

How the MIRRI-PT has been developed in its smart specialisation and cutting-edge technologies to offer better services

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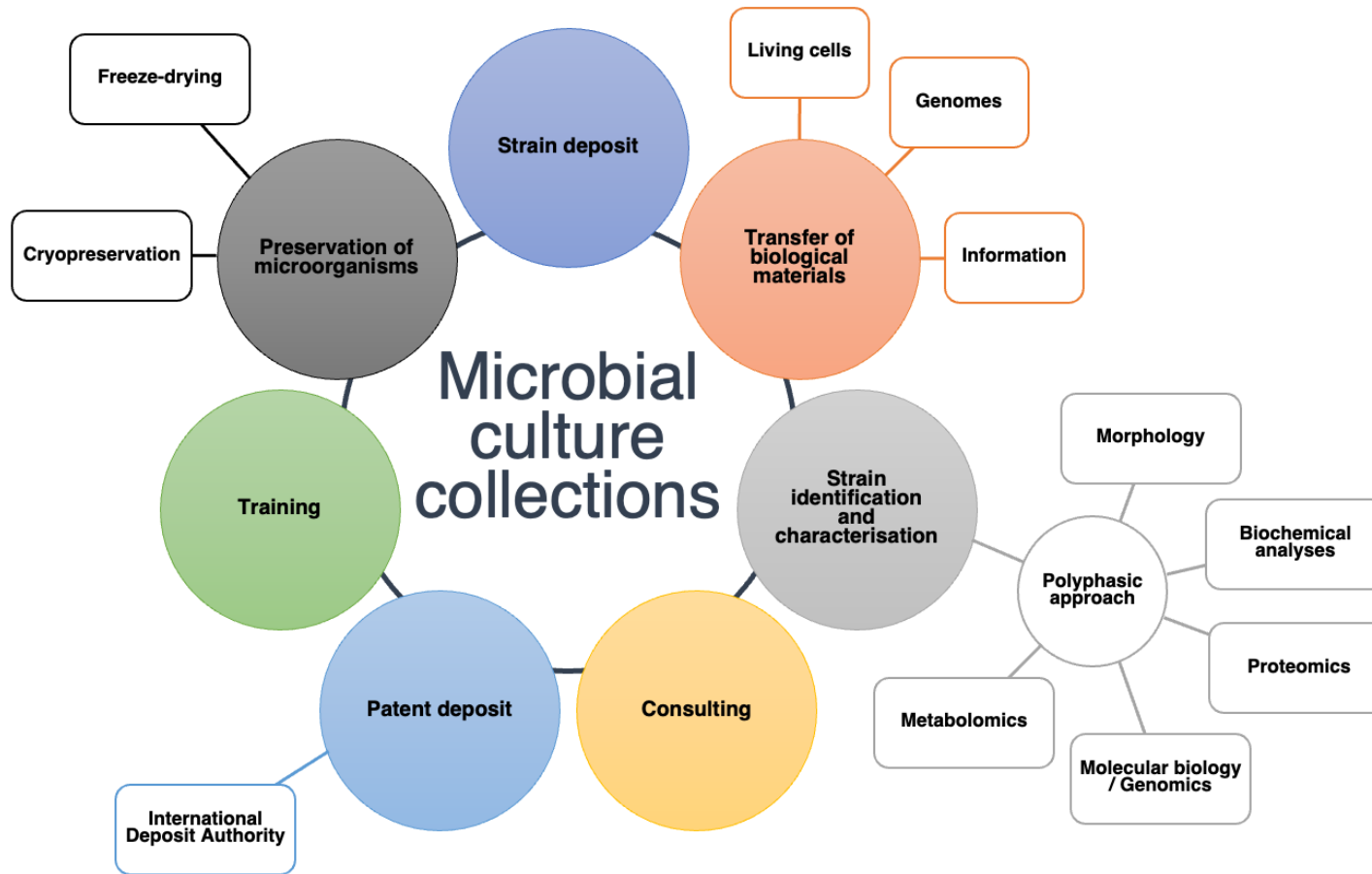
Bari - Italy, September 20th, 2024



ECCO XLII Meeting

"Microbe & Microbiome Management for a Better Planet"

