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nanoscience foundries & fine analysis

Safe-by-design, which opportunities in the next NFFA pilot proposal?

Workshop, Lund (Sw), 9th and 10th January 2020

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Nanotechnology & NFFA Industrial Liaison Engineer at the ESRF

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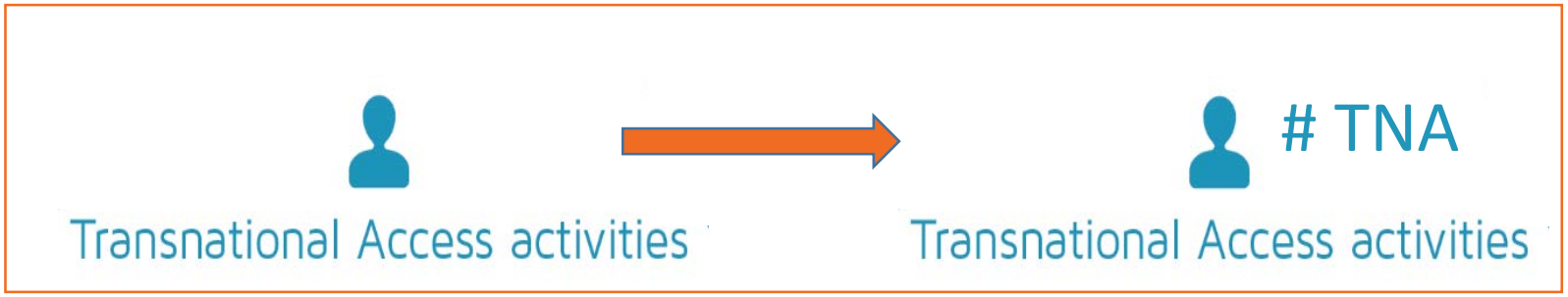
Schedule

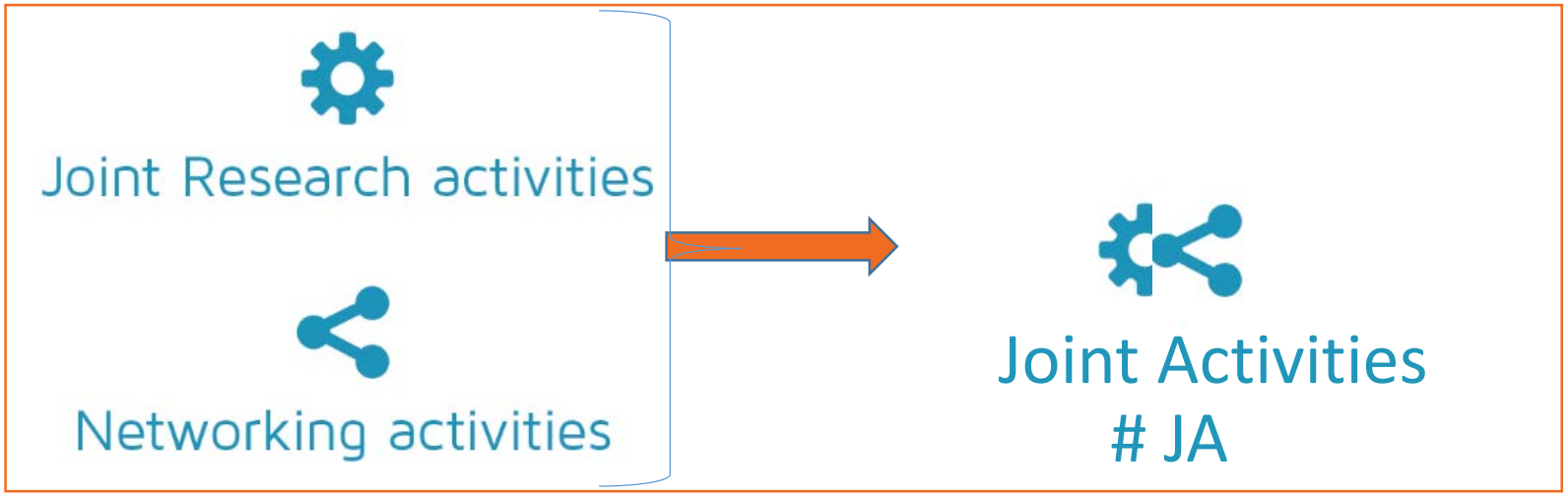
10th January: JA platform	
8:30 AM	welcome Coffee
session 3:	JA: nanosafety Plateform
9:00 AM	Sub-micron X-ray microspectroscopy for life and environmental nanotoxicology: **Hiram Castillo**
9:15 AM	Nanosafety case study using large scale facilities : **Heinz Amenitsch**
9:30 AM	Potential contribution of the JRC Nanobiotechnology Laboratory to NFFA project : **Pascal Colpo**
9:45 AM	Definition of the safe-by design platform project : **Cécile Girardot**
10:00 AM	Development of a Nanomaterial hazard assessment platform for low volume and low concentration samples: how much the nanosafety community need it?
10:45 AM	Coffee break
session 4:	follow up of the results
11:15 AM	CEA-PNS and nanosafety days : **Simon Clavaguera**
11:30 AM	Nanosafety Activities at INL : **Dmitry Petrovykh**
11:45 AM	Risks perceptions, and safety and health in the handling of nanomaterials in academia and industry – results of the caLIBRATe nano project : **Pete Kines**
12:05 AM	Data governance, formation, how to manage the datas and inform the NFFA's users and workers ?
12:50 PM	Final lunch

Definition of the activities done within NFFA:

NFFA-1: → NFFA-2:



9th January



10th January

Definition of the J(R)A

"The Joint Research Activities of NFFA-Europe, by addressing bottlenecks of nanoscience research, aim to overcome them and **to develop** new enabling **methods and tools** at the frontier in nanoscience and novel services to the TNA users program to carry out academic as well as industrial projects."

