

GNSSN Plenary

17 September 2025

Update on SMR Regulatory Activities

- Outcomes of the SMR Conference
- Status of the NHSI Regulatory Track

Brett Rini, Senior Nuclear Safety Expert (SMRs)
Regulatory Activities Section
Division of Nuclear Installation Safety
Department of Nuclear Safety and Security
International Atomic Energy Agency



International Conference on

small modular reactors

and their applications

21–25 October 2024, Vienna, Austria

2024 IAEA International Conference on SMRs and their Applications

~1300

In-Person
Participants

>1100

Virtual
Participants

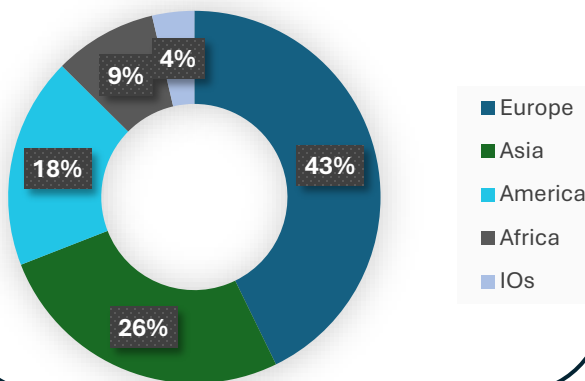
95

Member
States

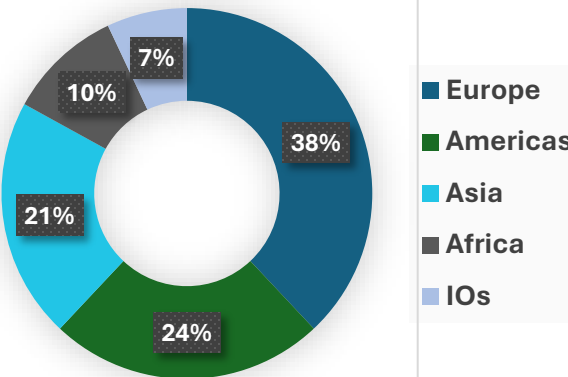
17

International
Organizations

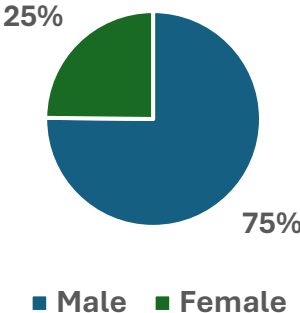
Global Distribution of Participants



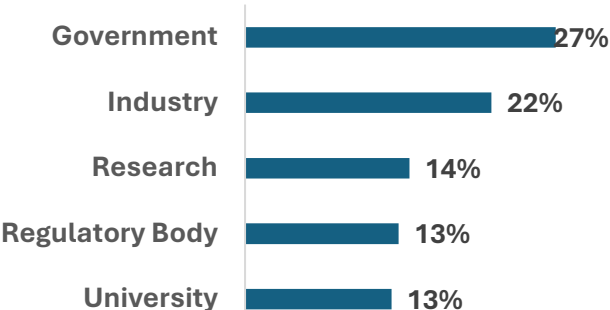
Global Distribution of Accepted Papers



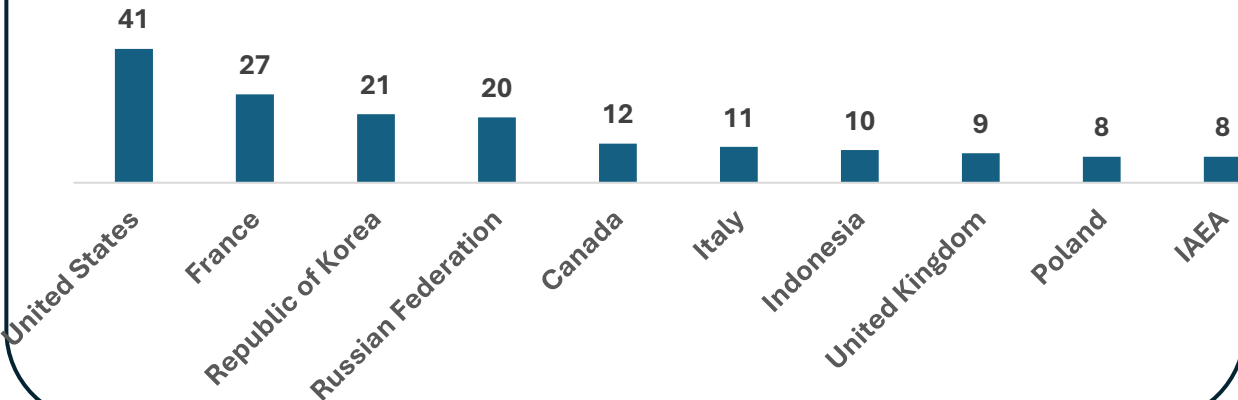
Participant Gender Distribution



Top 5 Participant Organization Types



Top 10 Countries and Organizations based on Submissions of Papers



307

Accepted
Papers

44

Technical
Sessions

295

Presenters

~ 50

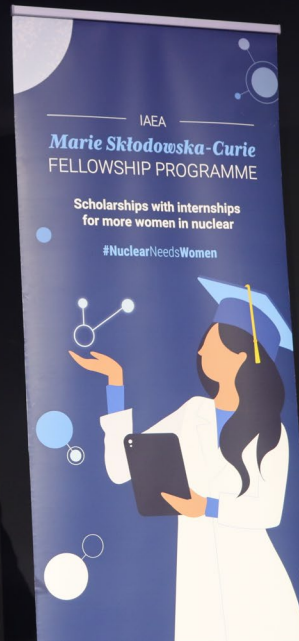
Presenters -
Plenary & Side
Events

58

Contributing
Member States

10

International
Organizations



Conference Plenary Sessions

- End Users
- Regulatory Preparedness, Innovation and Collaboration for the Safe & Secure Deployment of SMRs
- Innovative SMRs (Non-water cooled and Gen IV)
- Capacity Building: A Driver for Accelerated Deployment of SMRs
- Innovative Industrial Involvement for SMRs: from concept to manufacturing



Side Event – SMRs: Women as Game Changers



Aleshia DUNCAN

Deputy Assistant Secretary
for the Office of
International Cooperation
US DOE,
VP of WiN Global



Reelika RUNNEL

