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FHERITALE

FOOD, HEALTH AND ENVIRONMENT RESEARCH INFRASTRUCTURES TO TACKLE EMERGING PRIORITIES (GA n. 101131588)

Milestone 3.1 – First catalogue of the current state of services offered across European RIs

WP 3 – UU + MU

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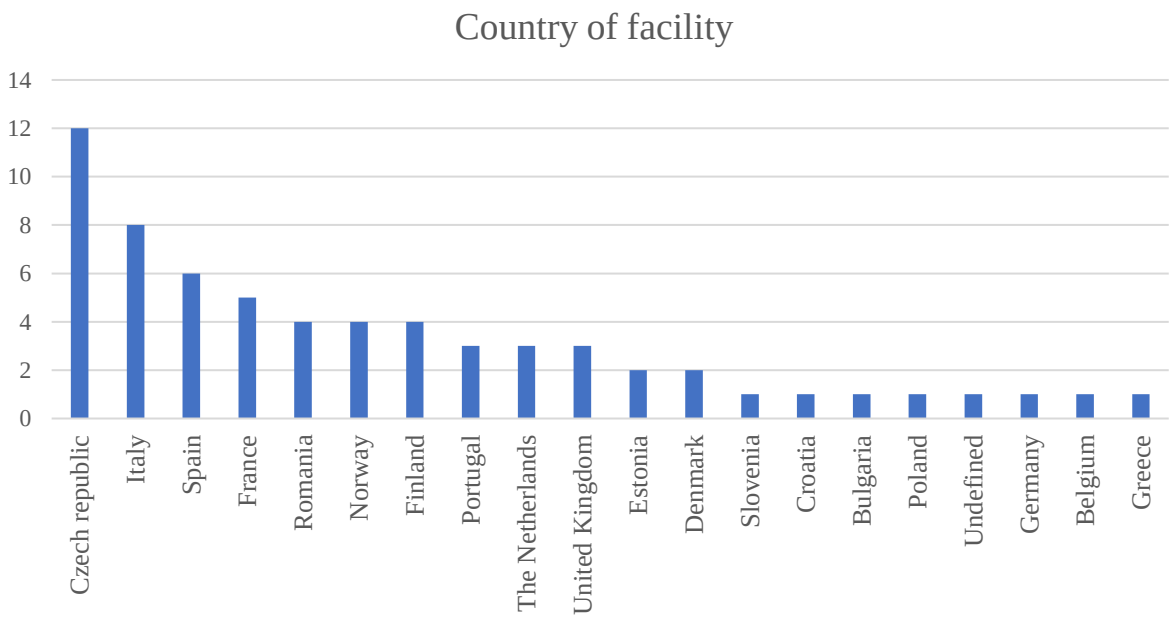
Introduction

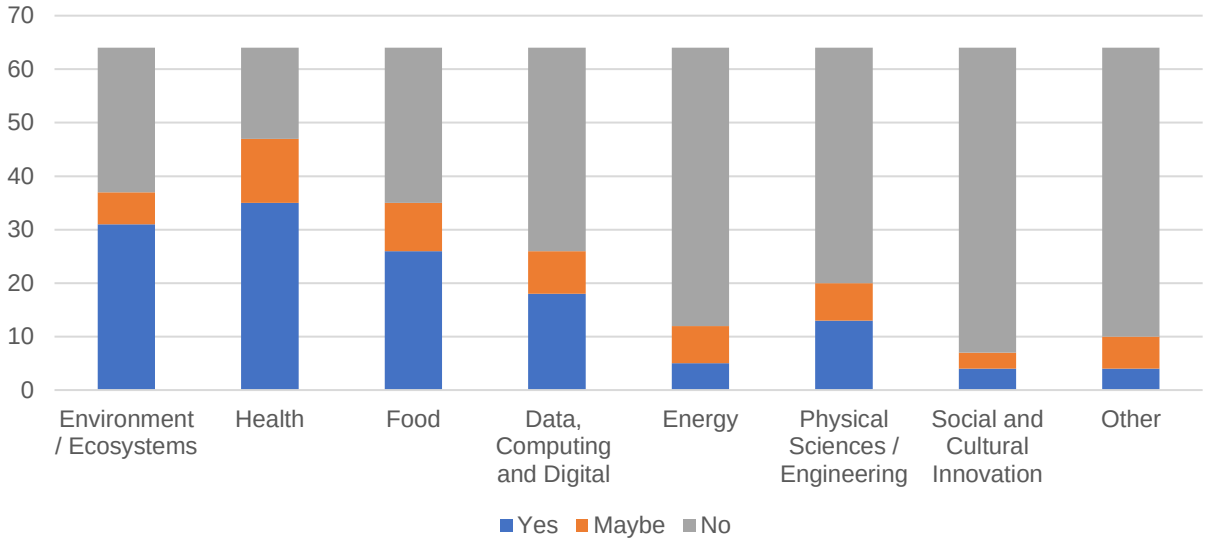
A questionnaires was distributed to relevant European Ris and organizations to identify potential service domains and to gather the details on the core methodologies offered at each site. The collected data covers services relevant across the broad spectrum of specific parameters (physical, chemical, in vitro, in vivo biological properties) allowing researchers to address challenges relevant to health, food, and environmental conditions and the overall impact of artificial materials on health. As a consequence, services will encompass several scales, from the molecular level all the way to ecosystems. This is presented in this **catalogue of the current state of services offered across European RI.**