Culture Collections services to the scientific community

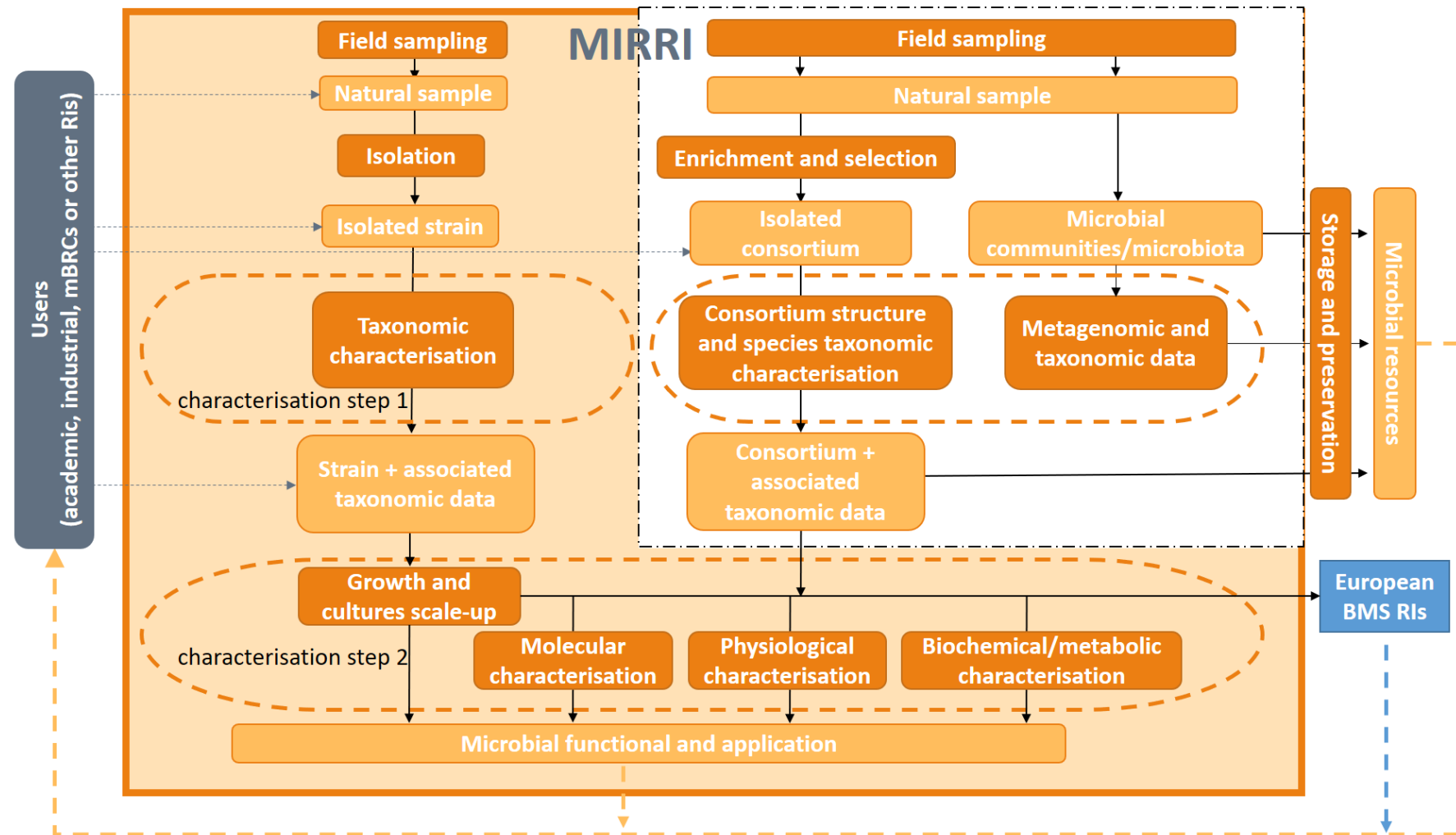


“Key component of the scientific and technological infrastructure of the life sciences and biotechnology.”

