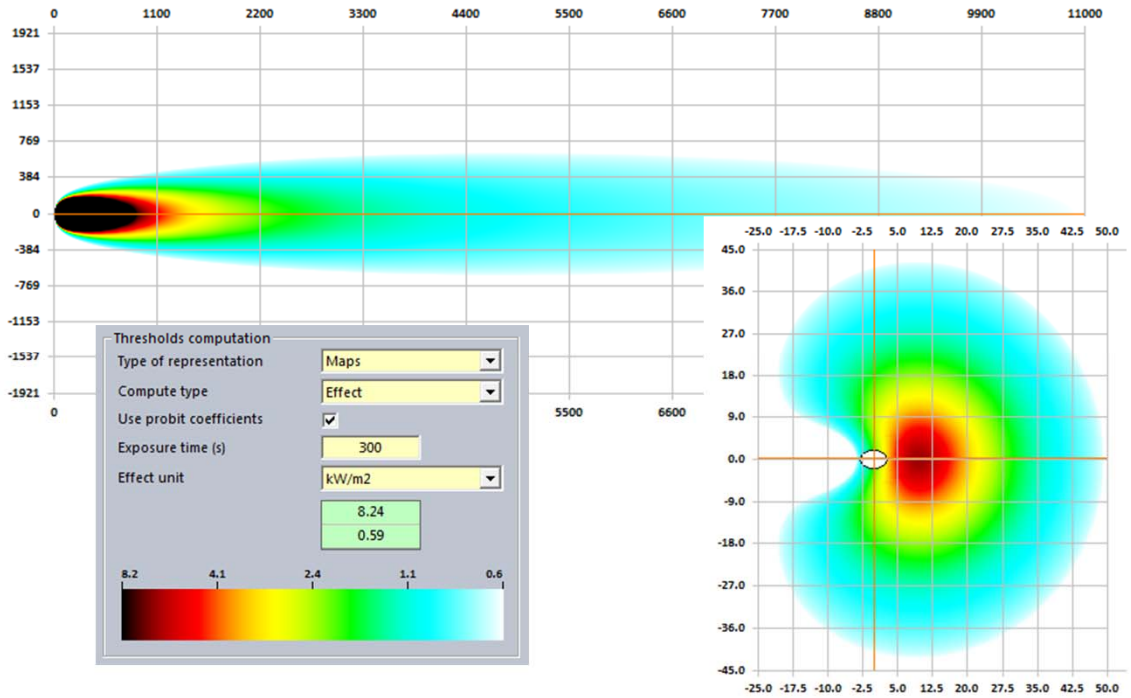
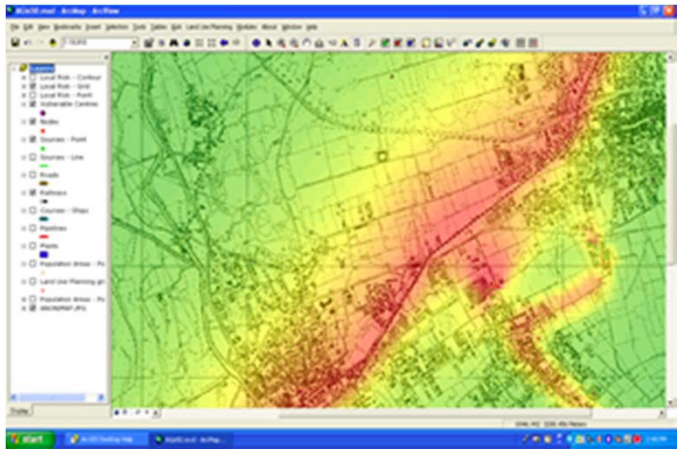
Overview of JRC Tools - GIS-ARA/ADAM

Brainstorming Workshop on a Capacity Building Strategy for Seveso Programme Implementation in EU Neighbour Countries

