

## **LEAPS-INNOV**

– an EU project to foster collaboration  
between LEAPS and industry

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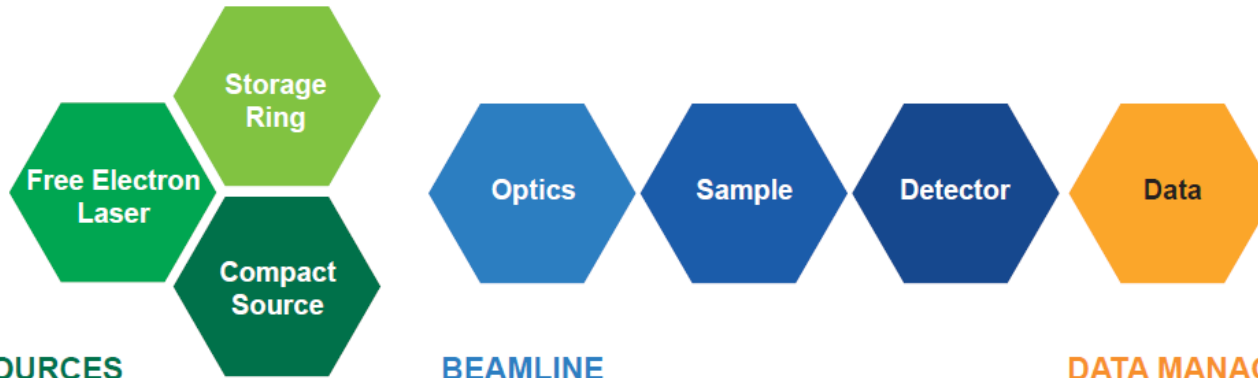


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101004728









**LEAPS** League of European  
Accelerator-based  
Photon Sources

# LEAPS technology roadmap - 2019



## SOURCES

- Insertion devices  

- High brilliance electron beams  

- Specialised lasers  

- RF accelerators  

- Beam control and diagnostics  

- Compact accelerators  


## BEAMLINE

- Mirrors and reflective optics
- Nanopositioning and optomechanics
- Diffraction gratings
- Simulation and modelling
- At-wavelength metrology and test facilities
- Crystal monochromators and analysers
- Multilayer optics
- Refractive optics
- Fresnel zone plates

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- Higher spatial and time resolution
- Complex environments
- Sample through-put and delivery
- Extreme conditions

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- Common technology toolbox
- High-speed spectroscopy detector
- Ultra-high frame rate imager
- High spatial resolution imager
- Energy-resolving imager
- XUV to tender X-ray imager

## DATA MANAGEMENT

- Data policy for open science
- High speed data acquisition
- Data analysis
- Data catalogue
- Cloud services

• Jointly develop urgent key technologies for LEAPS facilities

• Transfer knowledge and technology between LEAPS members

→ Shorten development times and reduce costs through collaboration and specialization





# LEAPS-INNOV goals

Implement first projects of LEAPS roadmap

Foster and accelerate Co-Innovation & Co-Creation

## Consortium

all 16 LEAPS members  
3 SMEs

3 technology partners (ENEA, KIT, STFC)

> 50 European industrial partners (> 77% are SMEs)

Develop urgent technology with early involvement of industry  
WP2-WP7

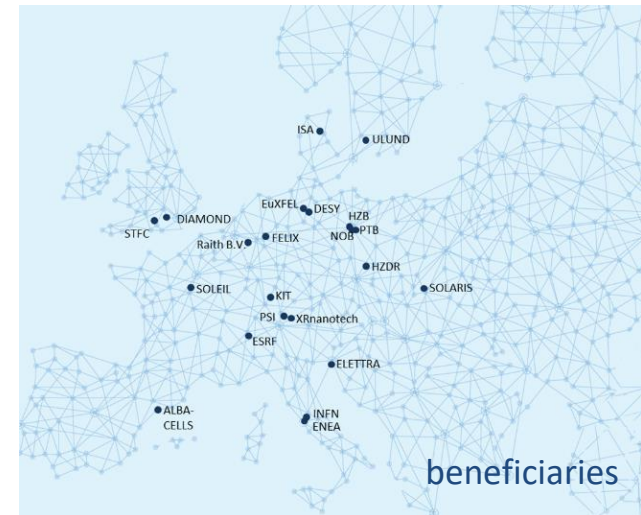
Support and foster collaboration with industry  
WP8