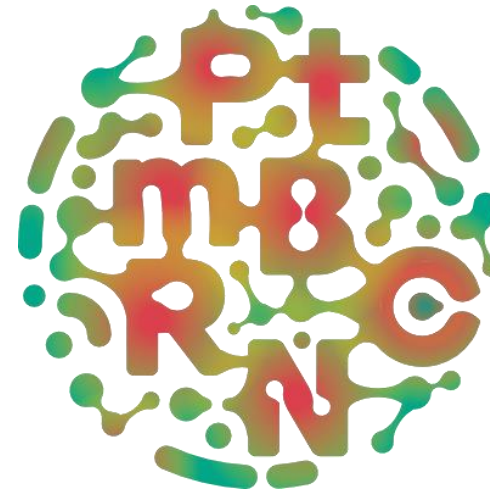
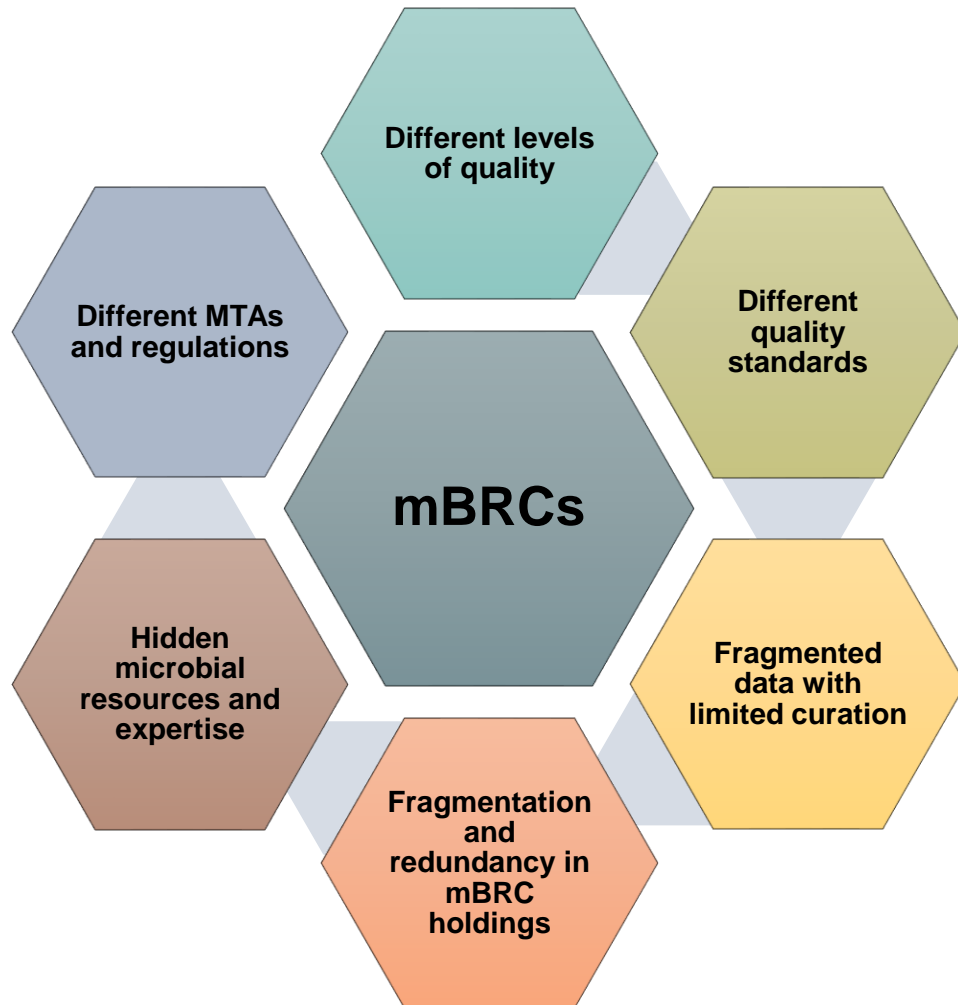
(OECD, 2001)

- Fundamental role in different fields, including agriculture, food security and safety, industrial, and medical microbiology.
- Key players for the development of new and more sustainable products, compounds and practices.

MIRRI's perspectives on the operational activities of CC's



Pt-mBRCN / MIRRI-PT



Portuguese
microBiological
Resource Center
Network



MIRRI

EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

MICROBIAL
RESOURCE
RESEARCH
INFRASTRUCTURE

ERIC



PORTUGAL

Portugal has 9 Culture Collections (CC) Registered on WDCM

A B C D E F G H I J K L M N O **P** Q R S T U V W X Y Z

Pakistan Papua New Guinea Philippines Poland **Portugal**

There are 9 collections in Portugal

Acronym	WDCM Number	Collection	Region
ACOI	WDCM 906	Coimbra Collection of Algae	Europe
BACA	WDCM 1242	Bank of Algae and Cyanobacteria of the Azores	Europe
CCMI	WDCM 761	Culture Collection of Industrial Microorganisms	Europe
CCP	WDCM 1252	Culture Collection of Porto - Faculty of Pharmacy of the University of Porto	Europe
LEGE	WDCM 1089	Blue Biotechnology and Ecotoxicology Culture Collection	Europe
MEAN	WDCM 881	Micoteca da Estacao Agronomica Nacional	Europe
MUM	WDCM 816	Micoteca da Universidade do Minho	Europe
PYCC	WDCM 595	Portuguese Yeast Culture Collection	Europe
UCCCB	WDCM 1179	University of Coimbra Bacteria Culture Collection	Europe



Portuguese
microBiological
Resource Center
Network

<https://www.mbrcn.pt>

PT-mBRCN / MIRRI-PT



MIRRI-PT 11 Partners

MUM-UM ISO9001 (Coordinator)

CDB-UMinho

PYCC-UNLisboa ISO9001

LEGE-UPorto

ACOI-UCoimbra

BBC:UCoimbra

INIAV-Governmental (Veterinary and Agriculture)

INIAV-Azores Island (Veterinary)

IHMT-UNLisboa

IVDP-Governmental (Douro and Porto Wines)

CIMO-IPBragança



Portuguese
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MIRRI MICROBIAL ERIC
RESOURCE RESEARCH
INFRASTRUCTURE
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

PORTUGAL



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CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

Gabinete do Ministro

Despacho n.º 4958/2020

Sumário: Procede à atualização do Roteiro Nacional de Infraestruturas de Investigação de Interesse Estratégico.