Participant data

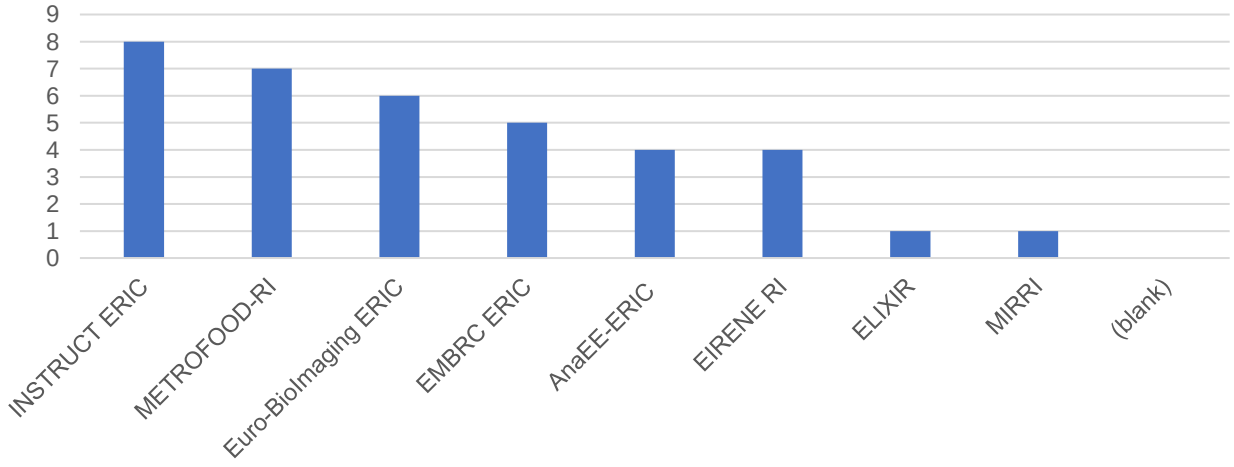
Date of current version: 30-01-2025
Number of participants: 64



It was first assessed if the facility is involved in a European or national project on “artificial materials”, and if these then impact on the research domains defined in the plot below. Participants could reply with Yes, Maybe or No:



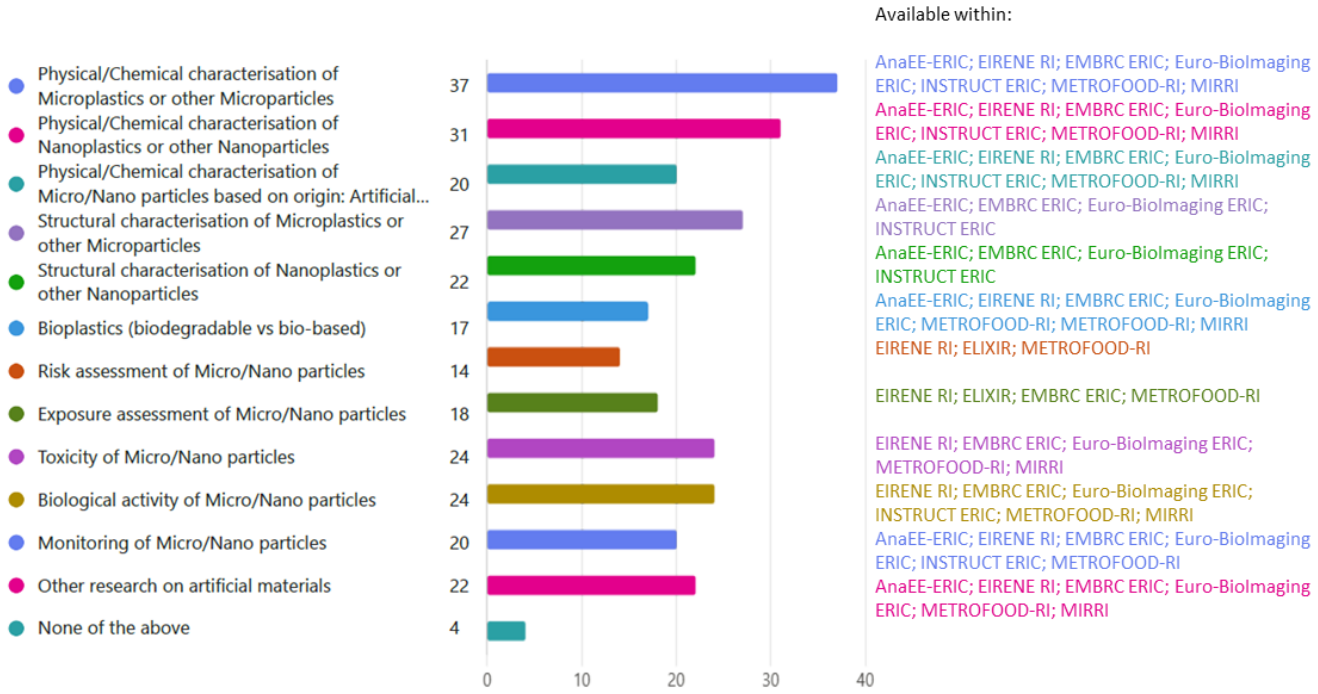
More specifically, a total number of 37 facilities belong to an ESFRI project or landmark, and 18 participants were unaware if their facility belongs to one. The other 9 facilities indicated to not belong to such projects or landmark. The distribution of indicated ESFRI projects or landmarks is represented below:



The ESFRIs BBMRI ERIC, EATRIS ERIC, ECRIN ERIC, EMPHASIS, ERINHA, EU-IBISBA, EU-OPENSCREEN ERIC and INFRAFRONTIER were not represented.

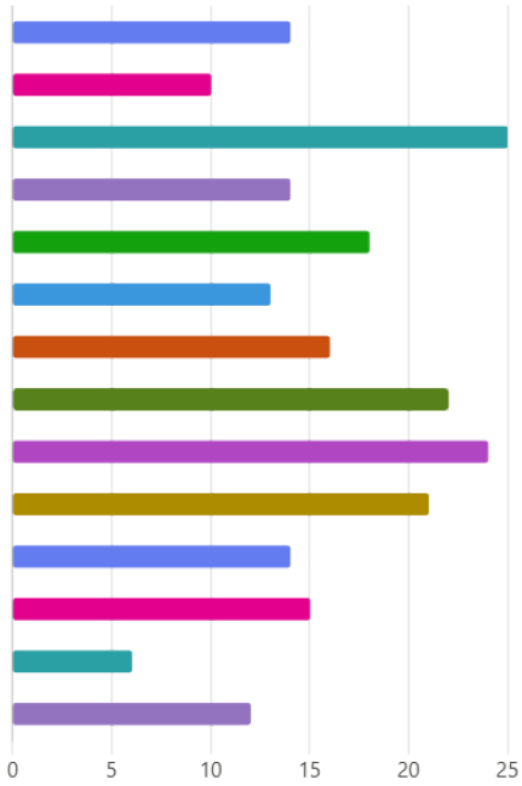
Services

The participants were asked to fill in current services they provide on artificial (micro- and nano) materials, or to consider if they may have the capacity to offer them. The following categorized services are available:



