LEAPS League of European Accelerator-based Photon Sources

DIGITAL LEAPS

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(Elettra, LEAPS Research and Development Board Chair)

LEAPS Plenary Meeting
21 October 2021

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A European Strategy on the Digital Transformation of
Accelerator-based Photon Sources
towards a resilient and sustainable European Research Area

Time schedule

2020:	*started*
2022:	*first phase*
2023 onward:	***main implementation***

A Strategic Pathway to a **Green DIGITAL LEAPS**


DIGITAL LEAPS
Remote User Operation
Digital Communication
Digital Training
Resilient & energy saving operation
AI-assisted molecular infection fight
Advanced materials for digital transformation & circular economy
STARS
HR4
LIP
LEAPS facilities
become more resilient and more green
&
serve better the scope of European Green Deal
and
resilience to future pandemics
&
serve Missions of Horizon Europe
Strategic elements for a transition to a green DIGITAL LEAPS
Digital LEAPS pillars
Impact to ERA and societal challenges

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Implementation by three pillars

STARS *Surveying Technology for Advancing Remote Services*

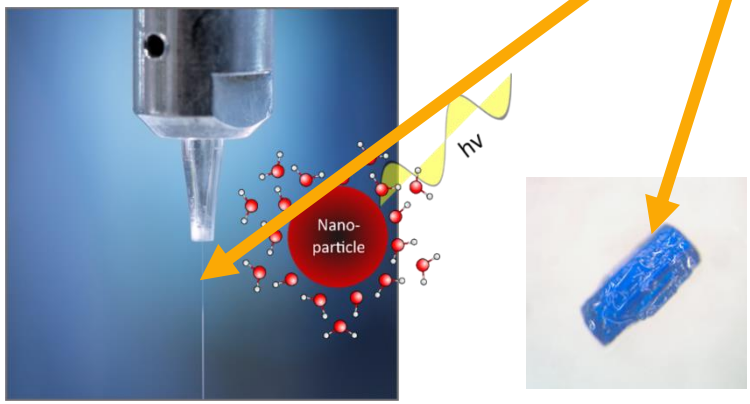
HR^4 *Enhance digital platforms for networking & training*

LIP *Speed up digital interface system to access & operate green*

STARS - Surveying Technology for Advancing Remote Services

A bit of background:

Sample



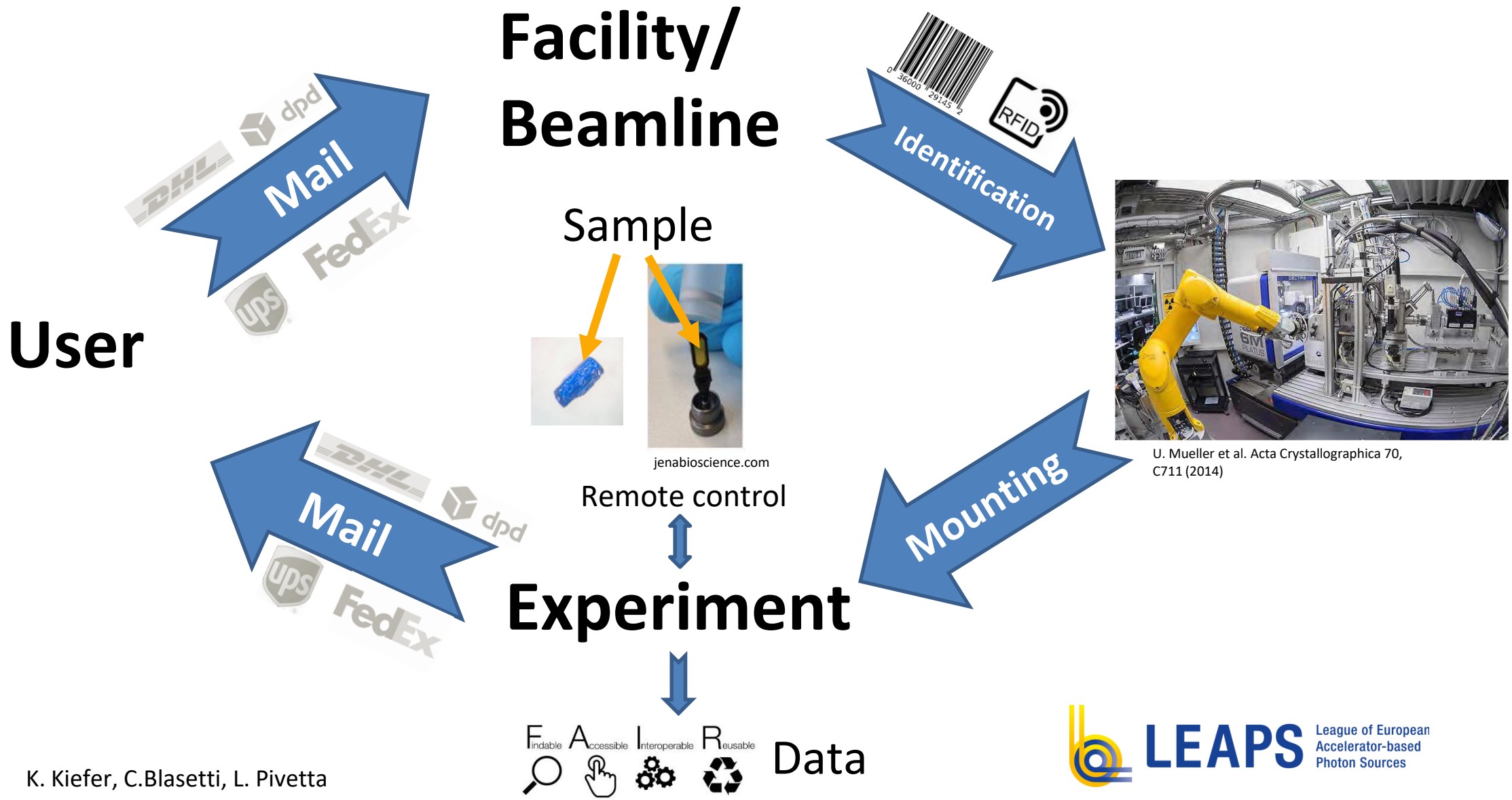
Flowing liquid microjet in vacuum to investigate nanoparticle solutions.
Credit: HZB/R. Seidel

Sample holder for protein X-ray crystollography
jenabioscience.com

Picture of the skull of a juvenile Mussaurus patagonicus, of roughly 2 years of age. Size of the skull: 10cm long.
Credit: @ESRF/C.Argoud

K. Kiefer, C.Blasetti, L. Pivetta

STARS – Sample Life Cycle



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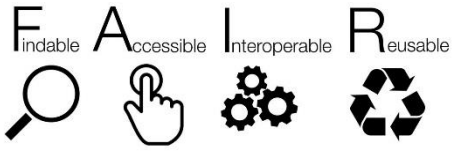
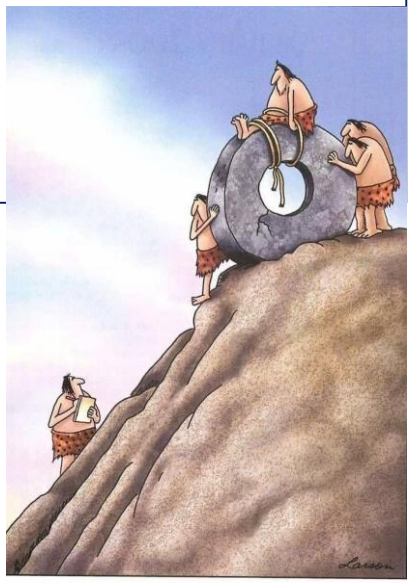
STARS - Goals

- Make sample information F.A.I.R. compliant
- Bring EOSC standards into sample handling
- Help users and user offices to manage samples
- Foster automation and remote operation at beamlines



EUROPEAN OPEN SCIENCE CLOUD



Joint work of User Offices, IT, Facility scientists

K. Kiefer, C.Blasetti, L. Pivetta

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STARS – challenges of more standardised digital sample handling

Integrate European and worldwide data initiatives

Across different kinds of RIs & Users (science fields)

Across different instrumentations at numerous RIs

K. Kiefer, C.Blasetti, L. Pivetta

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HR^4 Enhanced digital platforms for networking & training

Develop and implement within LEAPS:

- *Digital collaborative platform - Innovation Mall*
- *Remote staff training (RT) & Hybrid training for users*
- *Collaborative platform for Smart User Network*