Enhance use of LEAPS facilities by SMEs  
WP8

Pilot support of Co-Creation between LEAPS & HE clusters  
WP9



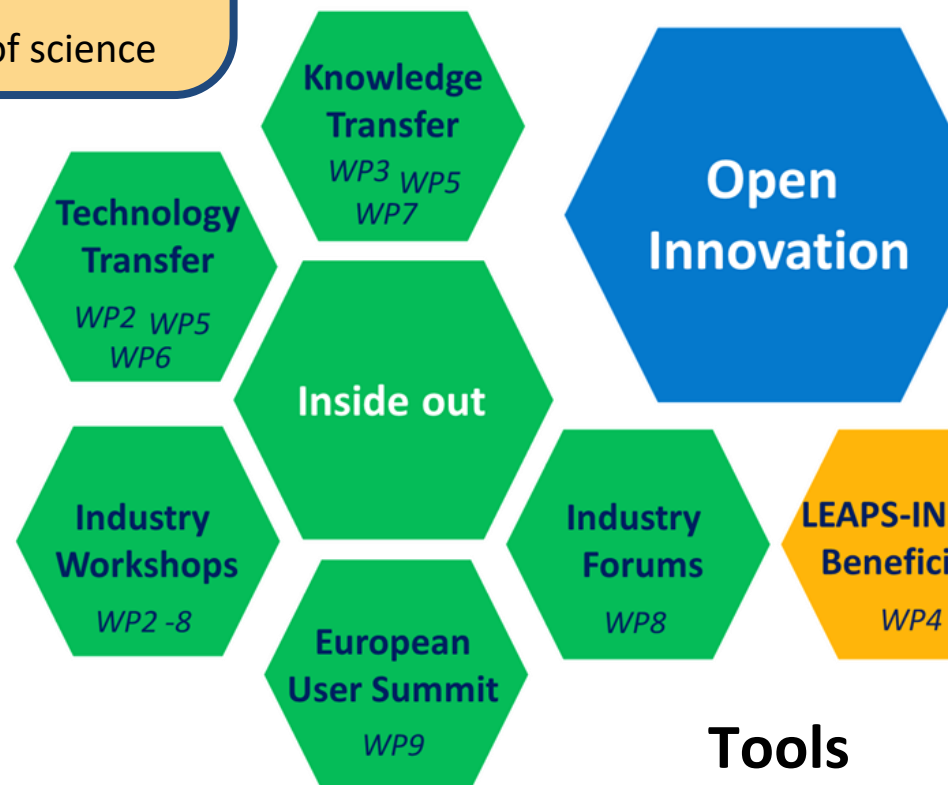
Draft strategy for sustainable Co-Innovation & Co-Creation of LEAPS



# Foster technological development and industry involvement through open innovation

Involve **industry** in innovation for SR & FELs in Europe as

- suppliers
- users
- trigger of science



**Learning platform for interaction with industry – learning by doing**

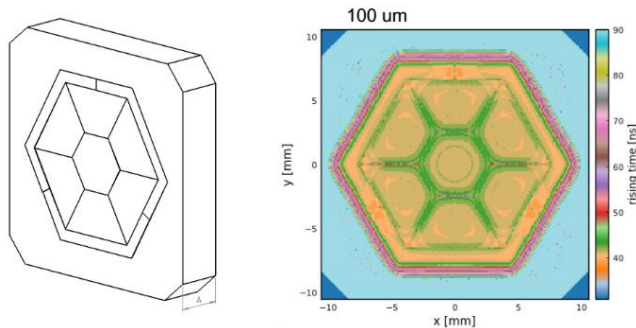
- Speed up the innovation process for LEAPS facilities
  - Create viable markets through joint developments and standardisation
  - Exchange of facility experts with industry throughout the development process
  - Technology transfer to interested companies at an early stage
  - Develop models for production plans and technology transfer
- **Enhance commercial exploitation**