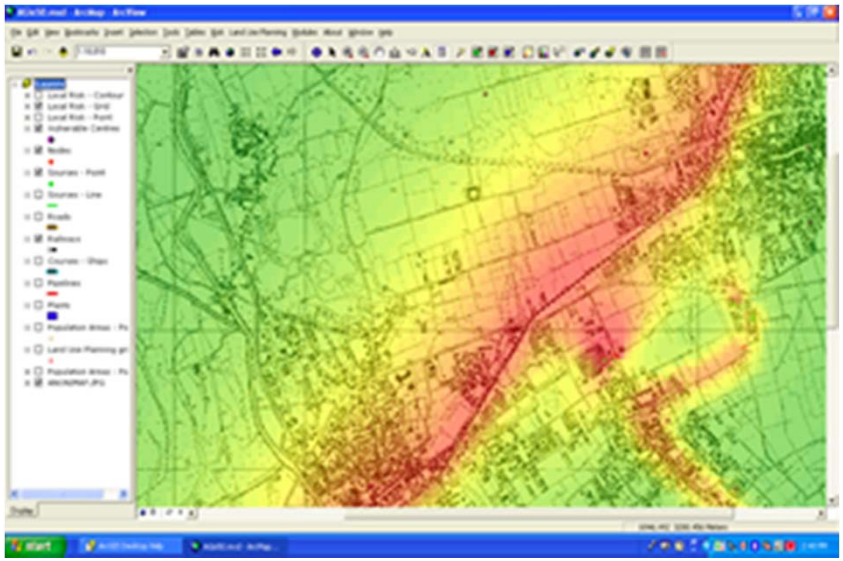
26-27 March 2015, Ispra, Italy



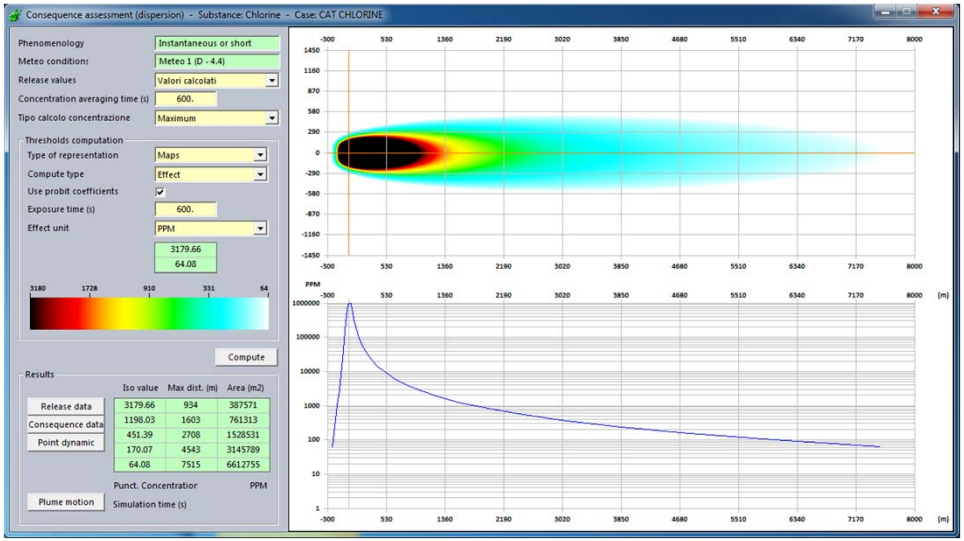


European Commission
DG-ECHO and the Joint Research Centre

GIS - Area Risk Assessment Tool



Accident Damage Assessment Module (ADAM)



In short …

GIS –ARAT

Aggregation of all risk sources

- Fixed installations
- Transport

Calculation and Display of

- individual area iso-risk curves
- relative contribution of risk sources
- F-N curves and I-N histograms
- Land use planning zones

