Fostering of Integrated Global Networks through Leveraging and Positive Feedback Loops

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IUR International Workshop on Worldwide Harmonization of Radioecology Networks

Aix en Provence, France, 19-20 June 2014

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International Atomic Energy Agency

Summary:

(starting from where we left off…)

- The IAEA is responsible for activities of coordination, information sharing and development of safety standards.
- Activities are carried out in a harmonized manner, with consideration of those undertaken by other organizations.
- For example, international model validation programmes provide a forum for evaluation of tools and standardization of approaches to assess potential risk. Findings from such studies can then be considered in IAEA safety standards (e.g., updated SRS 19).
- In addition, through such programmes, international data are compiled to gain understanding of natural processes for a range of situations.

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Summary:

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- The outputs of activities, such as MODARIA, form the technical basis that informs higher-level IAEA guidance documents.
- One example is IAEA SRS-19, which provides guidance on predicting radionuclide transport in the environment and corresponding doses .

- **Through such activities and programmes, it would be useful to identify mechanisms to leverage such efforts and strengthen international networking.**
- **In this way, self-perpetuating positive feedback loops can be created to the benefit of the international community.**

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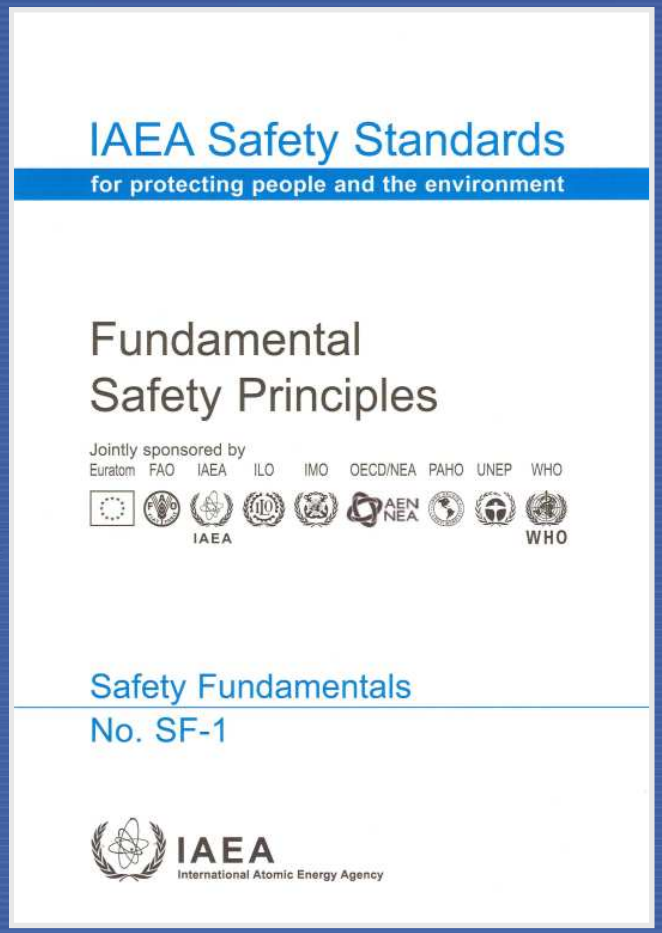
The Basis – the Safety Fundamentals



"The fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation."

