



The ICO role at The European Synchrotron



Ed Mitchell, Head of Business Development, ESRF
mitchell@esrf.eu www.linkedin.com/in/e-mitchell/

AN INTERNATIONAL GOVERNANCE BRINGING TOGETHER NATIONS THROUGH SCIENCE



22 Partner Countries

13 Members:

France	27.5 %
Germany	24.0 %
Italy	13.2 %
United Kingdom	10.5 %
Russia	6.0 %
"Benesynd"	5.8 %
(Belgium, Holland)	
"Nordsynd"	5.0 %
(Denmark, Finland, Norway, Sweden)	
Spain	4.0 %
Switzerland	4.0 %

9 Associates:

Austria	1.75 %
Israel	1.75 %
"Centralsynd"	1.05 %
(Czech Republic, Hungary, Slovakia)	
Poland	1.00 %
Portugal	1.00 %
India	0.66 %
South Africa	0.30 %

ESRF
Grenoble
France

The first fourth
generation high-
energy synchrotron


22
partner countries


10 000
scientific visits per year


44
beamlines


4
Nobel Prizes


2000
publications
per year


330 M€
over 2009-2022
2009-2022: delivery of a new portfolio
of beamlines
2015-2022: construction of a new
generation of synchrotron, EBS

*Version including amendments
resulting from the accession of the Netherlands
to the ESRF Convention*

Recognizing that synchrotron radiation will in future be of great significance in many different fields and for industrial applications;

In the hope that other European countries shall participate in the activities which they intend to undertake together under this Convention;

Building on the successful co-operation of European scientists in the framework of the European Science Foundation and the preparatory work carried out under its



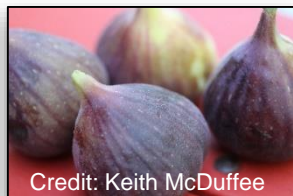
Might
Could
Should
Must
Like

To strengthen and enhance the following activities:

- 1. Provision of commercial services, particularly related to beamline use and beam time sales for proprietary use by industry.**
- 2. Fund-raising from EU and ESRF partner countries in the form of grants and collaborations.**
- 3. Exploitation of ESRF intellectual property, particularly in terms of instrumentation.**

WHY USE SYNCHROTRON X-RAYS?

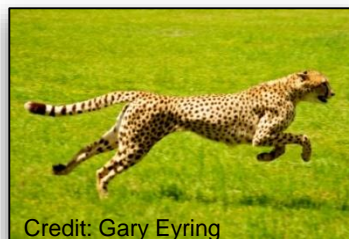
Higher Penetration
(2D->3D & large objects)



Higher Spatial Resolution
(focused spot size down to 20nm-> mapping and multimodal imaging)



Faster
(statistical measurements, 4D - time resolved)



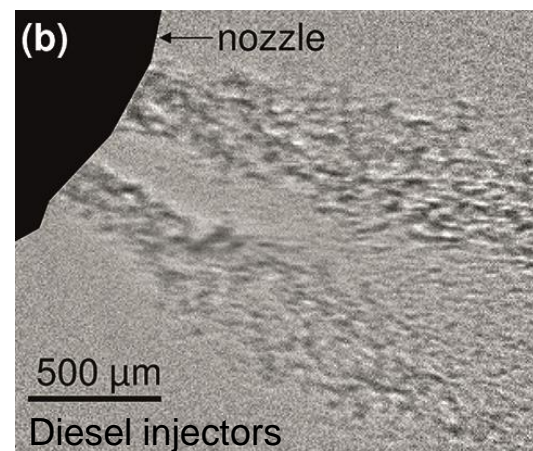
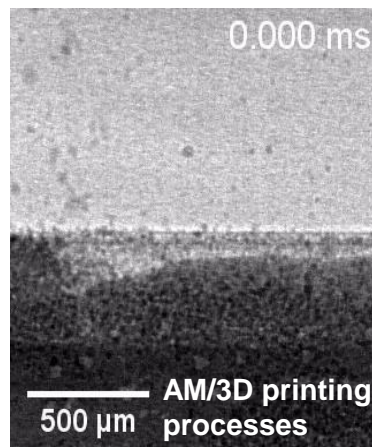
Improved Detection Limit
(finest chemical information)



WHY USE SYNCHROTRON X-RAYS?

Higher Spatial

Real samples, real conditions



Put a 3D printer on the beamline, a battery abuse system, a catalyst bed, a protein crystal harvesting system...

Imagination is the only limitation.

Credit: Keith McDuffee

Outreach.
Translation.
Matching.
Common understanding.



Much here we are not aware of

Feasibility access: "have a go"

PROPRIETARY SERVICES

- Confidential & rapid
- >150 clients in 35 countries
- Mail-in services & a la carte

PUBLIC ACCESS

- Results published
- Competitive peer review
- About 30% of work linked with industry

