R&D ACTIVITIES TO BE CONDUCTED BY TSO IN EMBARKING COUNTRIES

R&D to Support Understanding of Severe Accident and Planning of Emergency Response

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Outline

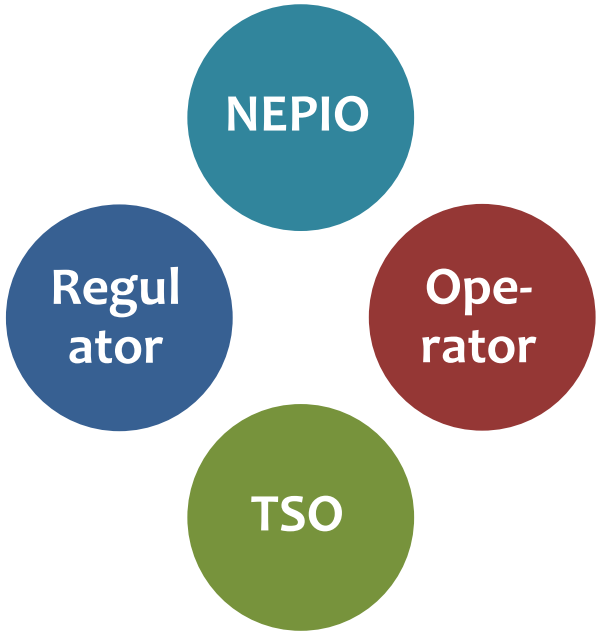
- Introduction
- TINT R&D Programme on Severe Accident
- ASEAN Network on Nuclear Power Safety Research (ASEAN NPSR)
  - 2017 Benchmark Problem
- Conclusion

Introduction

Work during pre-project phase

Nuclear Safety

- The IAEA Safety Standards
- The prime responsibility of the licensee for safety
- An effective legal and regulatory framework for safety
- The establishment of effective leadership and management for safety
- Decommissioning and long-term management of spent fuel and radioactive waste
- Siting
- Efforts to prevent and mitigate accidents
- Arrangements for emergency preparedness and response



