Towards Optimized Use of Research Reactors in Europe – Summary & Results

Roberta CIRILLO, ENEN

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Context – TOURR project

TOURR = **Towards Optimised Use of Research Reactors**

Euratom funded coordination action
October 2020 – September 2023

The **ambition** of TOURR project is to **secure access and availability of RRs** as a vital part of the European Research Area **and to support stable supply of medical radioisotopes**.

Partners – 6 RR operators

TOURR nuclear research reactors

>> Partnership

1. European Nuclear Education Network (ENEN) Belgium
2. Centrum Vyzkumu Rez sro (CVR) Czechia
3. Energiatudomanyi Kutatokozpont (EK) Hungary
4. Narodowe Centrum Badan Jadrowych (NCBJ) Poland
5. Studiecentrum Voor Kernenergie / Centre D'etude De L'energie Nucleaire (SCK CEN) Belgium
6. Jožef Stefan Institute (JSI) Slovenia
7. Evalion sro (EVALION) Czechia
8. Universitaet Stuttgart (USTUTT) Germany
9. Centro De Investigaciones Energeticas, Medioambientales Y Tecnologicas-Ciemat (CIEMAT) Spain

TOURR in the frame of EU initiatives

The **TOURR project results** are intended to contribute to the **SAMIRA** (Strategic Agenda for Medical Ionising Radiation Applications) pillar on 'Securing the supply of medical radioisotopes' under **ERVI** (European Radioisotope Valley Initiative).

Aim of the TOURR project

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TOURR **primary objective** is to develop a strategy for RR in Europe and prepare the ground for its implementation.

Strategy = **Recommendations**

prepare the ground for its implementation = provide some **tools**

STRATEGY + TOOLS = Recommendations + Platform

Objectives

1. **Assessment of the current status of European RR fleet**

   Inventory of existing RR, going beyond IAEA Database. (scope of implemented applications, scientific strength of each facility, user structure, instrumentation, future developing plans, actual and future needs...)

2. **Estimation of future needs**

   Elicited and evaluated along the main interests for neutron sources

3. **Plan for the upgrade of reactor fleet**

   Several applications (isotope production, radiography, spectroscopy, cancer treatment) will **increase the demand** for research with RR.

Objectives

4. **Plan to maintain the fleet**

Factors influencing **sustainability of RR fleet** will be analyzed (material and components ageing, waste management, cost of fuel manufacturing and upgrades, systems, instrumentation, increasing safety and licensing requirements…)