MIRRI-PT +6 Prospective Partners

BACA-Azores Island (WFCC/ECCO)

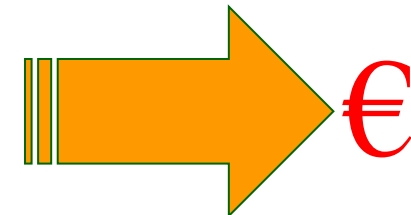
CCP- UPorto (WFCC/ECCO)

FMUPorto-MCC

CYCUCoimbra

Técnico-CC-Lisboa

ESSACC-Governmental (Health)



PT-mBRCN / MIRRI-PT (Northern Region – ERDF)

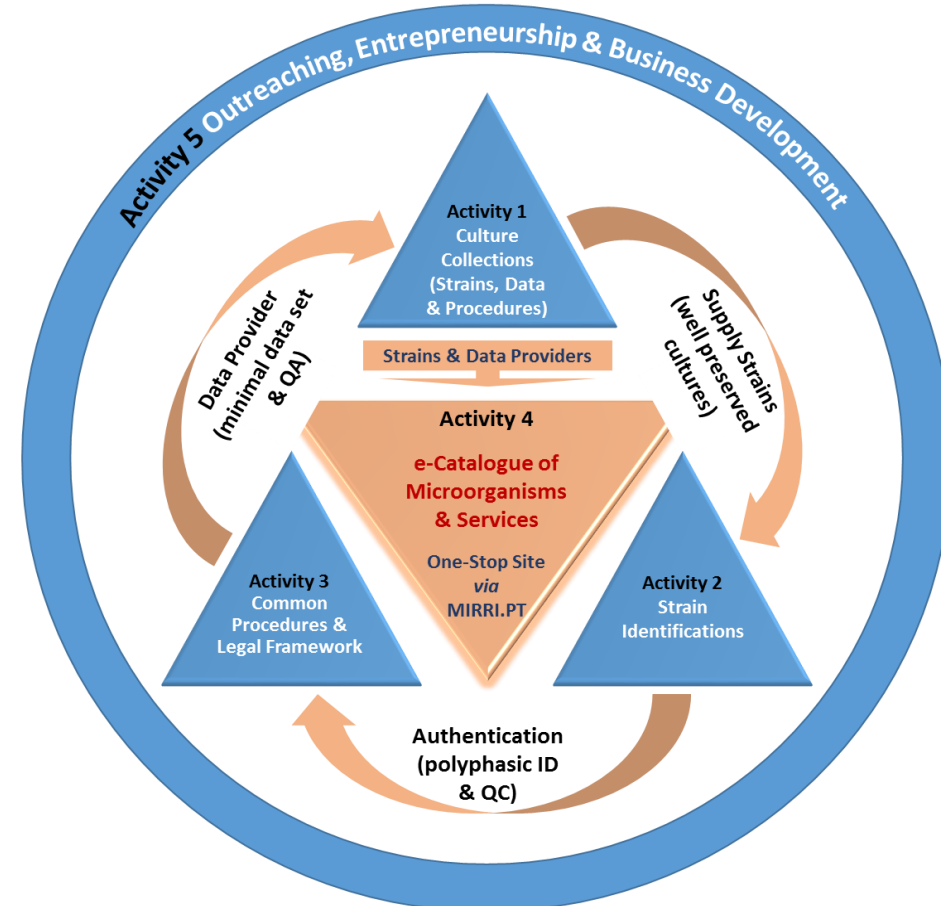


MIRRI-PT Partners
MUM-UM (Coordinator)
CDB-UM
LEGE-UP
CIMO-IPB



MIRRI MICROBIAL ERIC
RESOURCE RESEARCH
INFRASTRUCTURE
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

III PORTUGAL



