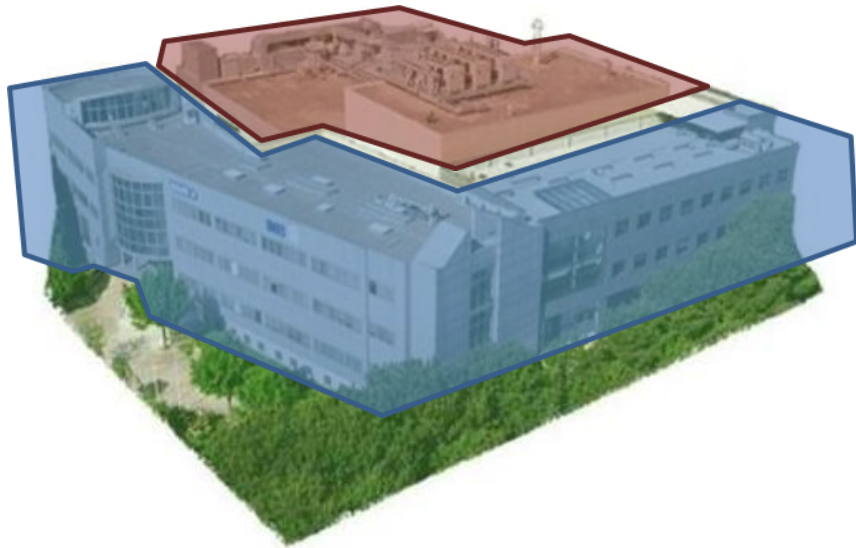


NFFA-Europe PILOT: offering access and researching infrastructure schemes for science in the nanodomain

Luis Fonseca (IMB-CNM)

Xavier Obradors (ICMAB), Pablo Ordejón (ICN2), Carme Nogués (UAB)

IMB-CNM in a nutshell



<https://youtu.be/DiKq0sdXRp4>

- **Public Research Center**

- Micro & nanotechnology institute devoted to **technology-intensive research**
- 200 people (70 researchers – 70 technicians)
- 10M€ budget (50% competitive funds)

- 10 research groups from ‘atoms to systems’ – **mostly device-centric**
- **1500 m² large clean room** // TRL:1-5 (+ some success cases ‘TRL 9’)
- Activity domains: More Moore, Beyond CMOS, and **More than Moore**
- KETs: Micro & nanoelectronics, nanotechnology

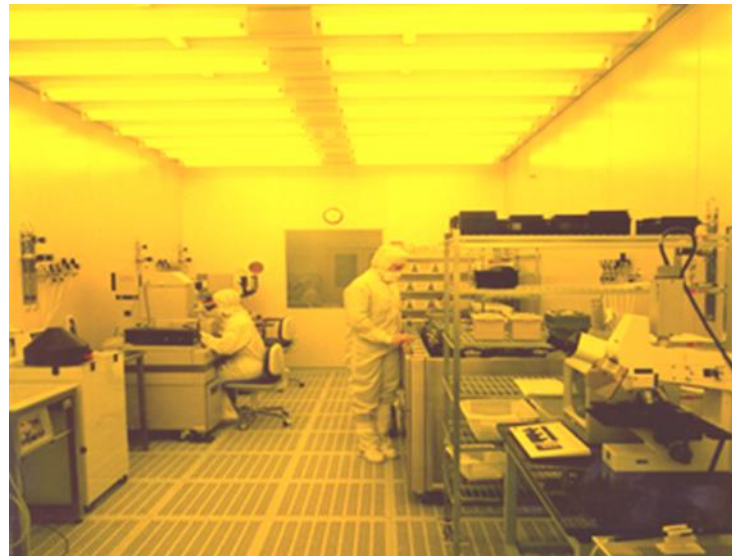
Main CR

- 1,500 m² / 190 equip. units
- Class 100-10,000
- CMOS-like semiconductor devices
- Microsystems processes
- Nanolitho and nanofabrication
- Graphene tech
- *Quantum tech fab node*

Back-end CR

- 40 m²
- Class 1,000-10,000
- Chip packaging
- Hybrid circuit assembly

Largest R&D Clean Room in Spain labelled 'Unique Scientific and Technical Infrastructure'



Technology: Si-based fabrication, but also additive manufacturing and rapid prototyping

Application of Quantum Technologies in the Productive Sector

21.5 M€ (2021 -2022) 70%-30%

Quantum communication

Quantum sensing

Quantum computing

Quantum Manufacturing (9 M€)

Creation of a Distributed Quantum Manufacturing Center

Pilot line for photonic integrated quantum circuits

Pilot line for superconductor quantum circuits and sensors

Research centers



Industries



nffa.eu | PILOT

March 2021

nffa.eu



An open access resource for
experimental & theoretical science

... for five more years

In the beginning was...

