SLICES

European Scientific Large-Scale Infrastructure for Computing/Communication Experimental Studies

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June 28, 2022

Third generation Mid-Scale Test Platforms

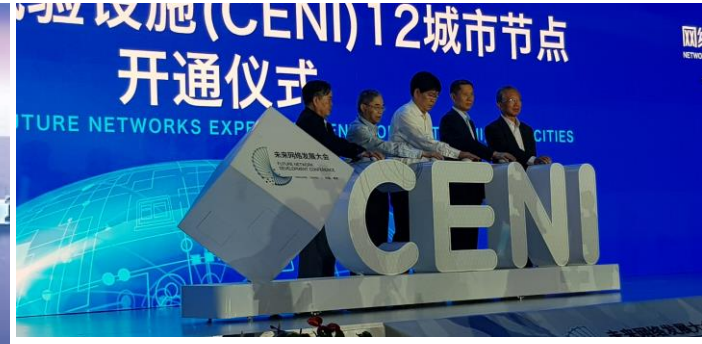
USA NSF PAWR (Platforms for Advanced Wireless Research): NSF + Industry, 100M€, 2017-2022

NSF Fabric: NSF, 20 M€, 2019-2023

Colosseum: NSF-DARPA, 20+7,5M$, 2017-2025.

BRIDGES: NSF, 2.5M€, 2021-2024

EU Horizon Europe
ICT 17-19-52, 2018-2022, 205 M€
SNS Stream C, first call, 2022-2025, 25M€



China CENI
Chinese Experimental National Infrastructure
2018-2022
190 M€

Lessons learned from past and present platforms

Previous and current generations are successful but however,

- "Not recognized"
- Not sustainable

Change the narrative

- Federation is not transformative
- Science driven (The full research life-cycle)

ESFRI SLICES

- On the ESFRI Roadmap 2021
- New generation

Research Infrastructures as a Scientific Instrument

ESFRI

MAKING SCIENCE HAPPEN

A new ambition for Research Infrastructures in the European Research Area

http://www.esfri.eu/

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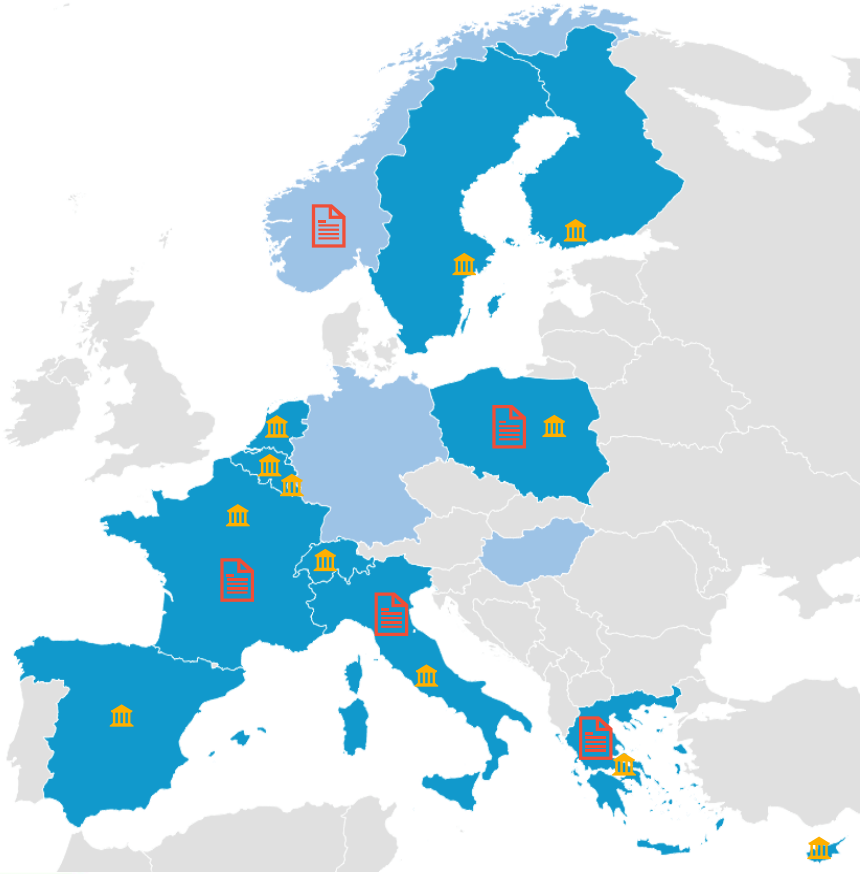
A vibrant community