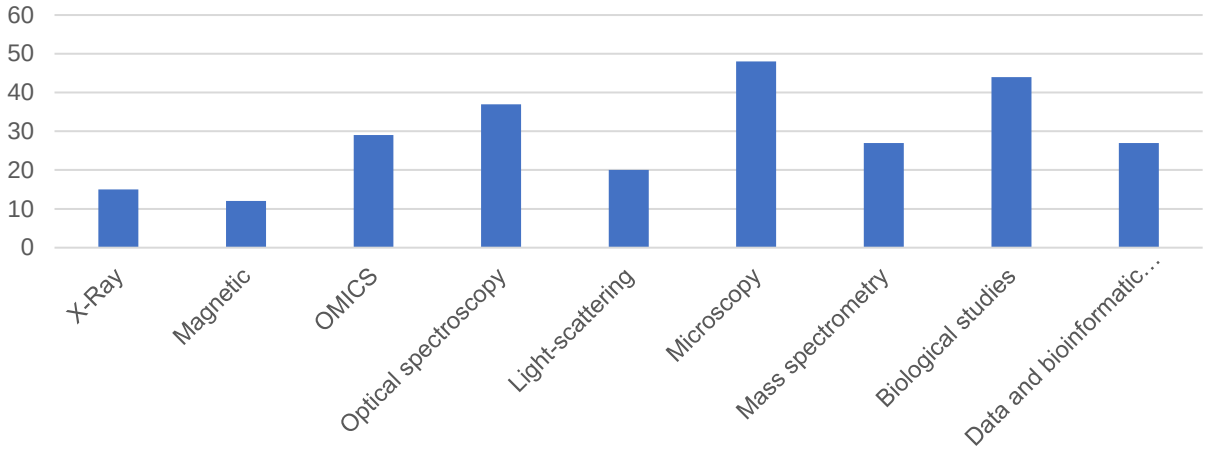
The majority of services is focusing on the physical / chemical or structural characterization of micro- and nanoparticles and/or plastics. The impact is represented in e.g. the toxicity of MNPs, the exposure assessment of MNPs or the biological activity of MNPs. The participants were asked to link their services to impact: on what topics do the services have impact? This is highlighted in the following chart.

Soil quality	14
Air quality	10
Water Quality	25
Agriculture practices	14
Ecosystems	18
Marine species	13
Micro-organisms	16
Animals/Animal Health	22
Humans/Human Health	24
Food contamination	21
Food chain	14
Food packaging	15
Other	6
None of the above	12