Coordinator of Estonian
Nuclear Energy Working
Group, **Estonia**
President WiN Estonia



Diana MUSYOKA

Implementing programmes
for nuclear power
prospects, **NuPEA, Kenya**
alumni of the Lise Meitner
Program



Laure CLAQUIN

COO, Managing Director for
France
THORIZON



Richard OLLINGTON

Partner
Radiant Energy Group



Niina KIVILUOMA

Project researcher, **LUT**
University Finland

Moderator

Closing



Aline DES CLOIZEAUX

WiN IAEA, Nuclear Power
Director, **IAEA**



Maria KORSNICK

CEO, **NEI** and President of the
2204 SMR Conference

WiN IAEA Side event at the IAEA SMR Conference

Tuesday 22 October 2024, 12.30-13.45

Board Room B, M-Building, IAEA

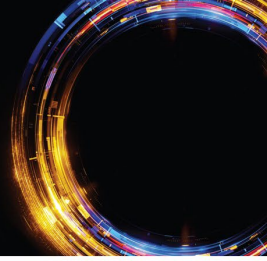
Please Register <https://forms.office.com/e/zUtG7U4nav>

Broadcast [here](#)

Sponsored by US DOE

Industry Night – Tuesday

Jointly organized by IAEA and WNA



Panel 1: LWR SMR

Moderator: Frederik Reitsma (IAEA)

Panellists: **Westinghouse Electric Company, CNNC, Rolls-Royce SMR, Teplator**

Panel 3: LWR SMR

Moderator: Nathan Paterson (WNA)

Panellists: **GE-Hitachi, Holtec, KHNP, NuScale Power, Last Energy**

Panel 2: Non-water Cooled Reactors

Moderator: Andrei Goicea (Nuclear Europe)

Panellists: **Oklo, Newcleo, Terrapower, Hexana, Otrera, NAAREA & Thorizon**

Panel 4: Advanced Reactors and Applications

Chair: Sangmin Park (KSOE)

Moderator: Derek Novak (ABS)

Panellists: **OKBM, Seaborg Technologies, MoltexFlex, CNNC**

Side Event: IAEA Activities on SMRs



**Mikhail
CHUDAKOV**

Deputy Director General
Head of Department of
Nuclear Energy



**Lydie
EVRARD**

Deputy Director General
Head of Department of
Nuclear Safety and
Security



Frederik REITSMA

Head of Nuclear Power
Technology Development
Section
Department of Nuclear
Energy