Identification of major causes of risk in the area

ADAM

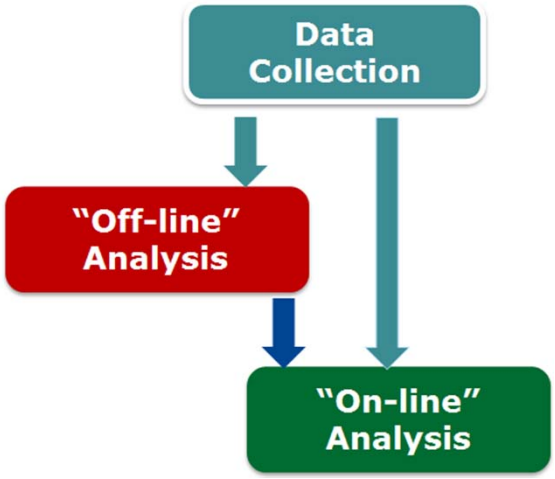
Modeling

- Source Term
- Physical Effects
- Vulnerability

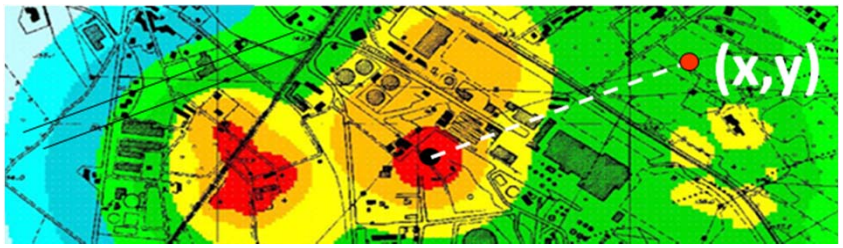
Calculation and Display of

- Physical effects
- Lethality
  - Contours
  - Maps
  - Maximum distances
  - Area impact

