin	50
Sn-126	tin	50
Sb-124	antimony	51
Sb-126	antimony	51
Sb-126m	antimony	51
Sb-127	antimony	51
Sb-129	antimony	51
Te-127	tellurium	52
Te-127m	tellurium	52
Te-129	tellurium	52
Te-129m	tellurium	52
Te-131	tellurium	52
Te-131m	tellurium	52
Te-132	tellurium	52
I-125	iodine	53
I-129	iodine	53
I-131	iodine	53
I-132	iodine	53
I-133	iodine	53
I-134	iodine	53
I-135	iodine	53
Xe-131m	xenon	54
Xe-133	xenon	54
Xe-133m	xenon	54
Xe-135	xenon	54
Xe-135m	xenon	54
Xe-138	xenon	54
Cs-134	caesium	55
Cs-135	caesium	55
Cs-136	caesium	55
Cs-137	caesium	55
Cs-138	caesium	55
Ba-133	barium	56
Ba-137m	barium	56
Ba-140	barium	56
La-140	lanthanum	57
Ce-141	cerium	58
Ce-144	cerium	58
Pr-144	praseodymium	59
Pr-144m	praseodymium	59
Pm-145	promethium	61
Pm-147	promethium	61
Sm-147	samarium	62
Sm-151	samarium	62
Eu-152	europium	63
Eu-154	europium	63
Eu-155	europium	63
Gd-153	gadolinium	64
Tb-160	terbium	65
Ho-166m	holmium	67
Tm-170	thulium	69

FILE OF I-131

ELEMENT	iodine
ATOMIC NUMBER	53
HALFLIFE T1/2 [hours]	1.9e02
HALFLIFE T1/2 [days]	8.0e00
MEAN HALFLIFE Tm [days]	1.2e01
EARLY PHASE EFFECTIVE EXPOSURE PERIOD Tepeep [eff.hrs/100hrs]	84
EARLY PHASE INHALATION DCFe50 CEDE [mrem/h)/(uCi/m3)]	3.95e01
EARLY PHASE INHALATION DCFab Acute Bone [mrem/h)/(uCi/m3)]	2.40e-01
EARLY PHASE INHALATION DCFal Acute Lung [mrem/h)/(uCi/m3)]	2.89e00
EARLY PHASE INHALATION DCFthy Thyroid [mrem/h)/(uCi/m3)]	1.30e03
EARLY PHASE DEPO.EXTNL.EXPOSURE RATE ECFg [(mR/h)/(uCi/m2)]	4.9e-03
EARLY PHASE DEPO.EXTNL.EDE DOSE RATE DCFg [(mrem/h)/(uCi/m2)]	3.5e-03
DEPO.4-DAY DOSE EXT.& NON-ARID DCFepgna [(mrem/4d)/(uCi/m2)]	3.0e-01
DEPO.4-DAY DOSE EXT.& ARID RSPN. DCFepga [(mrem/4d)/(uCi/m2)]	6.2e-01
AIR IMMERSION EXTERNAL EDE DOSE RATE DCFa [(mrem/h)/(uCi/m3)]	2.4e-01
INTERMEDIATE PHASE EFF.EXPOSURE PERIOD Tipeep [eff.hrs/1year]	278
INTERMD.PH.DCF DEPO 1st year NORMAL [(mrem in 1st y)/(uCi/m2)]	9.64e-01
INTERMD.PH.DCF DEPO 1st y ARID [(mrem in 1st y)/(uCi/m2)]	2.03e00
INTERMD.PH.DCF DEPO 2nd y NORMAL [(mrem 2nd y)/(uCi/m2)]	0.0
INTERMD.PH.DCF DEPO 50 y NORMAL [(mrem 50 y)/(uCi/m2)]	9.64e-01
ISOTOPE/Cs-137 RATIO FOR REACTOR CORE DAMAGE ACCIDENTS 1 hr	24.2e00
ISOTOPE/Cs-137 RATIO FOR REACTOR CORE DAMAGE ACCIDENTS 6 hrs	24.8e00
ISOTOPE/Cs-137 RATIO FOR REACTOR CORE DAMAGE ACCIDENTS 12 hrs	24.3e00
ISOTOPE/Cs-137 RATIO FOR REACTOR CORE DAMAGE ACCIDENTS 24 hrs	23.2e00
ISOTOPE/Cs-137 RATIO FOR REACTOR CORE DAMAGE ACCIDENTS 3 d	19.6e00
ISOTOPE/Cs-137 RATIO FOR REACTOR CORE DAMAGE ACCIDENTS 7 d	3.9
ISOTOPE/Cs-137 RATIO FOR REACTOR CORE DAMAGE ACCIDENTS 15 d	7.0e00
ISOTOPE/Cs-137 RATIO FOR REACTOR CORE DAMAGE ACCIDENTS 30 d	1.9e00
INTERMD.PH.DCF INHL.RESPND.MAT.DCFipa [(mrem 1st y)/(uCi/m3)]	1.1e04
INTERMD.PH.DCF SKIN DOSE FROM DEPO [(mrem in 1st y)/(uCi/m2)]	8.50e-01
INGESTION DEPO.PREVENTIVE DRL PRODUCE DRLinggh [uCi/m2]	1.0e00
INGESTION DEPO.PREVENTIVE DRL COW FORAGE DRLinggk [uCi/m2]	1.3e-01
INGESTION PREVENTIVE DRL FRESH PRODUCE [uCi/kg]	1.0e-01
INGESTION PREVENTIVE DRL MEAT [uCi/kg]	1.4e-01
INGESTION PREVENTIVE DRL EGGS [uCi/kg]	5.8e-01
INGESTION PREVENTIVE DRL FISH [uCi/kg]	1.4e00
INGESTION PREVENTIVE DRL WATER [uCi/L]	2.3e-02
INGESTION PREVENTIVE DRL MILK [uCi/L]	1.4e-02
INGESTION DAYS OF INTAKE DI [days]	11.58e00
INGESTION PAG [mrem/uCi]	150.00e00
COW TRANSFER FACTOR [(uCi/L)/(uCi/d)]	9.9e-03
INGESTION CRITICAL ORGAN	Thyroid/2
CHILD INGESTION DOSE CONVERSION FACTOR DCFingch [mrem/uCi]	4.07e03
INFANT INGESTION DOSE CONVERSION FACTOR DCFingch [mrem/uCi]	1.33e04
COW FRESH FORAGE DERIVED RESP.L. DRLingcowf [uCi/kg]	5.0e-02
COW WATER DERIVED RESP.L. DRLingcoww [uCi/L]	2.3e-02
ISOTOPE SPECIFIC ACTIVITY [Ci/g]	1.243240e5
LWR TYPICAL CORE INVENTORY [Ci/MWe]	85135.126
BWR TYPICAL COOLANT CONTAMINATION [Ci/g]	0.21999997e-8
PWR TYPICAL COOLANT CONTAMINATION [Ci/g]	0.45135133e-7
LWR CORE RELEASE FRACTIONS AT 650 C	.05
LWR CORE RELEASE FRACTIONS AT 1250 C	.35
LWR CORE RELEASE FRACTIONS AT 1650 C	.64
ISOTOPE DECAY MODES	b-
TARGET NUCLIDE FOR NEUTRON ACTIVATION	Te-130
TARGET MATERIAL FOR NUCLIDE ACTIVATION	TeO2,U
NEUTRON TARGET NUCLIDE ABUNDANCE IN TARGET MATERIAL [%]	34.49
NEUTRON ACTIVATION CROSS-SECTION OF TARGET NUCLIDE [cm2]	0.22e-24
ELEMENT DENSITY [g/cm3]	4.94
DEPOSITION VELOCITY [m/s]	0.010
WASHOUT RATE [1/s]	0.00008
WASHOUT EXPONENT []	0.6

Good Practice and Regulatory Info



❖READINGS, LINKS, MEDIA…

READINGS

1 Nuclear Safety Basic Norms_RO
2 Norms on Radioactive Effluent Dispersion_RO
3 Norms on Environmental Radioactivity Near Nuclear Facilities_RO
4 Norms on Nuclear Facility Radioactive Release Monitoring_RO
5 EU COUNCIL DIRECTIVE_96 29 1996
6 EC_Radiation Protection Guidance 129
7 IAEA TECDOC_955
8 IAEA TECDOC_1162
9 IAEA_TE_1432_web
D0 IAEA Pub1467_webOILEAL
D1 IAEA Screening grade Solutions_SRS19
D2 A Standard European Plume Model
D3 Till Grogan_Radiological Risk Assessment and Environmental Analysis
D4 Source Terms NUREG 1228
D5 The Practical Approach_US NRC RTM 96
D6 Essential Data 1_US EPA FGR 11
D7 Essential Data 2_US EPA FGR 12
D8 US DHS Risk Lexicon 2010
D9 The Effects of Nuclear Weapons_Glasstone 77
E0 Nuclear Terrorism_The Harney Predictors
E1 The Dispersion Math
E2 Environmental Modelling for Blue Colars
P1 2014-ISFEE_Data Acquisition, Processing and Visualization for Early Warning Information Systems
P2 2015-EASe_Models and Technologies for Making Aspects of the Dosimetry Education Accessible to Non-Specialists
P3 2016-ICERI-1153_Capabilities for Education and Public Awareness within a Research Project on Radiological and Nuclear Vulnerabilities
P4 2016-ICERI_Online Learning Content for Power Engineering Students, with Semantic-Based Navigability
P5 2017-INTED_Mapping e-Content to Domain Ontology for Education and Awareness on Nuclear Hazards

LINKS

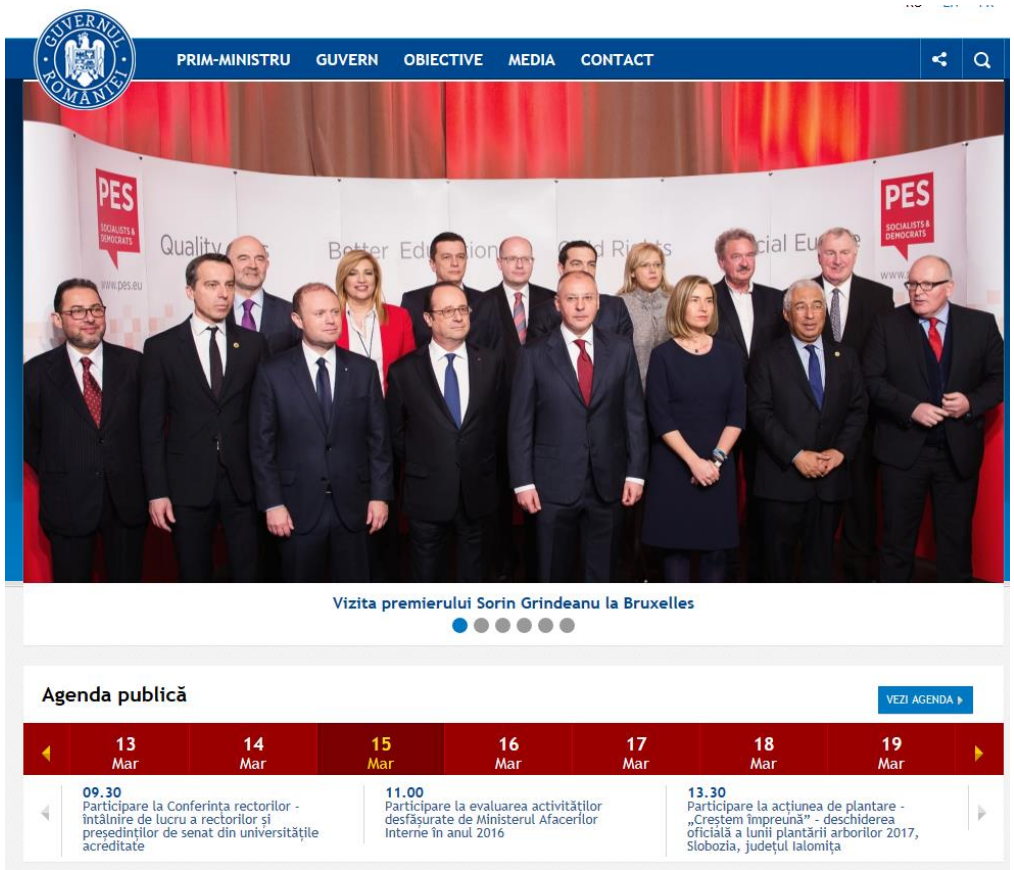
1 European Commission
2 European Radiological Data Exchange Platform
3 Government of Romania
4 IAEA Incident and Emergency Centre
5 International Atomic Energy Agency
6 National Commission for Nuclear Activity Control
7 National Inspectorate for Emergency Situations
8 National Institute of Physics and Nuclear Engineering
9 NWatchdog Wiki
10 SIVECO
11 United States Nuclear Regulatory Commission
12 University Poltehnica of Bucharest

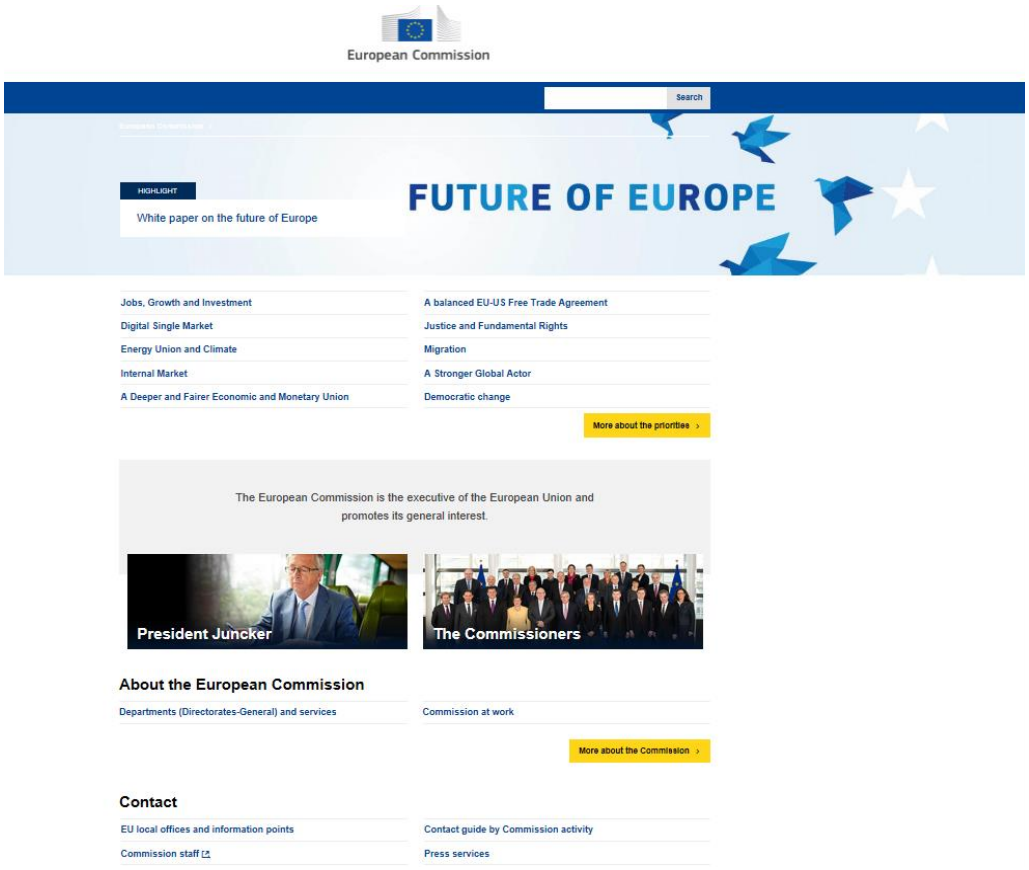
MEDIA

1 Chernobyl Nuclear Surviving Disaster
2 Contamination of the Environment
3 Fukushima - Understanding The Accident
4 Hiroshima
5 How Nuclear Energy Works
6 Meltdown at Three Mile Island
7 Nuclear Energy Explained
8 Nuclear power for the future
9 Nuclear Power Future
10 Nuclear Power Plant Safety Systems
11 Question - Do We Need Nuclear
12 Question - Nuclear Energy - Risk Or Opportunity
13 Seconds From Disaster
14 The lessons from the Fukushima nuclear accident
15 Three Mile Island Documentary
16 Top Ten Natural Disasters
17 What Is Radiation