Decision not made
→ Hesitation in large investment
→ Limited human resources

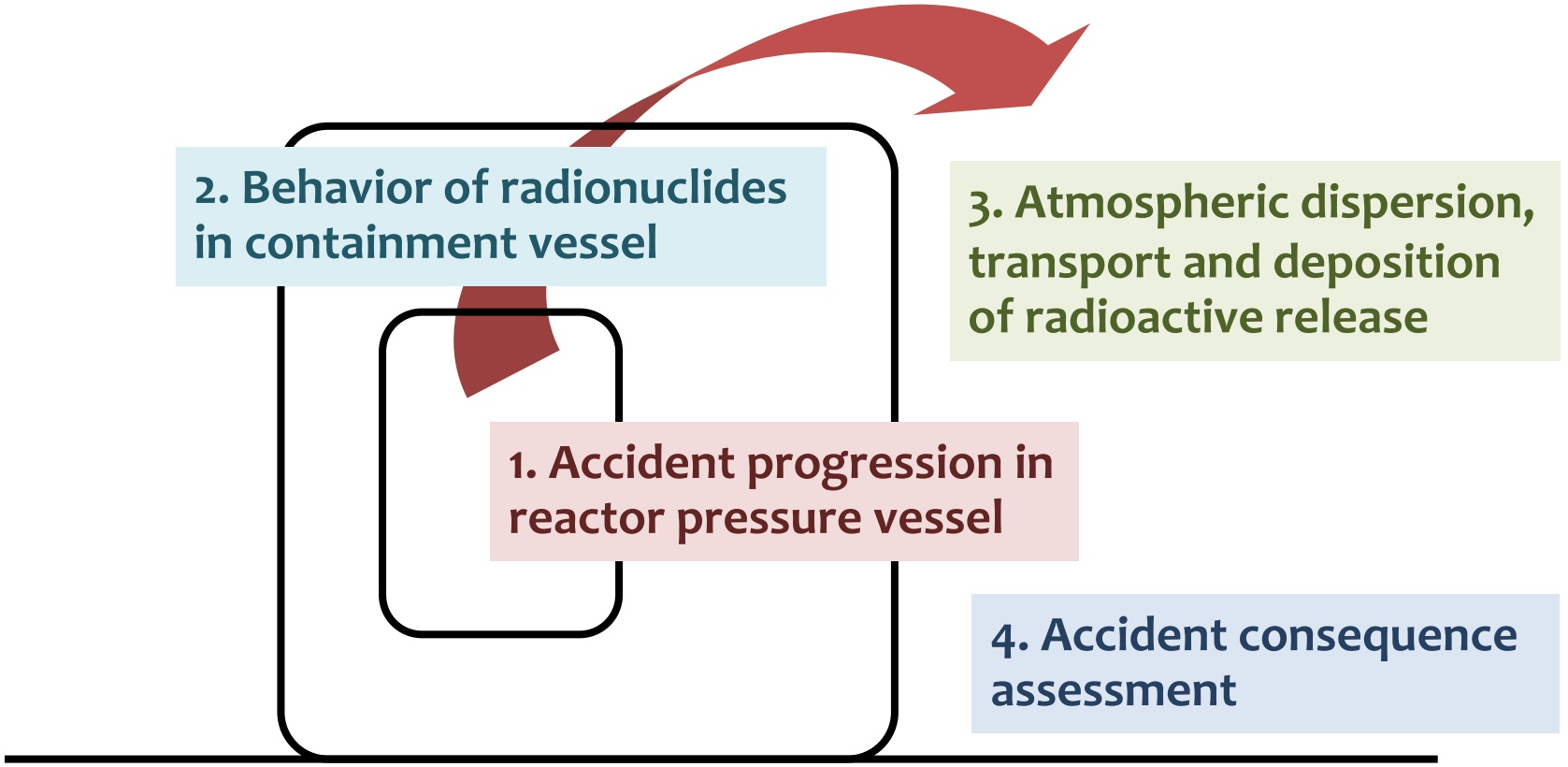
Objectives

Positions itself as a **TSO** for the future nuclear power programme

*"To present the way that TINT performs R&D to support the **pre-project phase** of the nuclear power programme with **limited human resources**"*

*"To introduce ASEAN Network on Nuclear Power Safety Research (ASEAN NPSR) and TINT's attempt to **disseminate its practice** to ASEAN countries through ASEAN NPSR."*

TINT R&D Programme on Severe Accident



1. Accident Progression in RPV

WHAT TO BE DONE

1. Select accident scenarios
2. Evaluate characteristics and progression
3. Consider accident management strategy

WHAT WE DO

1. Select accident scenarios
   - Most likely scenarios, e.g. station blackout
2. Evaluate characteristics and progression
   - Validation of RELAP/SCDAPSIM Mod 3.4 by SFD tests in PBF

2. Behaviour of Radionuclides in CV

WHAT TO BE DONE

1. Evaluate accident progression
2. Understand severe accident phenomena
3. Source term evaluation

WHAT WE DO

2. Understand severe accident phenomena
3. Source term evaluation
   - Evaluation of behaviour of I and Cs compounds in Phebus FPT3 experiment
   - ART Mod 2

3. Atmospheric Dispersion, Transport and Deposition of Radioactive Release

WHAT TO BE DONE

1. Evaluate atmospheric dispersion, transport and deposition of source term
   - Model selection
   - Data acquisition & management
   - System code
2. Evaluate marine dispersion

WHAT WE DO

1. Evaluate atmospheric dispersion, transport and deposition of source term
   - Benchmark problem evaluation
   - In-house code development

