WEPAB407

An Innovative Eco-System for Accelerator Science and Technology

C. Darve, J. Andersen, S. Salman, European Spallation Source, ERIC, Lund, Sweden

M. Stankovski, Lund institute of advanced neutron and X-ray science, Lund, Sweden

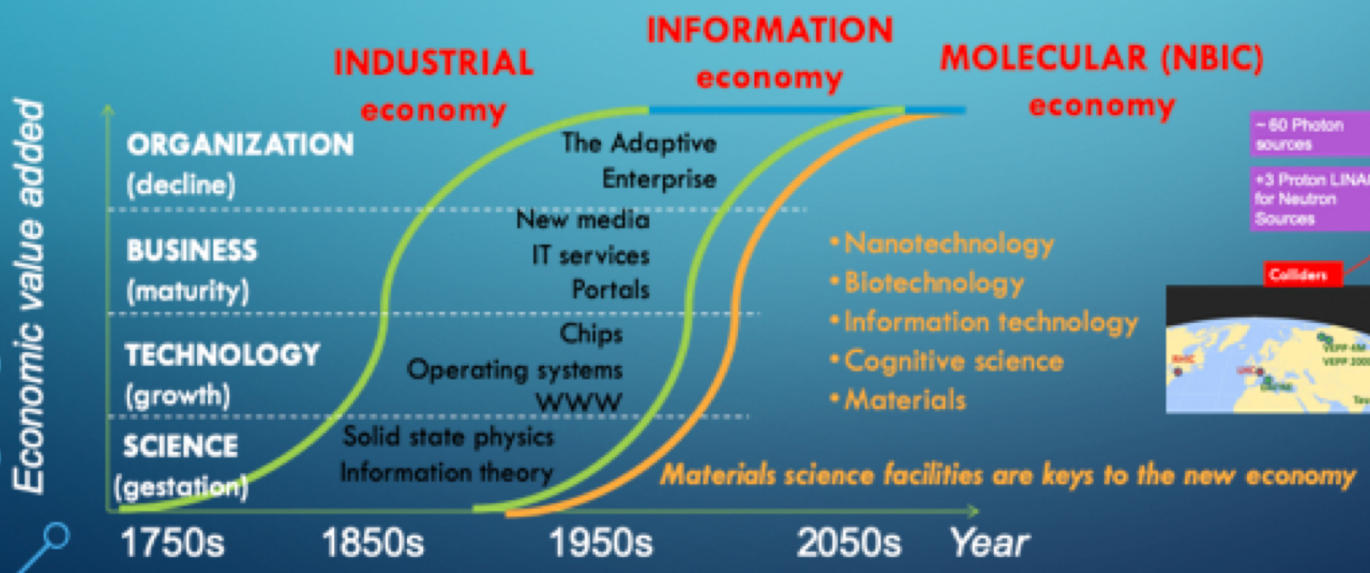
B. Nicquevert, S. Petit, CERN, Geneva, Switzerland

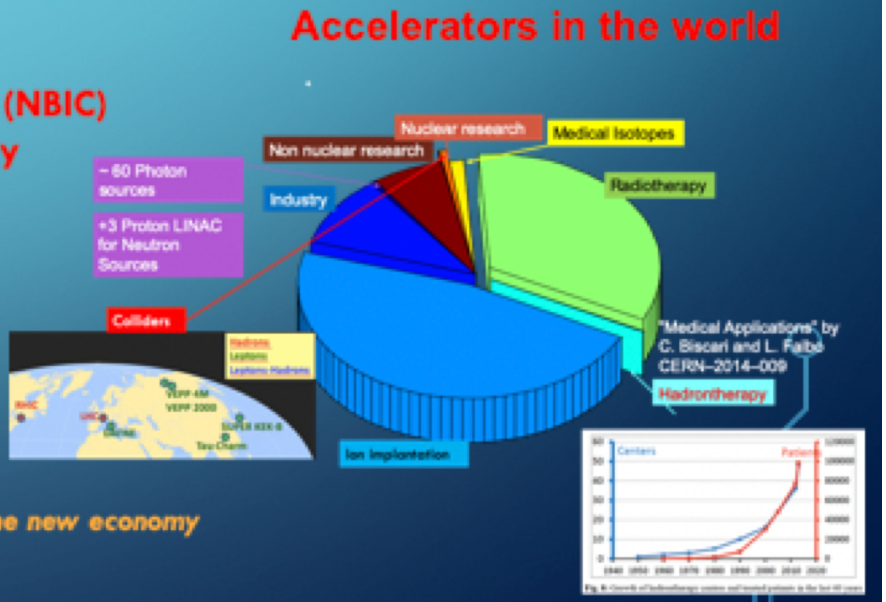
26 May 2021

christine.darve@ess.eu

AN EMERGING ECOSYSTEM

The emergence of new technologies and innovative communication tools, permits us to transcend societal challenges. While particle accelerators are essential instruments to improve our quality of life through science and technology, an adequate ecosystem is essential to activate and maximise this potential.