Paula CALLE VIVES

Senior Nuclear Safety Officer
Department of Nuclear Safety
and Security



Jeremy WHITLOCK

Senior Technical Advisor
Department of Safeguards



Jing ZHANG

Section Head of the
Division for Europe
Department of
Technical Cooperation



Khalid KHASAWNEH

Commissioner for Nuclear
Power Reactors
Jordan Atomic Energy
Commission



Geni SUNARYO

Managing Director
National Nuclear Energy
Agency of Indonesia



**Raúl Alberto
GONZÁLEZ JIMÉNEZ**

Nuclear Energy Programme
Implementation Organism – OIPEN,
El Salvador

SMRs and Microreactors: Towards a Sustainable and Equitable Future

Wednesday, 23 October 2024
17:45-20:15, Panel & Reception
BR-B/M1, M Building

This multigenerational, multidisciplinary panel will delve into the opportunities and challenges posed by SMRs and microreactors. Initially, it will examine how these reactors facilitate rapid deployment (modularity), cost-effectiveness (equity), and versatility for various electric and non-electric applications across diverse settings, suburban and urban, aiding in our journey towards a net-zero future. Subsequently, it will address the myriad challenges associated with these reactors, encompassing licensing, safeguards, fostering a diverse global workforce, and restructuring regulatory frameworks.



Scott Shrum

Director, National
Nuclear Security
Administration, USA



Kristine Madden

President,
International Youth
Nuclear Congress,
USA/Austria



Jeremy Whitlock

Senior Technical
Advisor,
International Atomic
Energy Agency



Khalid Khasawneh

Commissioner,
Jordan Atomic
Energy Commission,
Jordan



Festus Quansah

Finance Analyst,
Ghana Atomic
Energy Commission,
Ghana



Madeline Cohen

Research Associate,
EFI Foundation,
USA



Jakub Zychowicz

Licensing Lead, GE
Hitachi Nuclear
Energy, Poland



Ángela Abadía Zapata

Security Inspector &
Evaluator, Ministry of
Energy & Mines,
Columbia

Side Event: SMR Regulator's Forum

The SMR Regulators' Forum (SMR RF) is an independent 'first-of-a-kind' regulator-to-regulator entity facilitated by the IAEA. It provides a platform for experienced regulatory bodies (currently, 12) to work together to develop consensus-based common positions on challenging regulatory and technical issues related to SMRs. In 2024, the SMR RF celebrates its 10th anniversary, with the satisfaction of seeing the fulfilment of its objectives and the renewed motivation to further contribute to nuclear safety worldwide.

Opening remarks: **Ms Anna Hajduk Bradford**, DIR/NSNI

Mr Štěpán Kochánek, Deputy Chairperson (SUJB)

Overview of the SMR RF and its activities: **Mr Sean Belyea** (CNSC)

Panellists: **Ms Sarah Eaton** (CNSC)

Mr Eetu Ahonen (STUK)

Mr Karel Künzel (SUJB)

Mr Thomas Buckenmeyer (ASN)

Moderator: **Ms Paula Calle Vives**, SMR RF Scientific Secretary, RAS/NSNI

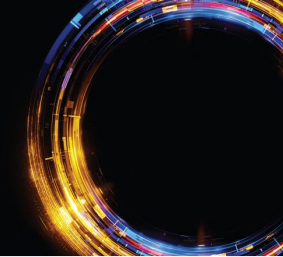
Closing remarks: **Mr Matthew Bamber** (UK ONR)



**Celebrating a
Decade of
Shaping the
Future of
Nuclear Safety
(2014-2024)**



Conference Topical Groups / Tracks



Topical Group A: SMR Design, Technology, Fuel Cycle and Applications

- Track 1: Design and Technology Development of SMRs
- Track 2: Advanced fuels, reprocessing, waste management and decommissioning aspects for SMRs – Safety, Design and Technology
- Track 3: Engineering, Codes & Standards, Supply Chain, Operation and Maintenance of SMRs
- Track 4: Transportable SMRs
- Track 5: Non-Electric Applications for SMRs