Readings -example mix

Links - example mix





Links - example mix, continued

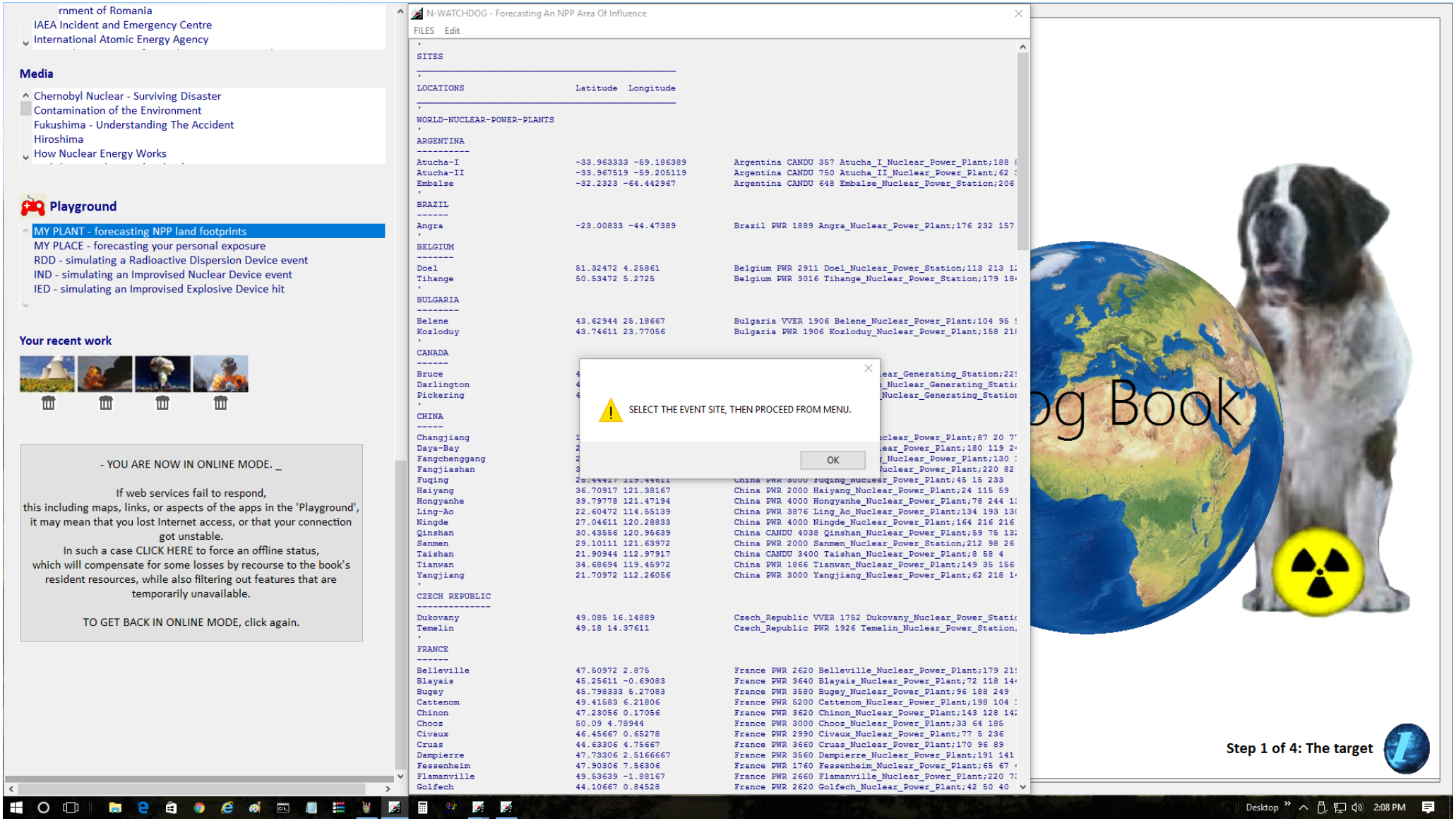
Media - examples

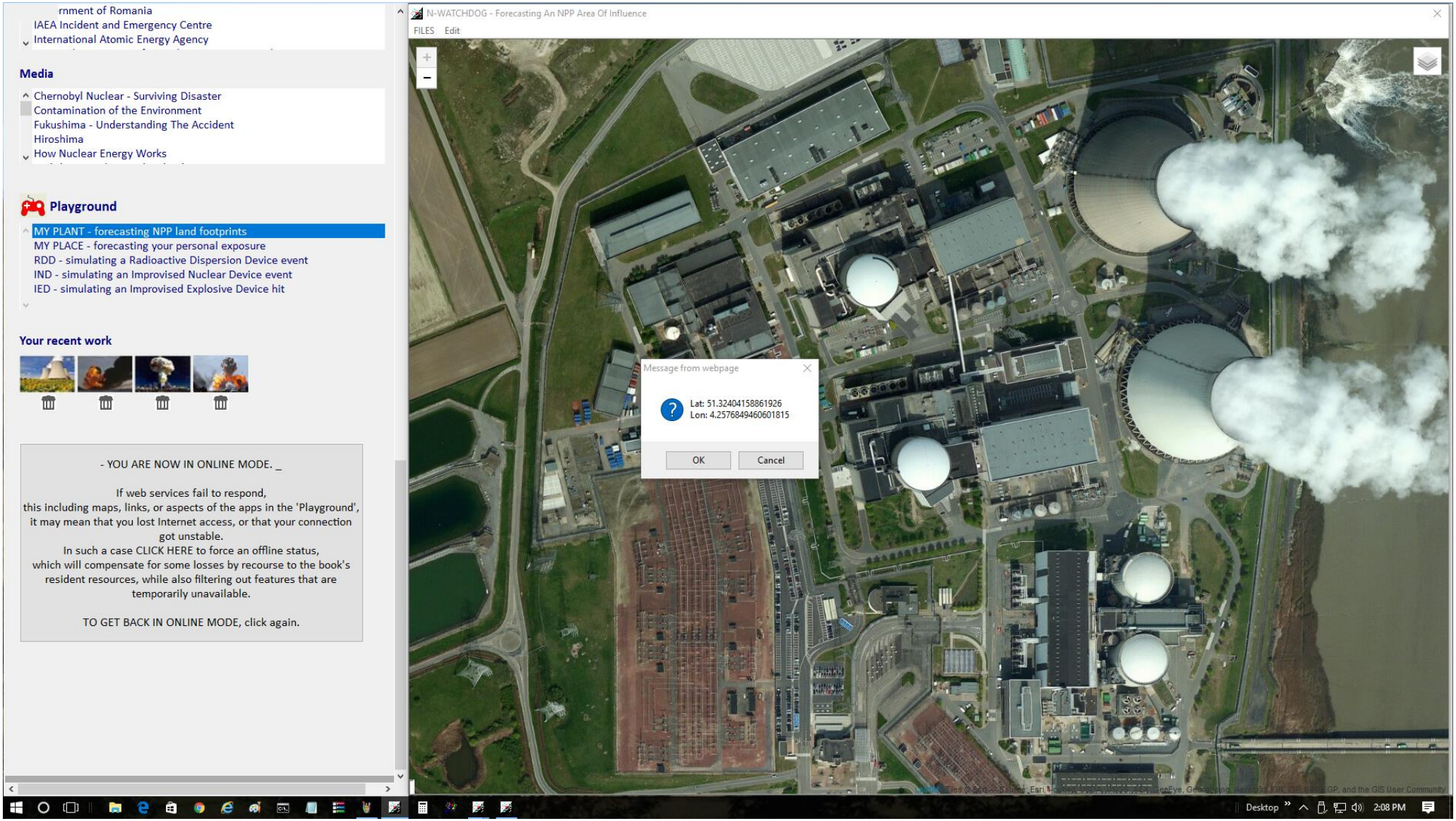
Media - examples, continued

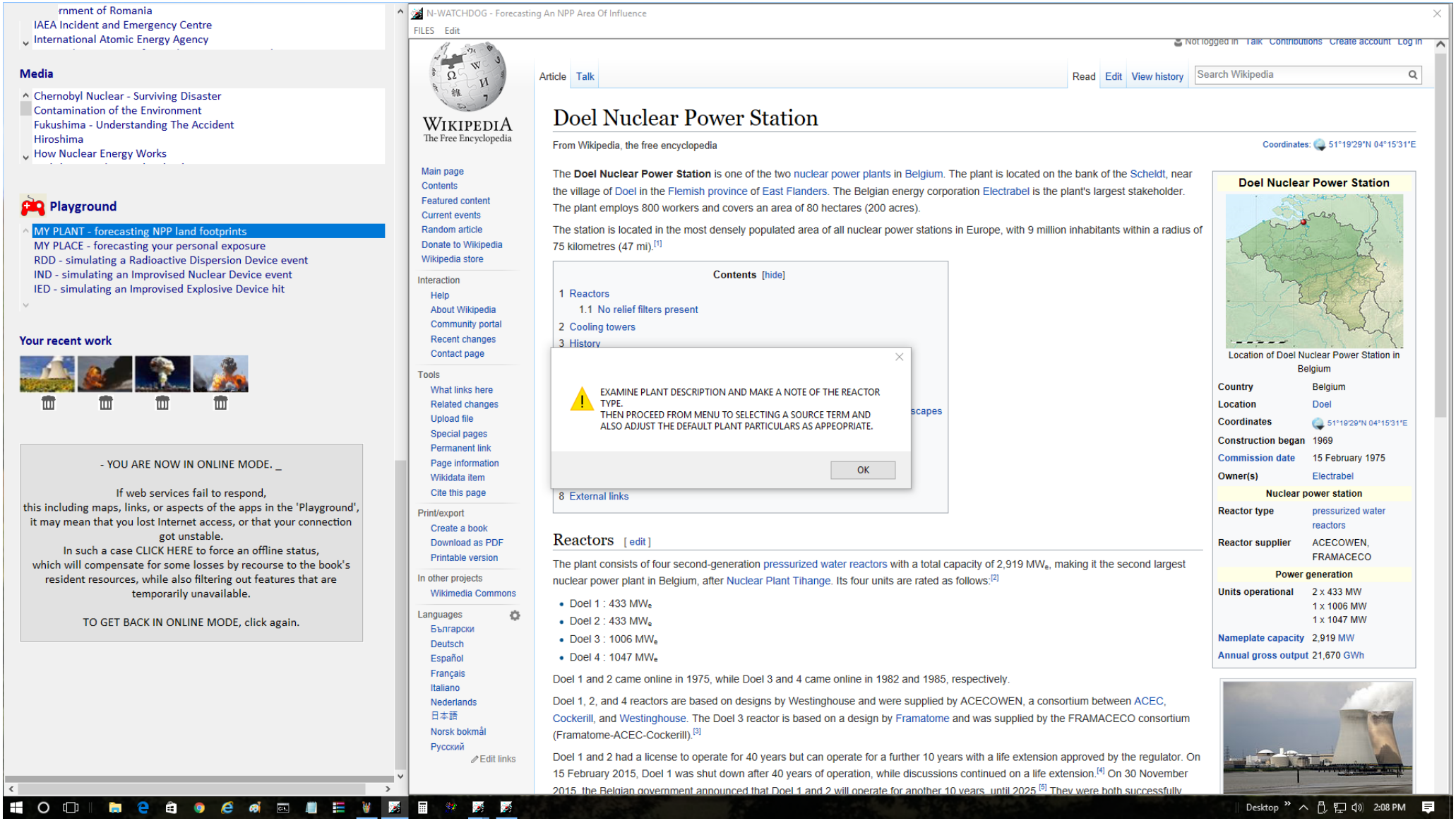
Media - examples, continued

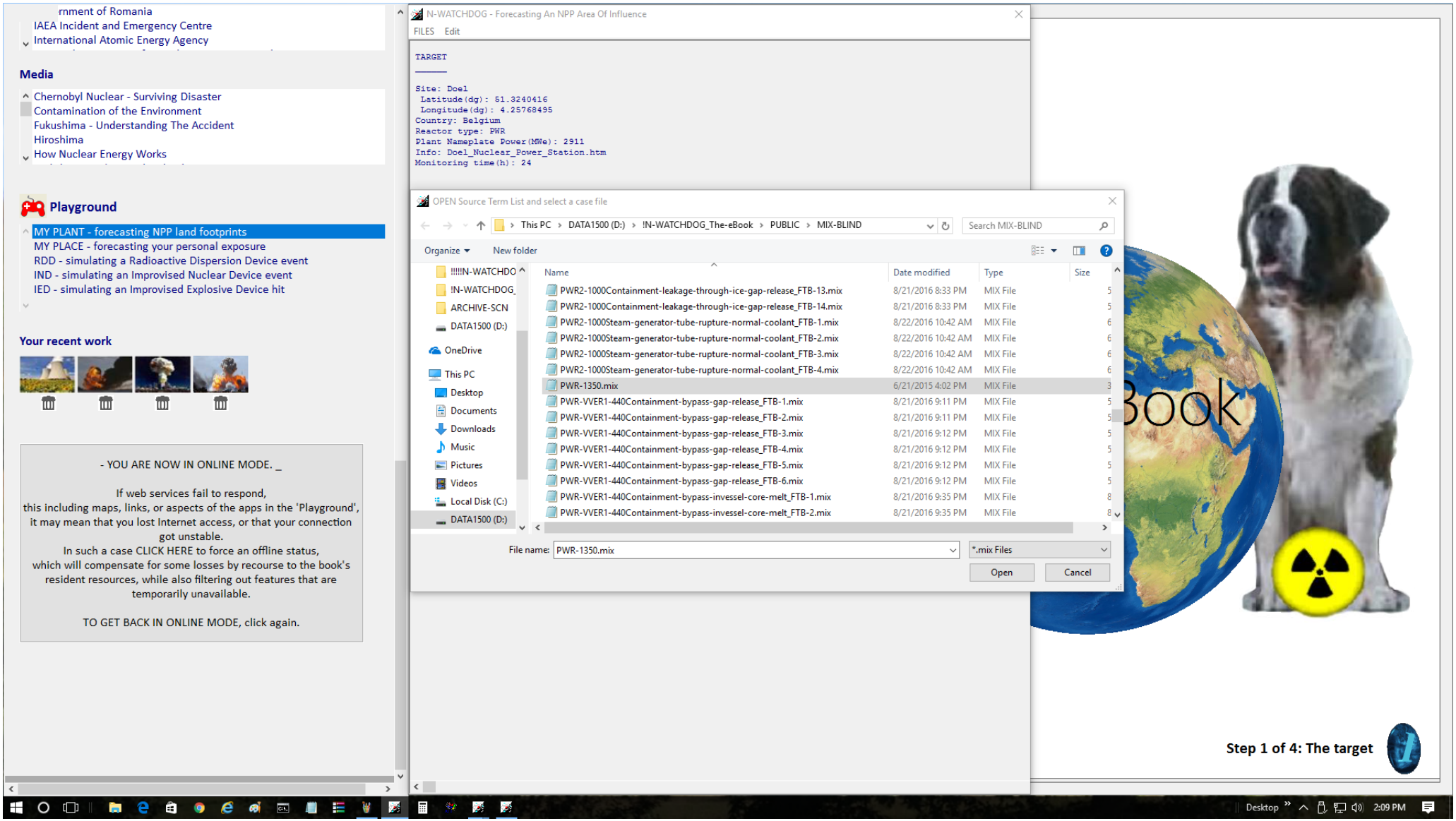
THE PLAYGROUND - Trying ones hand with N-Watchdog…

