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Federal Office for Radiation Protection

IRSN
INSTITUT DE RADIOPROTECTION ET DE SÛRETÉ NUCLÉAIRE

Atomic Questions Group meeting 19 May 2022

PIANOFORTE: A European Partnership For Radiation Protection Research

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Co-funded by the European Union

- I/V Introduction
- II/V Why radiation protection research requires European integration
- III/V The Euratom Call
- IV/V Pianoforte Objectives and Structure
- V/V Pianoforte Impact and Conclusion

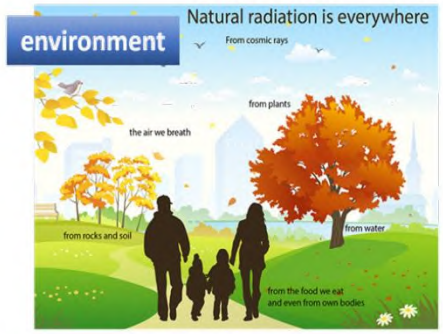
Introduction

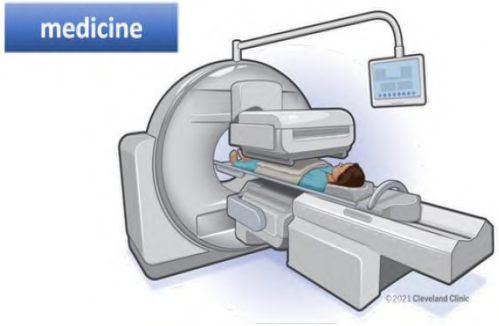
- Radiation protection aims at protecting people and the environment from detrimental effects of ionising radiation while maintaining or improving the benefits of its use.
- Consequences of all types of exposure to radiation are a concern for all categories of citizens and authorities.
- Protection based on state-of-the-art scientific evidence
- Knowledge gaps still exist
- Transnational, multi-disciplinary approach

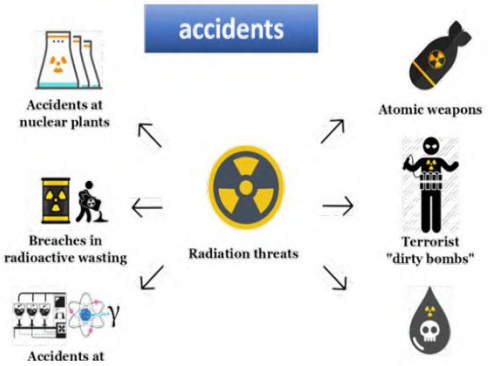
Ambition: to have an impact on **radiation protection of humans (public, workers, patients) and the environment** regarding the risks associated with **medical, industrial, or environmental exposures** and on **emergency management** in relation to accidents involving radiation.

I/V

Why Radiation Protection is relevant for the future: health, environment, security, technology