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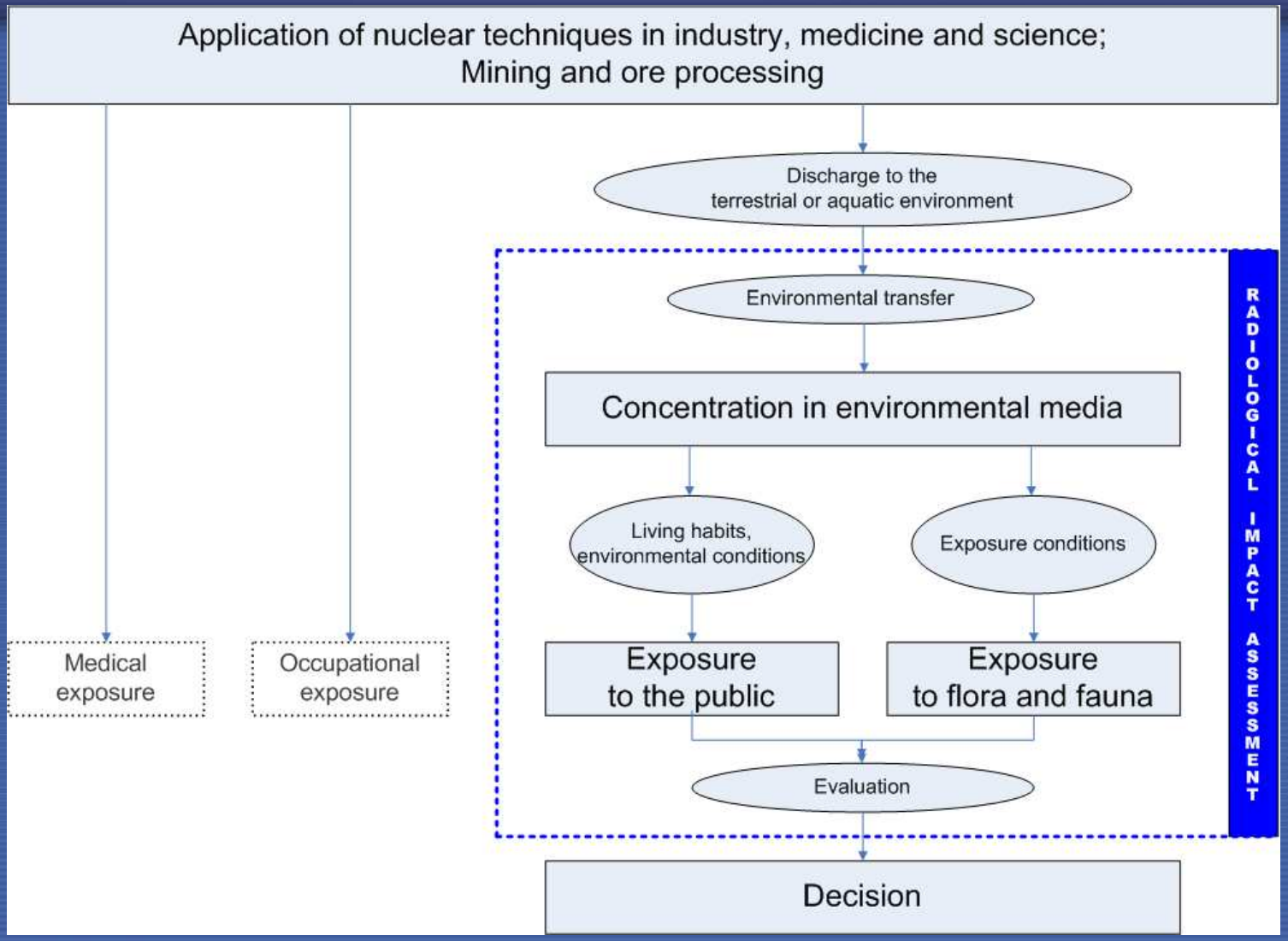
Radiological Impact Assessment



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Some Possible Objectives
- A Rough Breakdown -

Tool Development	→	**How to?**
Tool Testing	→	**How good?**
Compilation, Evaluation & Harmonization (?)	→	**Where can this fit?**
Compatibility, Consensus & Guidance	→	***Where do we go from here?***

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Key Steps in Harmonized Protection

Tool Development	**e.g., CROM (SRS-19), RESRAD codes, ERICA, PC-CREAM, CROMERICA (& others)**
Tool Testing	**MODARIA, EMRAS-II, EMRAS (& predecessors – VAMP, BIOMASS, etc.)**
Compilation, Evaluation & Harmonization	**e.g., IAEA guidance on Radiological Environmental Impact Analysis, Revision of Safety Review Series (SRS)-19, etc.**
Compatibility, Consensus & Guidance	**IAEA, ICRP, UNSCEAR, IUR, BIOPROTA, etc.**