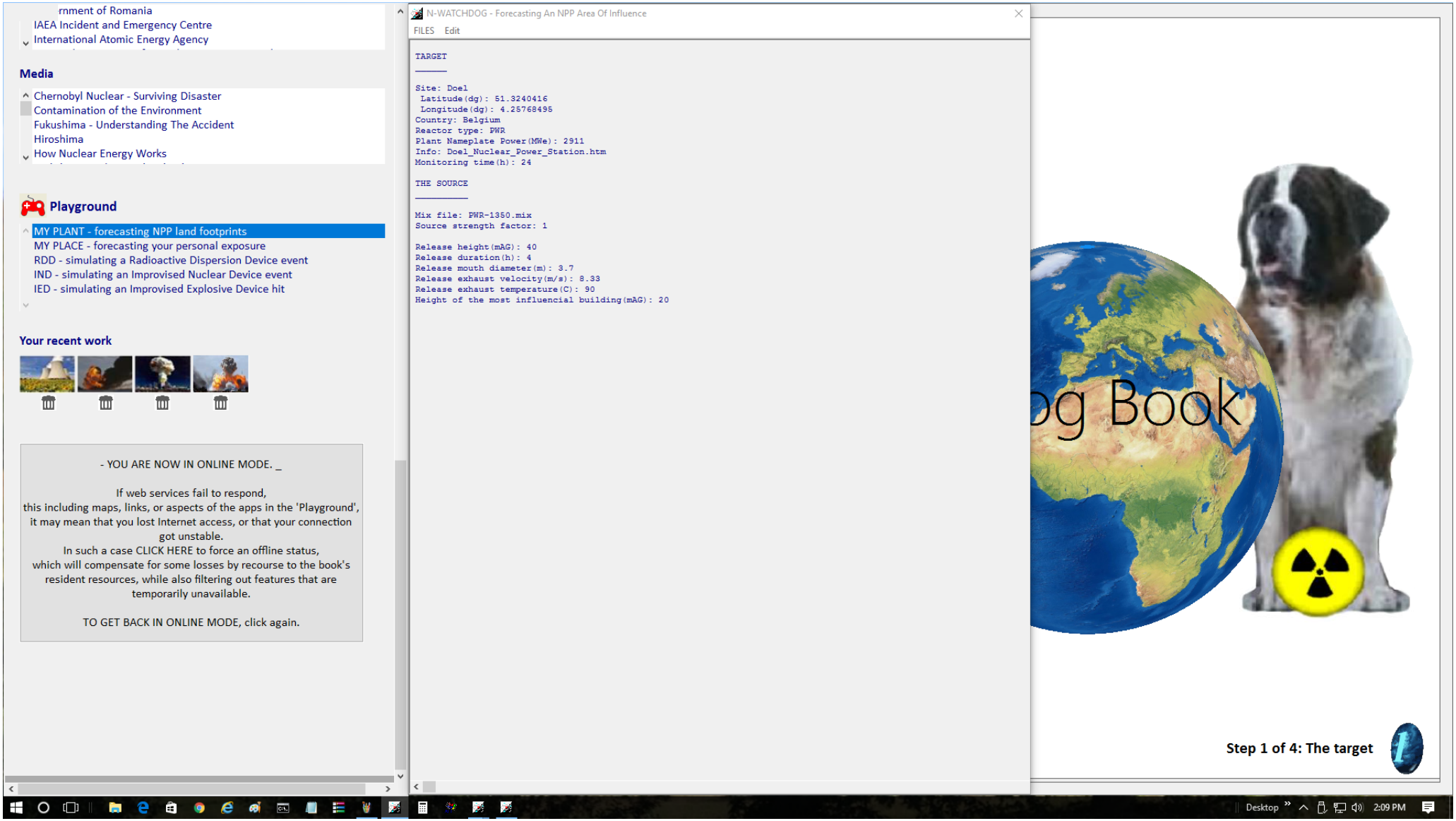
MY PLANT - forecasting NPP land footprints. The working sequence.




rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
N-WATCHDOG - Forecasting An NPP Area Of Influence
FILES Edit
Message from webpage
Lat: 51.32404158861926
Lon: 4.2576849460601815
OK
Cancel
Desktop
2:08 PM


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
N-WATCHDOG - Forecasting An NPP Area Of Influence
FILES Edit
Not logged in Talk Contributions Create account Log in
Article Talk
Read Edit View history
Search Wikipedia
WIKIPEDIA
The Free Encyclopedia
Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store
Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page
Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item
Cite this page
Print/export
Create a book
Download as PDF
Printable version
In other projects
Wikimedia Commons
Languages
Български
Deutsch
Español
Français
Italiano
Nederlands
日本語
Norsk bokmål
Русский
Edit links
Doel Nuclear Power Station
From Wikipedia, the free encyclopedia
Coordinates: 51°19'29"N 04°15'31"E
The Doel Nuclear Power Station is one of the two nuclear power plants in Belgium. The plant is located on the bank of the Scheldt, near the village of Doel in the Flemish province of East Flanders. The Belgian energy corporation Electrabel is the plant's largest stakeholder. The plant employs 800 workers and covers an area of 80 hectares (200 acres).
The station is located in the most densely populated area of all nuclear power stations in Europe, with 9 million inhabitants within a radius of 75 kilometres (47 mi).[1]
Contents [hide]
1 Reactors
1.1 No relief filters present
2 Cooling towers
3 History
8 External links
EXAMINE PLANT DESCRIPTION AND MAKE A NOTE OF THE REACTOR TYPE.
THEN PROCEED FROM MENU TO SELECTING A SOURCE TERM AND ALSO ADJUST THE DEFAULT PLANT PARTICULARS AS APPEOPRIATE.
OK
Doel Nuclear Power Station
Location of Doel Nuclear Power Station in Belgium
Country Belgium
Location Doel
Coordinates 51°19'29"N 04°15'31"E
Construction began 1969
Commission date 15 February 1975
Owner(s) Electrabel
Nuclear power station
Reactor type pressurized water reactors
Reactor supplier ACECOWEN, FRAMACECO
Power generation
Units operational 2 x 433 MW
1 x 1006 MW
1 x 1047 MW
Nameplate capacity 2,919 MW
Annual gross output 21,670 GWh
Reactors [edit]
The plant consists of four second-generation pressurized water reactors with a total capacity of 2,919 MWe, making it the second largest nuclear power plant in Belgium, after Nuclear Plant Tihange. Its four units are rated as follows:[2]
Doel 1 : 433 MWe
Doel 2 : 433 MWe
Doel 3 : 1006 MWe
Doel 4 : 1047 MWe
Doel 1 and 2 came online in 1975, while Doel 3 and 4 came online in 1982 and 1985, respectively.
Doel 1, 2, and 4 reactors are based on designs by Westinghouse and were supplied by ACECOWEN, a consortium between ACEC, Cockerill, and Westinghouse. The Doel 3 reactor is based on a design by Framatome and was supplied by the FRAMACECO consortium (Framatome-ACEC-Cockerill).[3]
Doel 1 and 2 had a license to operate for 40 years but can operate for a further 10 years with a life extension approved by the regulator. On 15 February 2015, Doel 1 was shut down after 40 years of operation, while discussions continued on a life extension.[4] On 30 November 2015, the Belgian government announced that Doel 1 and 2 will operate for another 10 years, until 2025.[5] They were both successfully
Desktop
2:08 PM


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
N-WATCHDOG - Forecasting An NPP Area Of Influence
FILES Edit
TARGET
Site: Doel
Latitude(dg): 51.3240416
Longitude(dg): 4.25768495
Country: Belgium
Reactor type: PWR
Plant Nameplate Power(MWe): 2911
Info: Doel_Nuclear_Power_Station.htm
Monitoring time(h): 24
OPEN Source Term List and select a case file
This PC › DATA1500 (D:) › !N-WATCHDOG_The-eBook › PUBLIC › MIX-BLIND
Search MIX-BLIND
Organize New folder
Name
Date modified
Type
Size
PWR2-1000Containment-leakage-through-ice-gap-release_FTB-13.mix
PWR2-1000Containment-leakage-through-ice-gap-release_FTB-14.mix
PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-1.mix
PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-2.mix
PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-3.mix
PWR2-1000Steam-generator-tube-rupture-normal-coolant_FTB-4.mix
PWR-1350.mix
PWR-VVER1-440Containment-bypass-gap-release_FTB-1.mix
PWR-VVER1-440Containment-bypass-gap-release_FTB-2.mix
PWR-VVER1-440Containment-bypass-gap-release_FTB-3.mix
PWR-VVER1-440Containment-bypass-gap-release_FTB-4.mix
PWR-VVER1-440Containment-bypass-gap-release_FTB-5.mix
PWR-VVER1-440Containment-bypass-gap-release_FTB-6.mix
PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-1.mix
PWR-VVER1-440Containment-bypass-invessel-core-melt_FTB-2.mix
File name: PWR-1350.mix
*.mix Files
Open
Cancel
Step 1 of 4: The target
Desktop
2:09 PM


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
N-WATCHDOG - Forecasting An NPP Area Of Influence
FILES Edit
TARGET
Site: Doel
Latitude(dg): 51.3240416
Longitude(dg): 4.25768495
Country: Belgium
Reactor type: PWR
Plant Nameplate Power(MWe): 2911
Info: Doel_Nuclear_Power_Station.htm
Monitoring time(h): 24
THE SOURCE
Mix file: PWR-1350.mix
Source strength factor: 1
Release height(mAG): 40
Release duration(h): 4
Release mouth diameter(m): 3.7
Release exhaust velocity(m/s): 8.33
Release exhaust temperature(C): 90
Height of the most influencial building(mAG): 20
og Book
Step 1 of 4: The target
Desktop
2:09 PM

rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency

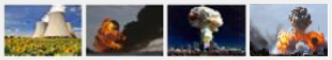
Media

Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works

Playground

MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit

Your recent work



- YOU ARE NOW IN ONLINE MODE. _

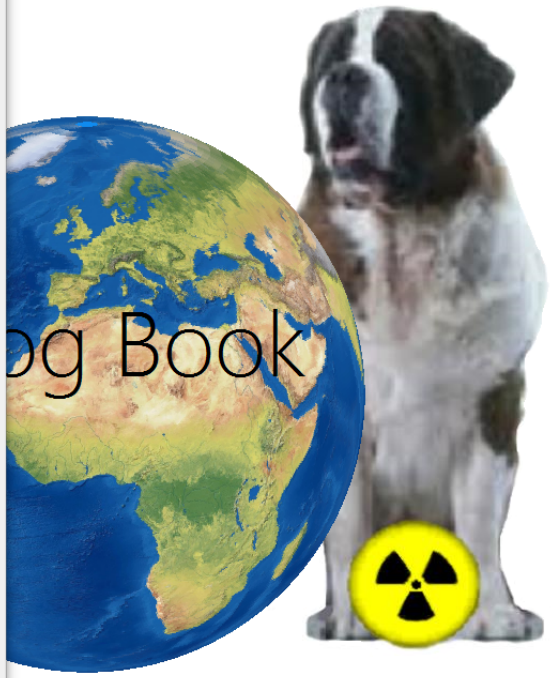
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.

TO GET BACK IN ONLINE MODE, click again.

MET FORECAST ACQUISITION

```
TARGET SITE: DOEL
 Lat(dg): 51.3240416
 Lon(dg): 4.25768495
 Country: Belgium
 Reference reactor type: PWR
 Plant nominal power (MWe): 2911
 Info: Doel_Nuclear_Power_Station.htm

Data acquired on 03-15-2017_14-09-44
Source: http://www.accuweather.com/

MET FORECAST
____________

Data acquired on 03-15-2017_14-09-44
Source: http://www.accuweather.com/
```

Time (hrs)	Wind speed (m/s)	Wind from (dg.NbyE)	Clouds (%)	Stability (Pasquill)	Rain* (mm/h)	Met Station (AccuWeather)
1pm	1.1	270	63%	C	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
2pm	1.7	270	57%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
3pm	1.7	270	53%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
4pm	1.9	270	45%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
5pm	1.9	270	32%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
6pm	1.9	315	20%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
7pm	1.9	0	8%	F	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
8pm	1.9	22.5	5%	F	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
9pm	1.7	45	3%	F	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
10pm	2.5	67.5	8%	F	0.0	/be/mechelen/27047/hourly-weather-forecast/270
11pm	1.9	67.5	6%	F	0.0	/be/mechelen/27047/hourly-weather-forecast/270
12am	1.9	90	3%	F	0.0	/be/mechelen/27047/hourly-weather-forecast/270
1am	1.9	112.5	0%	F	0.0	/be/mechelen/27047/hourly-weather-forecast/270
2am	1.9	135	0%	F	0.0	/be/mechelen/27047/hourly-weather-forecast/270
3am	1.1	157.5	45%	E	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
4am	1.1	180	53%	E	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
5am	1.1	180	52%	E	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
6am	1.1	202.5	50%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
7am	1.1	202.5	49%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
8am	1.7	202.5	51%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
9am	1.7	202.5	53%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
10am	1.9	202.5	54%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
11am	1.9	202.5	38%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704



Step 2 of 4: The met forecast

Desktop 2:10 PM

rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency

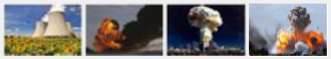
Media

Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works

Playground

MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit

Your recent work



- YOU ARE NOW IN ONLINE MODE. _

If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.

TO GET BACK IN ONLINE MODE, click again.

N-WATCHDOG - ASSESSMENT ENGINE. COMPUTING. Please WAIT!..

EVENT SITE

DOEL
Latitude(dg): 51.3240416
Longitude(dg): 4.25768495
Country: Belgium
Reference reactor type: PWR
Plant nominal power (MWe): 2911
Info: Doel_Nuclear_Power_Station.htm

THE MIX

Build mix by
(i) discarding unnecessary lines,
(ii) entering the appropriate values for nuclide 'Activity'; and, if appropriate,
(iii) adjusting the dose conversion factors.

NUCLIDE	ACTIVITY (Ci)	Halflife (d)	DCFe,50 (mSv/h)/(kBq/m3)	DCFbone (mSv/h)/(kBq/m3)	DCFlung (mSv/h)/(kBq/m3)	DCFthyd (mSv/h)/(kBq/m3)	DCFgi (mSv/h)/(kBq/m2)	DCFai (mSv/h)/(kBq/m3)	
Kr-85	402.810718	3.9e03	1.98e-07	0.00e00	0.00e00	0.00e00	0.00e00	9.17e-07	|sur
Kr-85m	17280.0	1.9e-01	1.26e-07	0.00e00	0.00e00	0.00e00	0.00e00	2.46e-05	|sur
Kr-87	33859.4515	5.3e-02	4.22e-07	0.00e00	0.00e00	0.00e00	0.00e00	1.42e-04	|sur
Kr-88	49037.832	1.2e-01	1.01e-06	0.00e00	0.00e00	0.00e00	0.00e00	3.50e-4	|sur
I-131	61297.2907	8.0e00	8.88e-03	2.38e-05	5.66e-04	1.80e-01	1.31e-06	6.08e-05	|sur
I-132	86400.0	9.6e-02	1.13e-04	1.68e-05	3.24e-04	1.68e-03	7.92e-06	3.78e-04	|sur
I-133	122400.0	8.7e-01	1.80e-03	2.74e-05	8.64e-04	3.36e-02	2.22e-06	9.94e-05	|sur
I-134	136800.0	3.7e-02	5.40e-05	7.32e-06	1.68e-04	3.12e-04	9.11e-06	4.39e-04	|sur
I-135	108000.0	2.8e-01	3.84e-04	2.64e-05	5.18e-04	6.84e-03	5.29e-6	2.71e-4	|sur
Xe-131m	720.0	1.2e01	0.00e00	0.00e00	0.00e00	0.00e00	0.00e00	1.33e-06	|sur
Xe-133	122400.0	5.2e00	5.19e-07	0.00e00	0.00e00	0.00e00	0.00e00	5.00e-06	|sur
Xe-133m	4320.0	2.2e00	0.00e00	0.00e00	0.00e00	0.00e00	0.00e00	4.58e-06	|sur
Xe-135	24518.9117	3.8e-01	6.81e-07	0.00e00	0.00e00	0.00e00	0.00e00	4.00e-05	|sur
Xe-135m	0.0d	1.1e-02	0.00e00	0.00e00	0.00e00	0.00e00	0.00e00	6.67e-05	|sur
Xe-138	122400.0	9.8e-03	0.00e00	0.00e00	0.00e00	0.00e00	0.00e00	1.96e-04	|sur
Cs-134	5409.72907	7.5e02	7.92e-03	2.01e-04	8.20e-04	0.00e00	5.33e-06	2.54e-04	|sur
Cs-135	0.0d	8.4e08	8.28e-04	1.66e-05	2.02e-04	0.00e00	9.68e-11	3.42e-08	|sur
Cs-136	2160.0	1.3e01	1.44e-03	2.26e-04	8.10e-04	0.00e00	7.31e-06	3.58e-04	|sur
Cs-137	3385.94515	1.1e04	5.52e-03	1.20e-04	8.60e-04	0.00e00	1.98e-06	9.18e-05	|sur

