

German Federal Office for Radiation Protection (BfS)
Emergency Management Division
Munich, Germany

- Evaluation of the radiological situation
- Prognosis/Forecast (dispersion modelling)
- Dose estimation
- Consequence assessment
- **Dose reconstruction** (= Estimation of individual doses based on environmental monitoring data)



Motivation 1


From EU BSS Annex XI:

„Assessing the effectiveness of strategies and implemented actions and adjusting them as appropriate to the prevailing situation;
Comparing the doses against the applicable reference level, focusing on those groups whose doses exceed the reference level;

From German Radiation Protection Law:

§ 111, Dose assessment, assessment of efficiency and effectiveness of protective actions

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Motivation 2

Answering questions and meeting real information needs of the people - in plain language:

„Am I safe?, „Are my children safe?


Through trustworthy and useful information helping to mitigate psycho-social consequences

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Planning and Operation of Emergency Units

- Operational Intervention Levels for decontamination.
- Detectors screening for contamination and iodine intake (thyroid)
- Coordination of appropriate treatment for affected persons
- Decontamination procedures
- Protection measures for emergency workers
- Decontamination of pets and vehicles
- **Dose assessment**

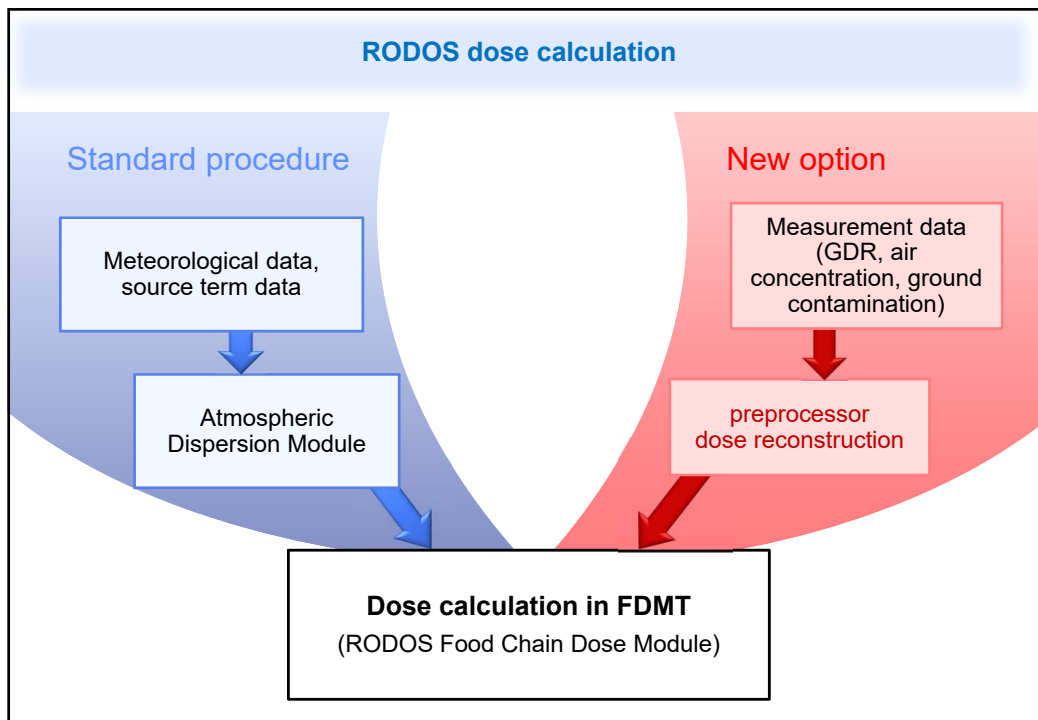


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Radiological measurement data used for the dose reconstruction in Germany

Gamma dose rate measurements (GDR)

- Nationwide: ~1800 automatic stations plus ~300 probes (remote monitoring of NPPs)
- (~200 spectrometric probes)



Nuclide measurements (continous)

- ~40 stations with nuclide information of ground contamination and activity concentration in air (DWD)
 - (precipitation)