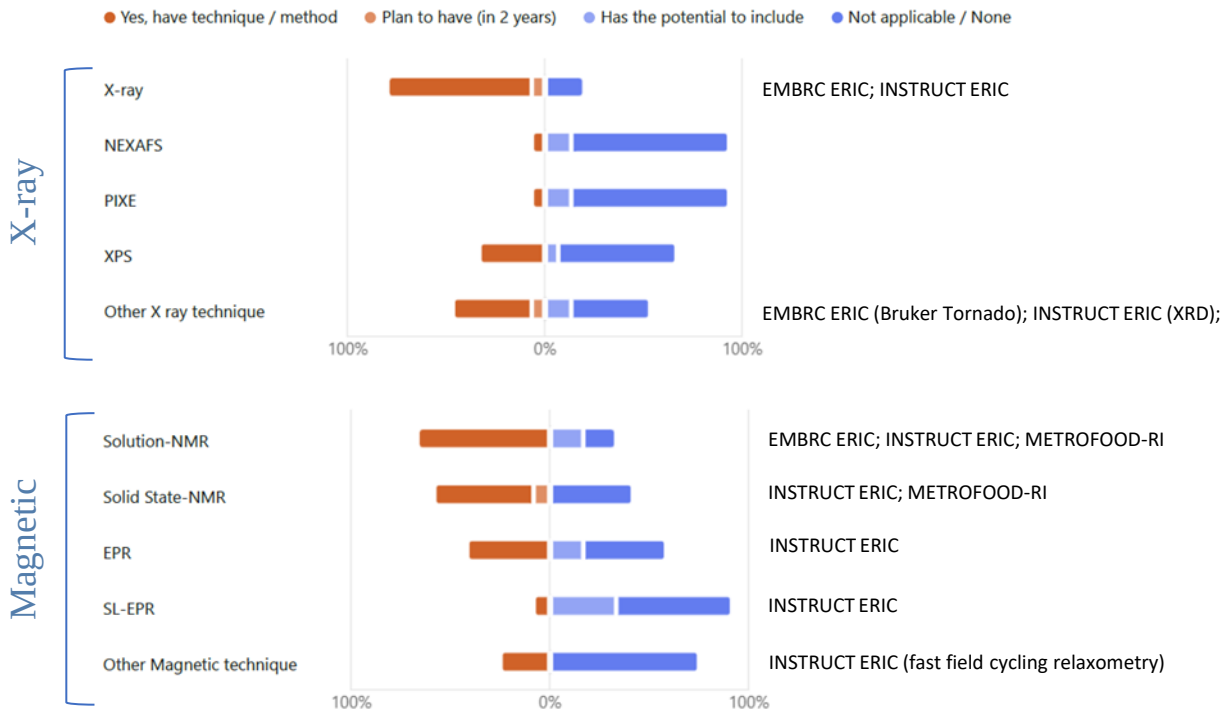


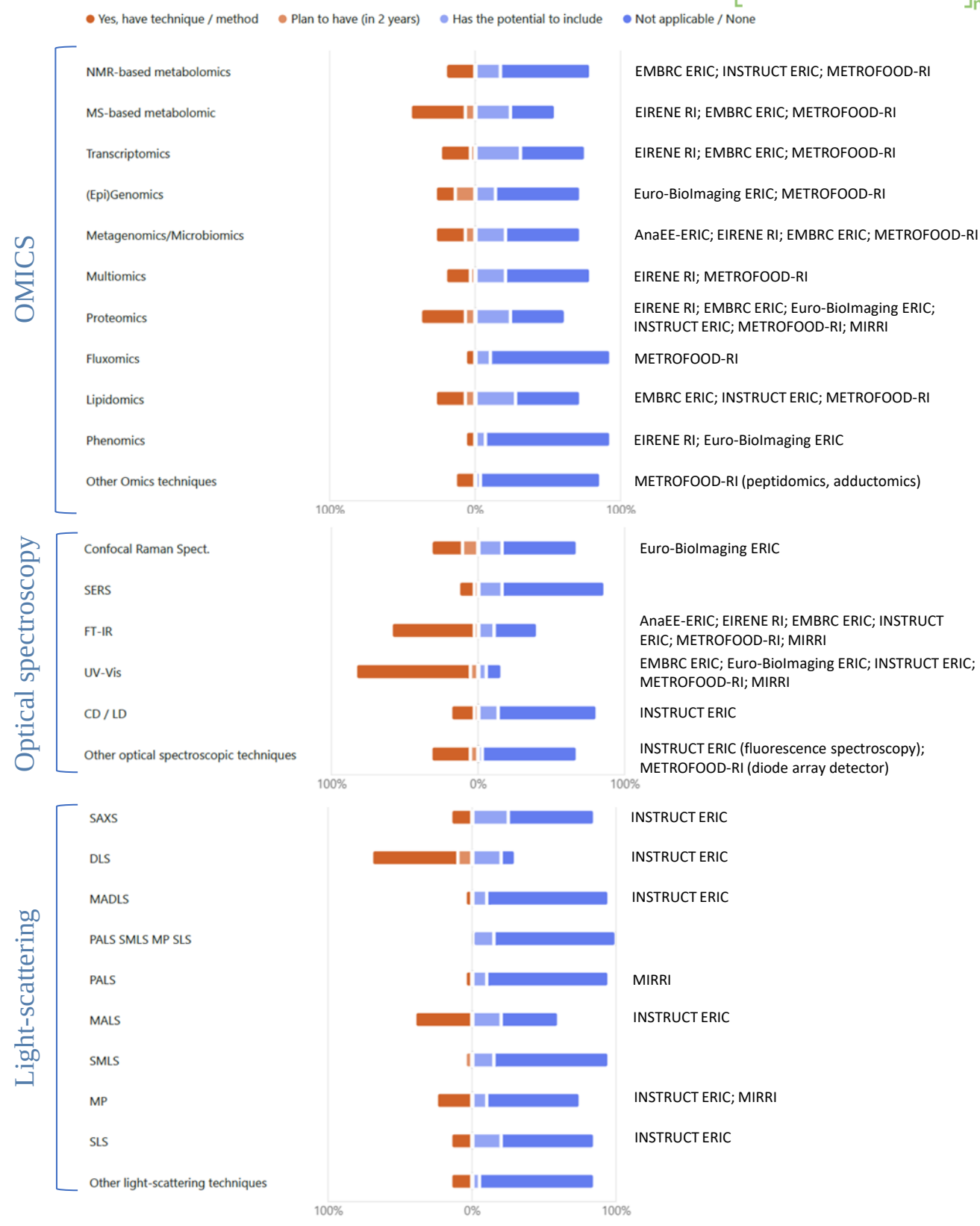
Specific categories of techniques are monitored as service to map the research infrastructure for artificial materials. These are:

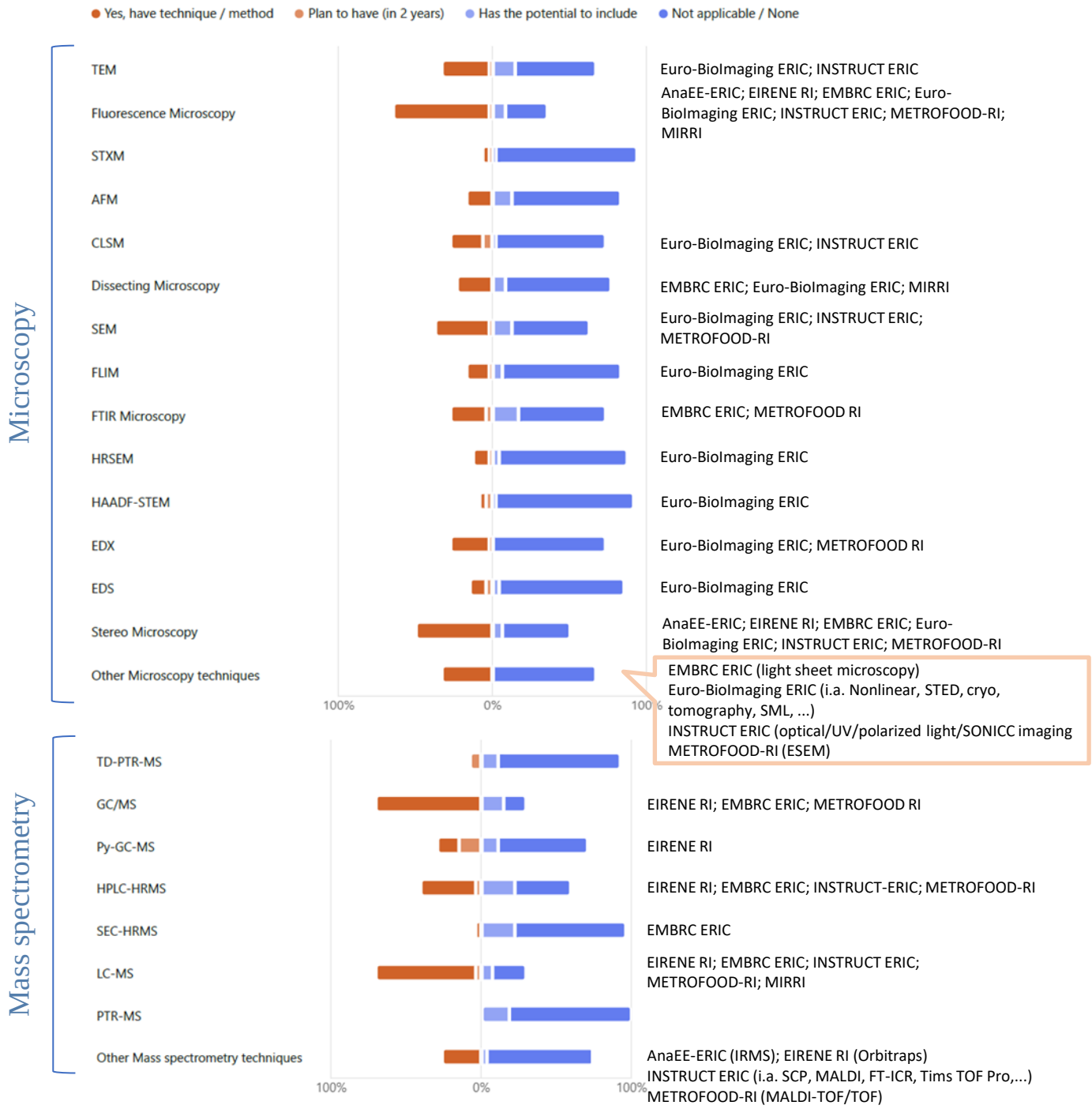
- X-ray techniques
- Magnetic techniques
- OMICS techniques
- Optical spectroscopic techniques
- Light scattering techniques
- Microscopy techniques
- Mass spectrometry techniques
- Biological studies
- Data and Bioinformatic methodologies