GIS – ARA General Structure

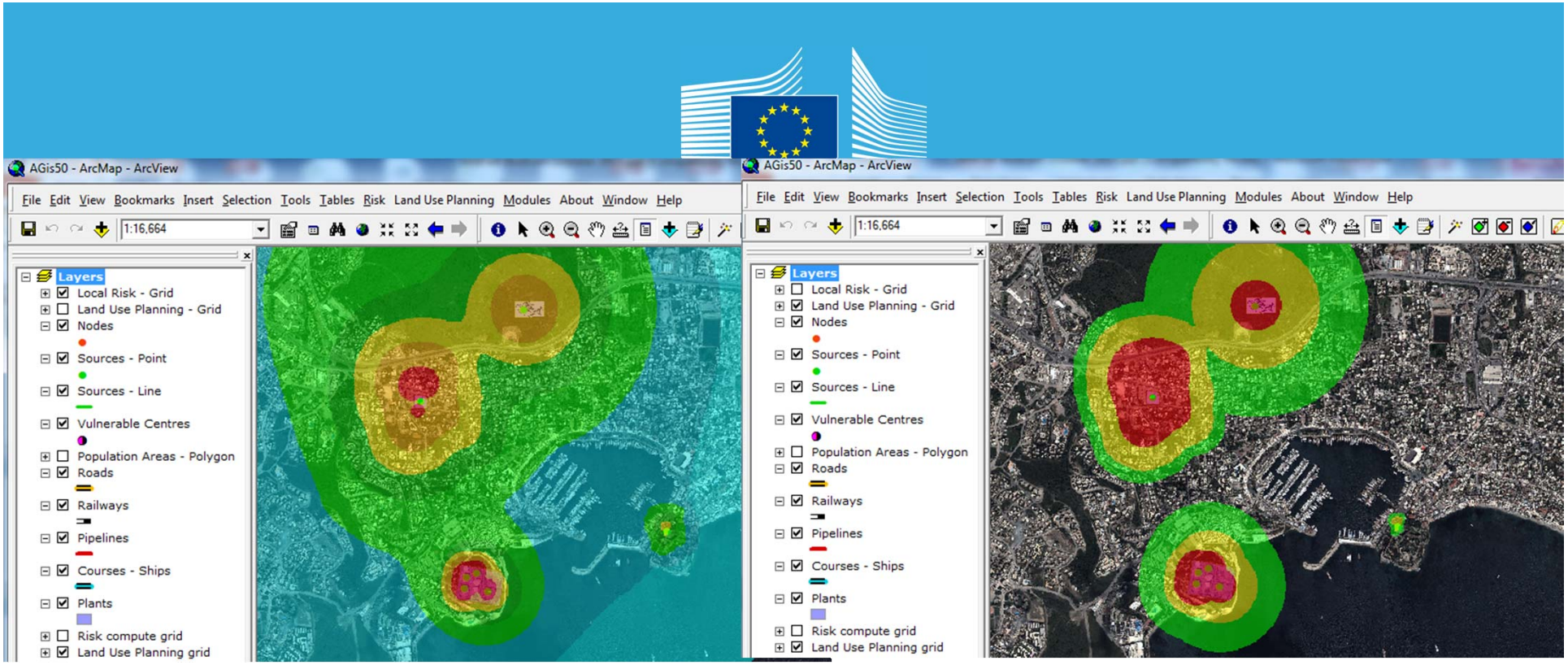


STEP 1: Accident Scenario collection
STEP 2: Frequency of occurrence
STEP 3: Physical Assessment
STEP 4: Vulnerability analysis
STEP 5: overall risk calculation
STEP 6: LUP zones production



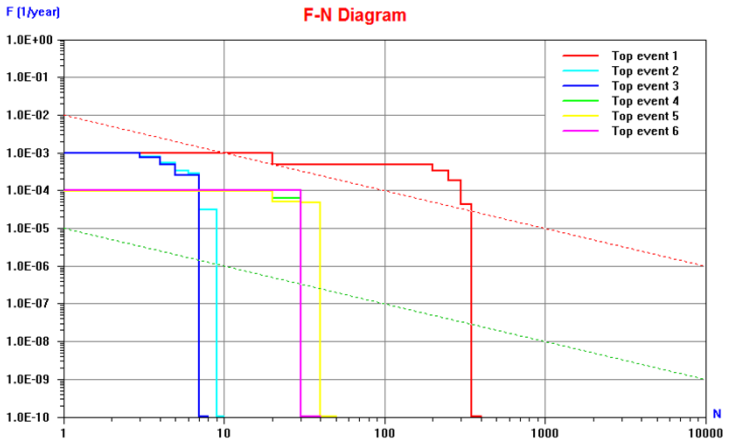
$$Risk(x,y) = \sum_{k,j=1}^{n,m} f_{sk} P_{lsk}(x,y) P_j$$

- n,m: Number of scenarios. Meteo conditions
- $P_{lsk}(x,y)$: Probability of lethality due to k-th scen.
- P_j: j-the meteo condition
- f_{sk}: Frequency of k-th scenario