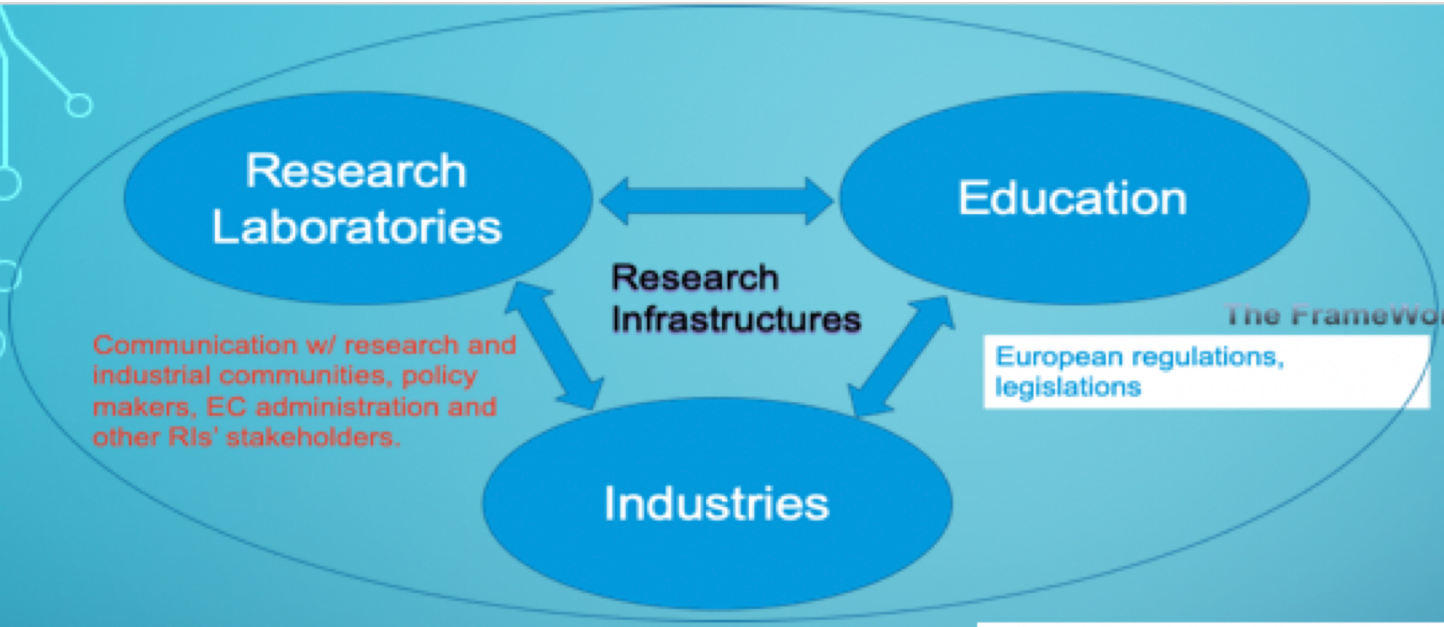




RI TO ENABLE SCIENCE FOR SOCIETY

Research Infrastructure (RI) and industries supported by the enlightened organizations and education, can generate a sustainable environment to serve this purpose

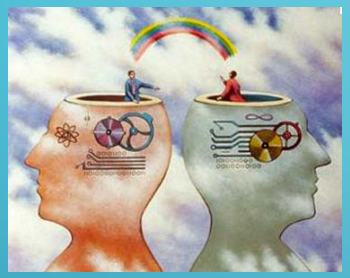
Synergies between 4 main stakeholder groups, that together empower solution driven and results focused execution of projects.