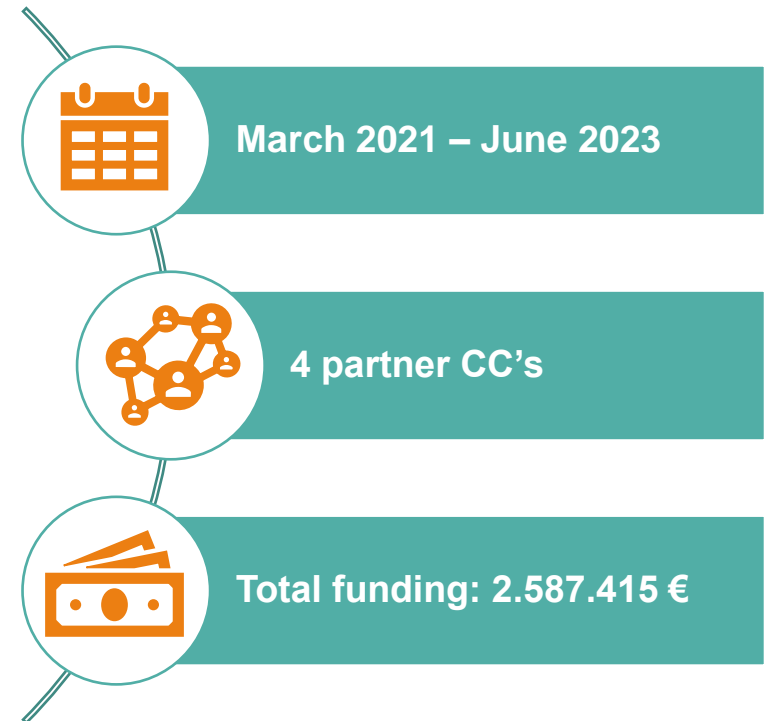
About 2.5 million euros for 2 years
Currently each Region has call for new founding:
opportunity or a headache... pros and cons

MIRRI-PT - Pólo Norte

Northern node of the Portuguese Microbial Resource Research Infrastructure

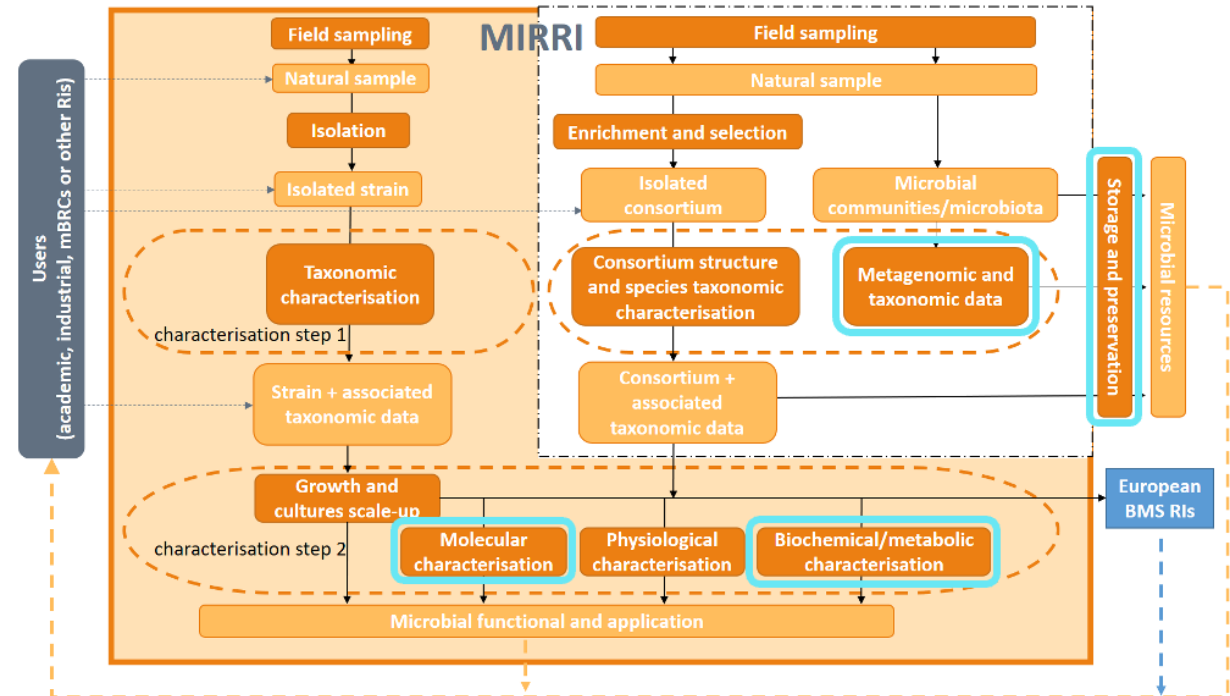
To be a strategic pillar in the development of research of excellence and to have a positive impact on the R&D system competitiveness, increasing its orientation and strategic focus.