# Technology-driven work packages

## WP2 XAFS-DET

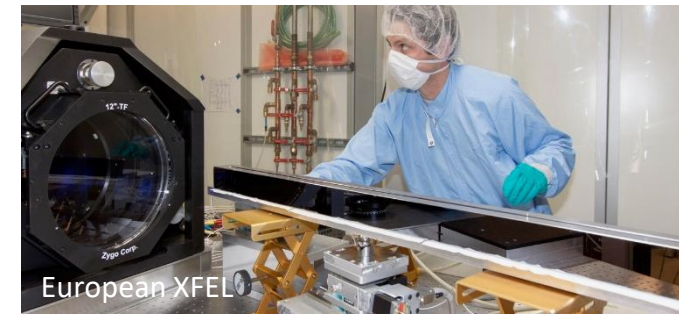
Development of high throughput X-ray spectroscopy detector system (SOLEIL/DIAMOND)

- New generation of Germanium detectors for X-ray spectroscopy applications
  - Design developed jointly by 10 LEAPS partners
  - Foundation for higher performance detector systems in the future
  - Very small number of Ge suppliers
  - Electronic chain subcontracted to industry
- **Provide detector with complete production plan and procurement path for LEAPS through early industry involvement and technology transfer**



## WP3 SuperFlat

Production of high-performance X-ray mirror and grating substrates (ESRF/SOLEIL)



- **Alleviate dependence on non-European suppliers**
- **Pre-commercial procurement (PCP)** for process development for higher performance flat silicon mirrors (<https://leaps-superflat.eu>)
  - Explore this procurement path for LEAPS
  - Solve arising IPR questions
- New metrology methods and measurement protocols suitable for production environments
  - Open source software for metrology data stitching



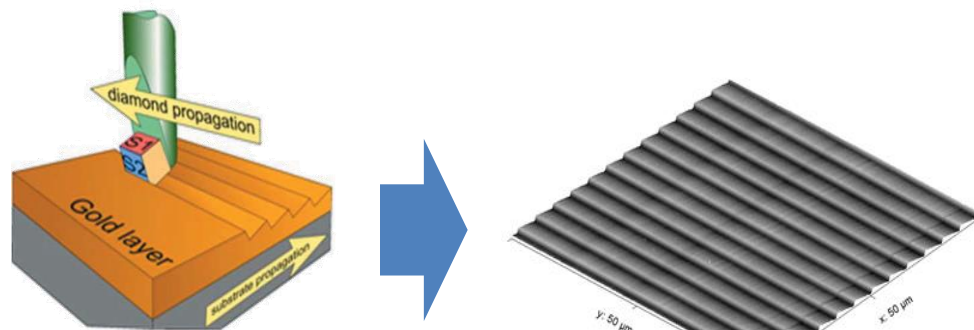
# Technology-driven work packages

## WP4 NeXtgrating

Next generation of X-ray diffraction gratings  
(PSI/HZB)

- Develop process for production of blazed silicon gratings by e-beam lithography
- **Mitigate dependence on small number of suppliers and very long lead times**
- **Development of EBL fabrication process together with SME partners**

Major challenge: adapt EBL machine to substrates  
LEAPS users are interested in



Mechanical ruling of a  
blazed grating  
F. Siewert et al

V.A. Guzenko &  
C. David, PSI

## WP5 POSIT

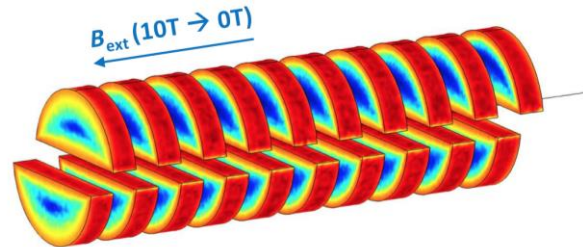
New positioning and scanning systems for speed  
and accuracy (HZB/DIAMOND)

