

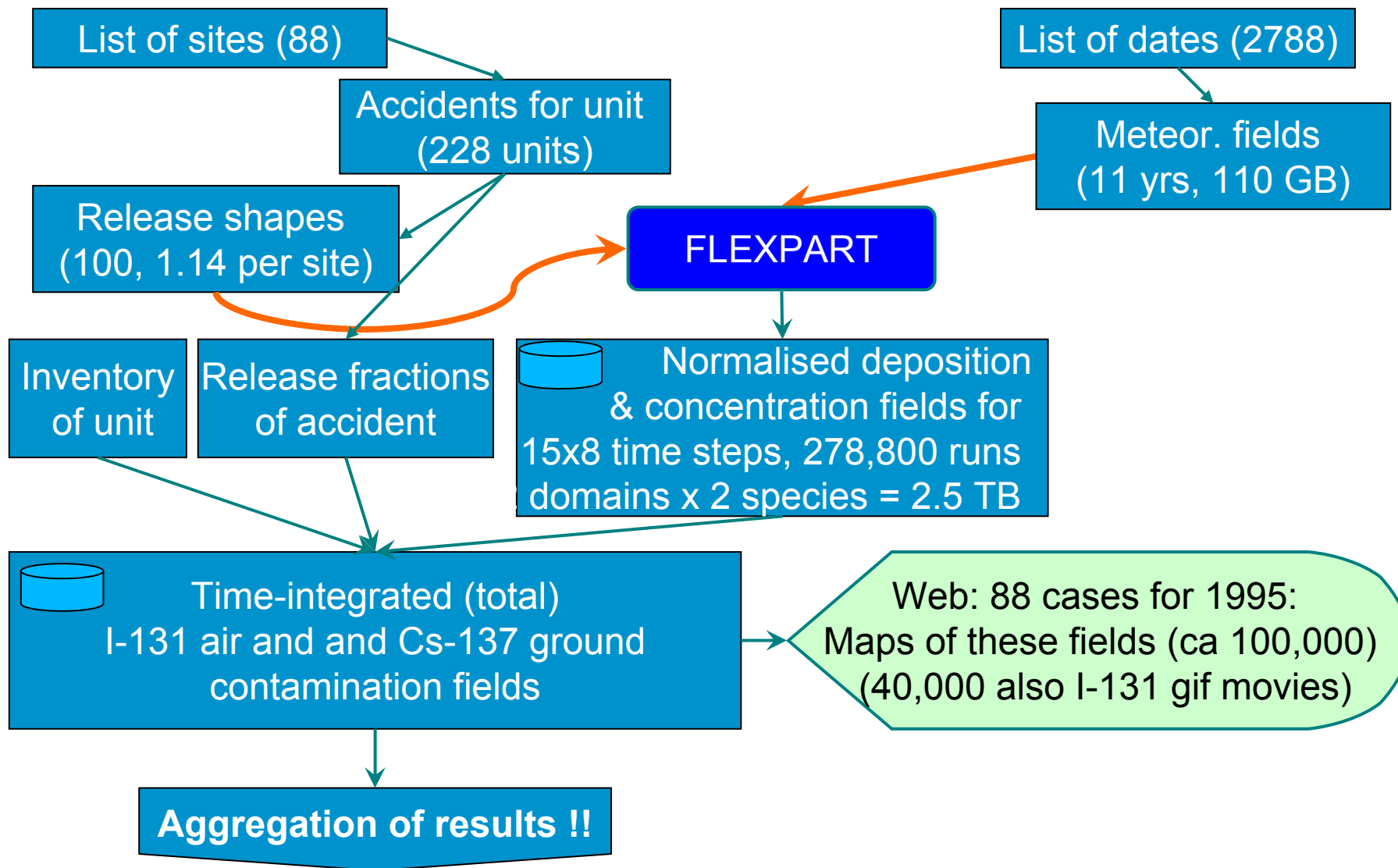
Radioactive contamination

flexRISK Final Workshop

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flexRISK Steps to produce contamination fields



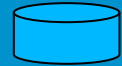
flexRISK Contamination-related risk parameter

Risk parameters

- can depend on contamination or dose
- average is not so useful – a few high-contamination events determine the mean, says nothing about how often something happens
- should be related to consequences:
 - Stochastic health consequences, proportional to collective dose, could go with averages
 - very high-level product, many uncertainties
 - Intervention measures, go with exceedance of thresholds
 - will trigger action, cause immediate costs and other impact, used already in RISKMAP
 - -> adopted for flexRISK (health product maybe later)

Zone	Effective dose in mSv per year	Cs-137 in kBq/m ²	Sr-90 in kBq/m ²	Pu-238, Pu-239, Pu-240 in kBq/m ²
Zone of regular radiation control	<1	37 - 185	5.55 - 18.5	0.37 - 0.74
Zone with the right to resettlement	1-5	185 - 555	18.5 - 74	0.74 - 1.85
Zone of subsequent resettlement	>5	555 - 1,480	74 - 111	1.85 - 3.7
Zone of primary resettlement	>5	>1,480	>111	>3.7
Zone of evacuation (exclusion zone)	Territory around Chernobyl NPP, from which population was evacuated in 1986			
Additional values used: 0.65 kBq/m ² , 5 kBq/m ² , 7,000 kBq/m ² (results mostly not shown)				

Aggregation of results !!