- Aims to establish the operation of the national MIRRI-PT node and its integration into the pan-European infrastructure MIRRI-ERIC.
- To create and strengthen CC's competencies and technical-scientific capacity:
 - better managed resources;
 - operation under a quality control/quality assurance (QC/QA) management system and legal framework to deliver live strains and their associated information;
 - state-of-the-art infrastructures for basic and applied research in the fields of microbiology and biotechnology;
 - e-Catalogue of Microorganisms & Services as part of a one-stop site platform.



Technological needs at MUM to address:

- **Molecular characterisation & Metagenomics:** cutting-edge molecular biology platform, including NGS;
- **Biochemical and metabolic characterisation:** UHPLC-MS and MALDI-TOF MS;
- **Storage and preservation:** cryopreservation using liquid nitrogen.



Cutting-edge molecular biology platform

QC



NanoDrop One

- Standalone spectrophotometer
- Quantify samples before downstream applications
- No need for dilutions
- Identify sample contaminants



Qubit 4

- Fluorescent dye only emits signal when bound to target (minimizes the effects of contaminants)
- Accurately measure DNA, RNA, and protein quantity



4200 TapeStation system

- High-throughput automated electrophoresis platform
- Nucleic acid sample quality control
- Quality control in NGS applications

PCR



Verity Pro

- Latest block technology - higher ramp rates, quieter runs, intuitive temperature optimization



QuantStudio 5

- OptiFlex technology and six independent temperature zones
- Improved data accuracy and sensitivity for genomic applications

Sequencing



SeqStudio

- Benchtop system for Sanger sequencing and fragment analysis by capillary electrophoresis
- Easy to use across a broad range of applications



MiSeq

- Highly accurate SBS and paired-end sequencing technologies
- Targeted gene, small genome, amplicon sequencing, and metagenomics



MinION

- Ultra-long reads for experimental flexibility and improved assembly
- Real time data
- High yield

Objectives:

- Design and implementation of a dedicated and fully equipped molecular biology pipeline in order to support identification and characterisation of microbial isolates and communities.
- Targeted sequencing and analysis of whole genome sequences of microbial isolates and communities.

UHPLC-Orbitrap Exploris 120 MS



UHPLC Vanquish

- Diode Array Detector
- Fluorescence Detector



Orbitrap Exploris 120 MS

- Single and stable calibration from m/z 40-3000
- Exact mass determination with 5 decimals
- MS/MS