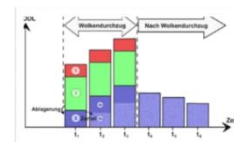
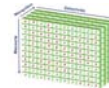
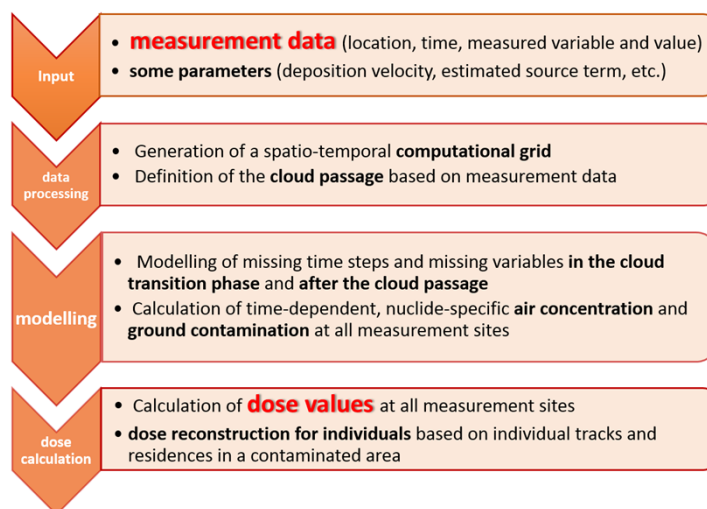


Nuclide measurements (mobile)

- Aerogamma (up to 4 helicopters)
- Car-borne (in situ, GDR; BFS: 12 cars + ...)



Overview of the dose reconstruction approach



Graphical User Interface (e.g. for emergency care stations)

Open Street Map:
Click to create
individual tracks
of the potentially
exposed person

Personal
information: ID
code, age, gender

Results of the dose
calculation:
effective dose,
thyroid dose and
red bone marrow
dose

Listing of all track sequences including information about their duration
and protective measures (e.g. sheltering; iodine tablets, protective masks)

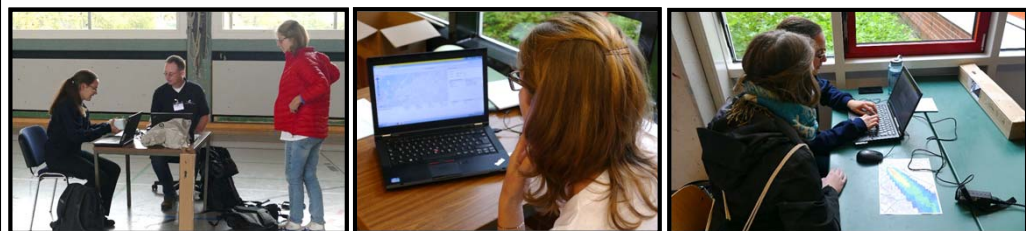
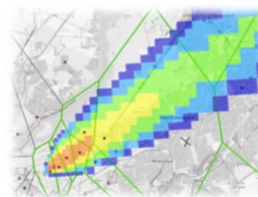
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drive to work	8.5479,49.3185	8.5492,49.321	02.06.2015 08:00	02.06.2015 08:30	im Freien/Auto	keine
at work	8.5492,49.321	8.5492,49.321	02.06.2015 08:30	02.06.2015 12:00	Heim	keine
drive to kindergarten	8.5492,49.321	8.5629,49.2937	02.06.2015 12:00	02.06.2015 12:15	im Freien/Auto	Schutzmaske
drive to emergency care station	8.5629,49.2937	8.7071,49.2206	02.06.2015 12:15	02.06.2015 13:00	im Freien/Auto	Schutzmaske, Jodtablette

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Individual dose reconstruction: first successful test

Large emergency response exercise (including an emergency care center) in Berlin in Oct 2017

- **Goal:** Testing the concepts of the emergency management plan for the research reactor BER II of the Helmholtz Center Berlin
- **Scenario:** plane crash, one-hour release of radioactive material, predefined weather conditions
- **Dose reconstruction:** Three BfS employees on site: Supervision of the "dose reconstruction" sub-station: Reconstructed doses for individuals on the basis of radiological measurement data, plausibility check of the skin contamination and thyroid measurement data



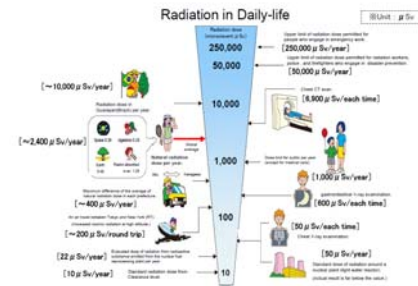
Outlook and open questions

The current concept is based on a Web based service. People are attended in emergency units and dose reconstruction is guided by trained first responders.

How to translate Millisievert into understandable risk?

Who can do this translation best?

How can we bring this service to as many people as possible in a responsible way?



Thank you for
your attention