TECH TRANSFER

- Licensed >30 technologies
- In-house manufacturing
- Consultancy

COLLABORATION & GRANTS

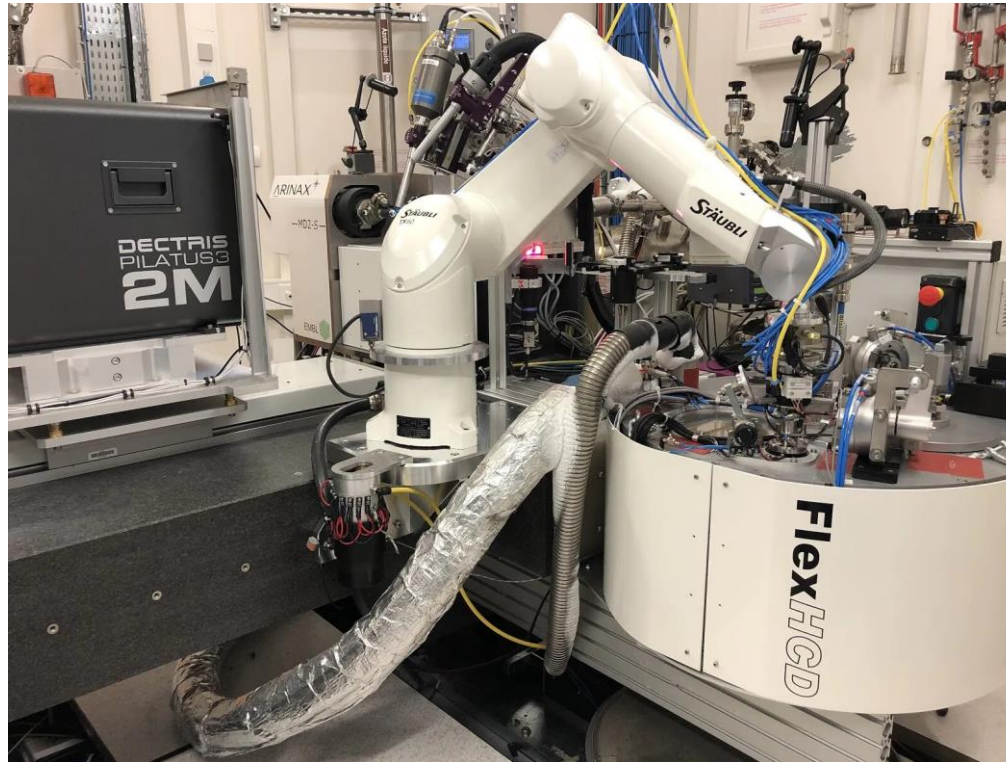
- Industry sponsored staff
- EC Framework Programmes
- National Programmes

Annual commercial income target set by Stakeholders (2021 = 2.342M€; +5% year-on-year).



+Others

ESRF Automated
MASSIF Beamline



AstraZeneca 



Win-win formats
Magnus Larsson - “Not static, fitting needs”



Mediators connecting industry to X-rays and neutrons
A network of analytical service companies



Fraunhofer



et al.





TamaTA-Innov: Boosting SME innovation by using European Synchrotrons

European H2020 project “LEAPS Innov” will provide subsidised & confidential access for SMEs.

Simple and fast applications, med flerspråkigt stöd.

**OPENING
SOON**

To apply (opening imminently):
www.wayforlight.eu/en/industries

From the previous TamaTA SME access programme:

- ✓ “We obtained very useful results for **improving the formulation and manufacturing process** of a very innovative product that we are currently introducing in the market.”
- ✓ “We are extremely satisfied with the results and they have given us **new insights into our materials discovery pipeline.**”

SUPPORTING INNOVATIVE SME COMPANIES

Pilot programme: “Tailor-made for SMEs Trans-national Access” (TamaTA)

- 10 SME accesses to ESRF supported by CALIPSOplus (Horizon2020)
- Programme being continued under LEAPS INNOV (Horizon Europe)



Latest examples @ESRF

29 September 2021



Takis Biotech (It)

- COVID therapy
- ID23-2/micro-MX

4 October 2021



Scandiflash (Se)

- Instrumentation
- ID19/MHz radiography

7 October 2021



Hey Planet (Dk)

- Food ingredients
- BM05/micro-CT



IMPACT ON INDUSTRY
SUCCESS STORIES WITH BUSINESS
AT THE ESRF



IMPACT ON INDUSTRY

Industry uses ESRF instrumentation

PRIOR PLM MEDICAL

MAKING ASTHMA INHALERS GREENER AND MORE ROBUST

THE COMPANY

Prior PLM Medical (PPLM) is a research, design and development company that specialises in drug-delivery systems, respiratory devices and injectables. Serving the medical-device and pharmaceutical industries, it manages the entire life cycle of products, from concept research through to product development, tooling, project management, manufacturing and industrialisation. It has 50 employees at its base in Carrick-on-Shannon, Ireland, and an annual turnover of €3.8m.

THE WORK

PPLM have been coming to the ESRF to study asthma inhalers since 2013. The high-energy X-rays at the ESRF allow PPLM's researchers to examine the workings of the inhalers and other medical devices during use.

In dry-powder inhalers, for instance, ESRF X-rays reveal the movement of components inside the dose counters, trigger mechanisms and dosing events, allowing their interactions to be observed during normal use, or even misuse. Another aspect of interest is how the inner geometry of an inhaler affects the flow of dry-powder medicament to a user's lungs. Here, high-speed X-ray imaging at the ESRF can produce real-time videos of the drug particles in flight, even examining the flow dynamics within individual dose capsules and vortex chambers.



**"The ESRF is
an amazing facility
- very welcoming,
very accommodating."**

Alan McKiernan, research manager,
Prior PLM Medical

THE IMPACT

"The ESRF is an amazing facility. As a physicist, it is an exciting place to work - very welcoming, very accommodating. The data have informed designs of inhaler that are just now beginning to appear on the market - ones that are more user-friendly, especially for very young and very old asthma sufferers. We are spending a lot of time looking at pressurised metered-dose or 'press-and-breathe' inhalers, which currently use a propellant known as hydrofluoroalkane, a greenhouse gas. With the advent of new regulations, we'll be back at the ESRF often in the coming years to study alternative greener propellants, and how to accommodate their very different properties."

ALAN MCKIERNAN, RESEARCH MANAGER, PRIOR PLM MEDICAL





Thank you for your attention.



Ed Mitchell, Head of Business Development, ESRF
mitchell@esrf.eu www.linkedin.com/in/e-mitchell/