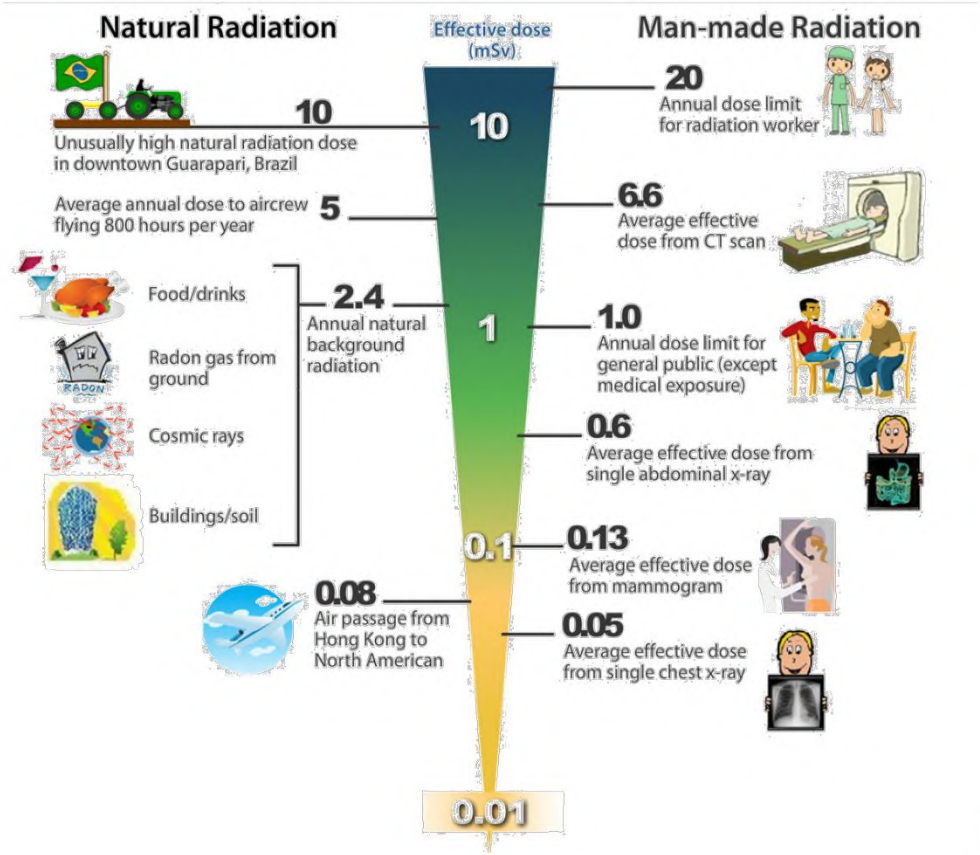


Radiation is ubiquitous. Radiation Protection concerns all citizens in ALL member states.

II/V

Why Radiation Protection is difficult: Radiation in daily life

- Very low and **low dose exposure** are most frequent
- Risks are with large uncertainties
- Various dose-response patterns are possible
- In general: risk estimates are derived from atypical exposure situations



www.dbcp.gov.hk

II/V

Where do we stand: European Landscape of Radiation Protection

European radiation protection research efforts have made great progress **over the last decades**

- Establishment of 6 research platforms: low dose, radioecology, radiological emergencies and recovery, dosimetry, medical radiation, social sciences and humanities
- Integrated, European approach with participation of all member states

1st European Joint Programme CONCERT (2015 – 2020)

- Development of a **transdisciplinary Joint Roadmap**

EUROPEAN JOINT PROGRAMME FOR THE INTEGRATION OF RADIATION PROTECTION RESEARCH

CONCERT

MELODI Multidisciplinary European Low Dose Initiative

NERIS

EURADOS

EUROPEAN RADIOECOLOGY ALLIANCE

EURAMED European Alliance for Medical Radiation Protection Research

SHARE Social sciences and Humanities in ionising radiation REsearch

II/V

One major result of Euratom funding (CONCERT): the first transdisciplinary Joint Roadmap for Radiation Protection Research

JRM is the main deliverable of EJP CONCERT and a living document, provides game changers as starting point for research calls, there are connections to other Horizon 2020 programs (MEDIRAD, Harmonic, Symphonia)

Exposure Scenarios	Joint Research Challenges	Scenarios
1. Medical / Patients	A. Understanding and quantifying the health effects of radiation exposure	1–6
2. Industrial applications / Public & Environment	B. Improving the concepts of dose quantities	1–6
3. Workers	C. Understanding radiation-related effects on non-human biota and ecosystems	1–2, 4–6
4. Nuclear or industry using NORM / Public & Environment	D. Optimising medical use of radiation	1, 3
5. Natural background / Public & Environment	E. Improving radiation protection of workers	3, 6
6. Nuclear or radiol. accident / Public, Workers, Environment	F. Integrated approach to environmental exposure and risk assessment from ionising radiation	2, 4–6
	G. Optimise energy and recovery preparedness and response	6
	H. Radiation protection in society	1–6

II/V

Scope of the Partnership (as expressed in the 2021-2022 WP)

1. Cooperation of the entire European research community
2. Take account of the priorities identified in the Strategic Research Agendas (SRA) and build on those identified by the EJP CONCERT
3. Support open and participatory approach of citizens
4. Address the identified research topics through Open Calls
5. Explore synergies across EU programme
6. Facilitate access to state-of-the-art research infrastructures