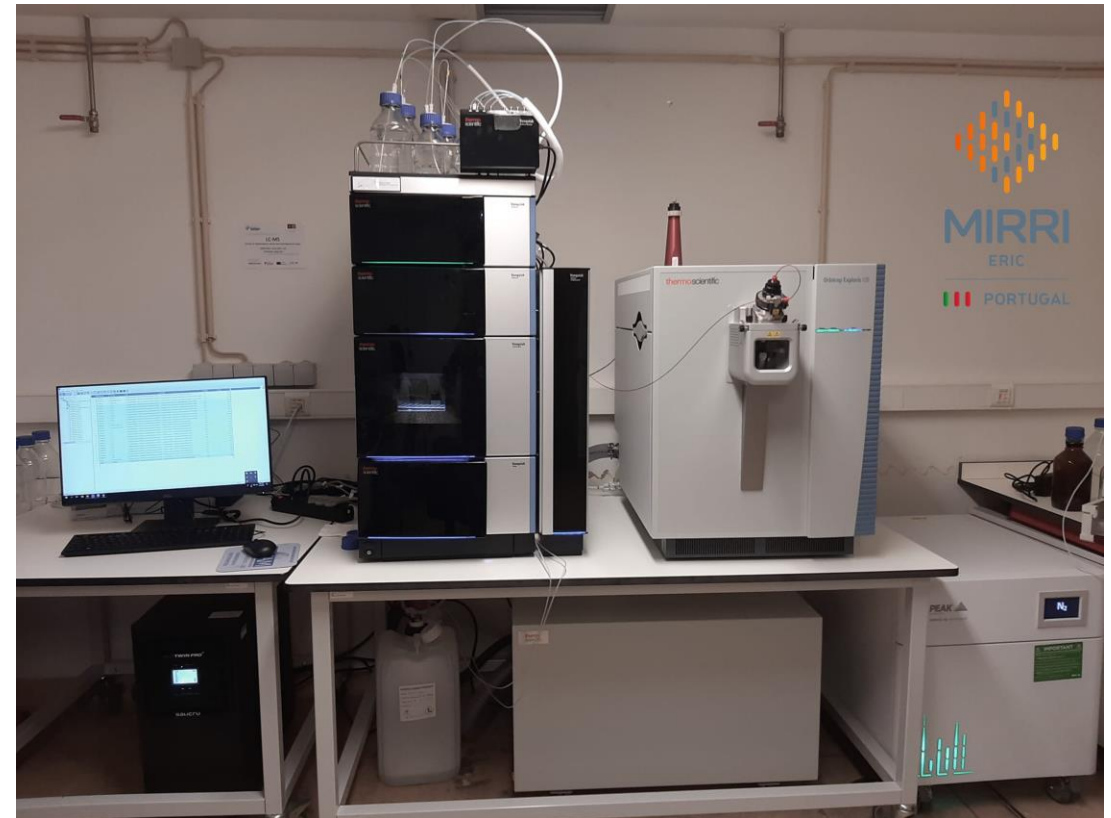


Compound Discoverer

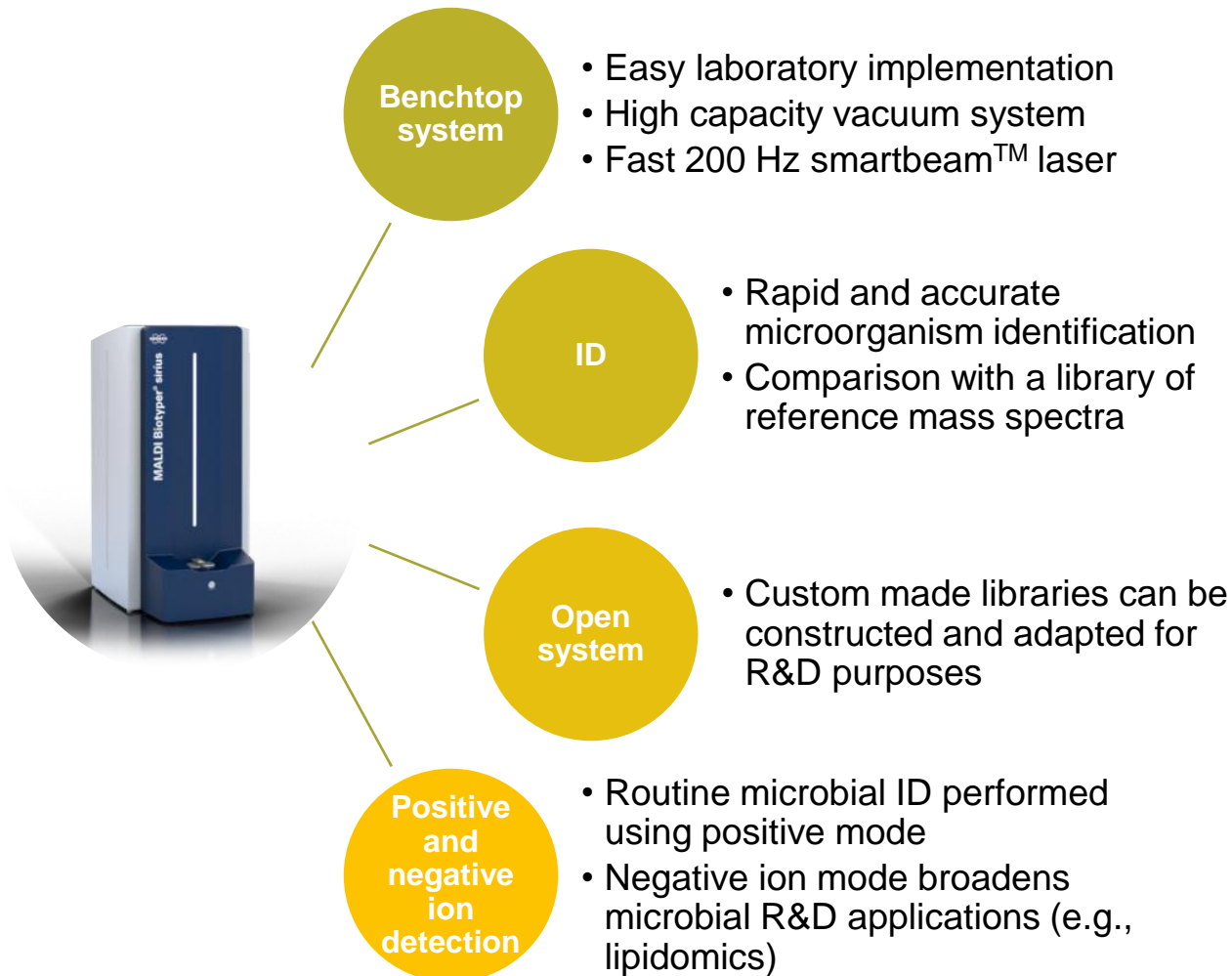
- Crosses mass spectra with online libraries

Applications:

- Screen samples for the presence of known metabolites (LC-MS).
- Identify metabolites by their MS/MS spectra.
- Screens the most abundant metabolites in a sample, store their mass spectra, and looks for a match in available libraries.