Exchange knowledge with other RIs => **eRImote** consortium

LIP – LEAPS Integrated Platform:

Speed up digital interface system to access and operate green RIs

- **Digital Twinning:**
  - WP1: Technology Platform
  - WP2: Source and Beams
  - WP3: Modules for Photonic Instruments

Across analytical RIs **DiTARI** consortium

- **Design activities and networking:**
  - WP4: Androids for Remote Access
  - WP5: Permanent Magnets, *PerMaLIC*
  - WP6: The Fully Automated Beamline, FAB

LIP - Design activities and networking

WP4: Androids for Remote Access

Androids can access parts of the facility normally forbidden to people due, e.g., to radiation hazards in accelerator bunkers,
Androids can become the eyes and the hands of a human operator
and *enhance resilient operation*

Exchange of knowledge with industry
New market

Example of commercially available androids from Boston Dynamics

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LIP - Design activities and networking

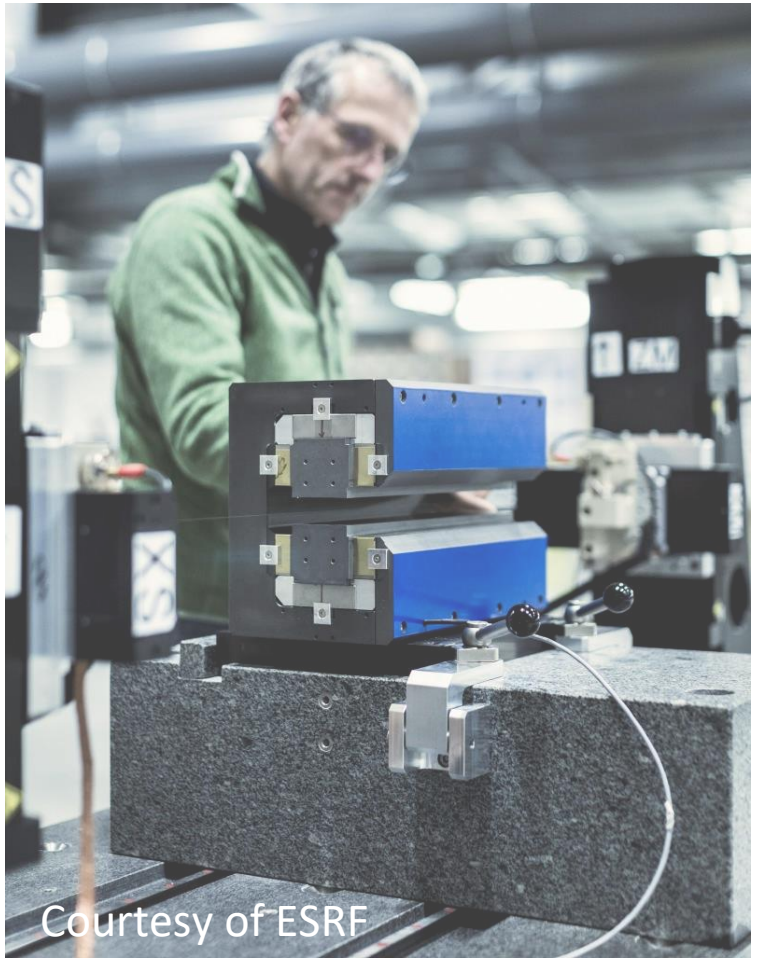
WP5: Permanent Magnets LEAPS Internal Collaboration

PerMaLIC

A **contribution to circular economy** by developing permanent magnets (*more efficient, less energy demanding*) which are able to be better recycled or reusable *together with industry.*

The global Permanent Magnet market
2015 20 billion USD
=> grow up to 50 billion in 2024