III/V

PIANOFORTE will contribute to the EU Policy by addressing 3 main challenges

Global policy	**UNITED NATIONS Sustainable Development Goals (SDG)**		
	HEALTH	**ENVIRONMENT**	**SECURITY**
EU policy	**Europe's Beating cancer plan and SAMIRA initiative** a European plan to fight cancer, to support Member States in improving cancer care and control	**EU Green Deal** to protect health and well-being of citizens from environmental risks and impacts	**Action plan on the Sendai Framework for risk reduction** Managing risks to achieve resilience
Challenges	**To improve the detection and treatment of cancer in EU**	**To consolidate regulations and improve practices by capturing low-dose research advances**	**To Improve the anticipation and resilience in case of radiological or nuclear event and legacy management**
Connections with HE Clusters	Cluster **Health**		Clusters **Civil security for society** and **Food, natural ressources, agriculture and environment, biodiversity**

R&I needs identified to contribue to the fight against cancer

1. Variability in the radiation response in humans
2. Paving the way to personalised medicine
3. Harmonising practices throughout in Europe with respect to the protection of human health from the harmful effects of IR and to the potential benefit for the individual patient.
4. Optimising protocols by use of AI techniques
5. Patient concern and trust

III/V

R&I needs identified to contribue to consolidate regulations and improve practices by capturing low-doses research advances

1. Better understanding of low-dose effects on health and ecosystems

2. Better understanding of link between exposure characteristics and cancer and non-cancer effects

3. Integrative radiobiology from basic mechanisms to clinic and epidemiology

4. Facilitating uptake of research results by decision makers and regulators to improve protection of workers, public, environment by science-based policy.

III/V

R&I needs identified to improve radiological event crisis management

1. Robust prediction of radiological contamination in the food chain for an integrated dose and risk assessment

2. Optimisation of emergency and recovery prepardness using AI and big data

3. Stakeholder's involvement strategy

4. Optimisation process and related values (reasonableness, tolerability…)

III/V

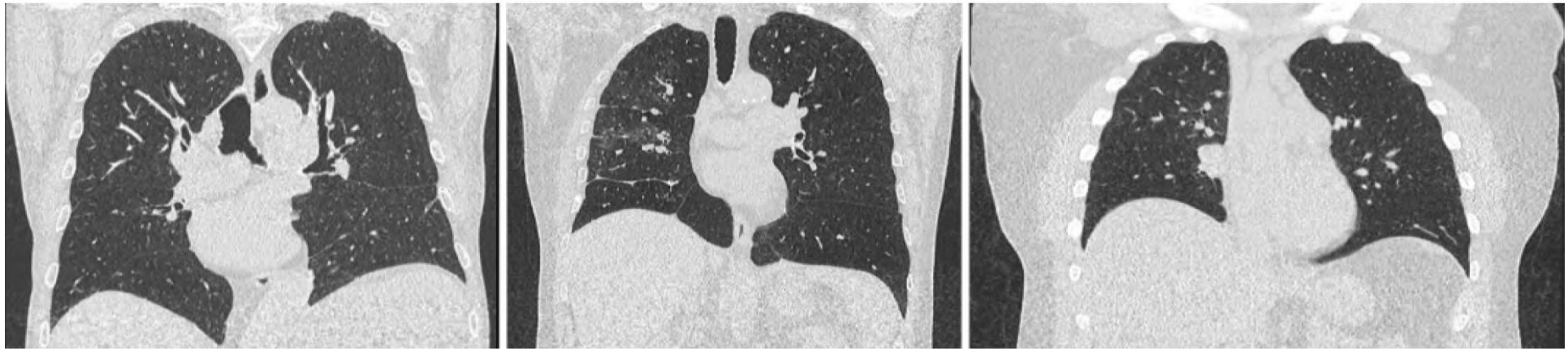
What we want to do

- Improve radiological protection of citizens, patients, workers and environment
- Support Basic Safety Standards implementation
- Improve practices by better understanding and reducing uncertainties in risk estimates in the domain of low-dose exposure
- Optimise and develop preparation to respond and recover from a potential radiological event
- Favour public acceptance and update of radiation protection measures
- Innovate in IR based medical applications combating cancer and other diseases by new and optimised therapeutic and diagnostic approaches
- Maintain a sustainable expertise capability across the EU by fostering shared infrastructures and conducting education & training activities