SLICES for research on Digital Infrastructures



Initiated in 2017, **25 partners** from 15 countries:

- **12 political support** from National Ministries
- included in **5 national roadmaps**

SLICES will enable **scientific excellence and breakthrough** and will **foster innovation in the ICT domain**, strengthening the **impact of European research**, while contributing to European agenda to address **societal challenges**, and in particular, the twin transition to a sustainable and digital economy.

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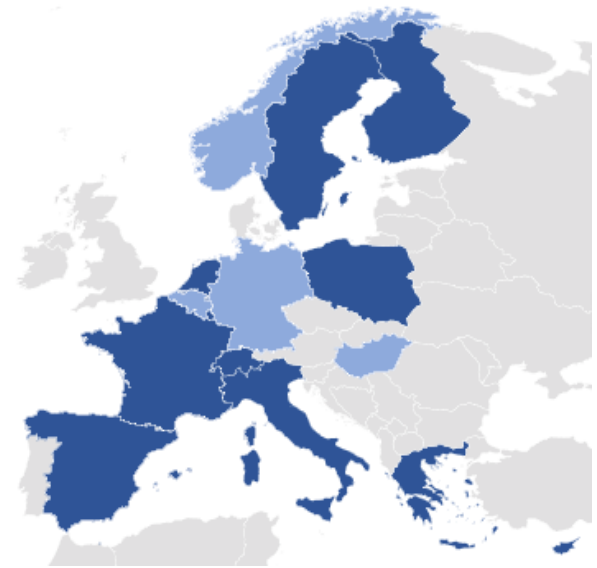
Current status of the partnership



SLICES
ESFRI successful application – 2020

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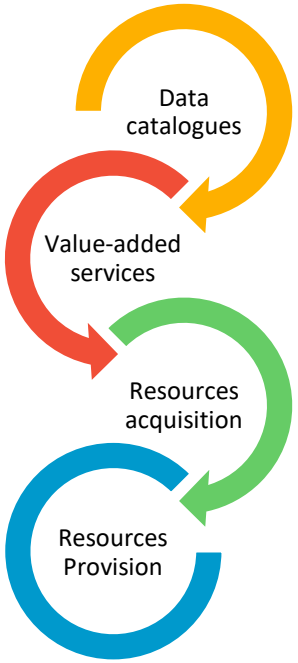
Countries	Government	Research and Academia		Industry	Clusters, networks and others	NRENs	Worldwide support
	National support	*Partners*	*Support*				
Core partners							
	Flemish conditional support + Walloon financial support to a linked project						
	Local support confirmed						

A strong identity

SLICES, first in digital sciences to entered the ESFRI Roadmap 2021

what we offer

- Launched in 2017, **SLICES** is an **RI** to support the **academic and industrial research community** that will design, develop and deploy the **Next Generation** of **Digital Infrastructures:**
  - **SLICES-RI** is a **distributed RI** providing several **specialized instruments** on challenging research areas of Digital Infrastructures, by **aggregating** networking, computing and storage **resources** across countries, nodes and sites.
  - ***Scientific domains***: networking protocols, radio technologies, services, data collection, parallel and distributed computing and in particular cloud and edge-based computing architectures and services.