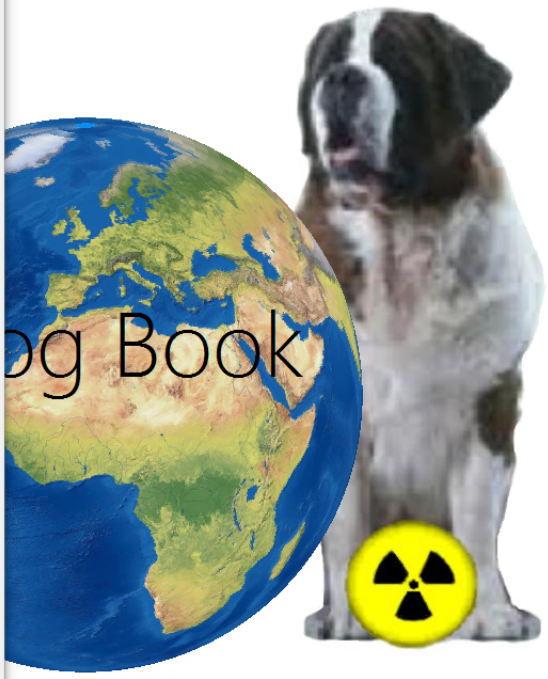
TARGET SITE: DOEL
Lat(dg): 51.3240416
Lon(dg): 4.25768495
Country: Belgium
Reference reactor type: PWR
Plant nominal power (MWe): 2911
Info: Doel_Nuclear_Power_Station.htm

MET FORECAST

Data acquired on 03-15-2017_14-09-44
Source: http://www.accuweather.com/

Ambient temperature at the time of release (C): 6

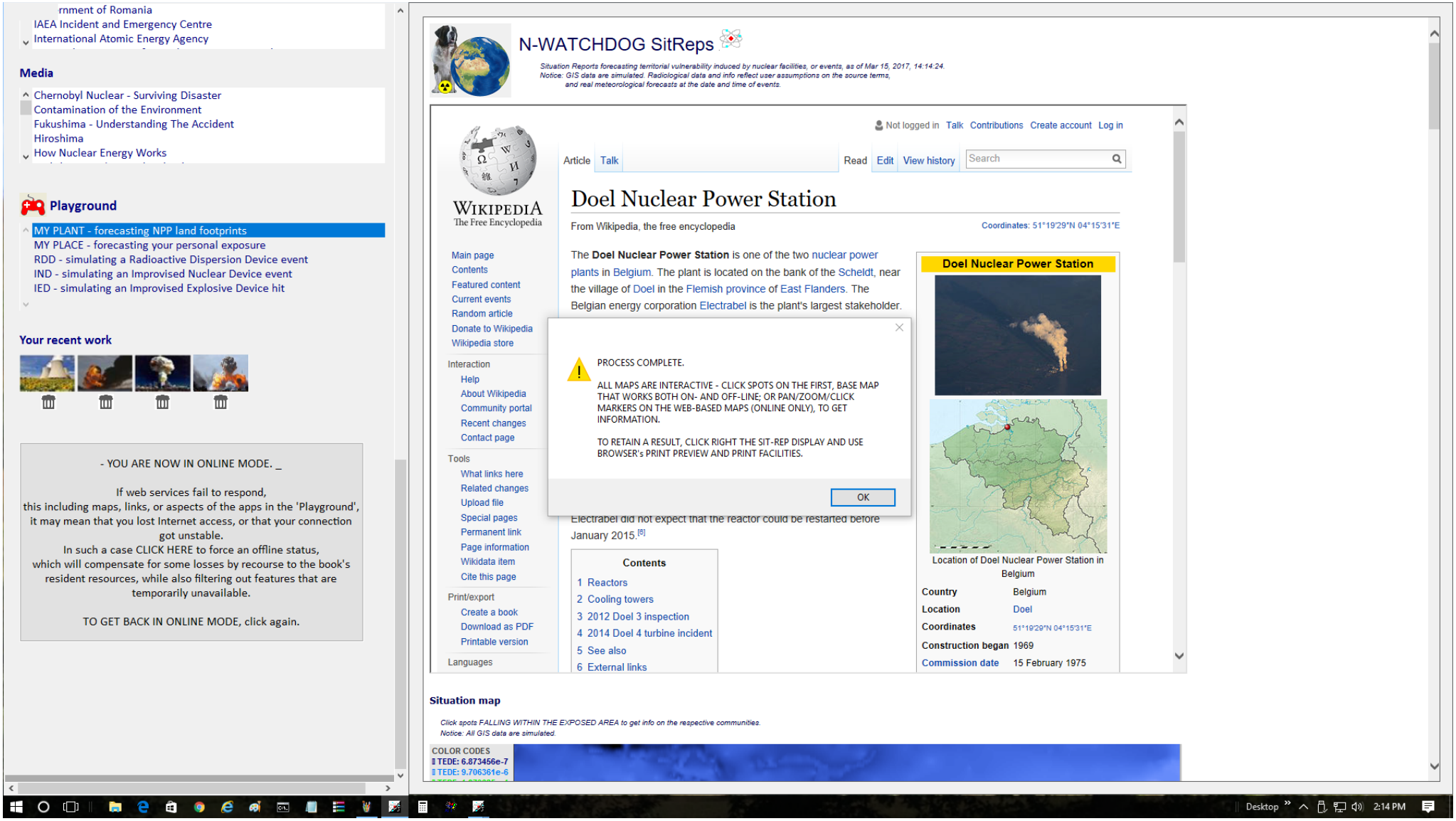
Time (hrs)	Wind speed (m/s)	Wind from (dg.NbyE)	Clouds (%)	Stability (Pasquill)	Rain* (mm/h)	Met Station (AccuWeather)
1pm	1.1	270	63%	C	0.0	/be/antwerp/27046/hourly-weather-forecast/2704
2pm	1.7	270	57%	B	0.0	/be/antwerp/27046/hourly-weather-forecast/2704