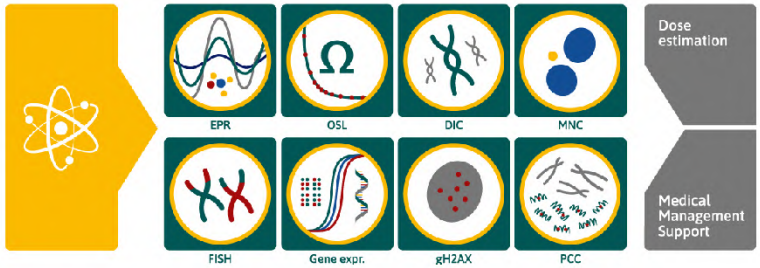
Health: there has been lots of progress in medicine, but we cannot stop here

- To innovate in ionising radiation based medical applications combating cancer and other diseases by new and optimised diagnostic and therapeutic approaches improving patient health and safety and supporting transfer of the R&I outcome to practice.

Example improved CT-Diagnostic for chronic obstructive pulmonary disease (COPD, development over about 10 years), effective dose has been reduced to a quarter



Environment: Radiation is a pervasive “co-risk” in a multi-hazard world



To improve scientific understanding of the variability in individual radiation response and health risk of exposure.

https://www.reneb.net/

To support regulations and implementation of the Basic Safety Standards and improve practices in the domain of low dose exposures of humans and the environment by better understanding and reducing uncertainties in risk estimates.

https://www.bfs.de/EN/bfs/laws-regulations/ordinances-radiation-protection-ion/ordinances-on-radiation-protection.html