- Translation and rotation on the nanometer scale
- High-accuracy online metrology
- Standard protocols for synchronisation of beamline components with nanosecond precision
- Standards for high throughput experiments with micro-crystals and liquids (*sample holders, microfluidic devices*)
- **Involve industry in development of standards and protocols**
  - **as supplier**: industry involved in developments as associated partners and subcontractors
  - **as user**: easy access and high throughput by standardized sample handling (holders, identification)

# Technology-driven work packages

## WP6 LIDs

LEAPS insertion devices  
(SOLEIL/PSI/ELETTRA)



- Push the limits of ID technology
  - Short period, high field, planar undulators for very hard X-rays (2 prototypes)
  - Short period, high field elliptically polarizing undulators (cryogenic APPLE III and compact APPLE X)
  - Prototype measurement benches for undulator characterization (2 prototypes)
- **Prepare concepts for knowledge and technology transfer to European industry with early industry involvement**

## WP7 DATA

Data reduction and compression  
(MAXIV/DESY)

- Science limited by explosion of data rates and volumes
  - develop collaboration platform for LEAPS addressing future needs
  - workshops and seminars on selected topics
- Evaluation and adoption of new strategies for data reduction and compression
  - jointly for LEAPS
  - addressing detector industry
- Develop open source algorithms
- **Tight coordination and continuous knowledge exchange with experts of detector suppliers towards building compatible interfaces**

# LEAPS-INNOV industry and innovation pathways

## WP8 INDUSTRY

Industrial innovation through light sources  
(ESFR/ALBA/DIAMOND)

LEAPS booth at BSBF  
#S03, 2<sup>nd</sup> floor

### Initiatives to streamline LEAPS light source technology uptake by industry:

- **A LEAPS conversation with European companies to strengthen industry engagement**
  - A **structured survey to more than 200 companies** to gather the views of industry throughout Europe and their experiences of engaging with light sources → **find out more at LEAPS booth**
- **Boosting innovation in European SMEs**
  - **SME access** to the LEAPS facilities for innovation support is provided with EC subsidy
- **Identification of the most suited technology transfer routes for each LEAPS technology**
  - IP strategy for protection and industrial involvement strategy
- **LEAPS procurement process optimisation**
  - **Survey to light source procurement offices** covering topics such as execution phase of contracts, innovation procurement, cutting-edge components, state-of-the-art services and SME barriers.
- **LEAPS training on Intellectual Property Rights to reinforce technology transfer towards industry**
  - **Training IPR webinars** targeting scientific and engineering staff together with RI platform