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Some Cases and Examples:

- **Case 1:** Model validation programmes (e.g., MODARIA)
- **Case 2:** Update to Safety Guidance (e.g., SRS 19)



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Nuclear Safety Resolution
September 2013

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Atoms for Peace

General Conference

GC(57)/RES/9
Date: September 2013

General Distribution
Original: English

Fifty-seventh regular session
Item 15 of the agenda
(GC(57)/24)

Measures to strengthen international cooperation in nuclear, radiation, transport and waste safety

60. Encourages the participation of Member States in the **Modelling and Data for Radiological Impact Assessments (MODARIA)** programme, launched in November 2012 to foster, develop and maintain capabilities in assessing radiological impacts from radionuclides being released or extant in the environment;

Case 1: Model Validation Programmes
- Needs for Modelling -

- **Requirements for assessment models**
  - Simple and transparent
  - Harmonized
  - Widely applicable
  - Conservative, but not too pessimistic
  - Provide certainty with to legal issues

- **Sound scientific base of assessments of radiological impacts**
  - Understand underlying transfer mechanism and exposure processes
  - Explore possibilities and limitations of modelling
  - Needed in any licensing process
  - Monitoring
    - Optimize monitoring
    - Interpretation of monitoring results
    - Appropriate allocation of efforts for environmental monitoring

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Past Model Validation Programmes:

- **VAMP: Validation of Model Predictions (1988-1996)**
  - Mainly scenarios from Chernobyl release
  - Transfer data collection
- **BIOMOVS: BIOspheric Model Validation Study, with SSI, Sweden, 1991-1996**
  - short- and long-term releases
  - power reactors, solid waste disposal repositories, uranium mill tailings
- **BIOMASS (1996-2001)**
  - Chernobyl scenarios
  - Environmental clean-up
  - Long-term environmental impact of waste disposal: *Reference biospheres*
- **EMRAS (2003-2007)**
  - Scenarios from routine and accident situations
  - Transfer data review and update
  - Biota model testing and comparison
- **EMRAS II (2009-2011)**
  - Continuation of EMRAS

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Current Programme is MODARIA

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http://www-ns.iaea.org/projects/modaria/default.asp?l=116

Identification of MODARIA Topics:

- **Questionnaire in 2012**
  - Sent to potential participants and organisations involved in previous programmes internationally
  - Scientific interests and gaps were identified to reflect needs in Member States
  - 160 responses were received from 49 Member States
- **Preparation Meeting in March 2012**
  - Developed proposals for a new programme
- Presentation of identified topics during the 1st Technical Meeting and finalization of Working Groups.

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MODARIA Working Groups:

- **Theme 1: Remediation of Contaminated Areas**
  - WG 1 — *Remediation strategies* and decision aiding techniques
  - WG 2 — Exposures in *urban environments* and effect of remedial measures
  - WG 3 — **Radiological impacts** from *NORM and legacy sites and* remediation
- **Theme 2: Uncertainties and Variability**
  - WG 4 — Analysis of **radio-ecological data**
  - WG 5 — **Uncertainty** from routine discharges of radionuclides
  - WG 6 — **Environmental modelling** for radioactive waste disposal facilities
  - WG 7 — Models for accidental tritium releases
- **Theme 3: Exposures and Effects on Biota**
  - WG 8 — Transfer and exposure **models for flora and fauna**
  - WG 9 — **Effects** on populations of wildlife species
- **Theme 4: Marine Modelling**
  - WG 10 — Dispersion and transfer in **the marine environment**