Topical Group B: Legislative and Regulatory Frameworks

- Track 6: International and National Legal Frameworks and SMRs
- Track 7: Regulatory Considerations for SMRs

Topical Group C: Safety, Security and Safeguards

- Track 8: Demonstrating SMR's Safety Case
- Track 9: Emergency Preparedness and Response for SMRs
- Track 10: Safety, Security and Safeguards Interfaces related to SMRs
- Track 11: Security of SMR: Physical Protection and Computer Security
- Track 12: Safeguards for SMRs

Topical Group D: Considerations to Facilitate Deployment of SMRs Lead: V. Artisiuk, NENP

- Track 13: SMRs in Energy Planning for Climate Change Mitigation
- Track 14: Nuclear Infrastructure and Enabling Environment for SMRs
- Track 15: Financing, Cost & Economic Appraisals and Contracting Approaches for SMR Projects
- Track 16: Public and Stakeholder Engagements in SMR Development and Deployment
- Track 17: Cooperation for Harmonization and Standardization

Summary & Findings: Topical Group B

Legislative & Regulatory Frameworks



- The establishment and maintenance of adequate **national legal frameworks** remains fundamental for SMR deployment, requiring systematic consideration of **safety, security, and peaceful use** while ensuring regulatory effectiveness.
- While existing **international legal instruments** generally encompass SMRs, their unique characteristics, particularly for FNPPs, require careful consideration of potential impacts on legal frameworks.
- Close **collaboration between legal and technical experts** is essential to ensure international legal instruments remain fit for purpose, with particular emphasis on addressing **nuclear liability** considerations for novel SMR applications.
- The development of **adaptive regulatory approaches** and **innovative licensing processes** is crucial, emphasizing the importance of **early engagement between regulators and vendors** through pre-licensing consultations.
- Need for **performance-based approaches**, taking into account **graded approach** principles; **regulatory flexibility and adaptation to new technologies**, such as **AI**, which can support **autonomous** or **remote** operations.
- **Bilateral and multilateral cooperation**, particularly through IAEA **Nuclear Harmonization and Standardization Initiative**, is vital for building and enhancing regulatory capacity while harmonizing approaches across jurisdictions.

Summary & Findings: Topical Group C

Safety, Security & Safeguards



- **Defence in depth**, the fulfilment of the **fundamental safety functions**, the use of **deterministic and probabilistic analyses** remain fundamental in all SMR designs.
- **Systematic** consideration of interfaces between **safety, security and safeguards** are important in the design stage of SMRs, which should be done with **proper consideration of risk insights** through risk-informed decision making process
- **Security by design** must address both **physical and computer security** through systematic risk assessment, with particular emphasis on vital area identification and insider threat mitigation.
- **International collaboration**, including sharing experiences in the application of advanced technologies, such as **digital twins** and **machine learning**, and on activities such as modeling and simulation, is essential for reaching **common approaches** for SMRs.
- **Early engagement** between industry, operators, regulators, and the IAEA is crucial for developing **efficient safeguards implementation**, requiring new approaches that reduce burden while ensuring effectiveness for advanced SMR technologies. **Safeguards by design** is essential for timely deployment, continued **communication** with Member States on the scope of safeguards by design is needed.



Status of the Nuclear Harmonization and Standardization Initiative: Regulatory Track

**Effective Global Deployment of
Safe and Secure Advanced
Nuclear Reactors**



NHSI aim:

- To facilitate the safe and secure deployment of SMRs in maximizing their contribution to reach net zero carbon emissions by 2050
 - ❑ To enhance harmonization of regulatory approaches and the harmonization and standardization of industrial approaches

Phase I (June 2022- December 2024):

- 125 participants from 33 countries worked in two separate but complementary tracks, regulators and technology holders and operators, to complete a wide range of activities

Phase II (January 2025- December 2026)

- The new phase of work builds on the outcomes of phase I towards the delivery of the NHSI objectives

Global Framework

Advance the development of a **global framework for regulatory reviews of advanced reactors**.

- ❖ This would include a set of **documents** and **procedures** that would outline a **common understanding** of regulatory approaches, requirements and how to meet the requirements based on **experience**. This would complement the IAEA safety standards and other international standards.
- ❖ For areas where there is no commonality across Member States, clarity on the **root cause of the differences** and targeted development of approaches accounting for the root cause of the differences.