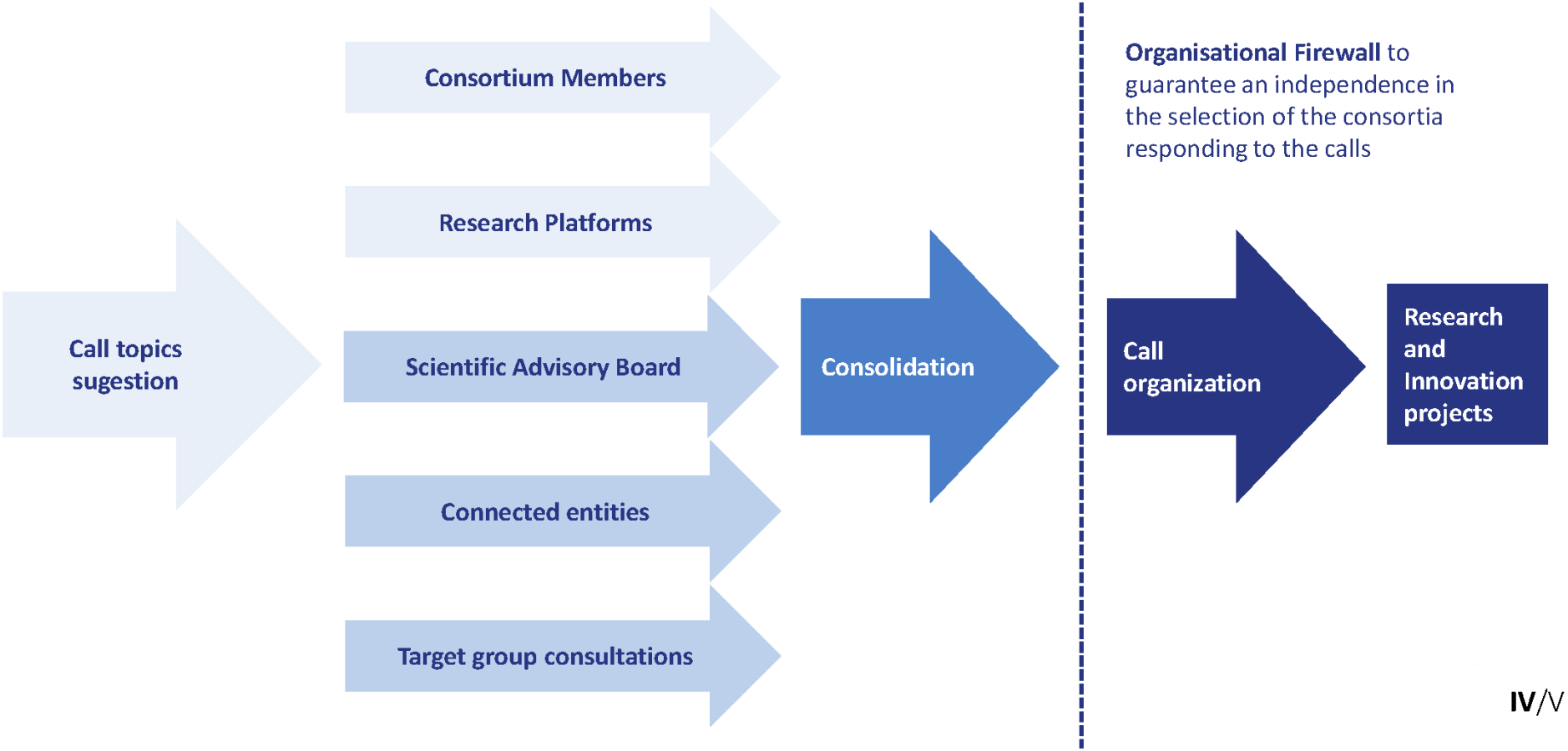
IV/V

Security: Co-ordinated radiation research equals being prepared for radiological events

https://www.bfs.de/EN/topics/ion/accident-management/emergency/scenarios/scenarios.html