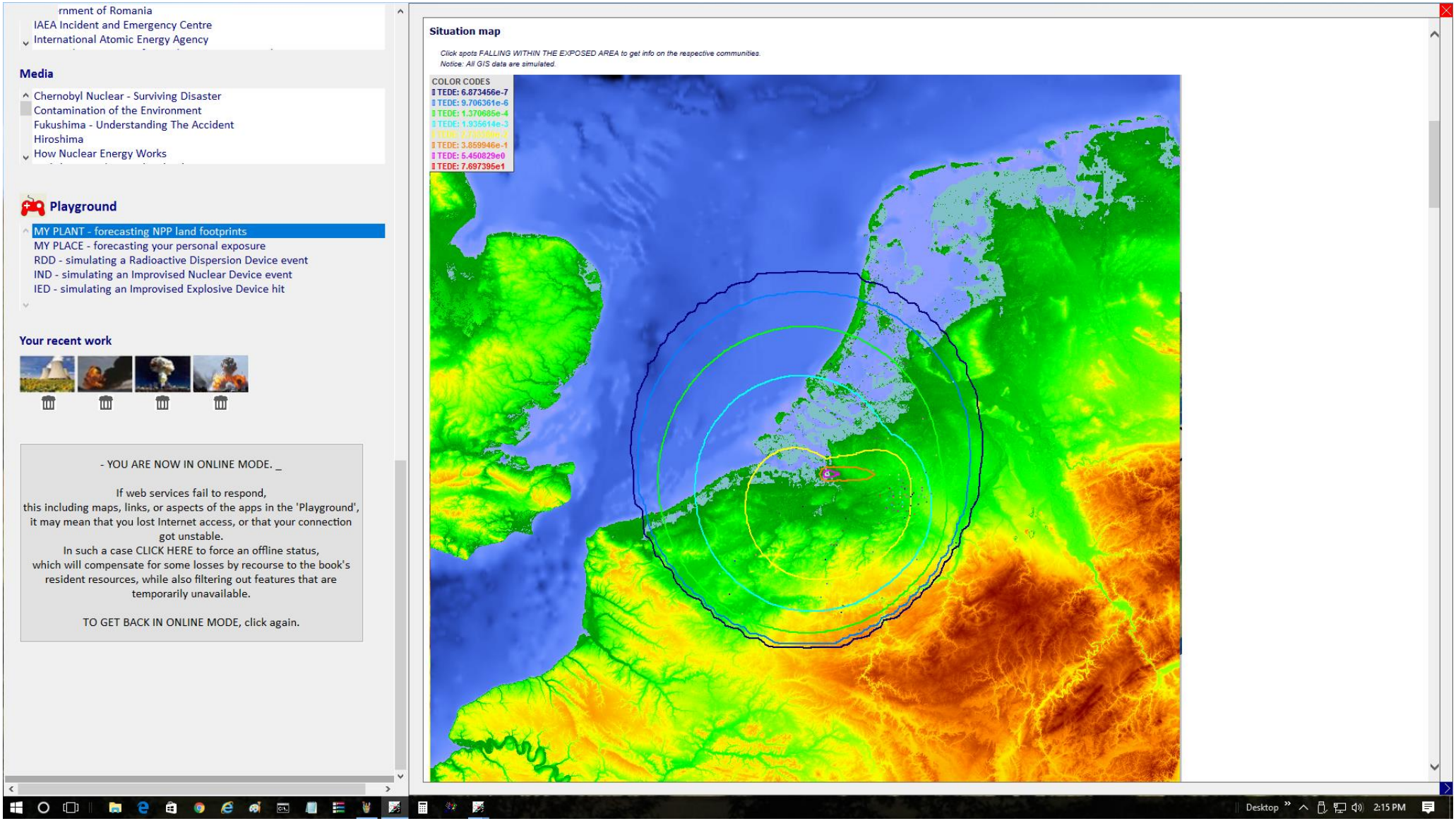


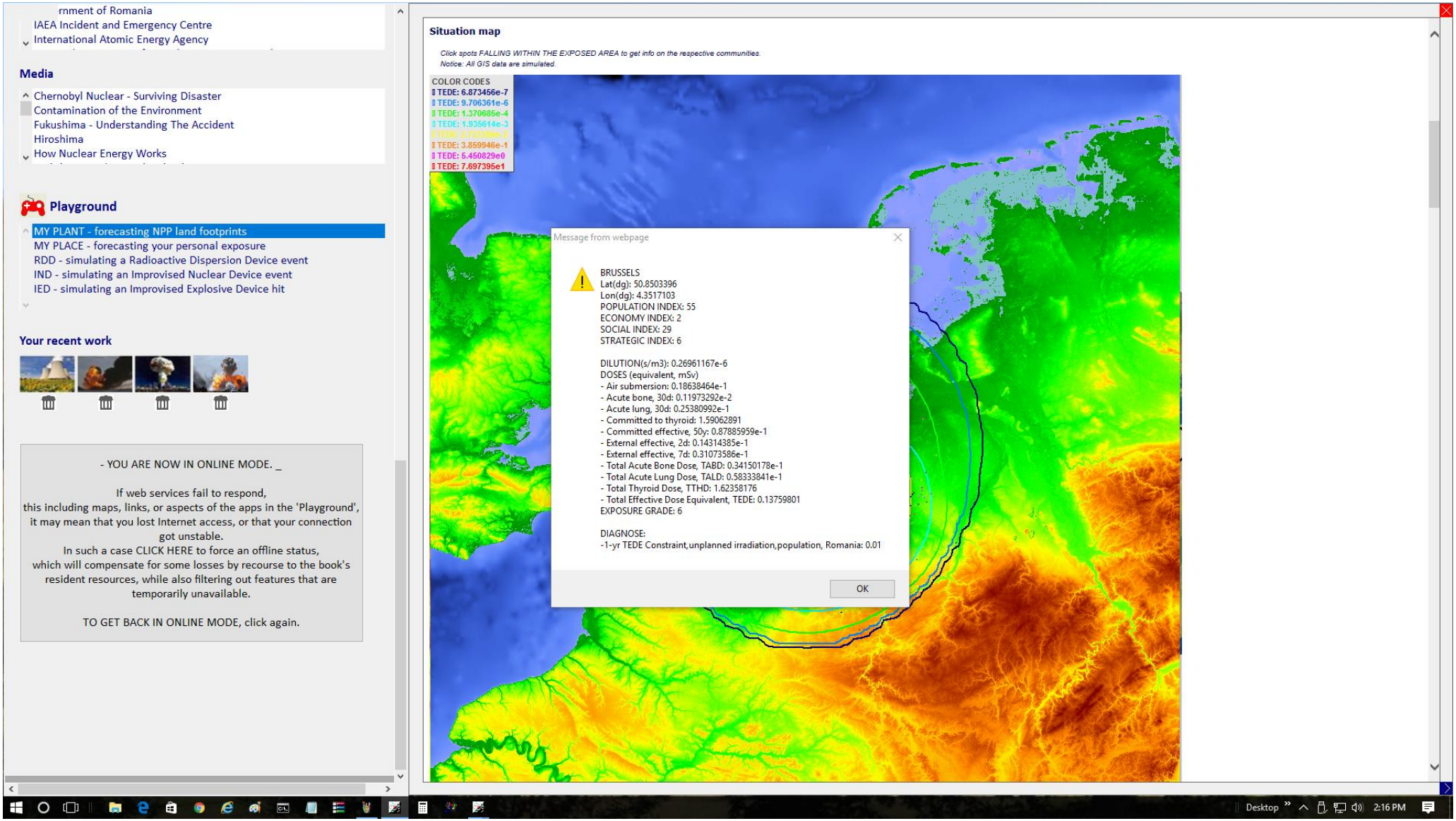
Step 3 of 4: Radiological assessment

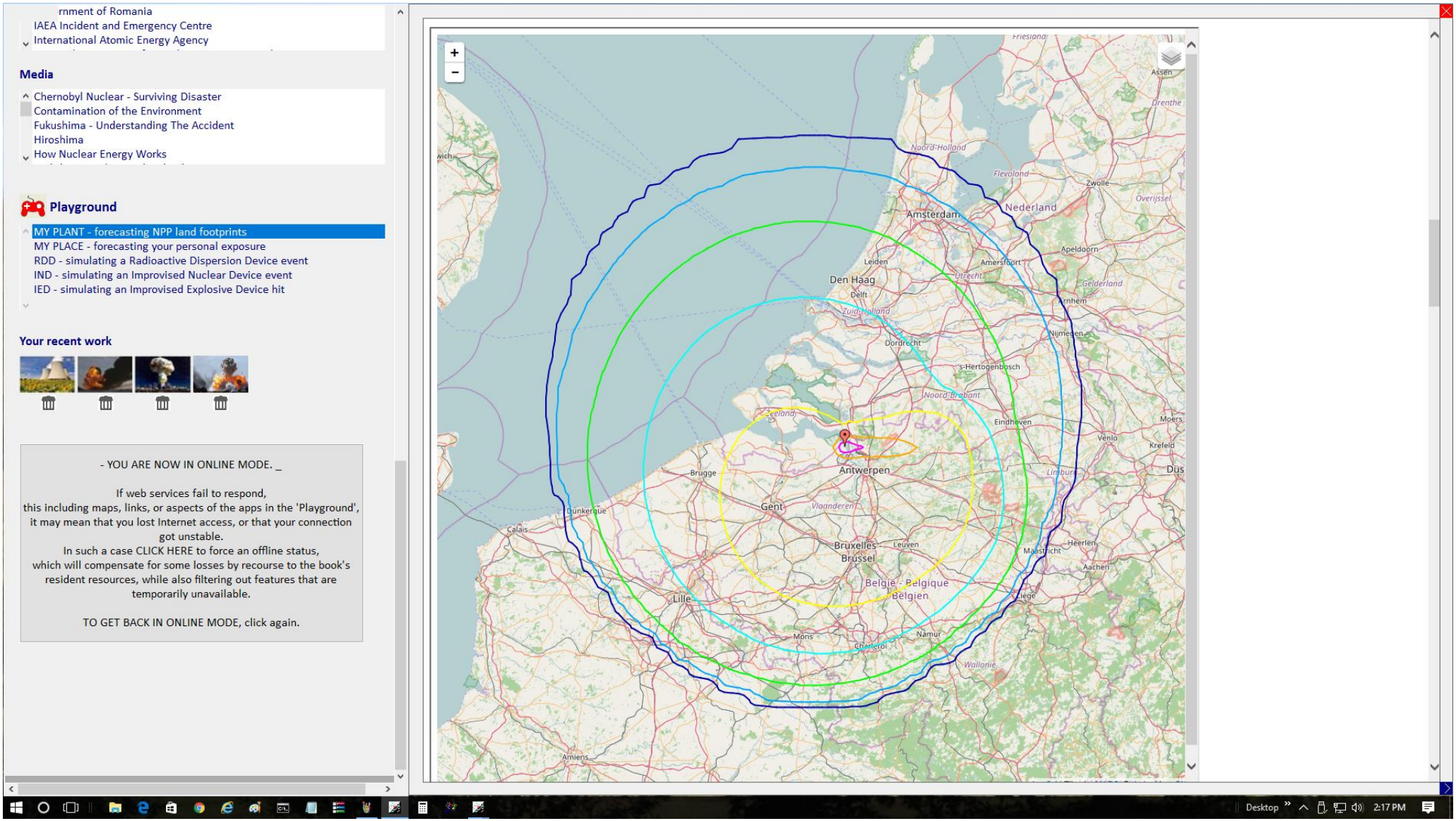
Desktop 2:10 PM

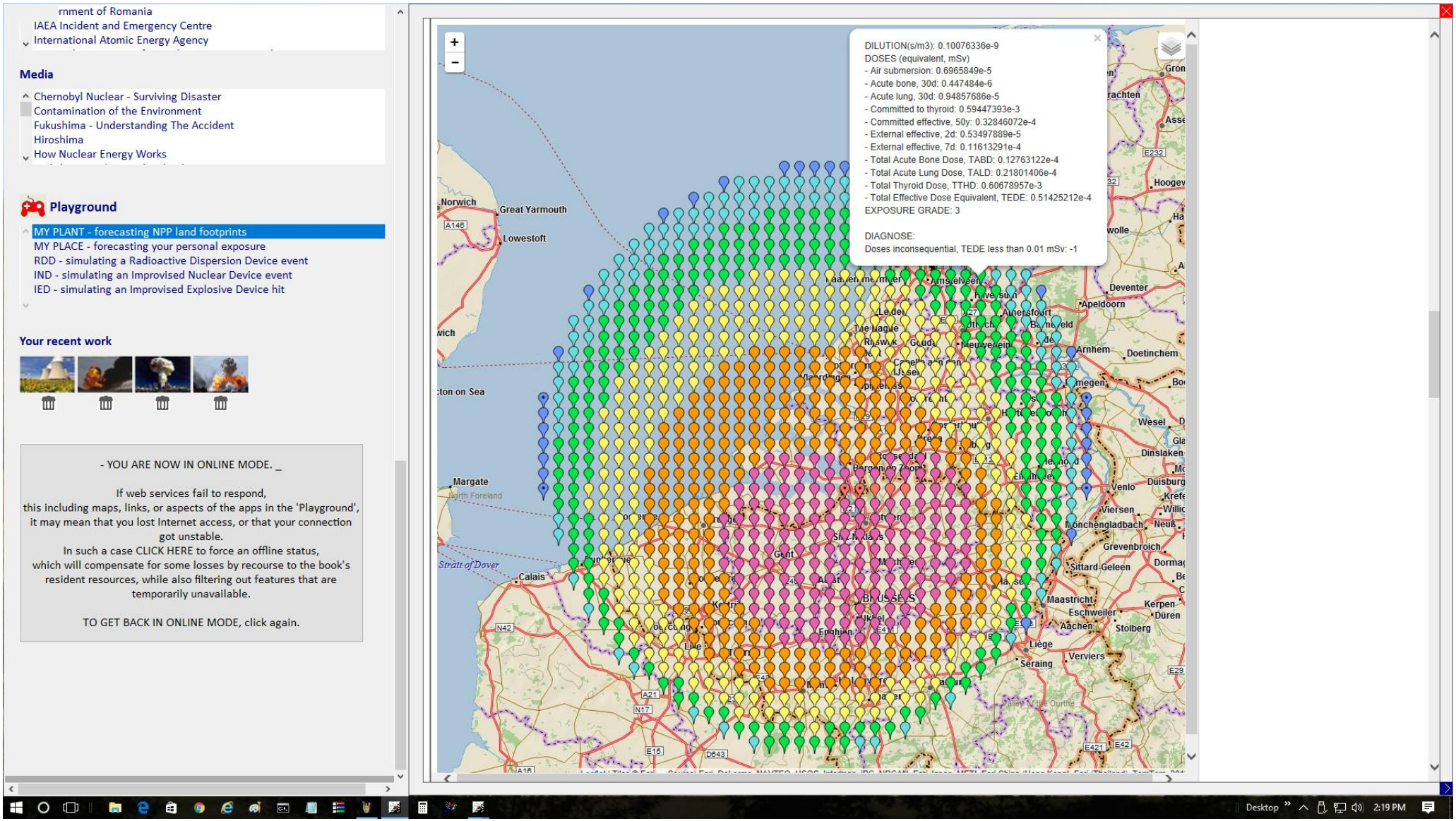
The Viewer…


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's resident resources, while also filtering out features that are temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
N-WATCHDOG SitReps
Situation Reports forecasting territorial vulnerability induced by nuclear facilities, or events, as of Mar 15, 2017, 14:14:24.
Notice: GIS data are simulated. Radiological data and info reflect user assumptions on the source terms, and real meteorological forecasts at the date and time of events.
Not logged in Talk Contributions Create account Log in
Article Talk Read Edit View history Search
WIKIPEDIA
The Free Encyclopedia
Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store
Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page
Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item
Cite this page
Print/export
Create a book
Download as PDF
Printable version
Languages
Doel Nuclear Power Station
From Wikipedia, the free encyclopedia
Coordinates: 51°19'29"N 04°15'31"E
The Doel Nuclear Power Station is one of the two nuclear power plants in Belgium. The plant is located on the bank of the Scheldt, near the village of Doel in the Flemish province of East Flanders. The Belgian energy corporation Electrabel is the plant's largest stakeholder.
PROCESS COMPLETE.
ALL MAPS ARE INTERACTIVE - CLICK SPOTS ON THE FIRST, BASE MAP THAT WORKS BOTH ON- AND OFF-LINE; OR PAN/ZOOM/CLICK MARKERS ON THE WEB-BASED MAPS (ONLINE ONLY), TO GET INFORMATION.
TO RETAIN A RESULT, CLICK RIGHT THE SIT-REP DISPLAY AND USE BROWSER's PRINT PREVIEW AND PRINT FACILITIES.
OK
January 2015.[8]
Contents
1 Reactors
2 Cooling towers
3 2012 Doel 3 inspection
4 2014 Doel 4 turbine incident
5 See also
6 External links
Doel Nuclear Power Station
Location of Doel Nuclear Power Station in Belgium
Country Belgium
Location Doel
Coordinates 51°19'29"N 04°15'31"E
Construction began 1969
Commission date 15 February 1975
Situation map
Click spots FALLING WITHIN THE EXPOSED AREA to get info on the respective communities.
Notice: All GIS data are simulated.
COLOR CODES
TEDE: 6.873456e-7
TEDE: 9.706361e-6
Desktop
2:14 PM


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
Situation map
Click spots FALLING WITHIN THE EXPOSED AREA to get info on the respective communities.
Notice: All GIS data are simulated.
COLOR CODES
TEDE: 6.873456e-7
TEDE: 9.706361e-6
TEDE: 1.370685e-4
TEDE: 1.935614e-3
TEDE: 3.859946e-1
TEDE: 5.450829e0
TEDE: 7.697395e1
Desktop
2:15 PM


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
Situation map
Click spots FALLING WITHIN THE EXPOSED AREA to get info on the respective communities.
Notice: All GIS data are simulated.
COLOR CODES
TEDE: 6.873456e-7
TEDE: 9.706361e-6
TEDE: 1.370685e-4
TEDE: 1.935614e-3
TEDE: 3.859946e-1
TEDE: 5.450829e0
TEDE: 7.697395e1
Message from webpage
BRUSSELS
Lat(dg): 50.8503396
Lon(dg): 4.3517103
POPULATION INDEX: 55
ECONOMY INDEX: 2
SOCIAL INDEX: 29
STRATEGIC INDEX: 6
DILUTION(s/m3): 0.26961167e-6
DOSES (equivalent, mSv)
- Air submersion: 0.18638464e-1
- Acute bone, 30d: 0.11973292e-2
- Acute lung, 30d: 0.25380992e-1
- Committed to thyroid: 1.59062891
- Committed effective, 50y: 0.87885959e-1
- External effective, 2d: 0.14314385e-1
- External effective, 7d: 0.31073586e-1
- Total Acute Bone Dose, TABD: 0.34150178e-1
- Total Acute Lung Dose, TALD: 0.58333841e-1
- Total Thyroid Dose, TTHD: 1.62358176
- Total Effective Dose Equivalent, TEDE: 0.13759801
EXPOSURE GRADE: 6
DIAGNOSE:
-1-yr TEDE Constraint,unplanned irradiation,population, Romania: 0.01
OK
Desktop
2:16 PM


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
Amsterdam
Nederland
Den Haag
Antwerpen
Gent
Bruxelles
Brussel
Belgie - Belgique
Belgien
Lille
Leiden
Utrecht
Delft
Dordrecht
Eindhoven
Brugge
Calais
Mons
Namur
Amiens
Desktop
2:17 PM


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
DILUTION(s/m3): 0.10076336e-9
DOSES (equivalent, mSv)
- Air submersion: 0.6965849e-5
- Acute bone, 30d: 0.447484e-6
- Acute lung, 30d: 0.94857686e-5
- Committed to thyroid: 0.59447393e-3
- Committed effective, 50y: 0.32846072e-4
- External effective, 2d: 0.53497889e-5
- External effective, 7d: 0.11613291e-4
- Total Acute Bone Dose, TABD: 0.12763122e-4
- Total Acute Lung Dose, TALD: 0.21801406e-4
- Total Thyroid Dose, TTHD: 0.60678957e-3
- Total Effective Dose Equivalent, TEDE: 0.51425212e-4
EXPOSURE GRADE: 3
DIAGNOSE:
Doses inconsequential, TEDE less than 0.01 mSv: -1
Norwich
Great Yarmouth
Lowestoft
Margate
Calais
Straits of Dover
Deventer
Apeldoorn
Arnhem
Doetinchem
Wesel
Venlo
Viersen
Mönchengladbach
Grevenbroich
Sittard-Geleen
Maastricht
Eschweiler
Aachen
Stolberg
Liège
Verviers
Seraing
Kerpen
Düren
Desktop
2:19 PM

rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency

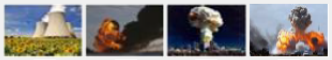
Media

Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works

Playground

MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit

Your recent work



- YOU ARE NOW IN ONLINE MODE. _

If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.

TO GET BACK IN ONLINE MODE, click again.

Downloads

The files under these links requires Google Earth(TM) installed and your being online.
Click right the links, 'Save Target' on your system, then 'View Downloads'.
REMEMBER: always 'save target' with a .KML extension.

The Case Contour Map
The Case Spots Map

The I/O summary

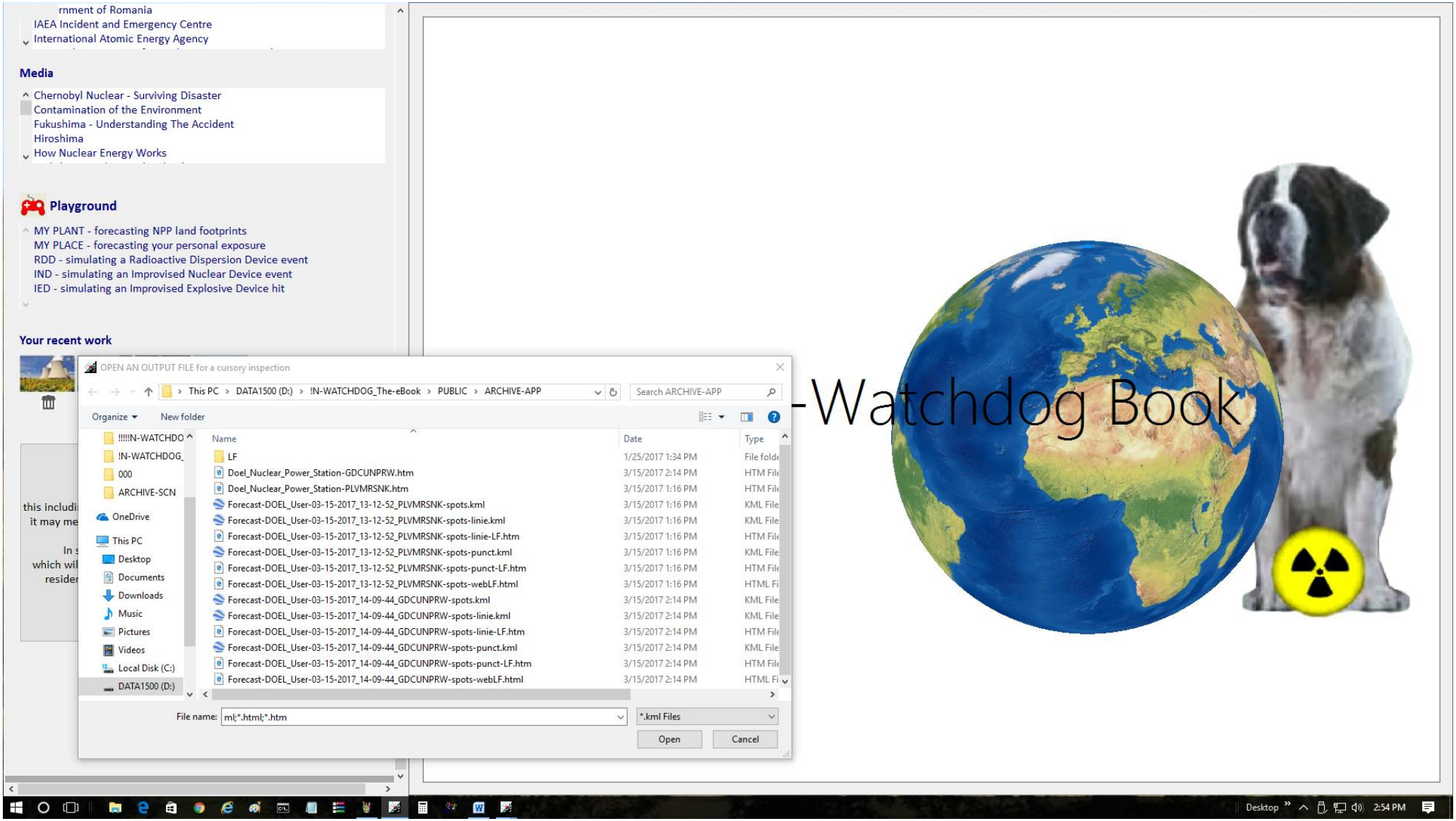
Radiological situation and GIS information on the communities exposed.

```
EVENT SITE
__________

DOEL
Latitude(dg): 51.3240416
Longitude(dg): 4.25768495
Country: Belgium
Reference reactor type: PWR
Plant nominal power (MWe): 2911
Info: Doel_Nuclear_Power_Station.htm


RadSit SUMMARY
______________

Number of communities in the emitter area of influence
exposed to the respective diagnose.
___________________________________________________

Doses inconsequential, TEDE less than 0.01 mSv: -1 ..................................... 68
1-yr TEDE Constraint,unplanned irradiation,population, Romania: 0.01 ................ 75
1-yr TEDE Limit to population, all sources, Romania: 1 ............................... 1
Sheltering TEDE PAG, Romania: 2 ...................................................... 1
Sheltering TEDE PAG, IAEA: 10 ......................................................... 1
Evacuation TEDE PAG, Romania: 30 ..................................................... 1
Evacuation TEDE PAG, IAEA: 50 ........................................................ 1
Hot Intervention Zone TEDE PAG, Romania: 100 ........................................ 0
Sheltering THYD PAG, Romania: 30 ...................................................... 1
Iodine prophylaxis THYD PAG, IAEA: 100 ................................................ 1
Evacuation and Iodine prophylaxis THYD PAG, Romania: 300 ............................ 1
Hypothyroidism in 1 or more yrs./8.0e-3 risk of fatal thy.cancer THYD PAG IAEA: 5000  0
Vomiting in 1 day TABD PAG, IAEA: 500 ................................................ 0
Death in 1-2 mnt./1.0e-1 risk of fatal cancer TABD PAG, IAEA: 1000 ................. 0
Death in 2-12 mnt./5.0e-2 risk of lung cancer TALD PAG, IAEA: 6000 ................. 0

* * *

THE MIX
_______

Build mix by
(i) discarding unnecessary lines,
(ii) entering the appropriate values for nuclide 'Activity'; and, if appropriate,
(iii) adjusting the dose conversion factors.
_____________________________________________________________________________________

NUCLIDE     ACTIVITY          Halflife  DCFe,50   DCFbone   DCFlung   DCFthyd   DCFgi     DCFai
.                                       (mSv/h)/  (mSv/h)/  (mSv/h)/  (mSv/h)/  (mSv/h)/  (mSv/h)/
.           (Ci)              (d)       (kBq/m3)  (kBq/m3)  (kBq/m3)  (kBq/m3)  (kBq/m2)  (kBq/m3)
_____________________________________________________________________________________________________

Kr-85       402.810718        3.9e03    1.98e-07  0.00e00   0.00e00   0.00e00   0.00e00   9.17e-07
Kr-85m      17280.0           1.9e-01   1.26e-07  0.00e00   0.00e00   0.00e00   0.00e00   2.46e-05
Kr-87       33859.4515        5.3e-02   4.22e-07  0.00e00   0.00e00   0.00e00   0.00e00   1.42e-04
Kr-88       49037.832         1.2e-01   1.01e-06  0.00e00   0.00e00   0.00e00   0.00e00   3.50e-4
I-131       61297.2907        8.0e00    8.88e-03  2.38e-05  5.66e-04  1.80e-01  1.31e-06  6.08e-05
I-132       86400.0           9.6e-02   1.13e-04  1.68e-05  3.24e-04  1.68e-03  7.92e-06  3.78e-04
I-133       122400.0          8.7e-01   1.80e-03  2.74e-05  8.64e-04  3.36e-02  2.22e-06  9.94e-05
I-134       126500.0          3.7e-02   5.40e-05  7.32e-06  1.68e-04  3.12e-04  9.11e-06  4.39e-04
I-135       108000.0          2.8e-01   3.84e-04  2.64e-05  5.18e-04  6.84e-03  5.29e-6   2.71e-4
Xe-131m     720.0             1.2e01    0.00e00   0.00e00   0.00e00   0.00e00   0.00e00   1.33e-06
Xe-133      122400.0          5.2e00    5.19e-07  0.00e00   0.00e00   0.00e00   0.00e00   5.00e-06
Xe-133m     4320.0            2.2e00    0.00e00   0.00e00   0.00e00   0.00e00   0.00e00   4.58e-06
Xe-135      24518.9117        3.8e-01   6.81e-07  0.00e00   0.00e00   0.00e00   0.00e00   4.00e-05
Xe-135m     0.0d              1.1e-02   0.00e00   0.00e00   0.00e00   0.00e00   0.00e00   6.67e-05
```