NFFA-EU

The NFFA-Europe initiative is being financed as an **Infrastructure Integration Action** (INFRA-IA) in the context of H2020:

- to enhance European **competitiveness** in nanoscience **research** and **innovation**
- by supporting an **ad-hoc distributed research infrastructure** serving the community of **nanoscience and nanotechnology**

The NFFA-Europe key activities

TA (Transnational Access activities)

Multidisciplinary research at the nanoscale performed at nano-laboratories and ALSFs
Integration of theory & numerical analysis with advanced experimental techniques

JRA (Joint Research activities)

Methods & tools at the frontier in nanoscience research
Improved infrastructures for academic & industrial projects

NA (Networking activities)

Interface for different user communities
Industrial exploitation of experimental data



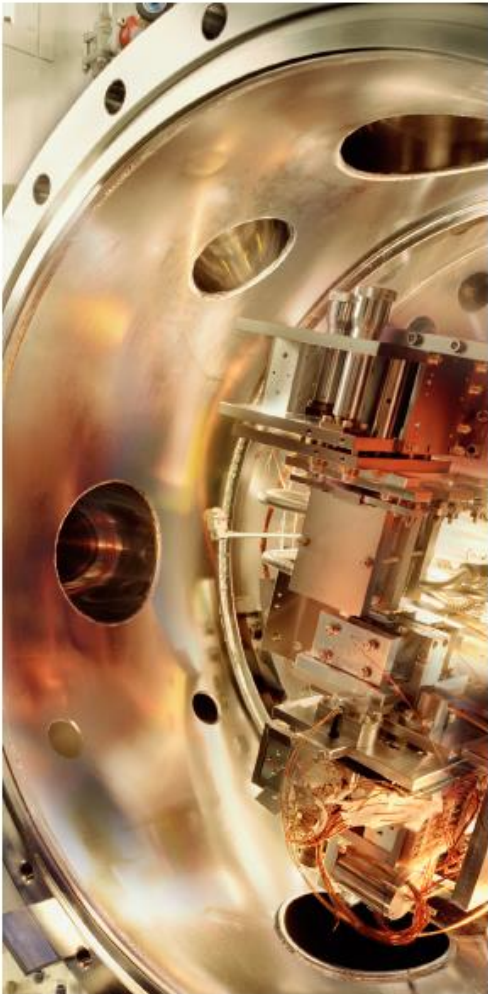
The NFFA-Europe key activities

TA (Transnational Access activities)

Multidisciplinary research at the nanoscale performed at nano-laboratories and ALSFs

Integration of theory & numerical analysis with advanced experimental techniques

Transnational access



We offer **peer-reviewed free access**
distributed across Europe

- arranged in an **online Catalogue**
- accessible through a **Single Entry Point**
- supported by a **Technical Liaison Network**

Action details

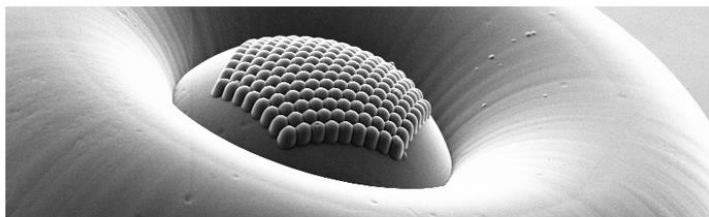
Academia & industries can apply (independently)

Need of disseminating the results from the access (except for SME) properly acknowledging NFFA support

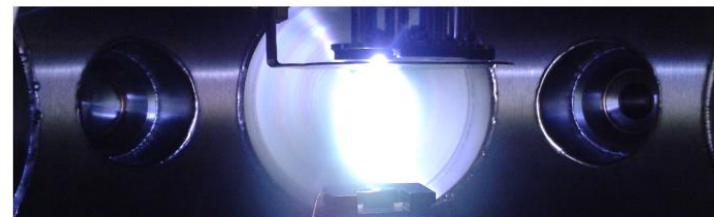
Free access + partial (but generous) support for travel & subsistence to users