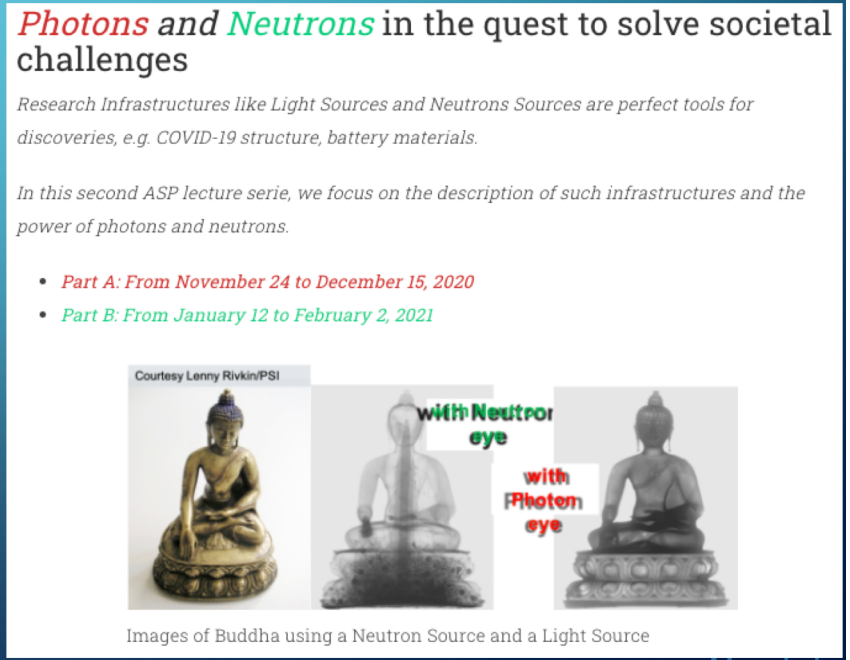
Industries benefit from particle accelerator fabrication, operation and breakthroughs resulting from large neutron and light sources with the typical average proportion of industry use of neutron and light-based Large Scale Research Infrastructures in Europe today being 20%-40% in collaboration with academia, and 1%-10% purely proprietary use, depending on the type of LSRIs.

TRANSFER OF KNOWLEDGE & EDUCATIONAL PLATFORMS

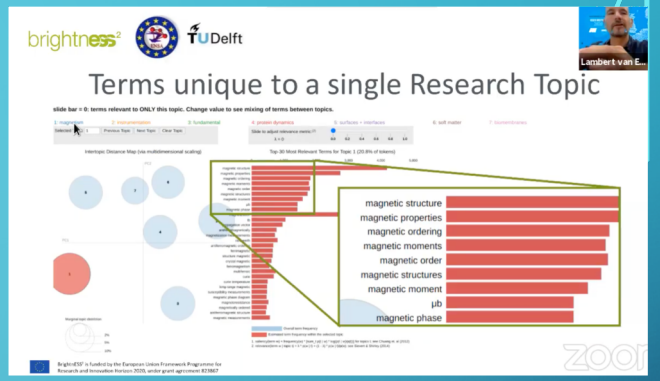
Technology and knowledge transfer are the pillars of the development of this innovative ecosystem, using scientific communication, education and collaboration as their vectors.



- MOOC: e.g. Nordic Particle Accelerator Project
- Online lectures: e.g. ASP - synchrotron and neutron based diffraction and spectroscopic techniques
- Communication channels: e.g. Connecting Industrial R&D Staff to State-of-the-Art Neutron Methods by CERIC/ACCELERATE



THE DATA PROCESS AND INNOVATION



→ Whether the evolution takes a semantic or cognitive route or a combination of both, the future possibilities are probably beyond our imagination.

→ Access to knowledge has become simpler and large quantities of data can be exchanged in a timely manner.

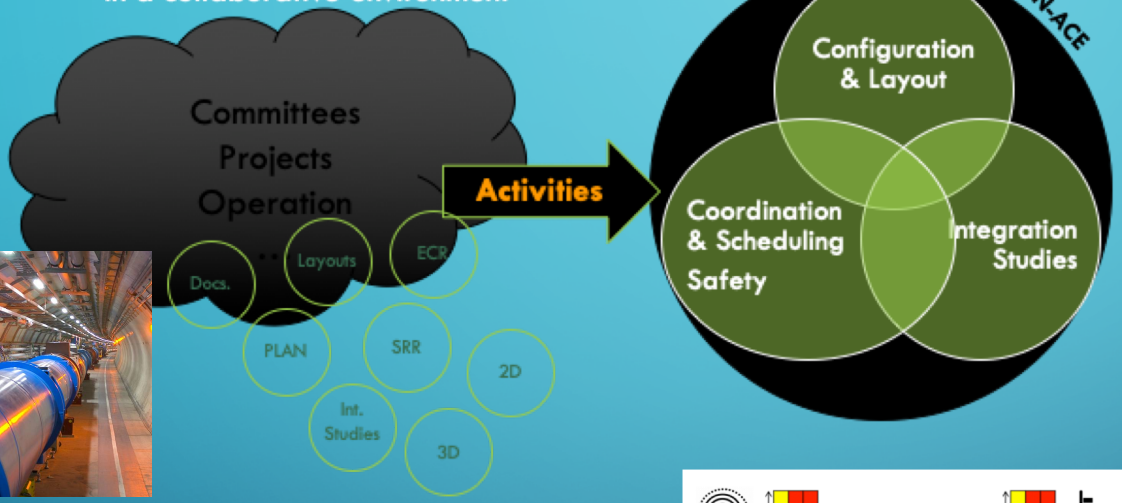
→ Smart/agile data storage, formatting and standardization are required to establish a FAIR data principle.