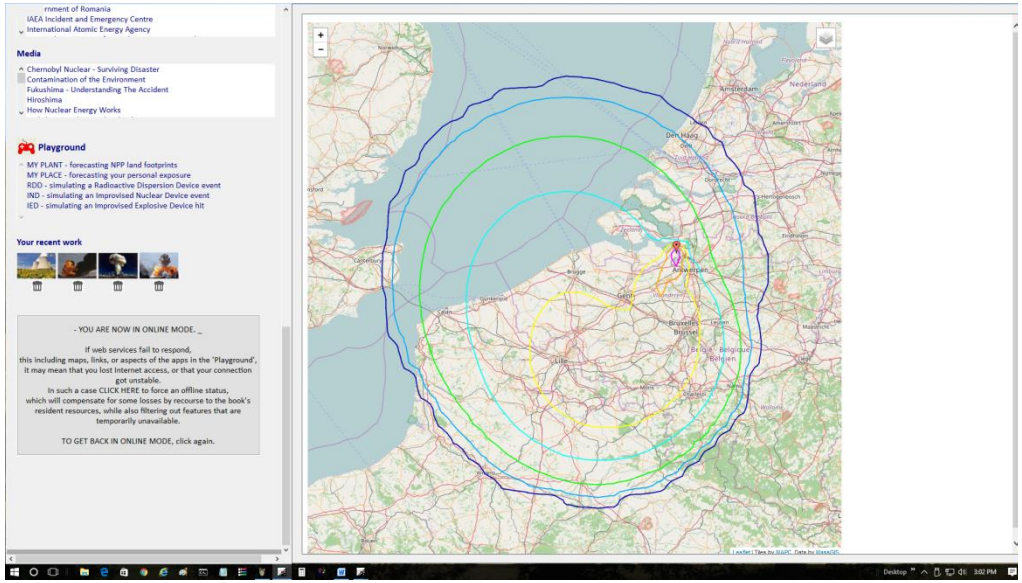
Desktop 2:21 PM

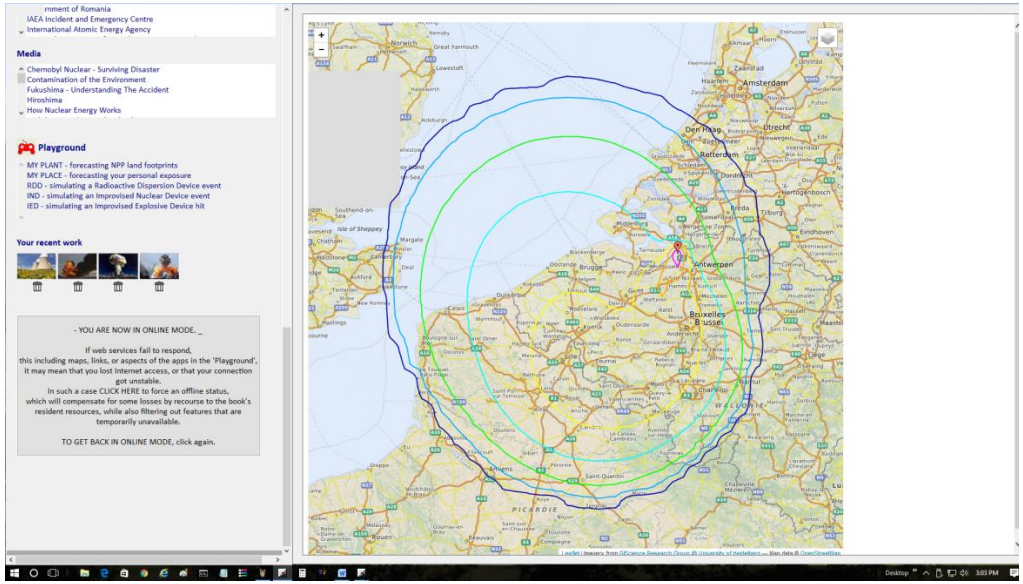
❖THE PLAYGROUND -Your recent work. Reclaiming cases on the record, for recollection or further analysis…

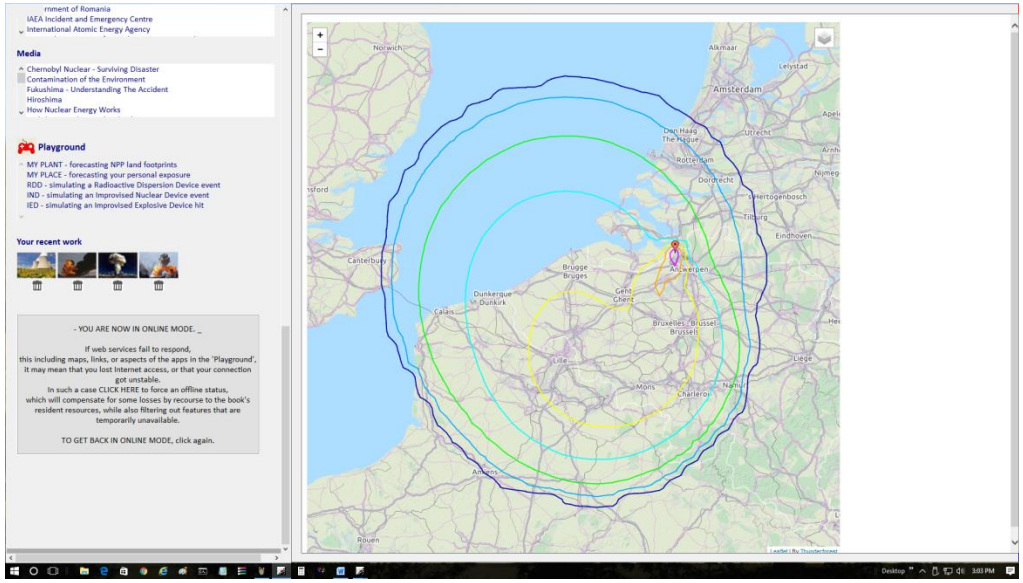
A 'MY PLANT' example...

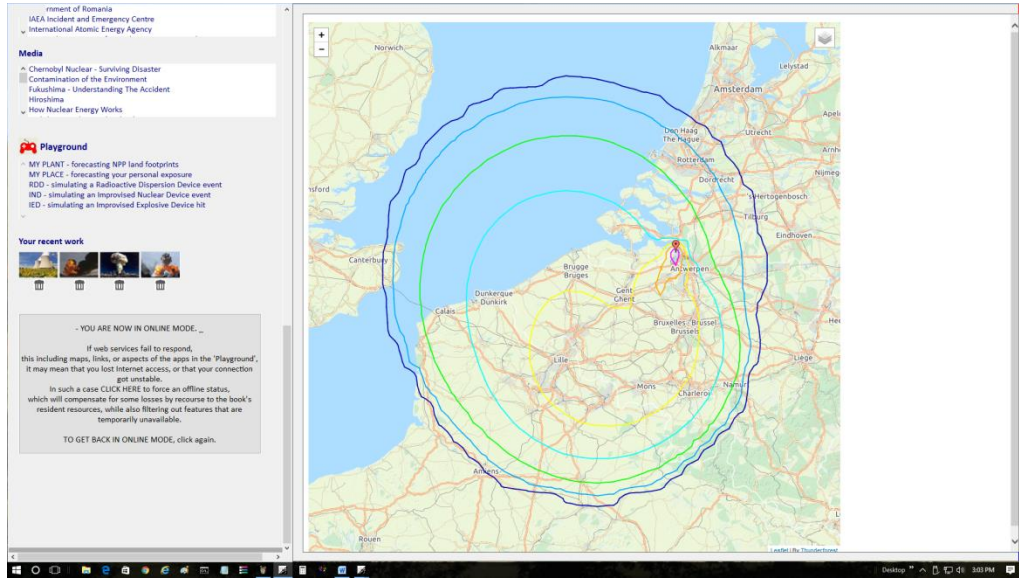


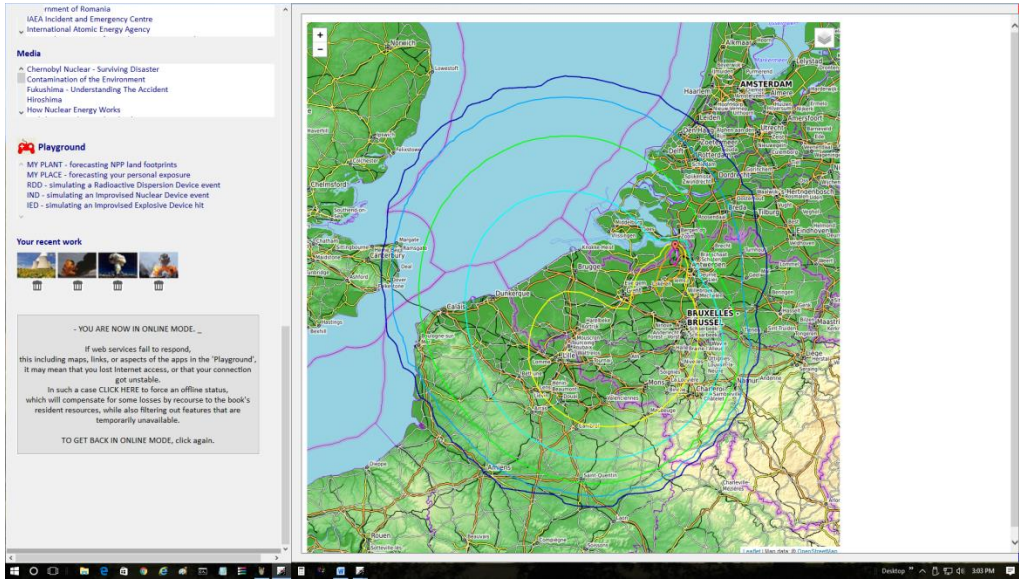
Reclaiming 2-D Isodose Maps, from various web mapping services…