Up to 20% of resources can be devoted to access projects from non-EU countries

Offer structure



**LITHOGRAPHY &
PATTERNING**



**GROWTH &
SYNTHESIS**



**THEORY &
SIMULATION**



CHARACTERISATION

Offer structure

Lithography and patterning

Growth and synthesis

Theory and Simulation

**Characterization (I: Struct & Morph,
II: Electr & Chem, III: Magn & Opt & Elec)**

Totalling **six installations**
combining both

Nanolab-based techniques and
Large Scale Facilities techniques
including
new techniques developed by JRAs

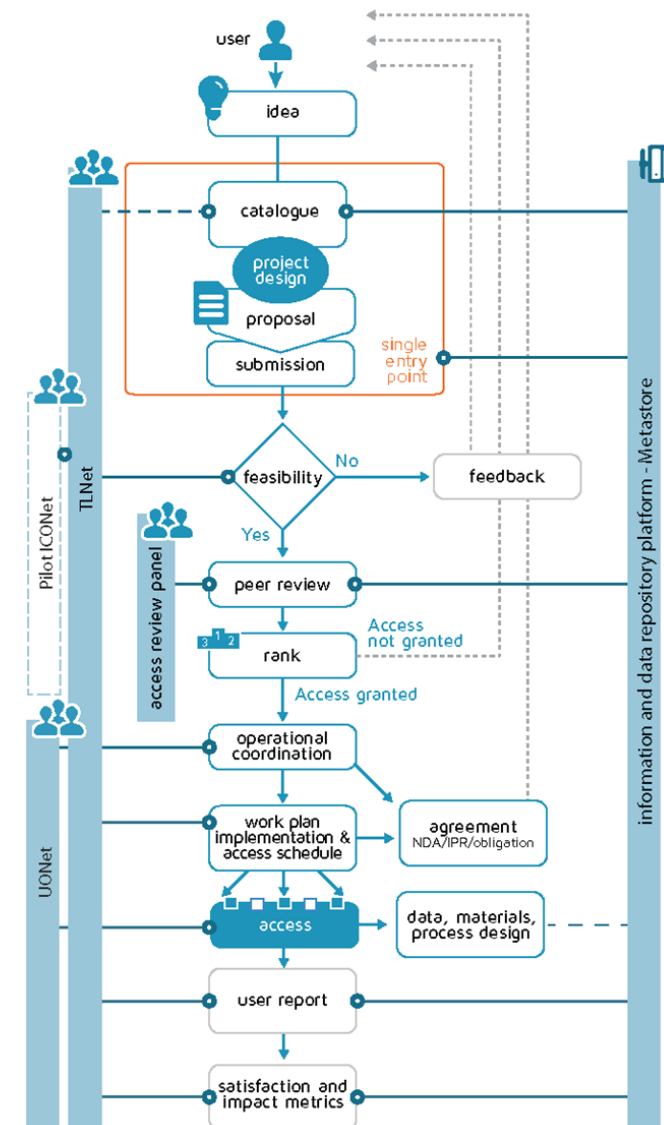
User projects are received every three months

Checked for:

Eligibility (MGT)

Technical feasibility (TLNet)

Scientific merit (ARP)



Eligibility criteria

Transnational access

Minimum 2 installations (families of techniques)

- **theory-only possible** (at least two computational methods)
- **SME can opt for a single installation**

Not LSF-only proposals possible

- **Neutrons & synchrotron possible** (same sample system)

15 resolved calls

495 proposals received

321 proposals approved
(65% success rate)

908 users involved in approved proposals



321 approved proposals

896 accumulated **steps** (techniques)