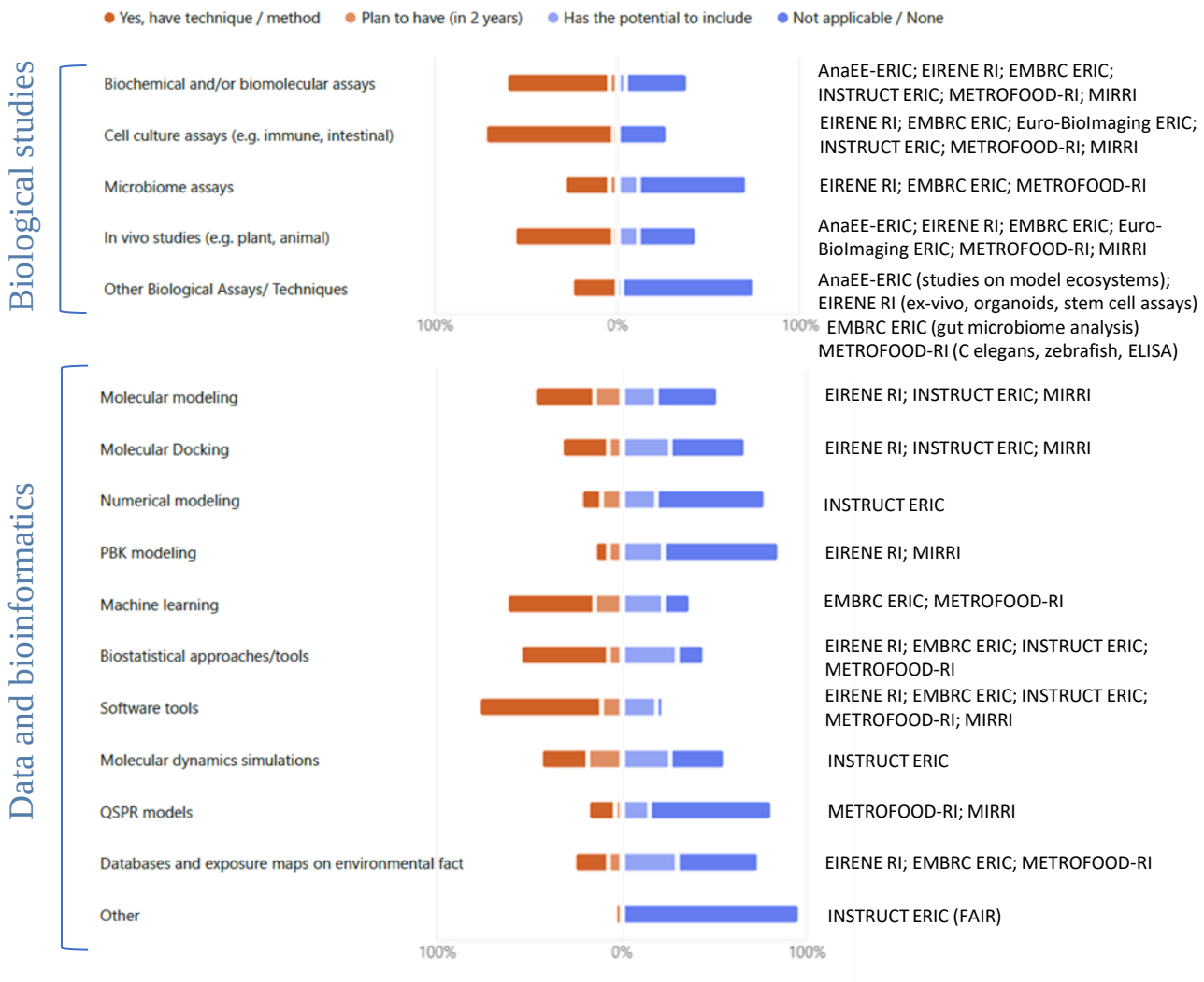


Above are the services provided by the participants in absolute numbers, for which the service is counted when it is either already available or planned to be available in two years. The majority of services is centered on micro-spectroscopic techniques on the analytical side, and biological studies on the impact side, whereas X-ray and magnetic technologies are lowest in number. Specific measurement techniques are provided per category, which are shown below together with the amount of facilities providing them. If these facilities belong to an ESFRI, this is specified (only if already present, not when planned).