4. Accident consequence assessment

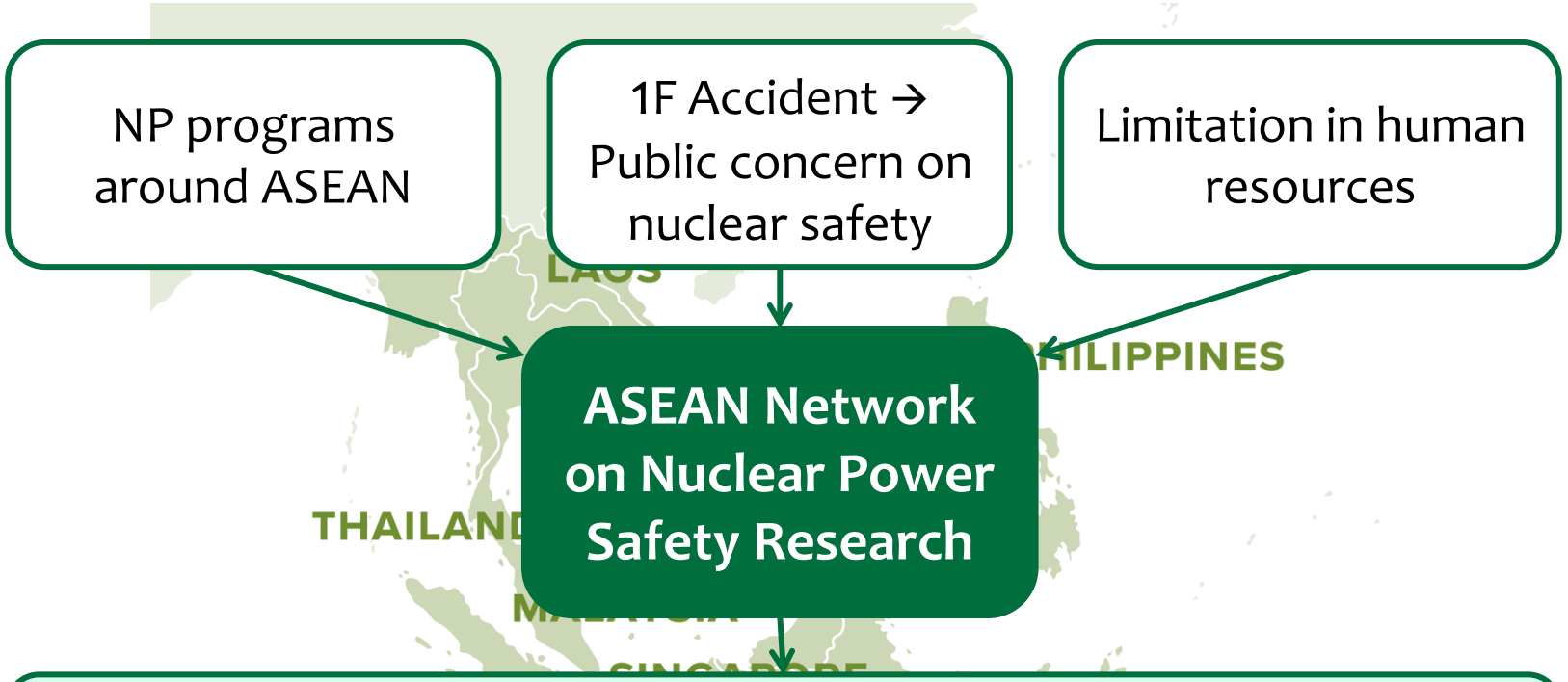
WHAT TO BE DONE

1. Evaluate radiation dose and health effects
2. Evaluate impacts other than radiation-induced health effects
3. Communicate with stakeholders

WHAT WE DO

1. Evaluate radiation dose and health effects
   - In-house code development
2. Evaluate impacts other than radiation-induced health effects
   - Nuclear Accident Consequence Index (NACI)
3. Communicate with stakeholders
   - Development of stakeholder communication program

ASEAN Network on Nuclear Power Safety Research
ASEAN NPSR



GOAL: To strengthen ***R&D, HRD and regional cooperation*** in the field of nuclear power safety in ASEAN in order to support formulation of ***regional strategy for accident management*** and to be consistent with ***IAEA Safety Standards***

ASEAN NPSR: Objectives & Scope

OBJECTIVES

- To be the regional platform to promote ***data and information sharing and cooperation***
- To ***fulfil needs and address gaps*** in ASEAN region in R&D
- To strengthen ***capability in R&D*** in order to be able to provide the technical support for decision making
- To establish and enhance the ***cooperation between ASEAN network and IAEA*** and other relevant international organizations

SCOPE

- Design basis accident analysis
- ***Severe accident analysis***
- ***Probabilistic risk assessment***
- ***Fission product transport***
- ***Accident consequence assessment***
- Linkage between reactor assessments and environment impact assessment
- Other topics agreed upon by the Member States

ASEAN NPSR: 2017 Benchmark Problem

ASEAN NPSR Activities

INFO & KNOWLEDGE SHARING	BENCHMARK PROBLEM ASSESSMENT	RESEARCH COLLABORATION	ANNUAL MEETING

Assessment of ***atmospheric dispersion*** of a radioactive release from a hypothetical severe accident in ***existing or planned NPPs around ASEAN***

- Proposed by Thailand
- Link with 3rd item of TINT's R&D Programme

ASEAN NPSR: Project Implementation

- Participants: ***Thailand***, Singapore, Vietnam
- Proactive observers : Malaysia, the Philippines
- Observer: Lao PDR, Myanmar
- Project meeting
  - Once in 1-3 months (online)
  - File sharing on online system one week prior to the meeting
- Progress
  - ***Preliminary atmospheric dispersion calculation results*** for two virtual NPPs near the region
  - ***Comparison of codes (models)*** using constant wind scenario
- Interaction with IAEA: Progress Report at ***WG2 Meeting in the 3rd Technical Meeting of MODARIA II*** (October 22-25, 2018)

Conclusions & Steps Forward

- ***TINT R&D programme on severe accident*** was introduced. It consists of four areas including:
  1. Accident progression in RPV
  2. Behaviour of radionuclides in CV
  3. Atmospheric dispersion, transport and deposition of released radioactive release
  4. Accident consequence assessment
- ASEAN NPSR was introduced.
  - ***Overlap between the scope of ASEAN NPSR and TINT R&D programme*** on severe accident was observed.
  - R&D in the field of severe accident is included in the plan of the future TSOs in many ASEAN countries.

Conclusions & Steps Forward *(cont'd)*

- ***2017 Benchmark Problem*** on atmospheric dispersion assessment of a radioactive release from a hypothetical severe accident was introduced.
  - Many participating countries suggest moving forward to ***upstream assessments***, e.g. source term assessment and reactor thermal hydraulic assessment.
  - These match perfectly with the TINT R&D programme.
- Rooms for further improvement can still be observed.
  - Gaps can be fulfilled by ***collaboration with well-established TSOs***.
  - ASEAN NPSR is ***requesting technical assistance and funding for this activity from the IAEA*** through a Technical Cooperation (TC) project.
  - **ASEAN NPSR also warmly welcomes cooperation with other networks of TSOs.**

Thank you!

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