- Data - DMSC, AI and ML applied to ESS accelerator
- Novel ways to communicate – www, VR, AR

The EDUSAFE integrated safety system uses a camera mounted on the helmet to monitor the working area.

NOVELS WAYS OF WORKING

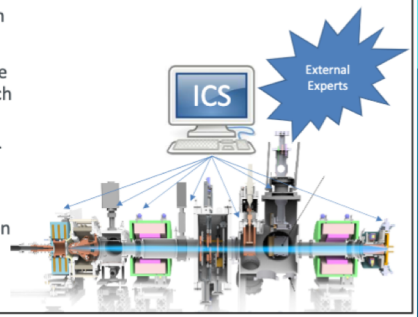
- "Track It" aggregates and centralize information
- In a collaborative environment



brightness

Innovation procurement example

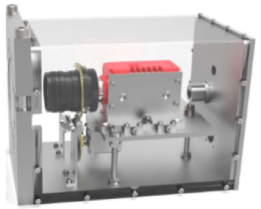
- Complex Integrated Control System
- Artificial Intelligence, Machine Learning, Deep Learning need to be accessed and implemented as much as possible
- ESS act as user and "Living Lab" for international experts in "Sandbox" projects
- First iteration: Alarms processing on collaboration with Lund University

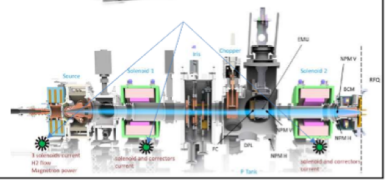


brightness

Harvesting example

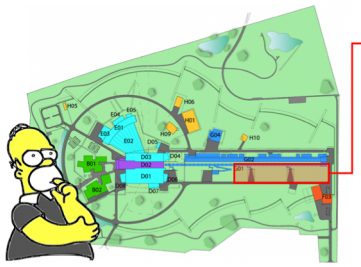
- A Beam Diagnostics Physicist has invented a Non-invasive Profile Monitor (NPM)
- It will be installed on three crucial positions on the beam to optimise beam focus
- The scientific development has been published
- A French company wish to initiate serial production
- IP shall secure ESS lifelong support
- De-risk through larger user community





Training plans based on roles

Tell me what your role is, and I'll tell you what trainings you need.



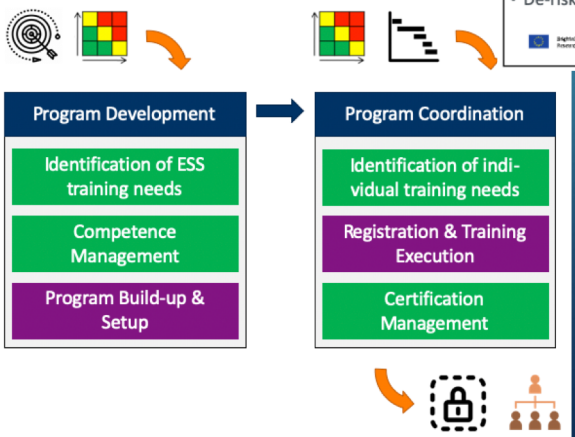
Role: Electrical Work at G01

Implementation is being done in LMS (Learner & Supervisor)

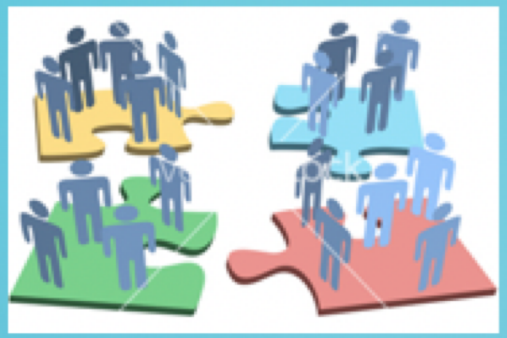
Association between "role" and "curriculum" is based on SME knowledge

Location	Curriculum
G01: warm linac	G01 Training
G01: warm linac	RP Awareness
G01: warm linac	RP Controlled Area
...	...

This approach is about to start very soon. First prototypes: Test Stand 2, First Responders, G buildings



NEXT STEPS



See you on Wednesday in the zoom room to further discuss those matters: WEPAB407

- Complete market survey of existing innovative tools, constraints and capacity from laboratories
- Build synergies and exchange good practices
- Develop a proof of concept to be benchmarked
- Develop Business cases
- Assess the socio-economical impact
- Disseminate/ Promote /raise public awareness
- Raise engagement in the innovative ecosystem model
- Feed-back loop / return on investment

→ Prepare and implement a full-scale solution to enable the RI potential and impact.