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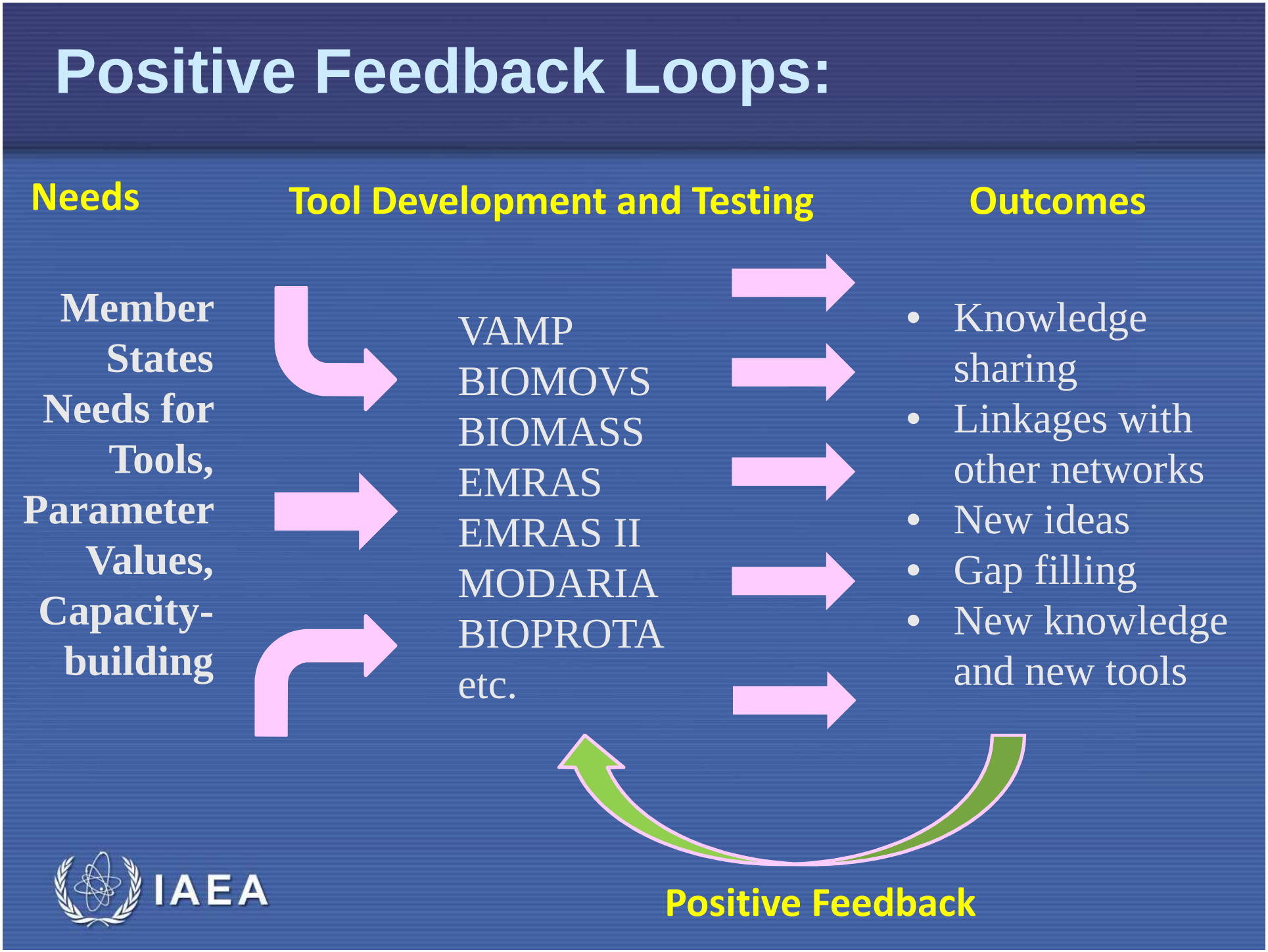
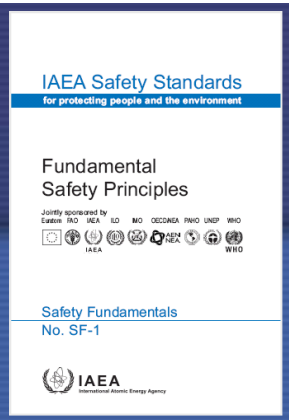
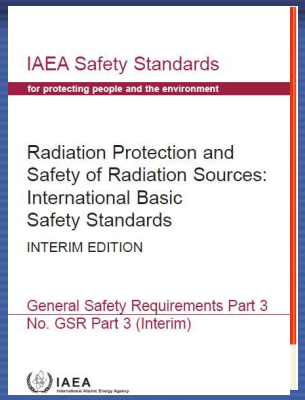
Positive Feedback Loops:



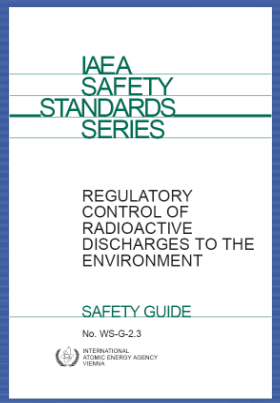
IAEA Document STRUCTURE

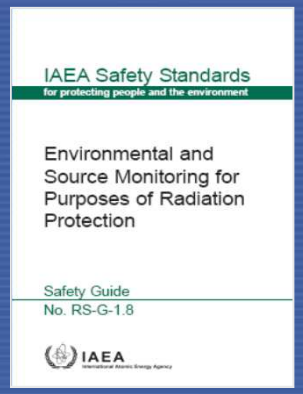


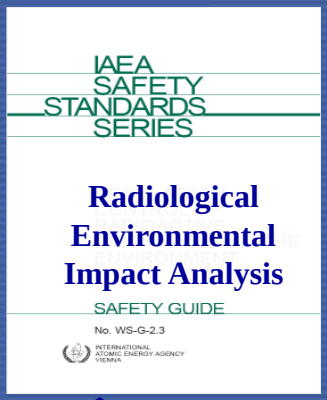
Safety Fundamentals (high-level objectives, concepts & principles)



Safety Standards ('shall' requirements)

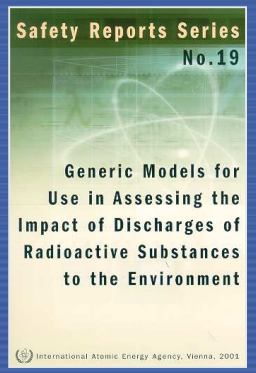


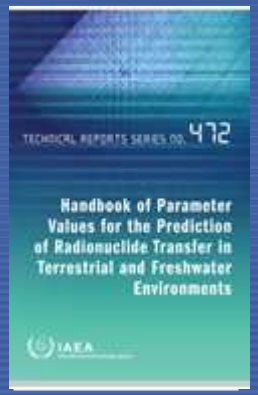




Safety Guides ('should' recommended actions, conditions or procedures to meet safety requirements)

Potential Area of Mutual Interest:





Technical Report Series & Technical Documents (technical basis)

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Case 2: Incorporation of Current Scientific Knowledge into Safety Guidance

SRS 19: Assessing Public Exposure and Environmental Impacts due to Radioactive Discharges from Facilities and Activities

- **Currently under revision.**
- **Being expanded into three volumes to update the previous single volume.**
- **SRS 19 (Volumes 1 and 2) are focused on human protection and are fairly far along in terms of drafting:**
  - **Volume 1: *"Screening Assessment of Public Exposure"***
  - **Volume 2: *"Generic Models for Use in Assessing the Impact of Radioactive Discharges"***
- **SRS 19 (Volume 3) will be focused on development of screening-level assessment of environmental impacts for Planned Exposure situations (flora and fauna).**
- **The first consultancy meeting for the preparation of SRS 19 (Volume 3) was held in December 2013.**

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Objective of the Revision of SRS 19:

- **To provide an** *"up-to-date, structured approach to the prospective screening assessment of the impact of radioactive discharges on the general public in planned exposure situations"*
- **Assessment of doses to the representative person from planned releases**
- **Emphasis on ease of use**