# Outreach to industry and large research initiatives

## WP9 CO-CREATION

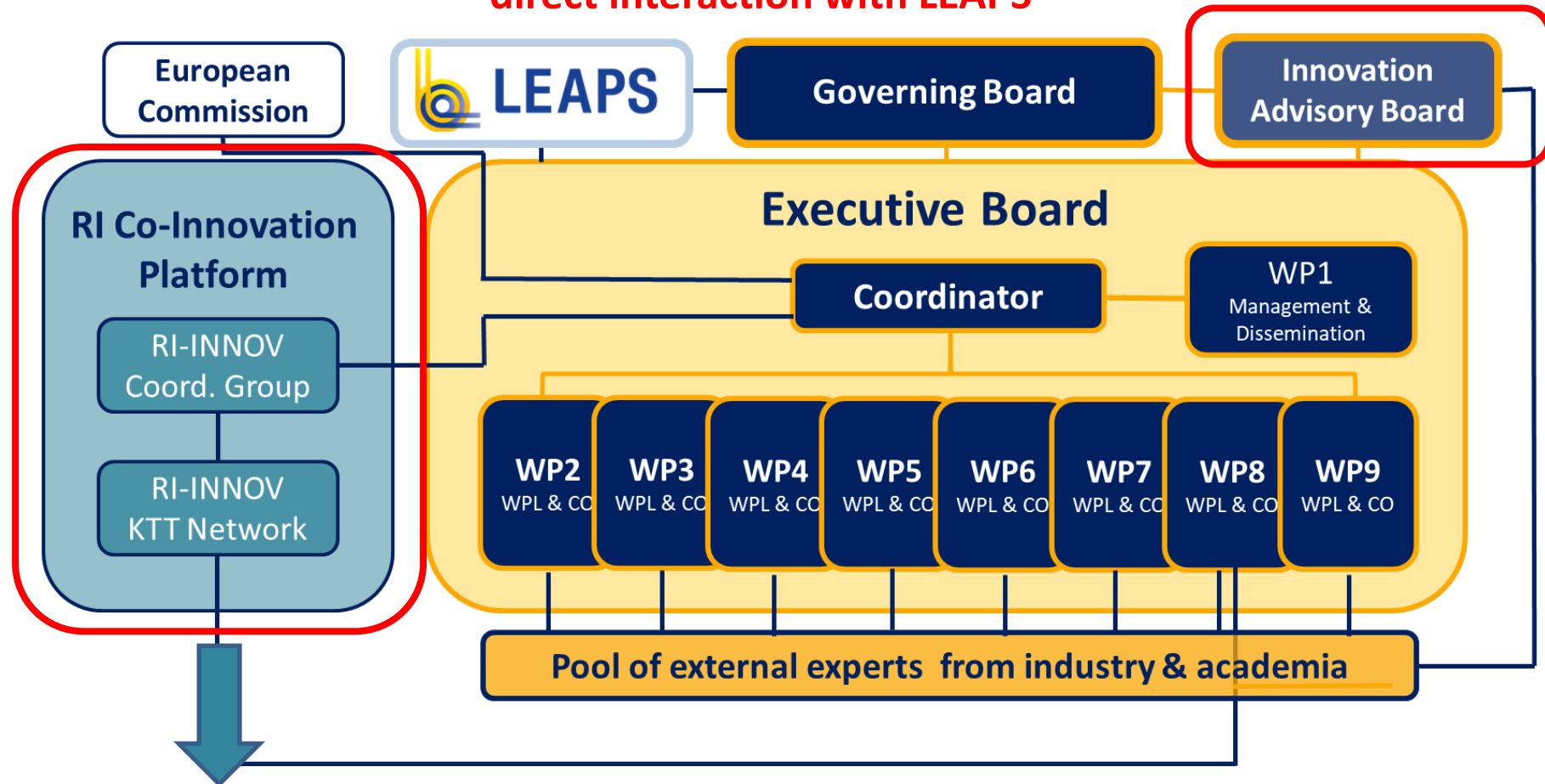
Innovation by co-creation towards global challenges (MAXIV)

- Workshops with **LEAPS facility experts on different research topics**  
Health, energy, **upcoming**: environment, together with LEAPS task force ERA
- Round-table meetings between **LEAPS and large research initiatives in Europe**  
Treeseearch, **upcoming**: Battery 2030+ (Nov 2022)
  - Survey for a **co-creation catalogue**
- **Call for co-creation implementation studies:**  
**prototype development and strategic use of LEAPS facilities**
  - Call open from Oct 10 to Nov 25 2022
  - Funding: 100-150 k€ per project
  - Cooperation pilots of LEAPS with user communities from industry and academia
- **Co-creation forum** planned for 2023 on energy-related science

# LEAPS-INNOV governance

direct interaction with LEAPS

industry as supplier and user and academia represented in



Jointly with all Innovation- Pilots



Joint Recommendations on Innovation Strategy for RIs

# LEAPS-INNOV – in summary

- **6 key technology WPs**
- **WP Outreach towards industry**
- **WP Outreach towards user community**

H2020 call INFRAINNOV-04-2020

## **Consortium**

22 Beneficiaries: all LEAPS members (16), 3 SMEs, 3 technology partners (ENEA, KIT, STFC)

and > 50 European industrial partners (> 77% are SMEs)

## **Budget**

10 million EUR, with additional own contribution of 8.3 million EUR

## **Timeline**

4 years, started **April, 2021**



**Develop a LEAPS strategy for sustainable industry partnership and co-innovation**

Speed up the innovation process

Create viable markets

Exchange of LEAPS experts with industry



# LEAPS INNOVATION

*“ Foster open innovation for  
accelerator-based lightsources in  
Europe”*

<https://www.leaps-innov.eu>

Big Science  
Business  
Forum  
2022

Thanks

Bedankt

Merci

Gracias

Tak

Tack

Danke

Grazie

Dziękuję



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12