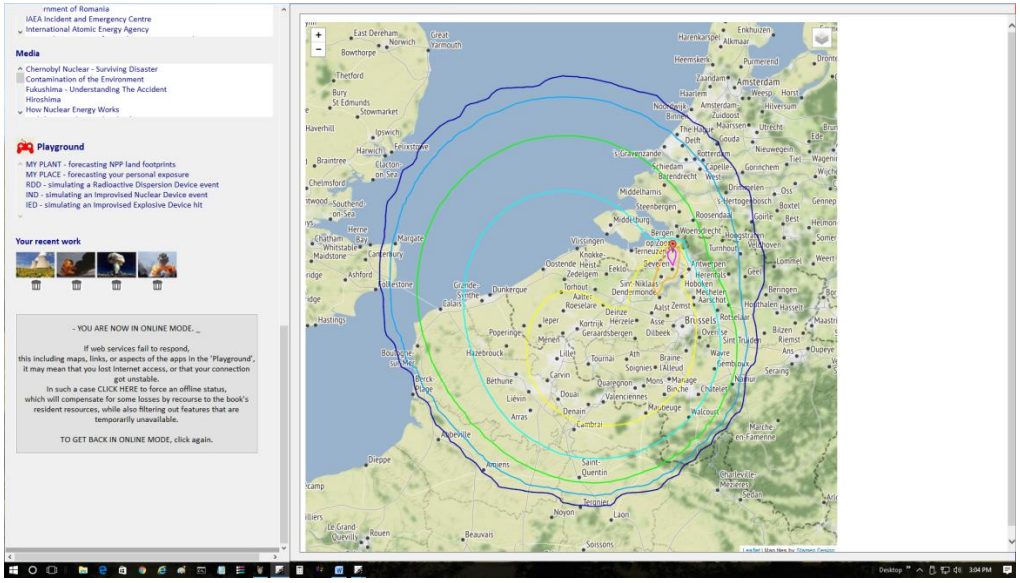


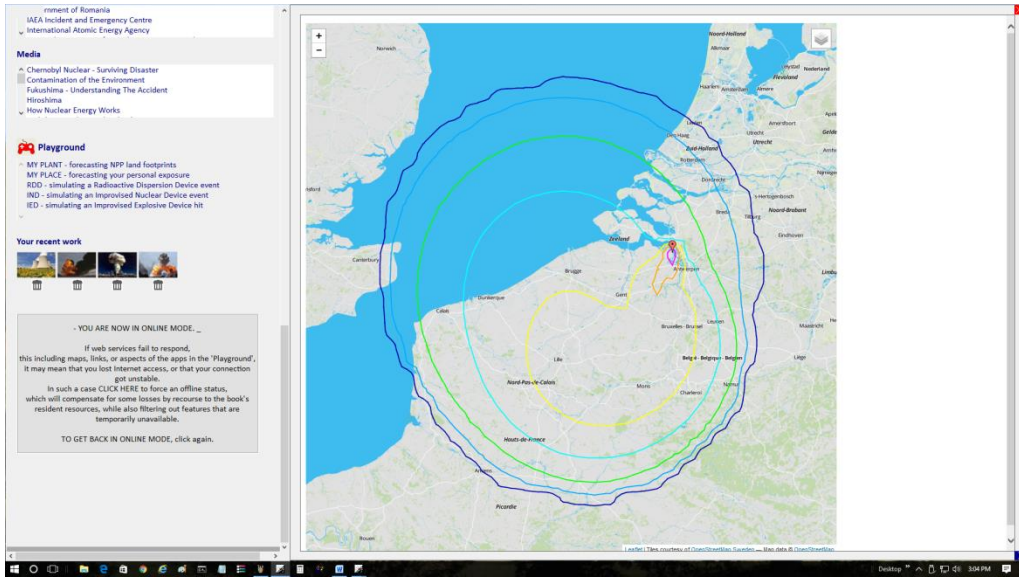


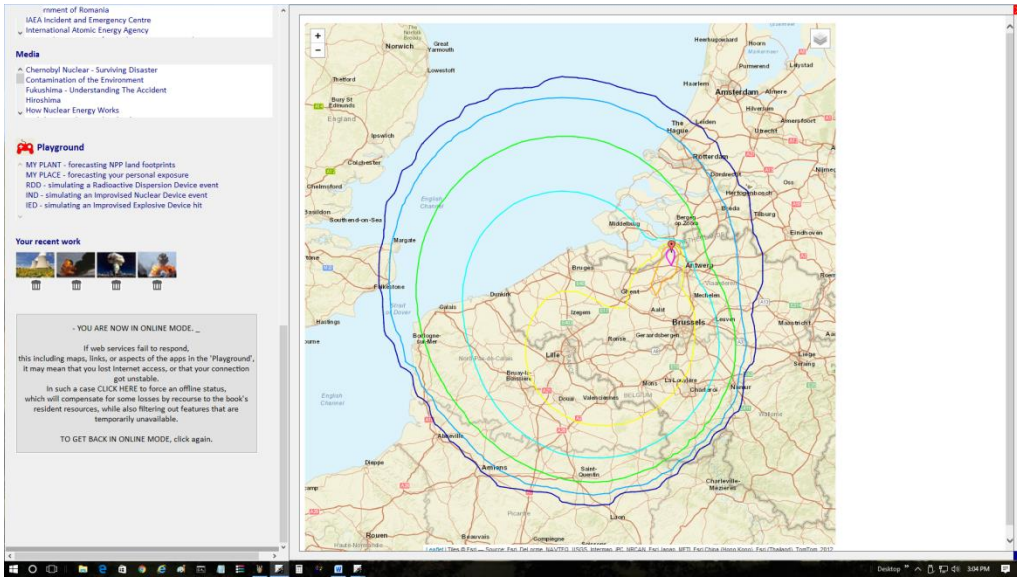


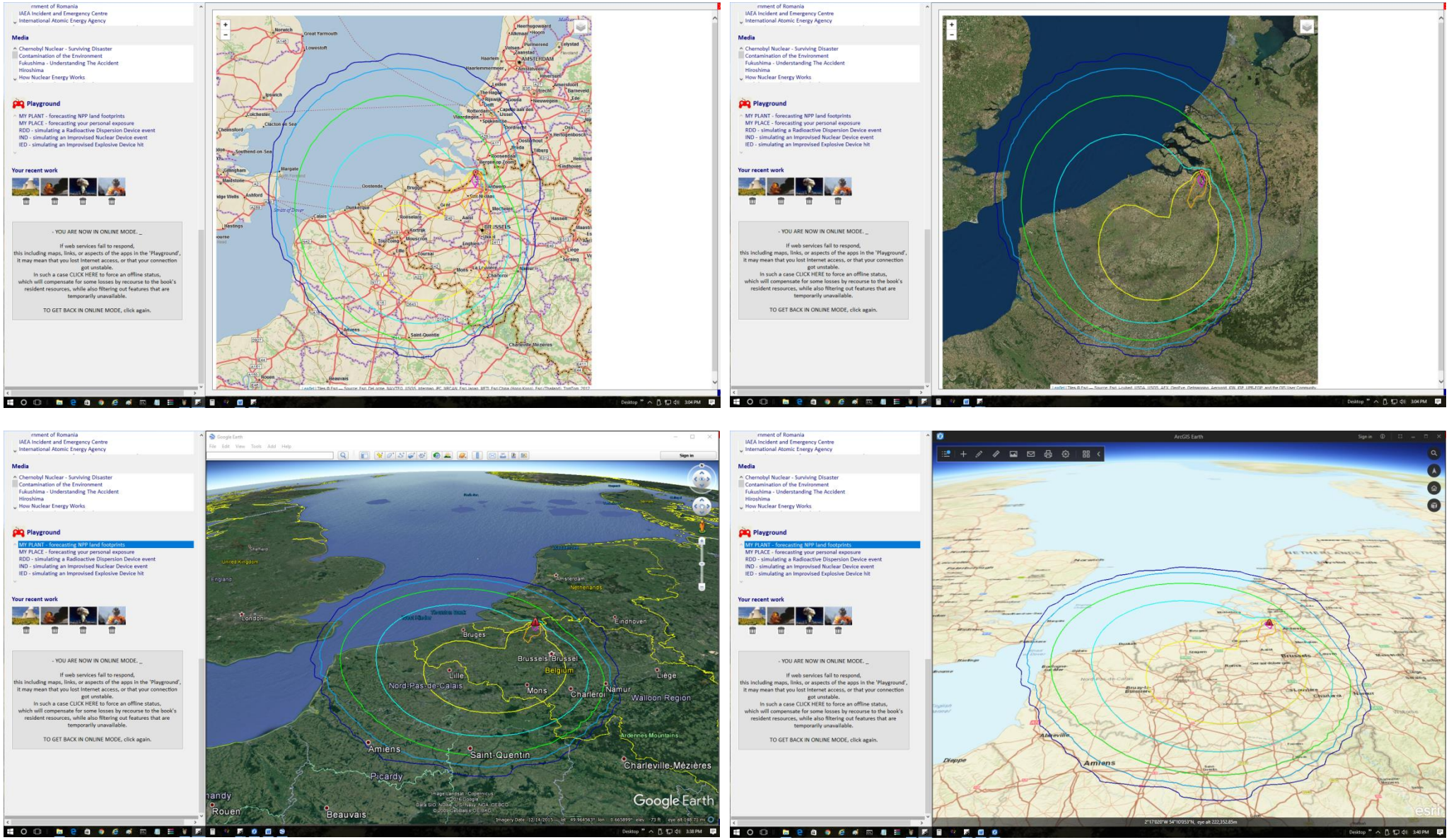



rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
AMSTERDAM
BRUXELLES - BRUSSEL


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.

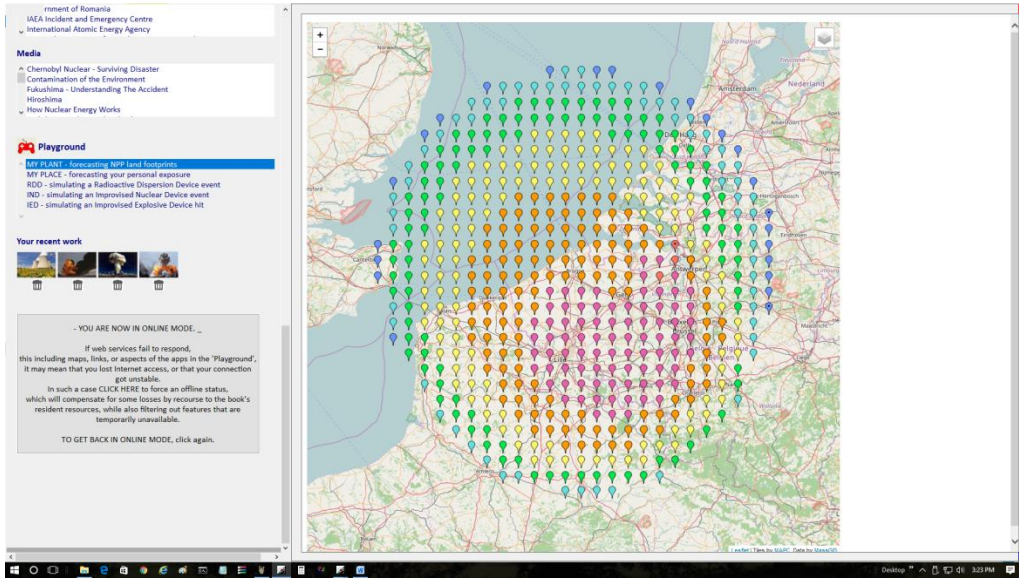

rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.

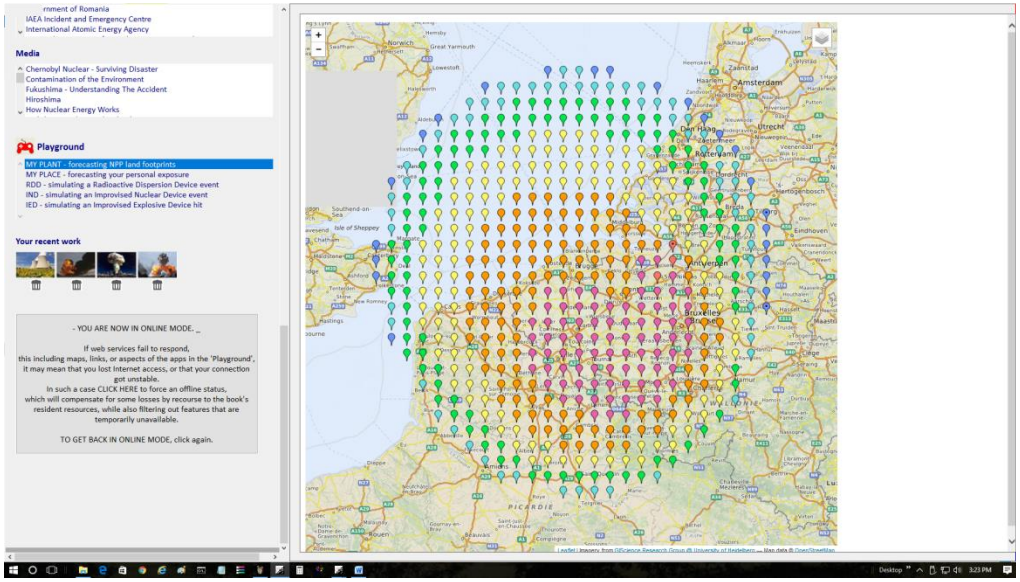

rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.

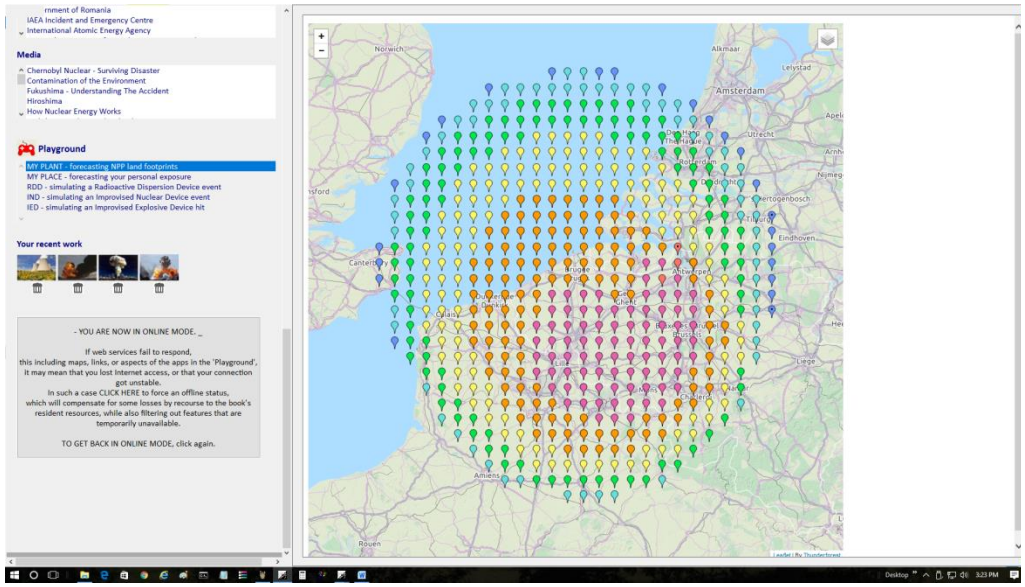


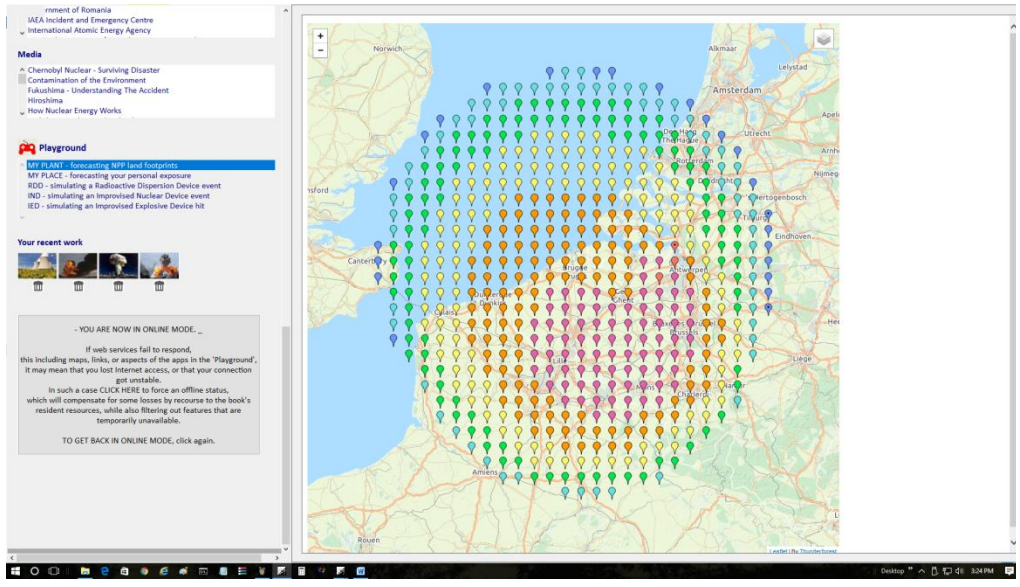
… and Google Earth or ArcGIS Earth (ESRI) versions are also available.