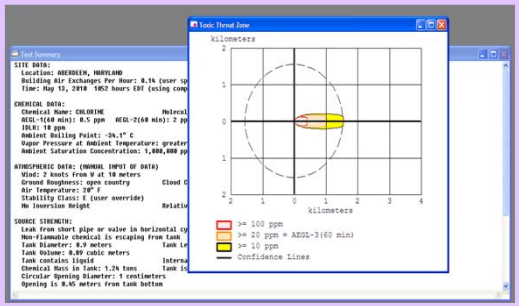
Individual risk maps

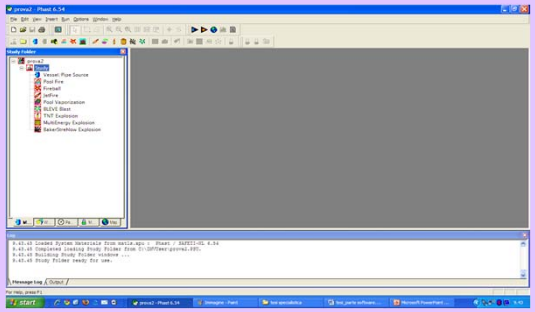
LUP zones

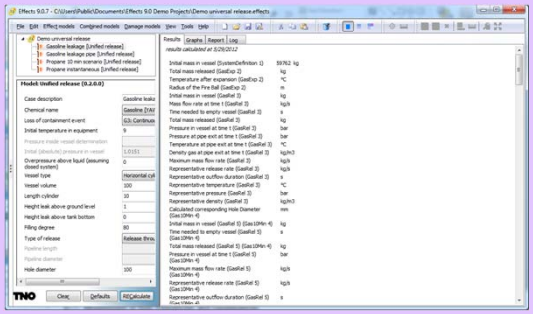


Social risk (FN curves)