IV/V

Systematic stakeholder involvement in Pianoforte



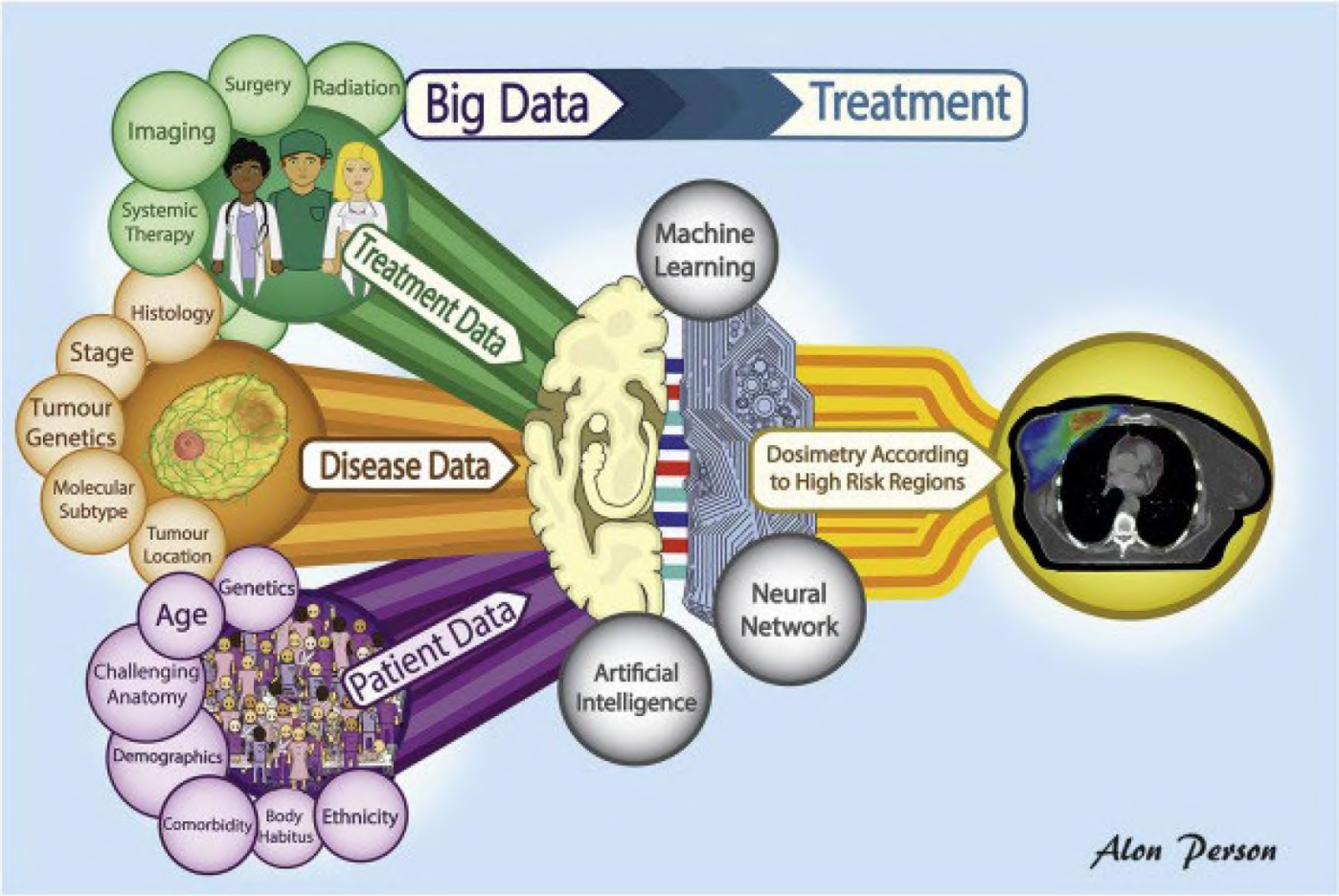
IV/V

Infrastructure: collaborative, standardized, innovative data usage

- Fostering transnational and international collaboration, exchange and network, especially by easing the share of radiation protection related research infrastructures at the European and International level
- Promote harmonisation of quality standards, practices and protocols in all areas relevant to implementation of the research roadmap
- Develop a plan and vision for **FAIR** (findable, accessible, interoperable and reusable) data management and approaches to exploitation of archived data in radiation protection R&I; connect RP community with big data and AI community

IV/V

Why Artificial Intelligence is important for Radiation Protection?



https://doi.org/10.1016/j.breast.2019.11.011

Education and Training

maintain existing and **develop new** competences in radiation protection for all member states