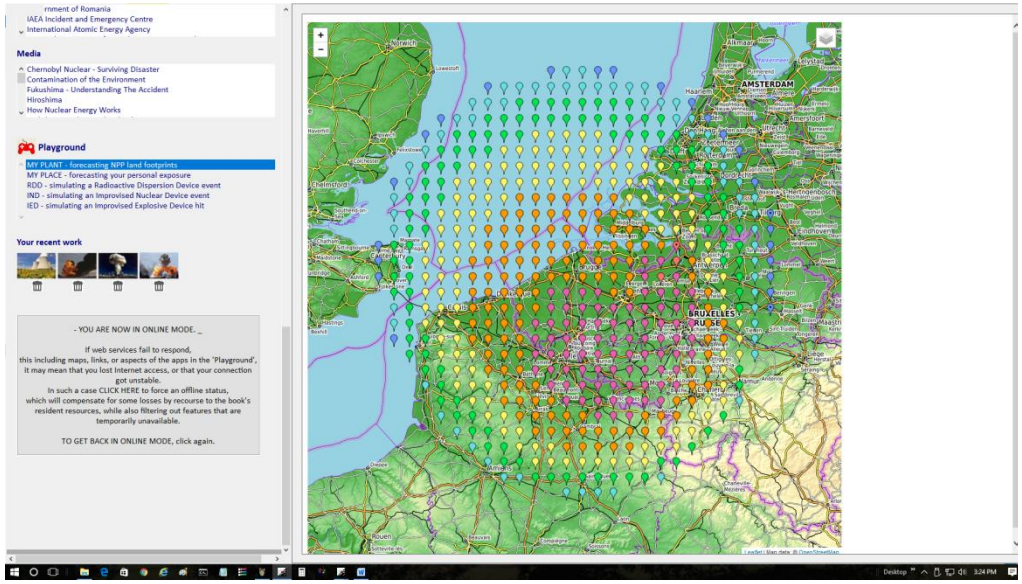
Reclaiming 2-D Grid Maps, from various web mapping services…

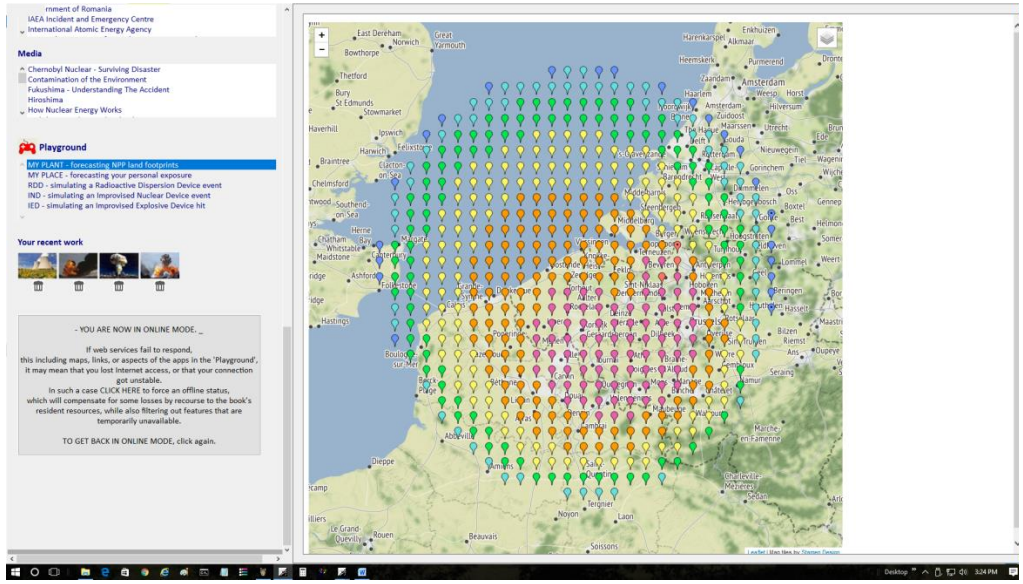


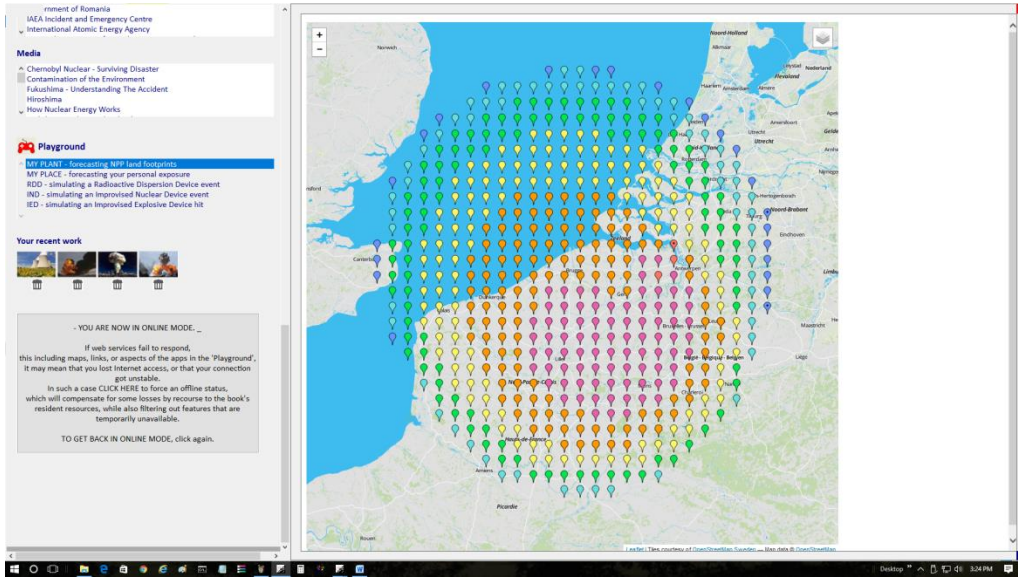


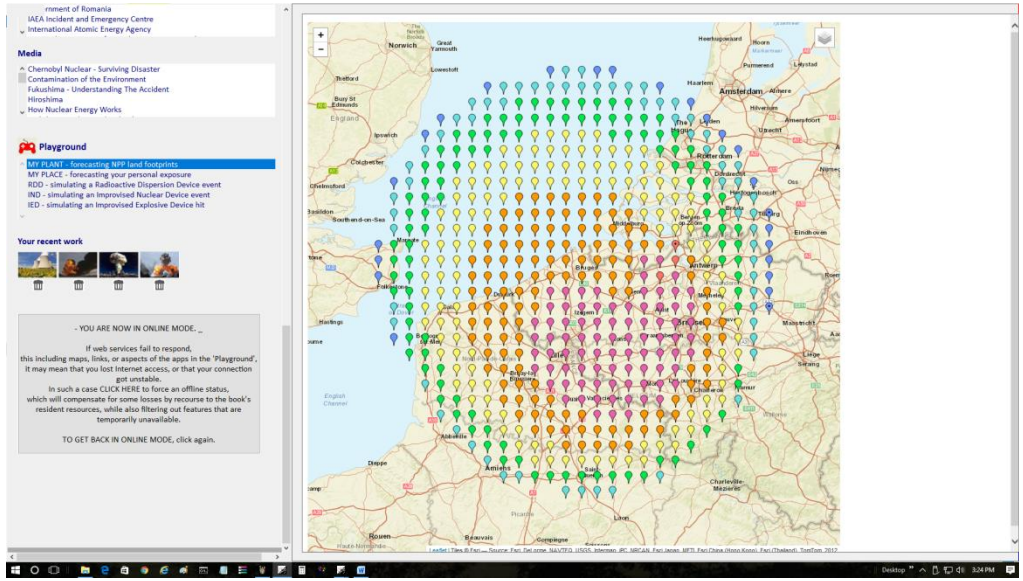


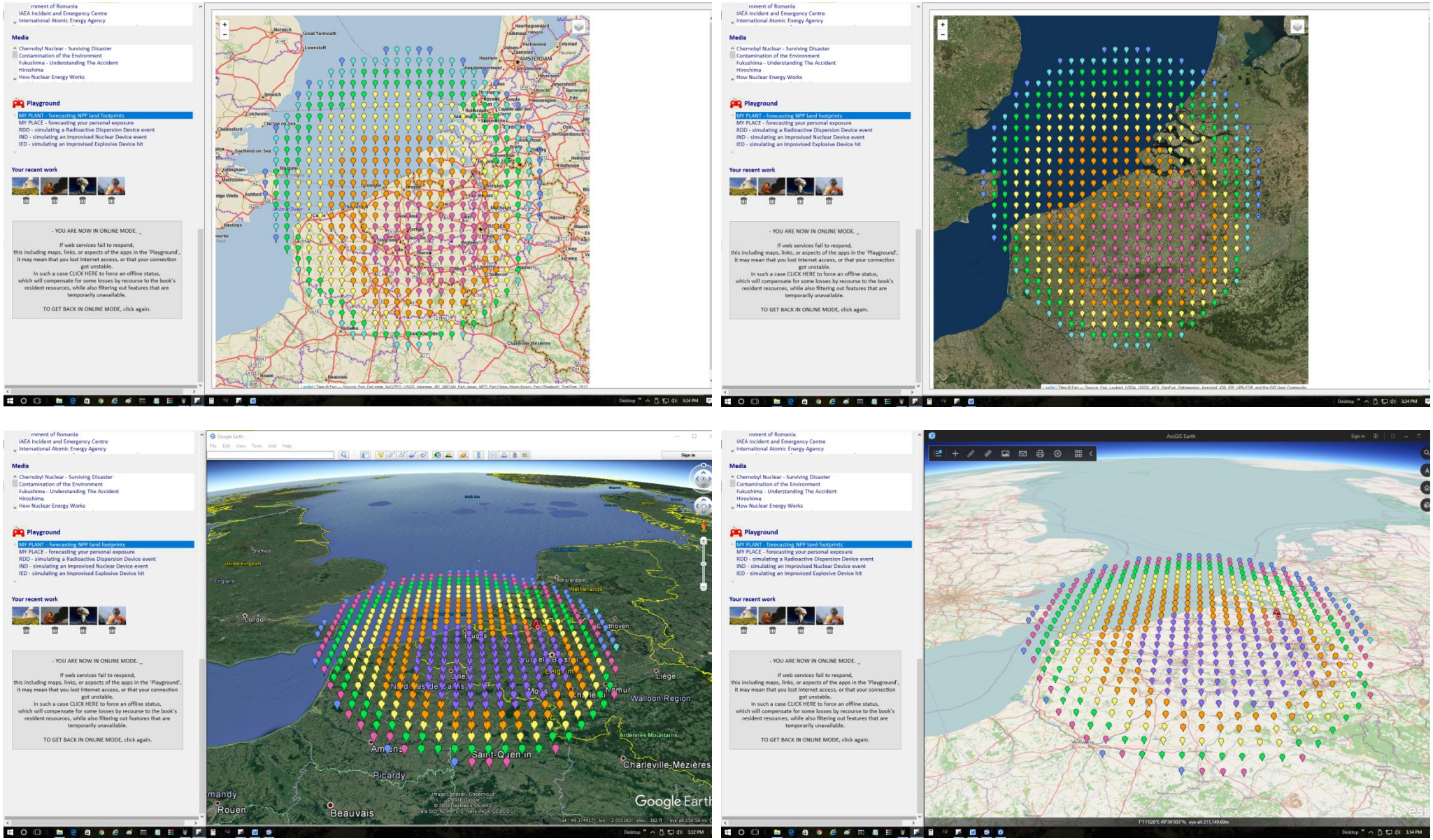



rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
AMSTERDAM
BRUXELLES

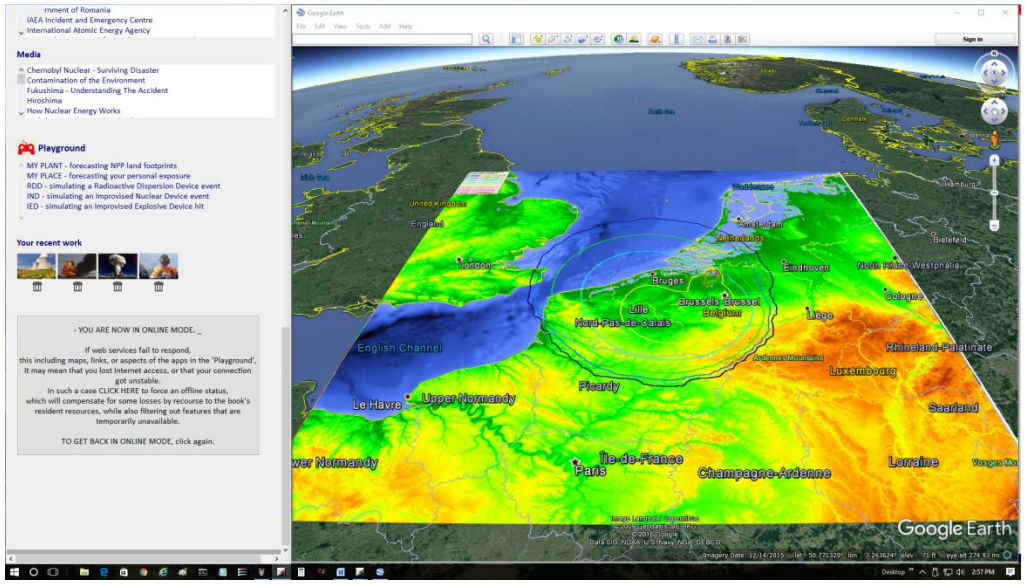

rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.

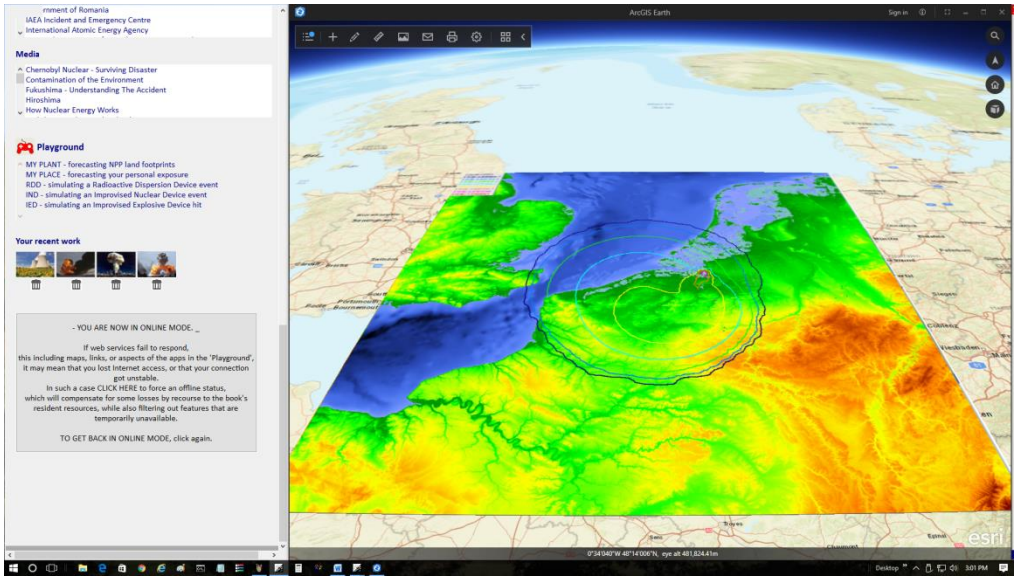

rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.


rnment of Romania
IAEA Incident and Emergency Centre
International Atomic Energy Agency
Media
Chernobyl Nuclear - Surviving Disaster
Contamination of the Environment
Fukushima - Understanding The Accident
Hiroshima
How Nuclear Energy Works
Playground
MY PLANT - forecasting NPP land footprints
MY PLACE - forecasting your personal exposure
RDD - simulating a Radioactive Dispersion Device event
IND - simulating an Improvised Nuclear Device event
IED - simulating an Improvised Explosive Device hit
Your recent work
- YOU ARE NOW IN ONLINE MODE. _
If web services fail to respond,
this including maps, links, or aspects of the apps in the 'Playground',
it may mean that you lost Internet access, or that your connection
got unstable.
In such a case CLICK HERE to force an offline status,
which will compensate for some losses by recourse to the book's
resident resources, while also filtering out features that are
temporarily unavailable.
TO GET BACK IN ONLINE MODE, click again.
Amsterdam



… and Google Earth or ArcGIS Earth (ESRI) versions are also available.





And, if Base Maps are preferred, one may overlay those on the Globe.

2. Incheiere

Atat prin continut cat si prin forma, *The N-Watchdog Book* este menita sa sprijine una din ambitiile declarate ale Proiectului – de a putea adresa nevoile de informare ale unui public larg, variat sub aspectul interesului aratat subiectului, nivelului educational, formatiei profesionale si misiunilor angajate.

Din aceasta perspectiva, cartea electronica reprezinta un complement bine-venit al produselor de baza ale Proiectului – platforma software N-WATCHDOG EX si Demonstratorul de concept.

Pe de alta parte, autorilor li se pare potrivit sa observe ca lucrarea constituie si o sinteza, o ‘dare de seama’ implicita asupra unei intreprinderi de tip nou - proiectul colaborativ de cercetare aplicativa – certificand fezabilitatea si profitabilitatea acestuia.

Referinte

1. IFIN-HH, SIVECO Romania S.A., UPB (2016). *Sistem de alertare timpurie si asistare computerizata a deciziilor, bazat pe evaluarea anticipativa a dinamicii rapide a vulnerabilitatilor induse in teritoriu de obiectivele nucleare*'. Etapa 3 01/01/2016 – 31/12/2016. *Testarea in-house si evaluarea Demonstratorului N-WATCHDOG. Dezvoltarea Modelului experimental N-WATCHDOG (EM), Partea I. Raport stiintific si tehnic*.' http://proiecte.nipne.ro/pn2/n-watchdog/rezultate/N-WATCHDOG_Annual-Report-2016.pdf.