Time-integrated (total)
I-131 air and Cs-137 ground
contamination fields

List of contamination
thresholds
(+ average and maximum)

Frequency of exceedance

- of a given threshold
- in a each grid cell
- for a given NPP unit
- for a given parameter
(here Cs-137 deposition)
- **statistics over all met. cases**

Web: maps
(ca. 1000 for Cs-137,
more for doses)

Statistics per NPP country & all countries

1. Maps of exceedance (sum over all units)
2. Size of territory affected in this & other countries

Web: 1. maps, 2. boxplots
(for Cs-137: 20 countries
x 3 scenarios
x 5 thresholds = 300
more for doses)

1. Exceedance per NPP unit
2. Risk per (caused by) NPP countries
 - Three scenarios (1/2011, 1/2012, phase-out pre-1980 units)
 - Now the risk is

Sum over all NPP units of country if active in scenario

Frequency of exceedance (weather-related, from step1)
ca. 1e-3 to 1)

x

Accident frequency
(ca. 1e-6 to 1e-9)

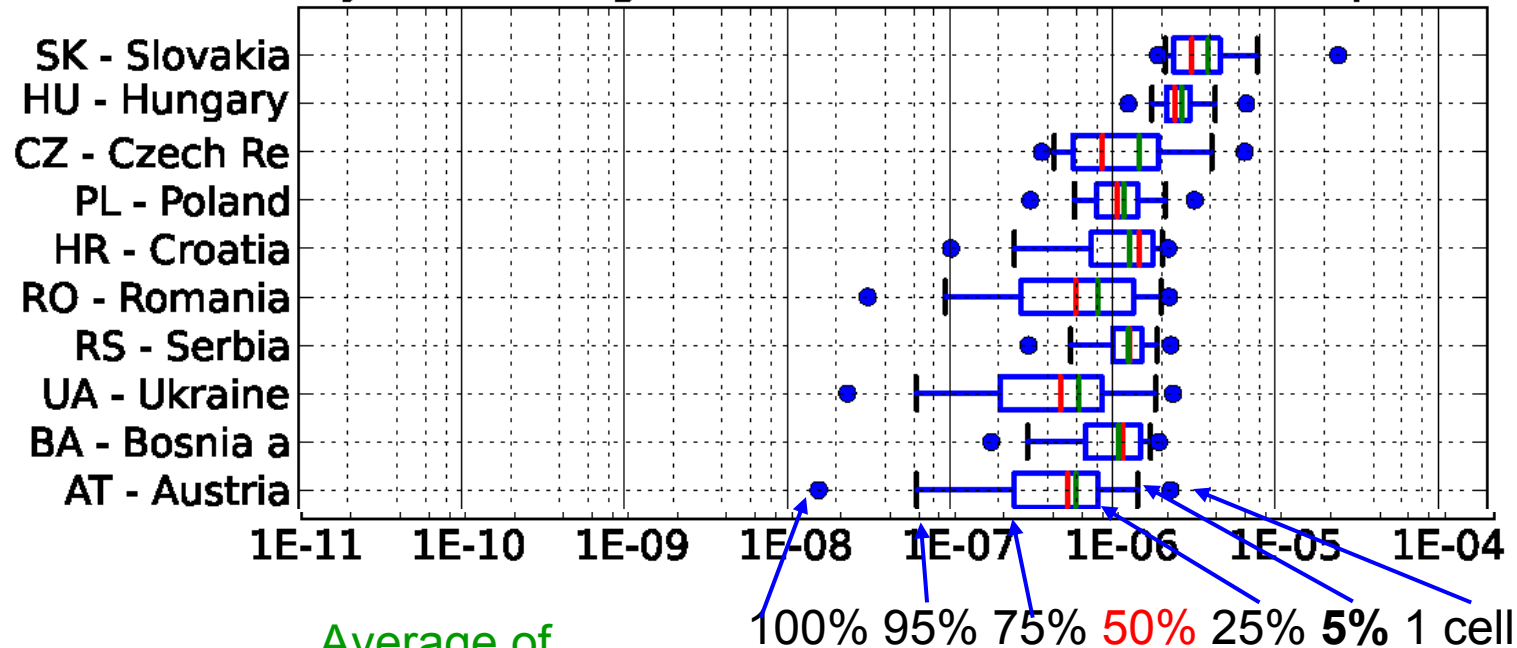
Let's see them directly on the web!

flexRISK Per country boxplots – how they work

Risk originating from Slovakia

Scenario: Active 1/2011

Probability of Cs-137 ground contamination > 185 kBq/m²



of the cells in the country (e.g. Austria) exceed the given probability value for the contamination threshold (here, 185 kBq/m²)

flexRISK The 7 day problem for intervention dose levels

Intervention guidelines use 7-day effective doses for decision on iodine tablet administration etc.

But which seven days? First contamination could be weak, main one arrive a day later atmosphere is complex! Also some accidents can be complex (see Fukushima, Chernobyl).

We evaluated the first and the maximum 7-day thyroid dose for infants. Some statistics (only Mochovce and dose in AT):

Cumulative frequency of relative difference
max 7 d thy inf dose - first 7 d