courses

financial support of exchange visits plus conference participation

financial support of networking

IV/V

PIANOFORTE: key features and governance

Starting date: **1st June 2022**

Co-funding rate: **65%**

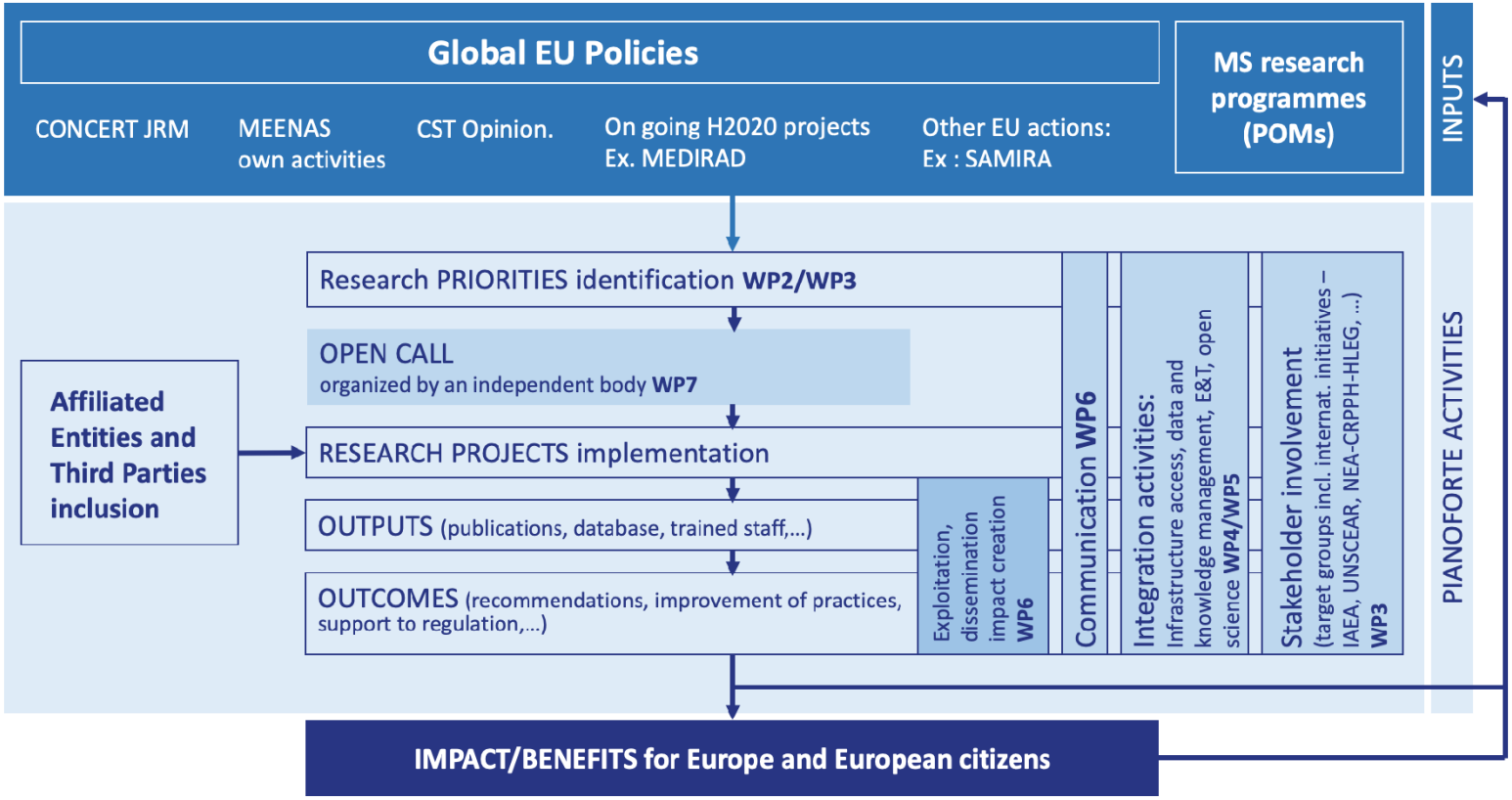
59 partners (39 beneficiaries, 5 associated partners, 15 Affiliated Entities)			**22 Member States + Norway and UK**		**30 + 16 M€/5 years**	
Coordination IRSN/France	**Research & Innovation** SCK CEN/ Belgium	**Stakeholder Engagement** BFS/Germany	**Education & Training** Stockholm U./ Sweden	**Infrastructure** PHE/UK	**Dissemination & Impact** SURO/ Czech Republic	**Open Calls organisation and selection** NCBR/Poland

Governance:
– Executive Board: WP leaders + one representative of platforms
– General Assembly: All beneficiaries including 6 platforms representatives (39 members)
– Stakeholder and Advisory Board: advise ExB and GA

Organisation of at least 3 **open** research calls (2023, 2024, 2025)

IV/V

From science to impact



V/V

CONCLUSION: Pianoforte impact

RP scientific community

- Better scientific knowledge
- Implementation and use of AI and data science in RP research

Government authorities

- Improving risk estimates for the justification of practices and optimisation of all persons concerned
- Better acceptance of radiation protection measures in normal and accidental situations

Practitioners

- Improved practices and recommendations for RP professionals
- In the field of medical applications:
  - New knowledge providing elements to decision-making and risk-benefit analysis
  - Transfer of new optimised medical procedure into medical practices

Civil society and citizens

- Improvement of RP of patients, of the general public and of the environment in normal and accidental situations
- Better knowledge on radiation risks

V/V