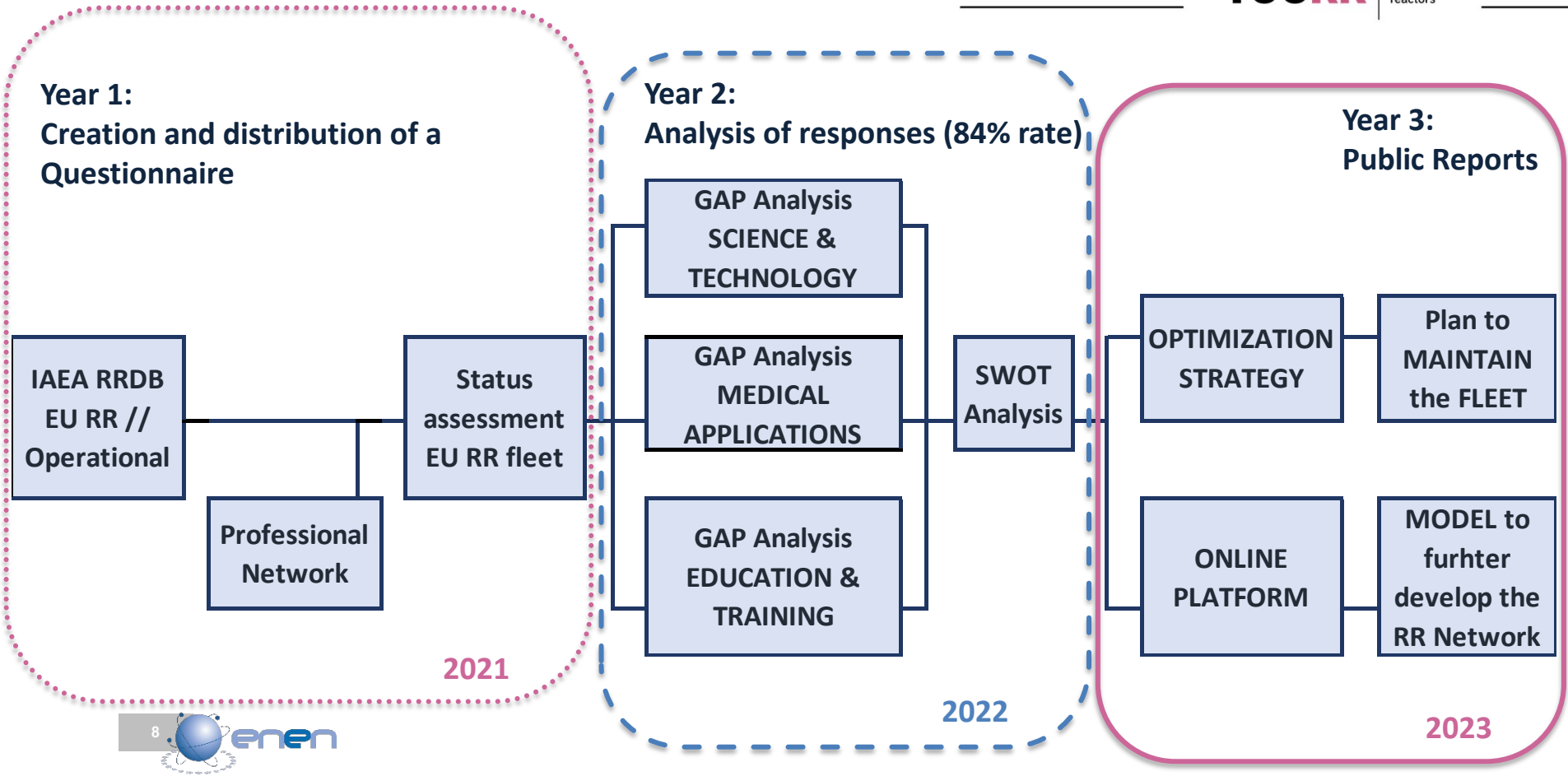
5. **Developing tools for optimal use of RR fleet**

Get inspired by other well functioning realities like the radioisotope production

6. **Rising awareness of decision makers and the public on the role of RR**

Change the image of RR and demonstrate, that they are modern research facilities providing **answers to multiple challenges**: health, energy, key technologies and cultural heritage

AFTER 36 Months



Main Findings

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STRENGTHS:

- High level of expertise
- A diverse fleet
- Flexibility to be utilized

WEAKNESSES:

- Lack of communication
- Uneven utilisation
- Relatively low average utilization
- Need for silicon doping and high flux RR will increase

THREATS:

- Loss of knowledge and competence
- Average age of RRs is 56. Threat of losing current capabilities and new opportunities
- Loss of knowledge and competence as an application is not being performed
- Few (or no) new built may lead to no RR services available in the future

OPPORTUNITIES:

- Expand utilization with increased funding and manpower.
- Increase the communication
- Research in new fields

Strategy Condensed

Strengths

S1: High level of expertise
S2: Diverse fleet of EU RR
S3: Flexibility of RR

Weaknesses

W1: Lack of communication between RR
W2: Uneven utilization among RR
W3: Lack of education of non -power nuclear applications

Opportunities

O1: Expand utilization with funding
O2: Increase communication between RR
O3: Research in new fields
O4: Use of new medical isotopes

Strategy S-O

S3O3: Using RR flexibility for research in new fields
S1O1: Using expertise to construct new RR for testing new nuclear technologies
S1O1: **Foster collaboration across other projects and networks**

Strategy W-O

W1O2: **Create a platform to increase communication between RR**
W3O4: Enhance cooperation between academia and medical sector (hospitals)
W2O3: Increase RR utilization by promoting research in new fields

Threats

T1: Losing knowledge – personnel aging
T2: Aging of RR fleet – RR closures
T3: Not building new RR – losing RR services in the future

Strategy S-T

S1T1: **Promote educational platforms to transfer expertise to younger generations**
S2T2,3: New European Multipurpose Research Reactor
S1T2: Modernization of the EU RR fleet