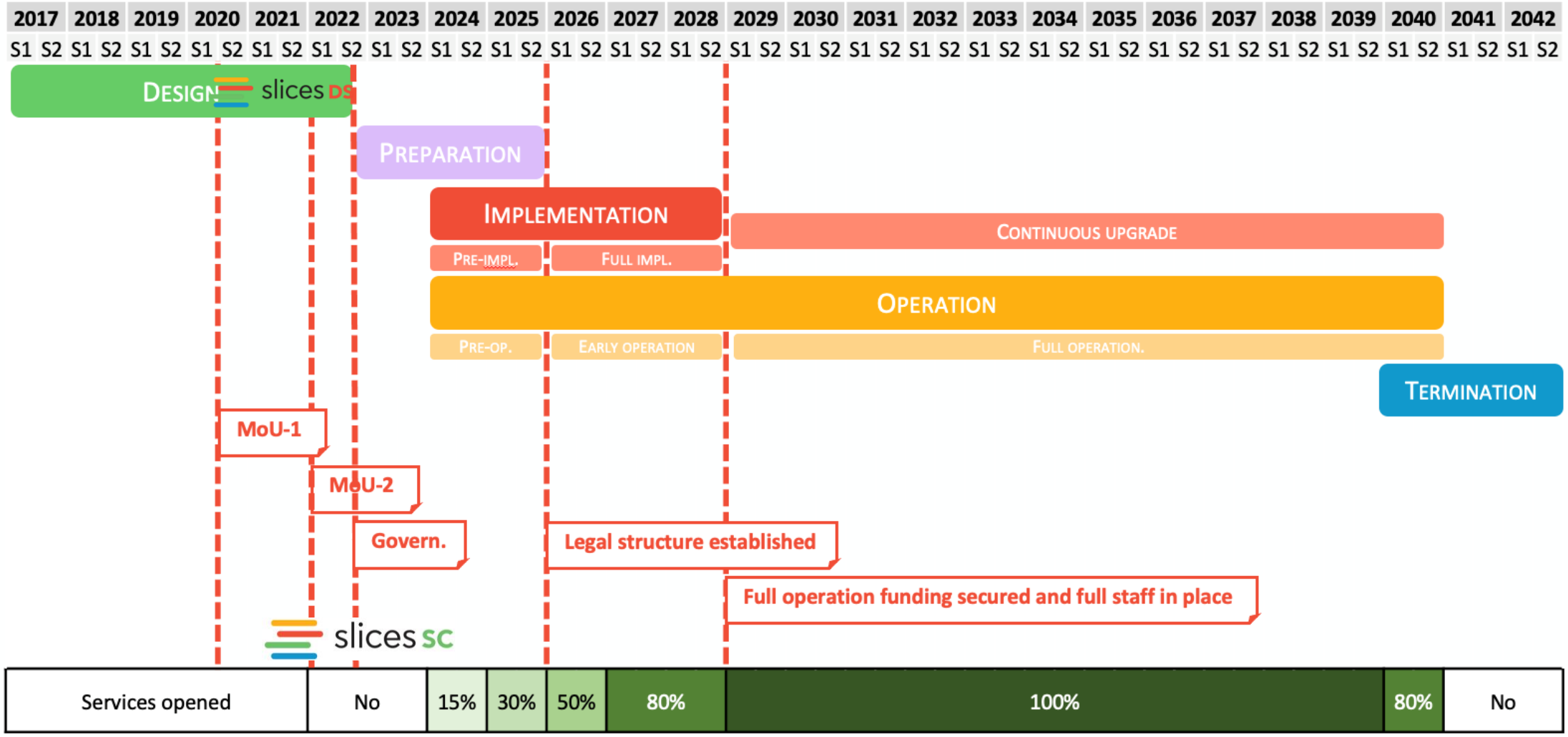


www.slices-ri.eu

Fully Controllable, programmable Virtualized Digital Infrastructure Test Platform
Openness

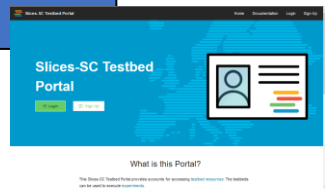
A sustainable facility

SLICES timeline



FED4FIRE

2012-2022



SLICES leverages access to national funding

SLICES on the ESFRI Roadmap 2021 *(indicative)*

- ***Italy:*** 5.6M€, 2022-2025, +
- ***Finland:*** 6.2M€, 2022-2025
- ***Poland:*** 6M€, 2021-2025 years, +
- ***Spain:*** 20M€, 2021-2024, +2M€ proposal 3 years
- ***France:*** 15M€, 2022-2028, PEPR Cloud – PEPR 5G