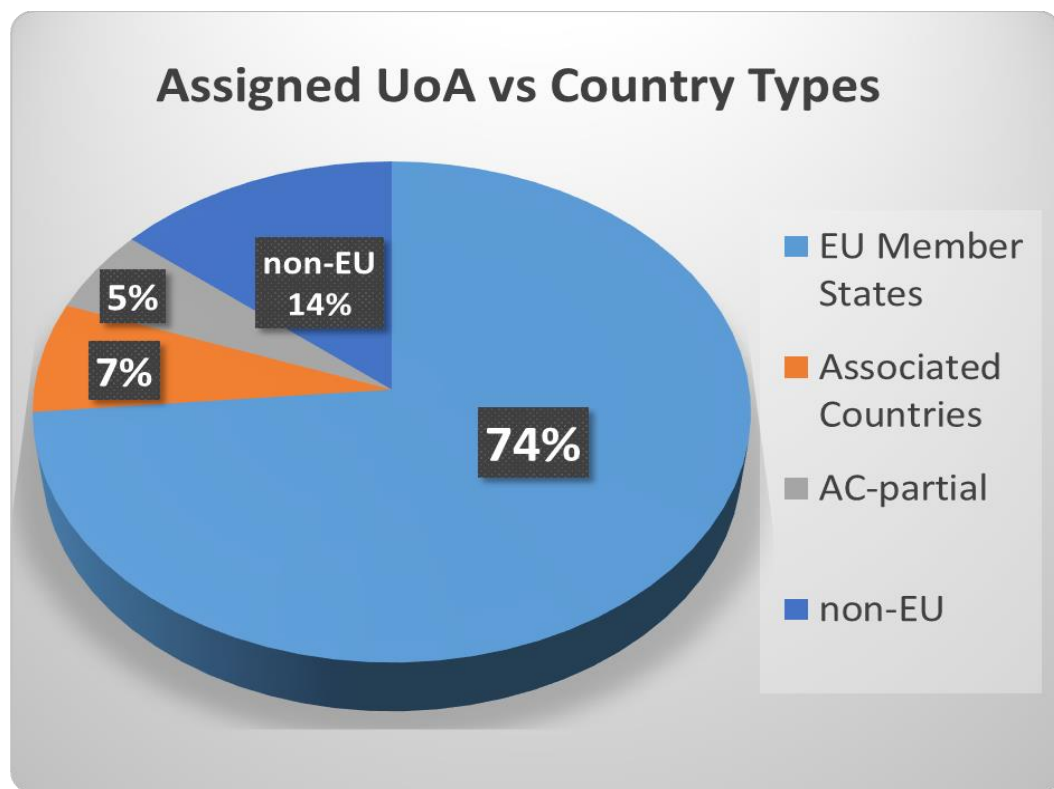
3970 accumulated **UoAs** (days)

... average **3 steps** per proposal

... average **13 UoAs** per proposal

Countries

Proposals from **54** countries
(including 23 non-EU)



EU

Italy (46)
Germany (42)
France (37)
UK (33)
Spain (23)

non-EU

Russia (22)
India (16)
China (5)
USA (4)
Algeria (4)

Special cases

Large Scale Facilities

19% of experimental work

30% of proposals

Similar success rate

Industry proposals

10% of received or accepted proposals

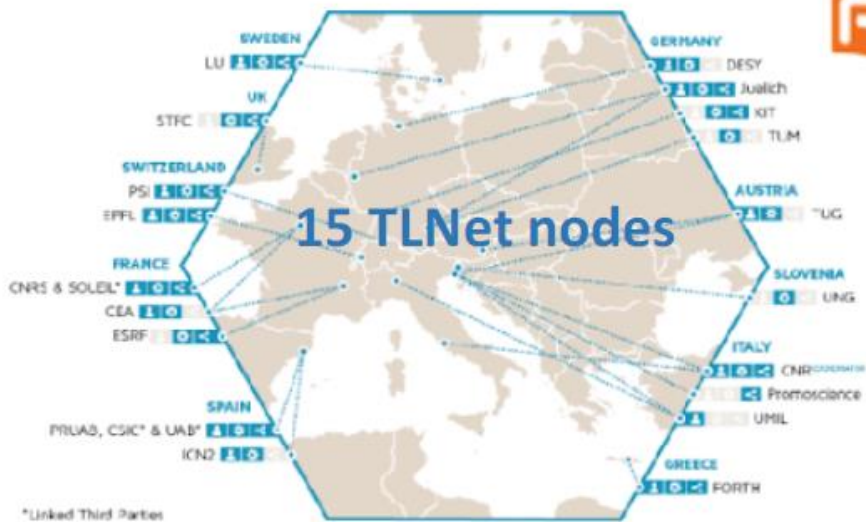
Similar success rate

NEP (NFFA.EU-Pilot)