Strategy W-T

W1T3: Build new RR accessible to all EU states
W3T1: **Retention and attraction of nuclear-educated people**

Strategy Condensed

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Supporting tool

A **centralised platform**, where RR could:

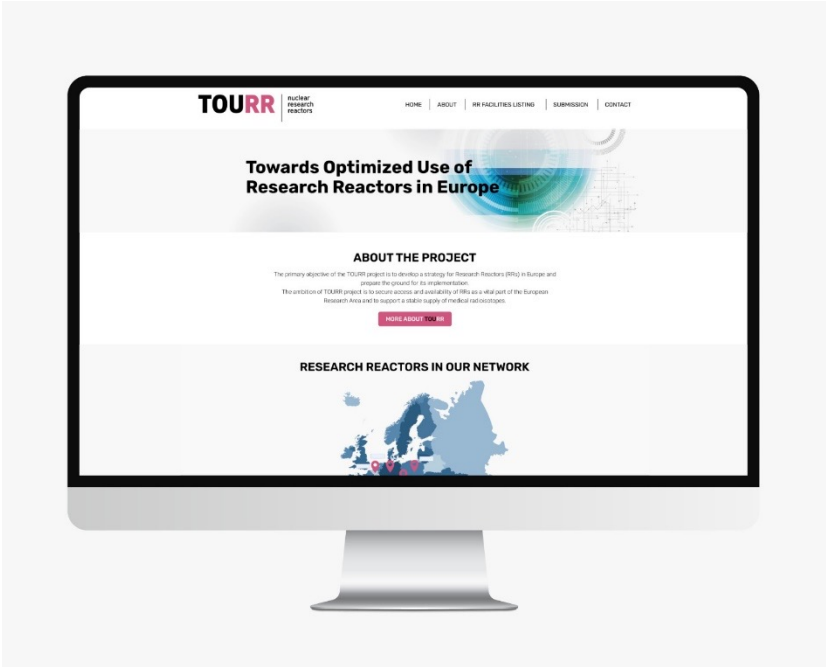
- **inventorize their activities**
- look for a **target audience**
- cooperate with other RRs to offer a **better program of activities**

THIS PLATFORM would be highly beneficial for the RR community.

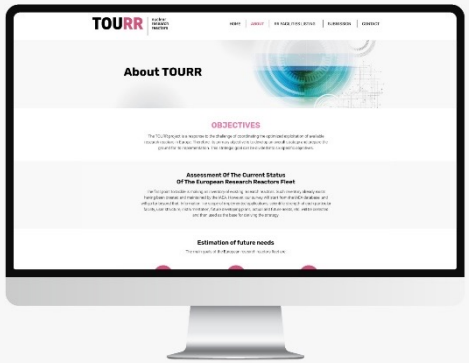
The platform outlook

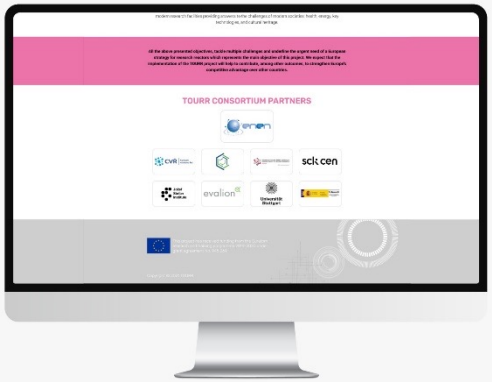
RRs share information beyond their technical characteristics describing their **capacity to operate** in the fields of:

- Science and technology
- Medical applications
- Education and training



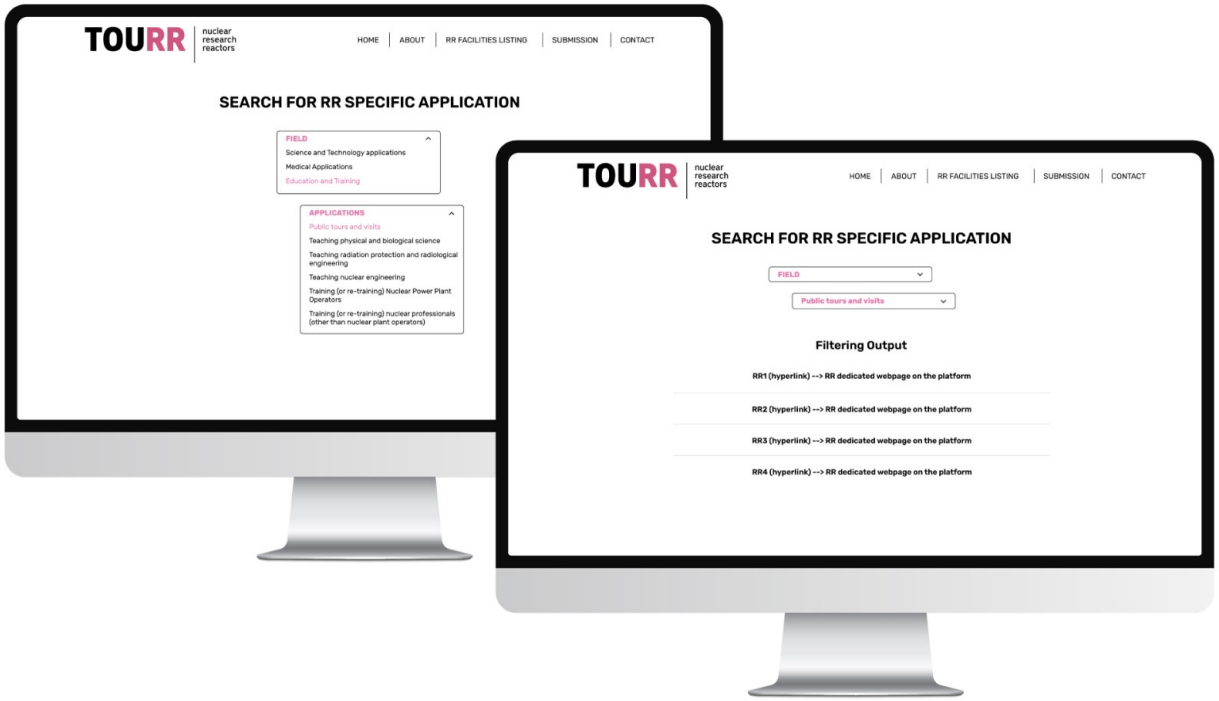
The platform outlook





- **ABOUT page**: where more detailed information about the TOURR Project will be presented along with the Consortium members and the aim of the platform
- **RR facilities**: where the RR registered on the platform are presented.
- **Submission / application system**: where user can request specific RR capacity.

The platform outlook



Filter by interest

RR1, RR2, RR3 who have the specific application implemented

Each of them will have a hyperlink to a dedicated webpage under the same platform

Further development of the platform

TOURR nuclear research reactors

Proposed Model of utilization and coordination of RR activities

EU Nuclear Science User Facilities (inspired on the (US) **NSUF** model)

- **Access** to RR with no cost to the user via a competitive proposal process and no funding to the end-user.

- **Peer-reviewed process**
  - Rapid turnaround experiments (limited scope and materials, short time frame) → also for E&T purposes
  - Consolidated innovative nuclear research (yearly call, significant funding and longer time frame)

- Proposal includes **governance, supporting tools and international collaboration**

Proposed model

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Conclusions 1/2

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Assessment of the current status of European RR fleet
Database of European Research Reactors Fleet

available for download

Strategy for optimized use of research reactors in Europe

SOON available for download

Refurbishment and construction **plan to maintain the fleet**

SOON available for download

TOURR RR Platform

ONLINE – available for consultation and subscription

Conclusions 2/2

TOURR nuclear research reactors

1. **Assessment of the current status of European RR fleet**

   Database of European Research Reactors Fleet

2. **Estimation of future needs**

   Gap analysis – Science & Tech // Med Apps // Edu & Train

3. **Plan for the upgrade of reactor fleet**

   Strategy for optimized use of research reactors in Europe → soon publicly available

4. **Plan to maintain the fleet**

   COMING SOON - Refurbishment and construction plan recommendations

5. **Developing tools for optimal use of RR fleet**

   ONLINE PLATFORM https://tourr-platform.eu/

6. **Rising awareness of decision makers and the public on the role of RR**

   Events – FINAL WORKSHOP IN SEPTEMBER – 21 SEPTEMBER 2023, Brussels

Thank you for your attention!

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