Accident Consequence Tools







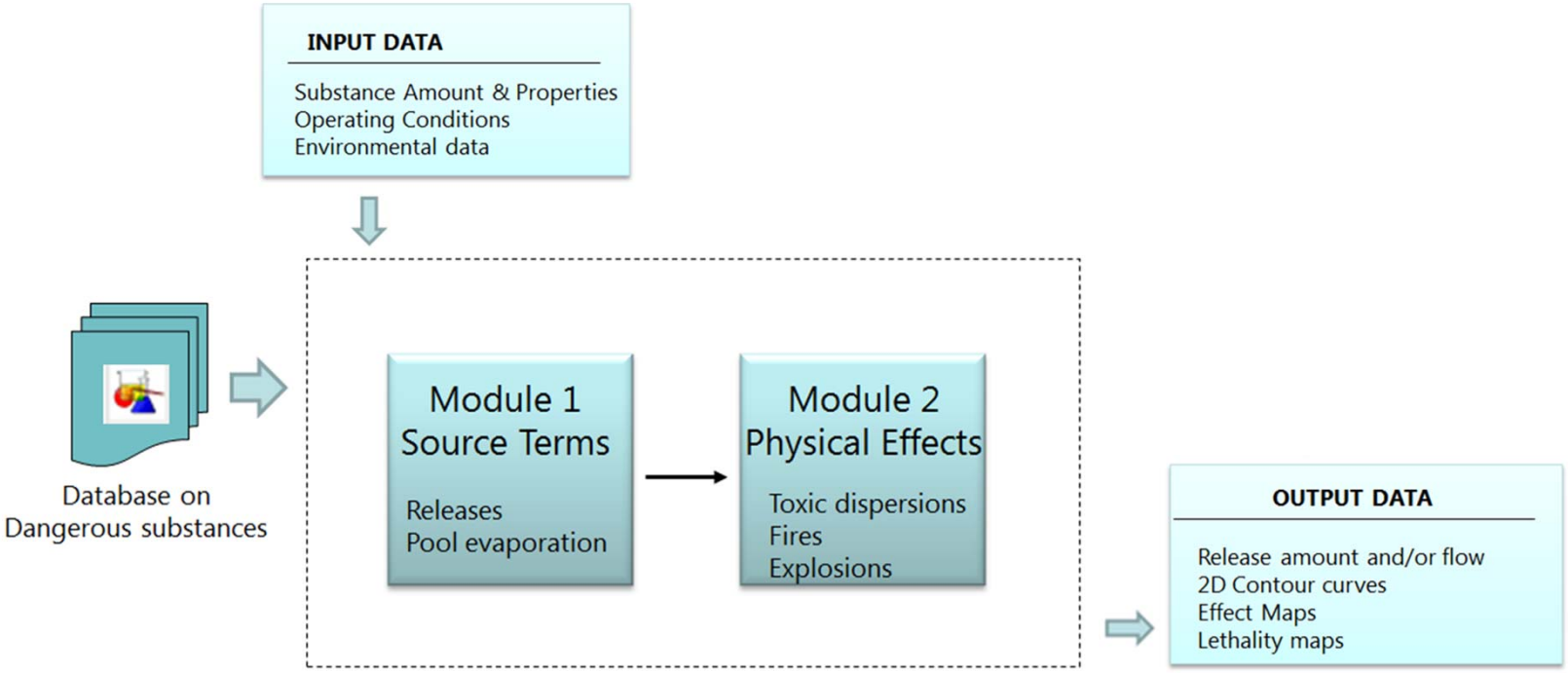
ALOHA
EPA

PHAST
DNV

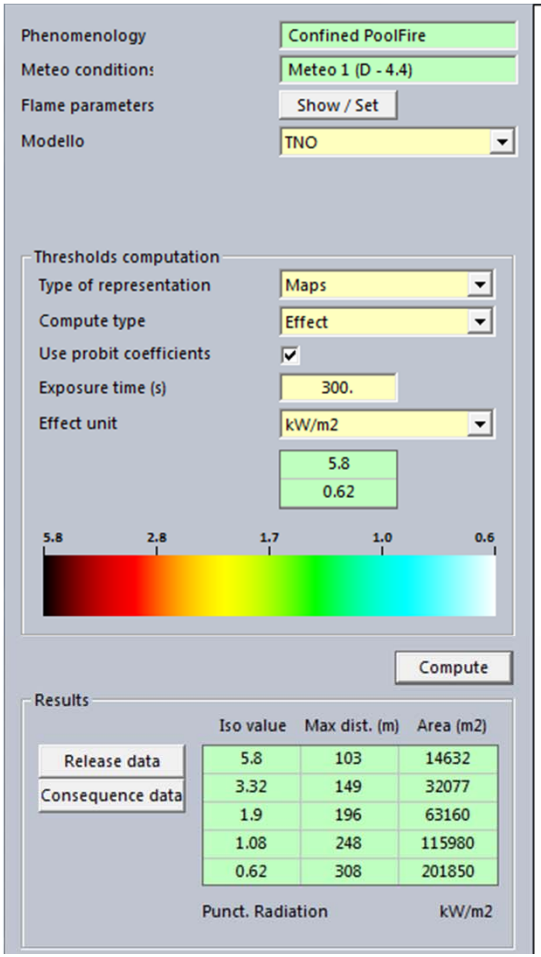
EFFECTS
TNO

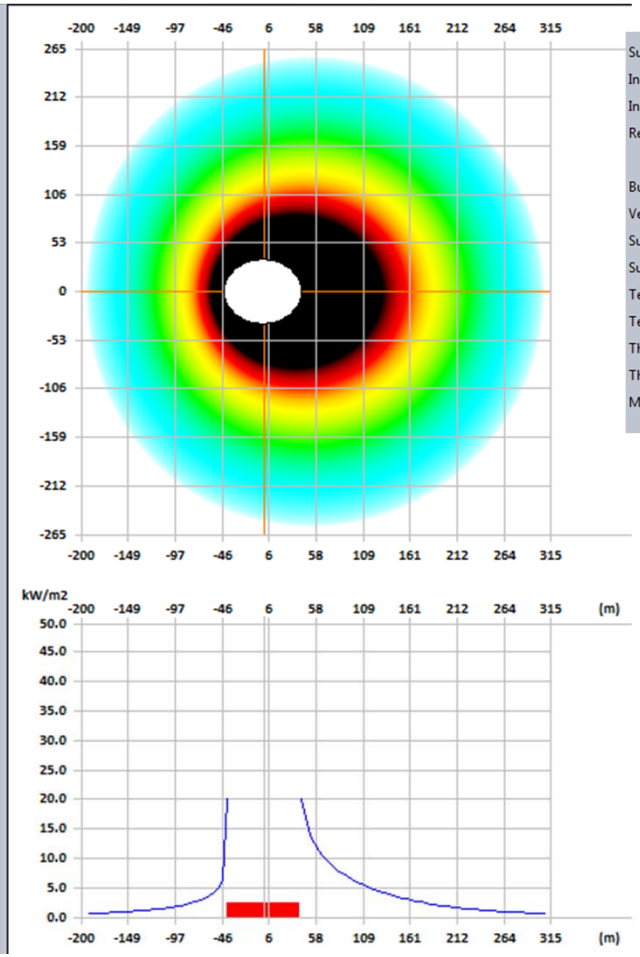
Joint Research Centre

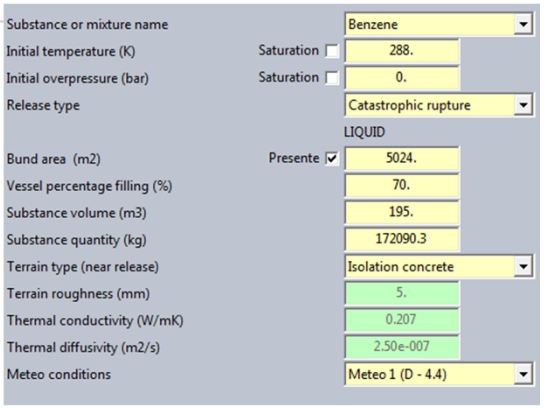
ADAM General structure

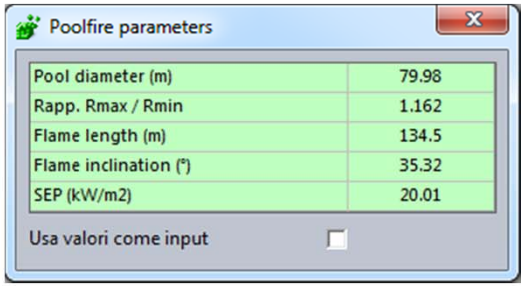


Example: Pool Fire









Example: Pool Fire

Phenomenology	Confined PoolFire
Meteo conditions	Meteo 1 (D - 4.4)