Yes, have technique / method
Plan to have (in 2 years)
Has the potential to include
Not applicable / None
OMICS
NMR-based metabolomics
EMBRC ERIC; INSTRUCT ERIC; METROFOOD-RI
MS-based metabolomic
EIRENE RI; EMBRC ERIC; METROFOOD-RI
Transcriptomics
EIRENE RI; EMBRC ERIC; METROFOOD-RI
(Epi)Genomics
Euro-BioImaging ERIC; METROFOOD-RI
Metagenomics/Microbiomics
AnaEE-ERIC; EIRENE RI; EMBRC ERIC; METROFOOD-RI
Multiomics
EIRENE RI; METROFOOD-RI
Proteomics
EIRENE RI; EMBRC ERIC; Euro-BioImaging ERIC; INSTRUCT ERIC; METROFOOD-RI; MIRRI
Fluxomics
METROFOOD-RI
Lipidomics
EMBRC ERIC; INSTRUCT ERIC; METROFOOD-RI
Phenomics
EIRENE RI; Euro-BioImaging ERIC
Other Omics techniques
METROFOOD-RI (peptidomics, adductomics)
100%
0%
100%
Optical spectroscopy
Confocal Raman Spect.
Euro-BioImaging ERIC
SERS
FT-IR
AnaEE-ERIC; EIRENE RI; EMBRC ERIC; INSTRUCT ERIC; METROFOOD-RI; MIRRI
UV-Vis
EMBRC ERIC; Euro-BioImaging ERIC; INSTRUCT ERIC; METROFOOD-RI; MIRRI
CD / LD
INSTRUCT ERIC
Other optical spectroscopic techniques
INSTRUCT ERIC (fluorescence spectroscopy); METROFOOD-RI (diode array detector)
100%
0%
100%
Light-scattering
SAXS
INSTRUCT ERIC
DLS
INSTRUCT ERIC
MADLS
INSTRUCT ERIC
PALS SMLS MP SLS
PALS
MIRRI
MALS
INSTRUCT ERIC
SMLS
MP
INSTRUCT ERIC; MIRRI
SLS
INSTRUCT ERIC
Other light-scattering techniques
100%
0%
100%


Yes, have technique / method
Plan to have (in 2 years)
Has the potential to include
Not applicable / None
Microscopy
TEM
Euro-BioImaging ERIC; INSTRUCT ERIC
Fluorescence Microscopy
AnaEE-ERIC; EIRENE RI; EMBRC ERIC; Euro-BioImaging ERIC; INSTRUCT ERIC; METROFOOD-RI; MIRRI
STXM
AFM
CLSM
Euro-BioImaging ERIC; INSTRUCT ERIC
Dissecting Microscopy
EMBRC ERIC; Euro-BioImaging ERIC; MIRRI
SEM
Euro-BioImaging ERIC; INSTRUCT ERIC; METROFOOD-RI
FLIM
Euro-BioImaging ERIC
FTIR Microscopy
EMBRC ERIC; METROFOOD RI
HRSEM
Euro-BioImaging ERIC
HAADF-STEM
Euro-BioImaging ERIC
EDX
Euro-BioImaging ERIC; METROFOOD RI
EDS
Euro-BioImaging ERIC
Stereo Microscopy
AnaEE-ERIC; EIRENE RI; EMBRC ERIC; Euro-BioImaging ERIC; INSTRUCT ERIC; METROFOOD-RI
Other Microscopy techniques
EMBRC ERIC (light sheet microscopy)
Euro-BioImaging ERIC (i.a. Nonlinear, STED, cryo, tomography, SML, ...)
INSTRUCT ERIC (optical/UV/polarized light/SONICC imaging
METROFOOD-RI (ESEM)
100%
0%
100%
Mass spectrometry
TD-PTR-MS
GC/MS
EIRENE RI; EMBRC ERIC; METROFOOD RI
Py-GC-MS
EIRENE RI
HPLC-HRMS
EIRENE RI; EMBRC ERIC; INSTRUCT-ERIC; METROFOOD-RI
SEC-HRMS
EMBRC ERIC
LC-MS
EIRENE RI; EMBRC ERIC; INSTRUCT ERIC; METROFOOD-RI; MIRRI
PTR-MS
Other Mass spectrometry techniques
AnaEE-ERIC (IRMS); EIRENE RI (Orbitraps)
INSTRUCT ERIC (i.a. SCP, MALDI, FT-ICR, Tims TOF Pro,...)
METROFOOD-RI (MALDI-TOF/TOF)
100%
0%
100%



The above analysis provides insights into the services available as indicated by all participants, as well as by the ESFRIs represented. The majority of services is available and well represented over the ESFRIs, although X-Ray, scattering and certain microscopy techniques seem to be under-represented. This catalogue additionally serves as a tool to indicate the existing gaps within the research landscape both related and unrelated to the ESFRIs on artificial materials.

Last version – 16/02/2025