MALDI Biotyper[®] sirius system



Cryopreservation using liquid nitrogen



SmartFreezer EVO®

- Fully automated robotic system for sample preservation at cryogenic temperatures
- Cherry picking concept – no exposure and temperature fluctuations of samples
- Operator safety – no exposure to liquid nitrogen vapours
- Guaranteed sample safety through controlled access and complete



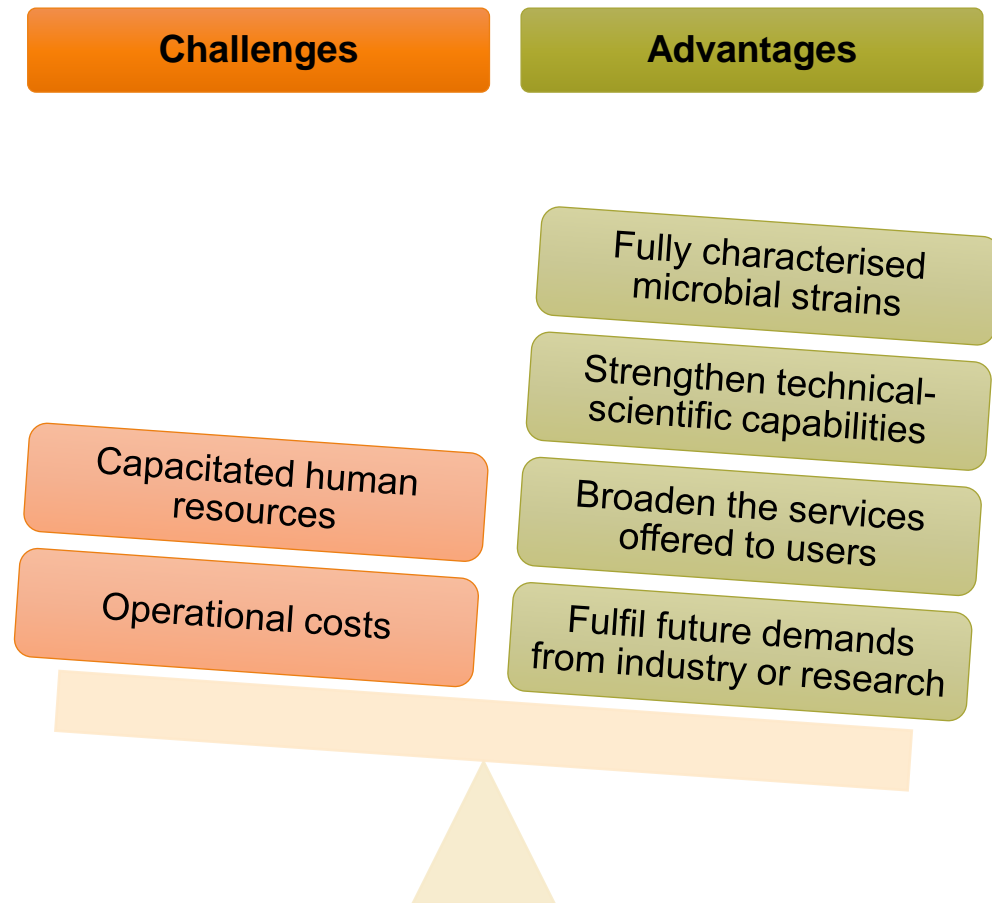
Liquid Nitrogen Generator LNG20

- On site LN generator – continuous independent supply
- Capacity to maintain the SmartFreezer EVO® and other necessities – production of up to 50 L/day

Objectives:

- Long-term reliable preservation of biological samples.
- **Establish the first IDA in Portugal** – deposit of microorganisms for the purpose of patent procedure.

Overall advantages and challenges of implementing cutting-edge technologies in CC's



- The overall balance of implementing cutting-edge technologies in CC's is highly positive.
- It ensures the provision of high-quality microbial resources, data and services to the scientific, industrial and academic communities under the regional smart specialization.
- It strengthens CC's role in the implementation of regional and national development strategies, enabling a more integrated and capacitated R&D system.
- It has a positive impact on competitiveness for the advancement of biotechnology and bioeconomy, and R&D in Life Sciences.

The Foster new networks and enlarge the participation of Portuguese national Node beyond of the borders



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Biobanking for tropical health: leveraging collaborative initiatives in the Lusophone world

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19 Biobanks + 2 Networks

LUSOPHONE NETWORK OF BIOBANKS AND BIOLOGICAL COLLECTIONS



FIGURE 1
Geographic distribution of the founder members of Lusophone Network of Biobanks and Biological Collections (2023).

Thank you for your attention!

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