Benefits

Benefits of a global framework

- ❖ **Resource savings** and **acceleration** of deployment: regulatory reviews performed by a regulatory body based on this framework could be used by another regulatory body (providing they have developed a regulatory framework) with appropriate amount of due diligence.
- ❖ A design that considers this framework will **not** require **significant** design and safety demonstration **changes** when deployed in multiple countries, other than for site specific issues.

Build a common basis for regulatory cooperation

Common processes to cooperate in regulatory reviews

NHSI Phase I (2022-2024)



Build trust and understanding among regulatory bodies through cooperation

Support the implementation of cooperation processes and gather implementation feedback and lessons learned

NHSI Phase II (2025-2026)

Define the elements of a common framework

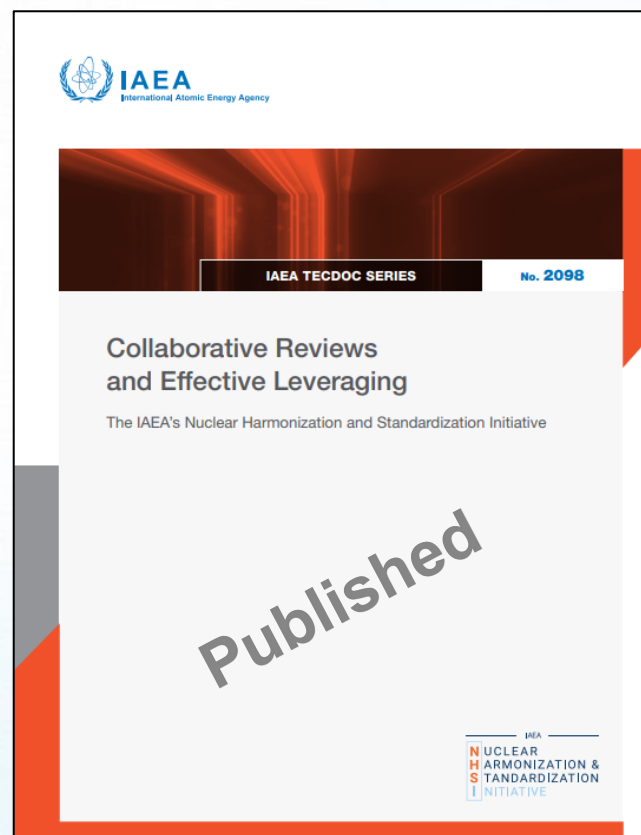
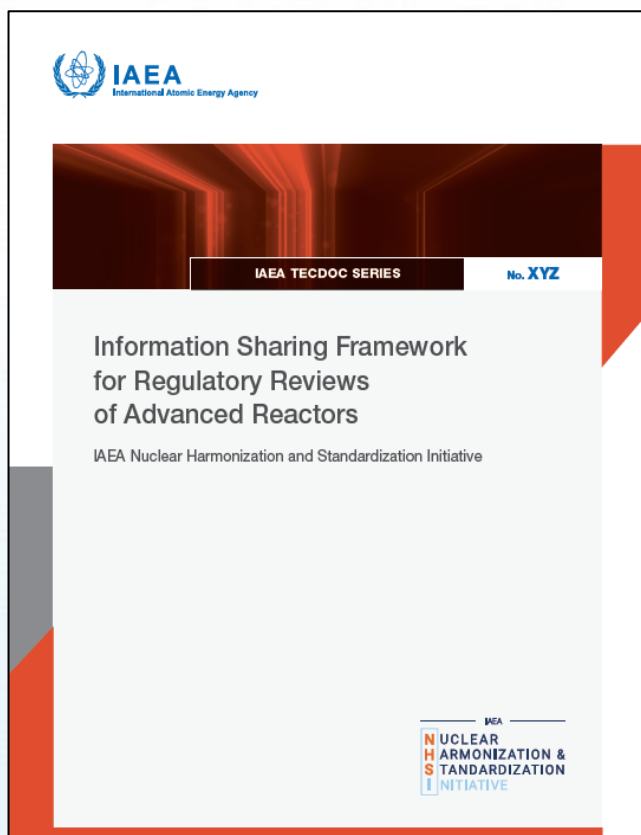
Analyse the implementation feedback and outline commonalities and differences