⇘definition for NFFA-1

On the future project i.e. NFFA-2:

⇨The technics developed on the JA project should integrate the catalogue before the end of the project.

“by addressing bottlenecks”

- Low concentration detection
- detection of the NPs into large matrix
- Presence of many contaminants
- Sample preparation

“to develop methods and tools”

↳developing a relevant in-vitro process compatible with the facilities of NFFA

(i.e. large scale facilities like synchrotron, but not only)

⇨ a nanosafety discovery platform for early stage hazard assessment on very low volume samples

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#early stage discovery, #safe by design, #life cycle analysis, #risk assessment, #nanosafety, #nanotoxicology

Potential participants

Transnational partnership between ≠ members of the cluster

The set up should bring some improvement for the partner and its facility

Then, Who ?

- NFFA Nanosafety Focus Group members

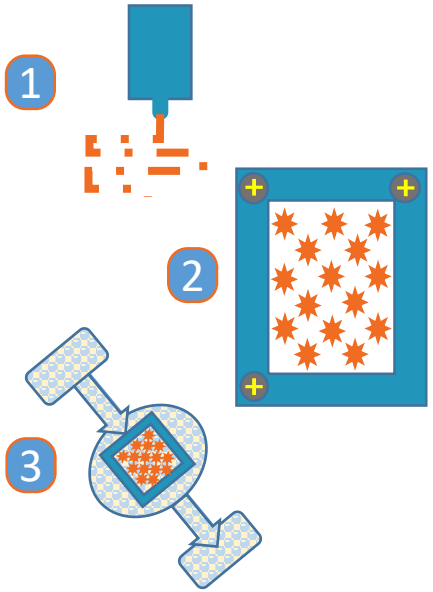
Name	Institution	Country
Cecile Girardot	ESRF	France
Ennio Capria	ESRF	France
Emmanuel Stratakis	FORTH	Greece
Ivan Maximov	Lund	Sweden
Christina Isaxon	Lund	Sweden
Heinz Amenitsch	TUG	Italy

- Experts on some specific techniques
- SME or industrial partnership would be a +

Backbones of the JA project

↳Putting 3 “legos” together and making them compatible each others :

1. Substrate preparation
   - ↳ “arranging” Bio cell
2. Sample holder
   - ↳ interoperability
3. Exposure system
   - ↳ µ-fluidic system

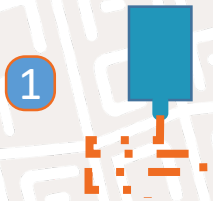


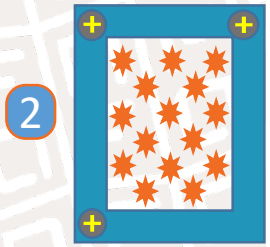
⇨plateform to carry out safe-by-design approach from the initial stage of a NMs synthesis

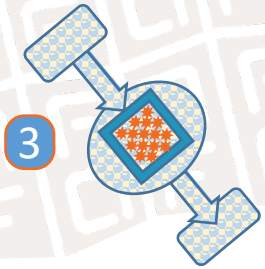
Potential technological and scientific impact(s)

- Giving the possibility to do in operando and high resolution analysis implying nanoparticles, biological cells and their interactions
- Improving the detection of nanoparticles in solution with low volume concentration
- Improving the facilities by decreasing the time necessary to search the regions of interest during the experimental preparation
- Continuum of previous JRA of NFFA1.0 (JRA1 and JRA5)

Specifications :

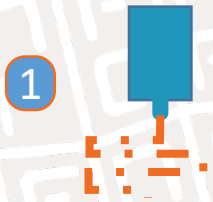


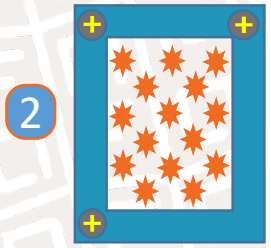


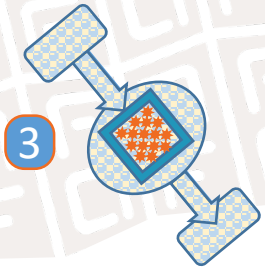


1. Precision Manufacturing of substrate
   - preparing patterned substrate to receive the bio sample, basis of the studies with a precision manufacturing equipment in order to print/sculpture biocompatible materials
   - Biocompatible (gel, intelligent fabric, glass, Si, TiO2, ... ?) to allow the growth of the bio cell
   - Position of each host site well defined to allow an easier observation or analysis of the system (sort of trap where we will enclosed the bio system studied)
   - System flexible where the user can determine the size and the morphology of the host site in function of the biocell used
2. Interoperable sample holder compatible with the micro-reactor and the substrate *(an evolution of JRA5)*:
   - positioning software program
   - Cover plate to allow the use of liquid sample
   - allow observation by transmission, grazing incidence, or reflexion,
3. Micro-reactor to allow in-operando system (the sample holder will be integrated within the reactor *(an evolution of JRA1):*
   - Microfluidic reactor where the substrate holder will be integrated
   - The reactor will allow an exposition of the samples to liquid or aerosol containing NPs.
   - Control heating/cooling system in case that live cell environment is desirable.
   - This system will be associated and operable with the most relevant imaging techniques for nanosafety sample, e.g. nano-XRF, optoacoustic, laser scanning confocal imaging etc.

Discussion







a nanosafety discovery platform for early stage hazard assessment on very low volume samples

How much could it be useful for you ?