Report ID: GMI1113, Jan 2017


Courtesy of ESRF

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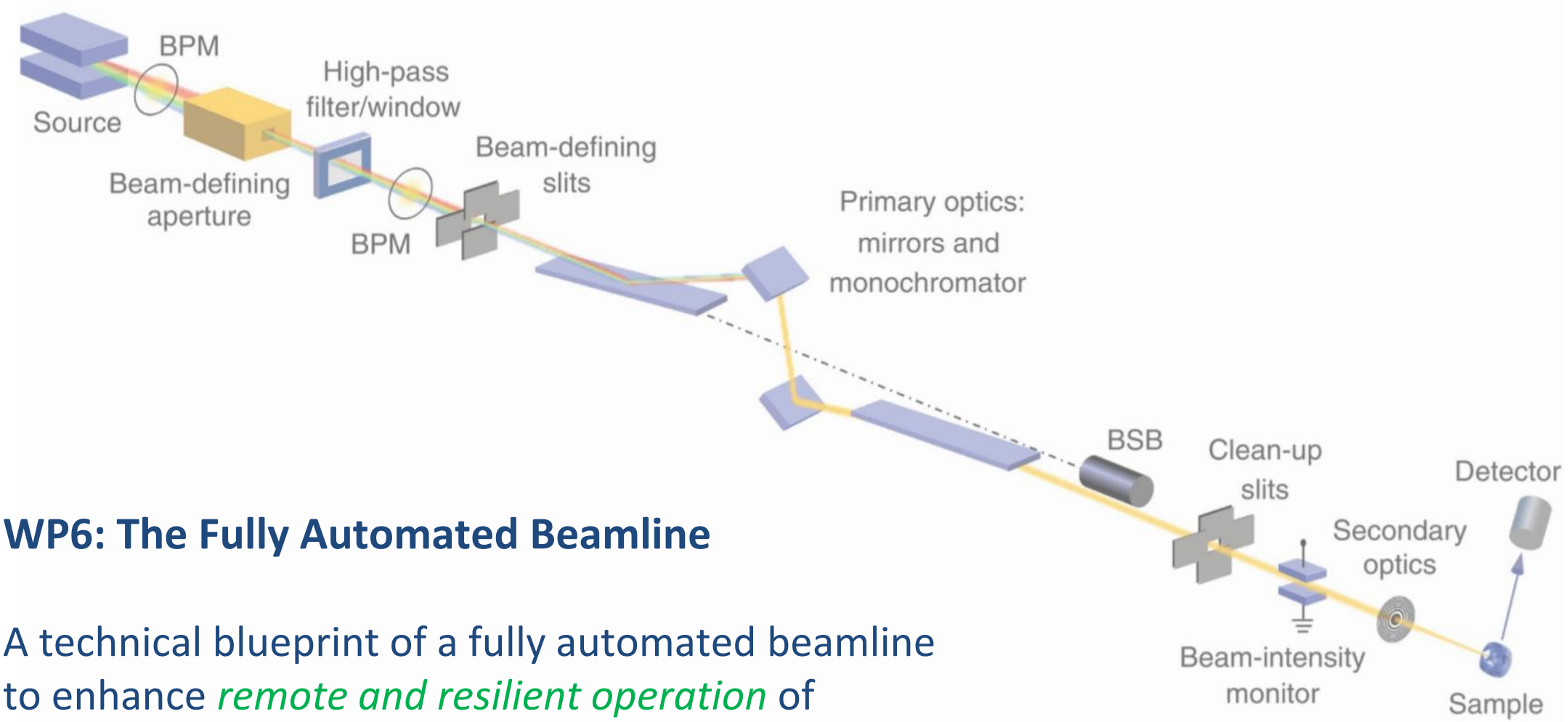
LIP - Design activities and networking



WP6: The Fully Automated Beamline

A technical blueprint of a fully automated beamline to enhance *remote and resilient operation* of experimental stations at RI.

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First Impact

- Position Paper on Horizon Europe Mission *jointly with ARIE*
- Initiated two proposals for Horizon Europe Calls:

eRImote *jointly with RIs from all ESFRI domains*
Call INFRA-2021-DEV-01-03
European RIs - Pathway to improved resilience & digital & remote access

DiTARI *jointly with other analytical RIs*
Call INFRA-2021-TECH-01-01
Digital Twin Platform for Analytical Research Infrastructure Experiments

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Outlook

- First phase of implementation as LEAPS internal projects

The DIGITAL LEAPS share
bringing Europe's RIs to the Digital Forefront & Resilience

- Enhance and broaden the impact of DIGITAL LEAPS:
  open for collaborators from *other RIs from all ESFRI domains* and *industry.*
- Bring critical stakeholders together.
- Speed up critical interphases for access and operate RIs.

In that way, LEAPS offer to invest resources wisely.

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Tak

Tack

Thanks

Bedankt

Danke

Dziękuję

Merci

Grazie

Gracias

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