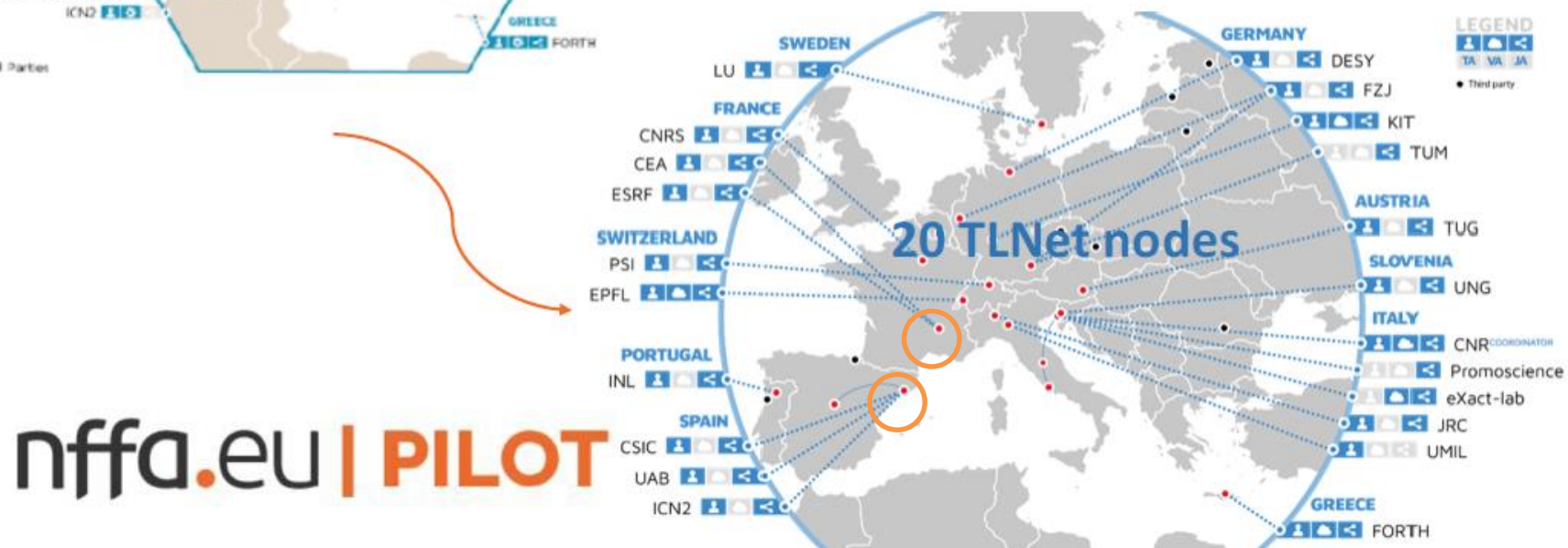
from  **nffa.eu** to **nffa.eu | PILOT**
nanoscience frontiers & fine analysis


a challenging qualitative and quantitative jump

The Networks



* **Alba** and **IREC** added as Third Parties



	 nffa.eu nanoscience foundries & fine analysis	nffa.eu PILOT
partners	19	22 (+ 5 Third Parties providing services + 3 Linked Third Parties)
providers	17 + Th	26
installations	6	6 (2 merged + 1 new “Nano to Micro/macro”)
techniques	78	190 (tools)
instruments	198	581
calls	15	16 (expected)
proposals	321	420 (expected)
UoAs	3790	> 5000 (expected)
Users	908	+ 50% (expected)

+ **Virtual Access** to pure online resources

NEP (NFFA.EU-Pilot)... and EOSC

Implementing FAIR data approach

Setting-up comprehensive and interlinked databases and repositories for the project management and generated data throughout user access.