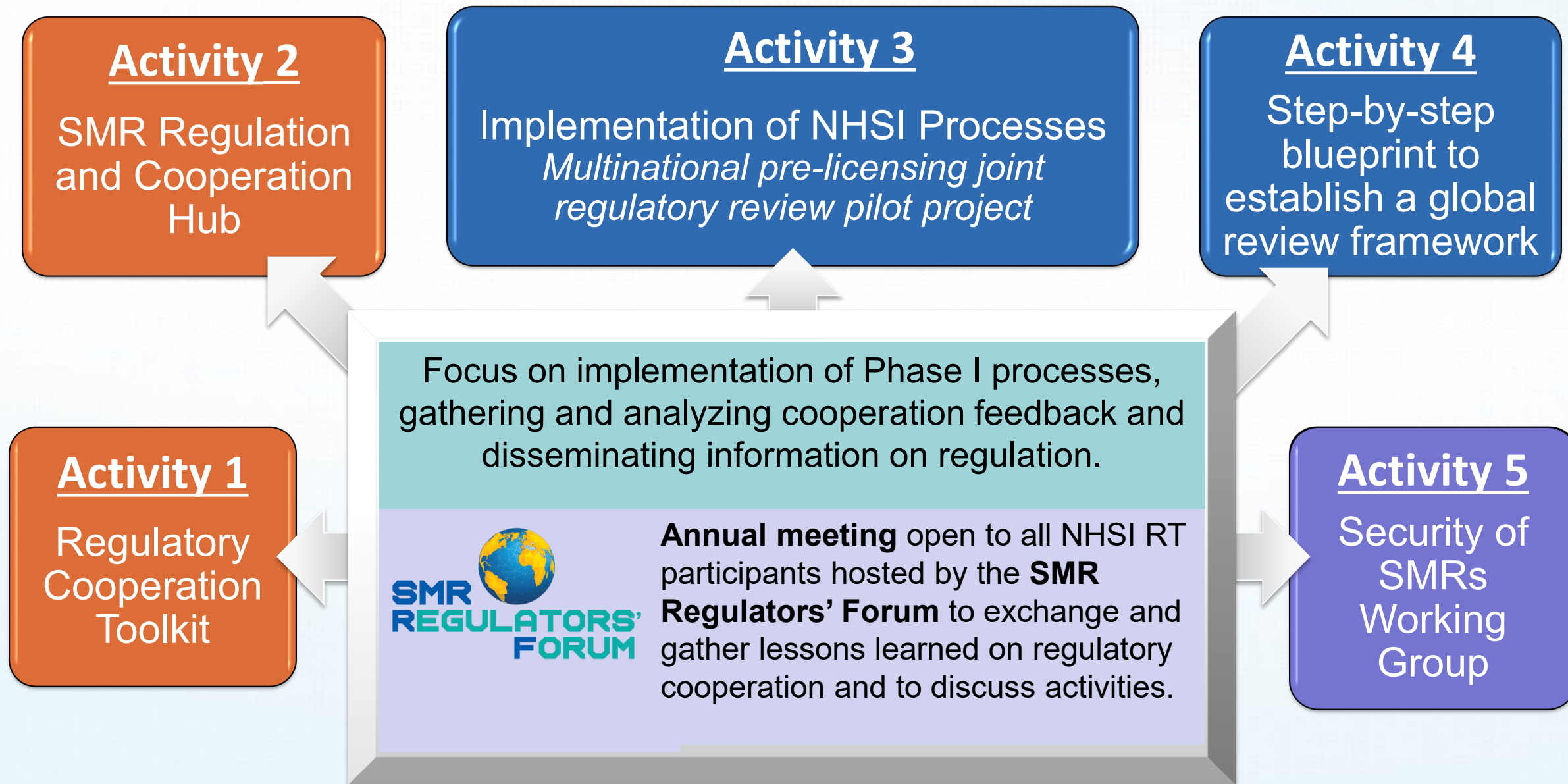
Resolve or explain differences as much as possible

Develop the necessary tools and guidelines

To achieve this aspiration, it is essential that regulatory bodies and the industry contribute by using the new NHSI processes and sharing feedback on the cooperation.

Three technical documents outlining common processes to cooperate in regulatory reviews to be published in 2025







New Book Alert: Get notified of IAEA Nuclear
Safety and Security Publications
[https://www.iaea.org/publications/new-ns-book-
alert](https://www.iaea.org/publications/new-ns-book-alert)

Thank You

b.rini@iaea.org