Flame parameters	Show / Set
Modello	TNO

Thresholds computation

Type of representation	Contours
Compute type	Effect
Use probit coefficients	☑
Exposure time (s)	300.
Use substance thresholds	☐
Effect unit	kW/m2

5.8
3.32
1.9
1.08
0.62

Compute

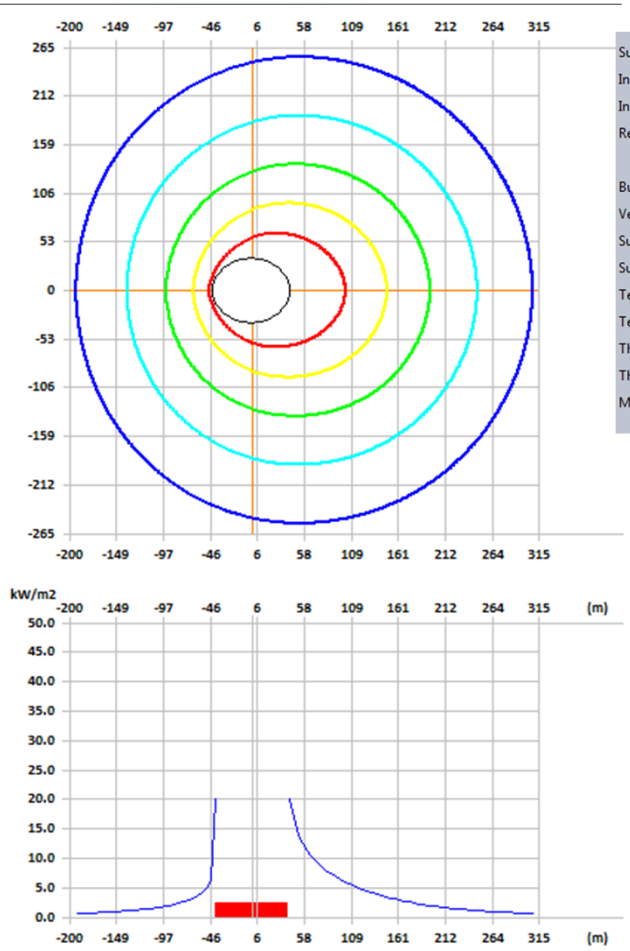
Results

Release data

Consequence data

Iso value	Max dist. (m)	Area (m2)
5.8	103	14632
3.32	149	32077
1.9	196	63160
1.08	248	115980
0.62	308	201850