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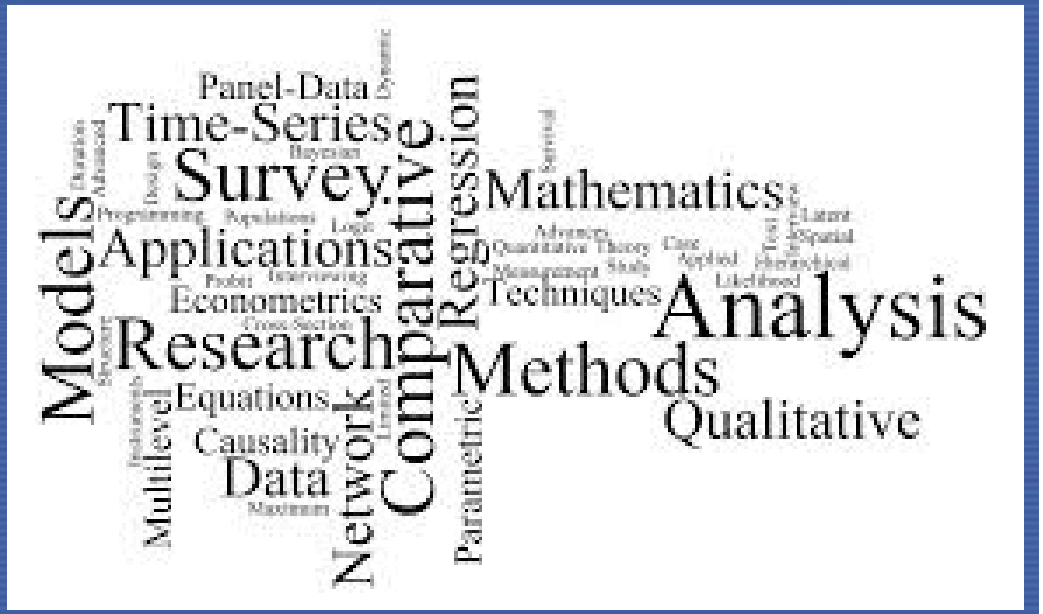
Why Revise SRS 19 ?

- Facilitate application of screening models
- Include different levels of assessment
- Include assessments of exposures to flora and fauna
- Updated database



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Updated Database:

- SRS 19 developed in the early 1990s
- New data compilations (from IAEA Model Validation Programmes)
  - TECDOC 1616
  - TRS 472
  - Handbook on transfer parameters to assess concentrations in wildlife (EMRAS II)
- New BSS (GSR-3)
  - Representative person
  - Biota

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Scope and Application:

- **Applications:**
  - Environmental impact assessments of facilities and activities;
  - Safety assessments of facilities and activities;
  - Independent verifications of the safety assessments;
  - Optimization of protection and safety; and
  - Establishment of operational limits and conditions related to public exposure and protection of the environment.
- **Generic Dose Assessments for Screening Purposes:**
  - Indication of the magnitude of the radiological impact of a discharge.
  - Approaches intended to be conservative.
- **Not to be applied for:**
  - Emergency planning or emergency response,
  - Long-term assessments for waste disposal facilities, where, for example, the contamination of ground water could be relevant.
  - Dose assessments outside the scope of radiation protection, such as risk projection and epidemiological studies, individual-related assessments,

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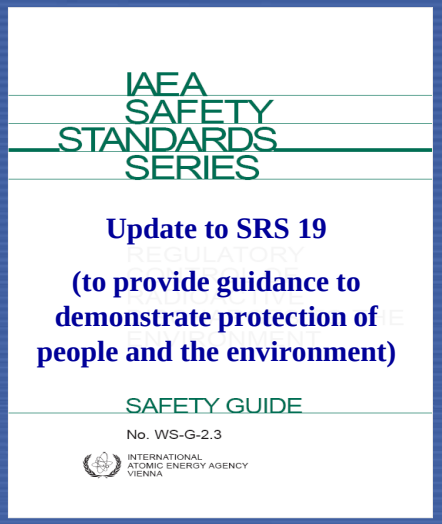
Positive Feedback Loops:

Outcomes from Tool Testing and Development

- Knowledge sharing
- Linkages with other networks
- New ideas
- Gap filling
- New knowledge and new tools

Development of Safety Guidance



Application of Guidance to Develop New Tools

Development of new CROMERICA tool

ERICA tool

Positive Feedback

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Summary:

(full circle…positive feedback loops)

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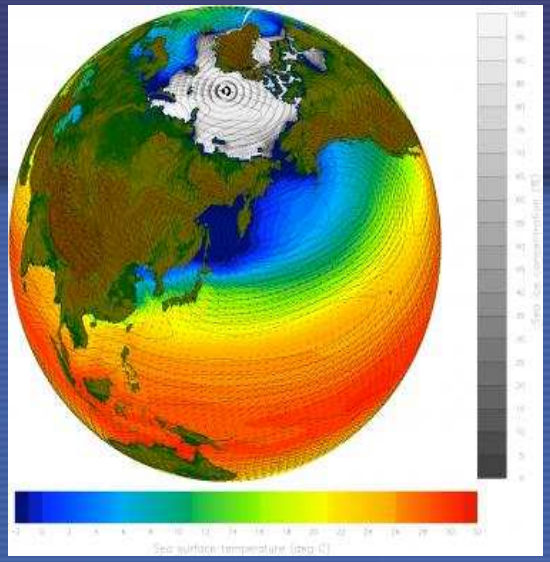
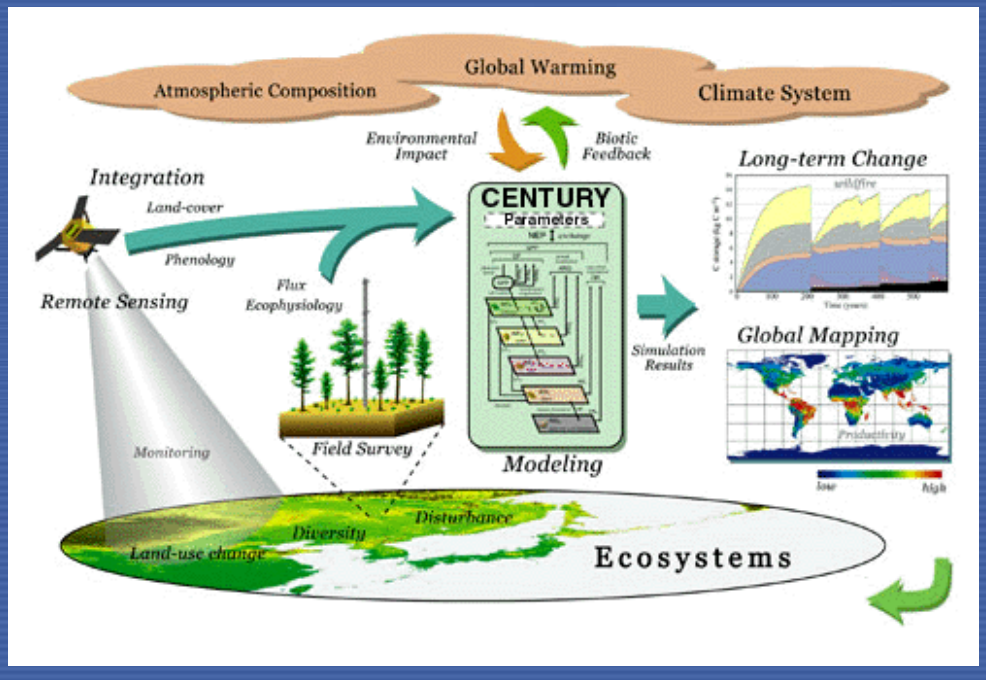


Thank YOU!!



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