NEP (NFFA.EU-Pilot)... and remote access

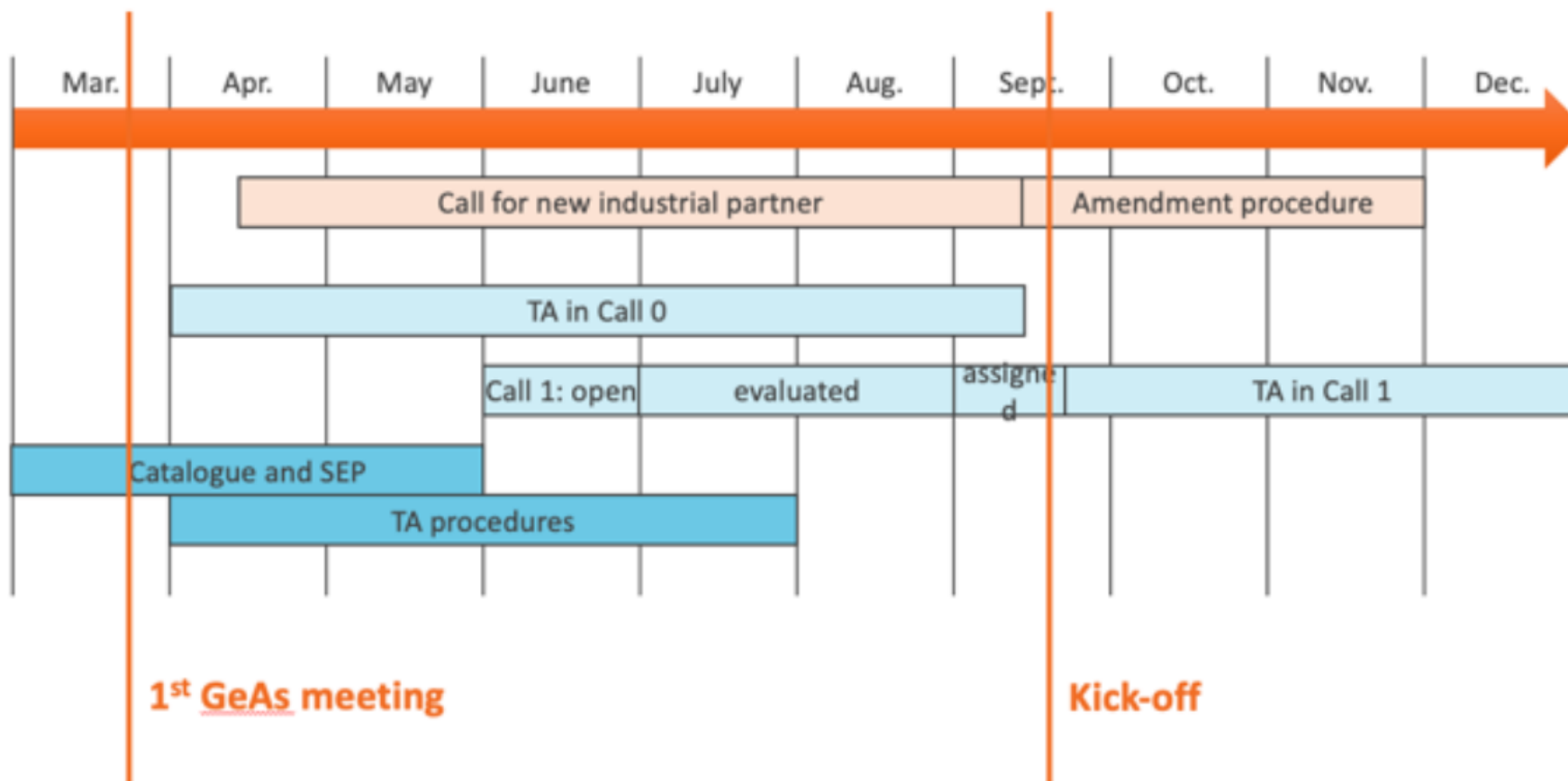
NEP is starting at time when mobility restrictions are still be in place!

Users will be welcome back in due time, as they have been pre-pandemic
NEP will collect and analyze partners institutional policies for remote access, and brainstorm on possible solutions to make access possible, effective and sustainable even when the users cannot be present

- *Mail-in access* has been and will be still an option
- NEP will assess the opportunities and constraints of adding user interaction to mail-in access, i.e. NFFA staff performing measurements and preparations according to real-time user's instructions (*collaborative interactive remote access*)

NEP (NFFA.EU-Pilot)

Timeline





Centro Nacional de Microelectrónica



IMB



CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

CSIC

Thanks for your attention

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