Punct. Radiation kW/m2



Substance or mixture name		Benzene
Initial temperature (K)	Saturation ☐	288.
Initial overpressure (bar)	Saturation ☐	0.
Release type		Catastrophic rupture
		LIQUID
Bund area (m2)	Presente ☑	5024.
Vessel percentage filling (%)		70.
Substance volume (m3)		195.
Substance quantity (kg)		172090.3
Terrain type (near release)		Isolation concrete
Terrain roughness (mm)		5.
Thermal conductivity (W/mK)		0.207
Thermal diffusivity (m2/s)		2.50e-007
Meteo conditions		Meteo 1 (D - 4.4)

Poolfire parameters

Pool diameter (m)	79.98
Rapp. Rmax / Rmin	1.162
Flame length (m)	134.5
Flame inclination (°)	35.32
SEP (kW/m2)	20.01

Usa valori come input ☐

Example: Pool Fire

Phenomenology	Confined PoolFire
Meteo conditions	Meteo 1 (D - 4.4)
Flame parameters	Show / Set
Modello	TNO

Thresholds computation

Type of representation	Contours
Compute type	Vulnerability
Exposure time (s)	300.
Effect unit	kW/m2

1.0
0.99
0.86
0.15
0.0

Compute

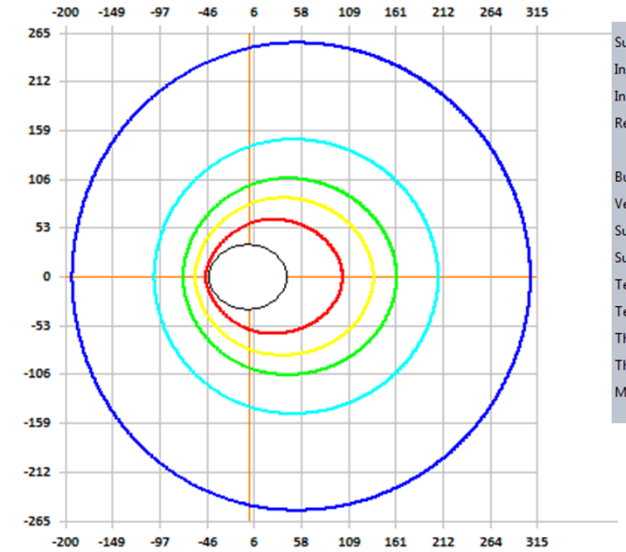
Results

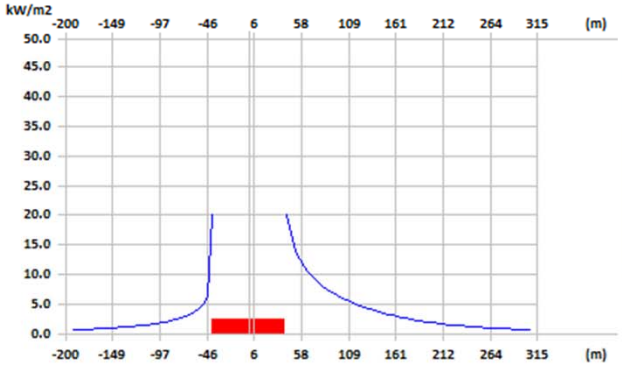
Release data

Consequence data

Vuln. Value	Max dist. (m)	Area (m2)
1.0	103	14632
0.99	137	26473
0.86	162	39668
0.15	208	73394
0.0	308	201321

Vulnerability value





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