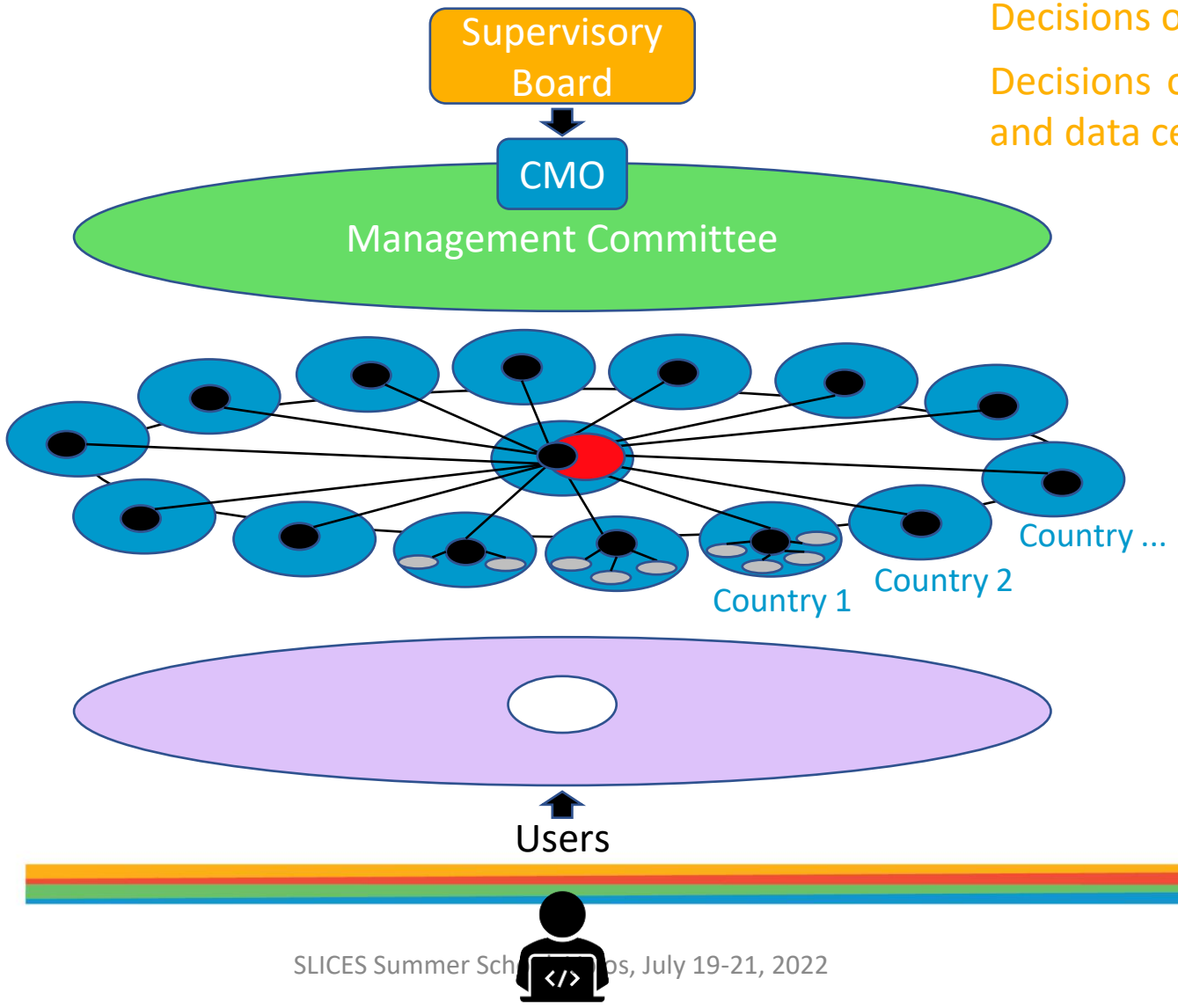
SLICES governance

SLICES is a distributed RI

Centralised governance

Distributed Infrastructure

Single entry point, single access policy



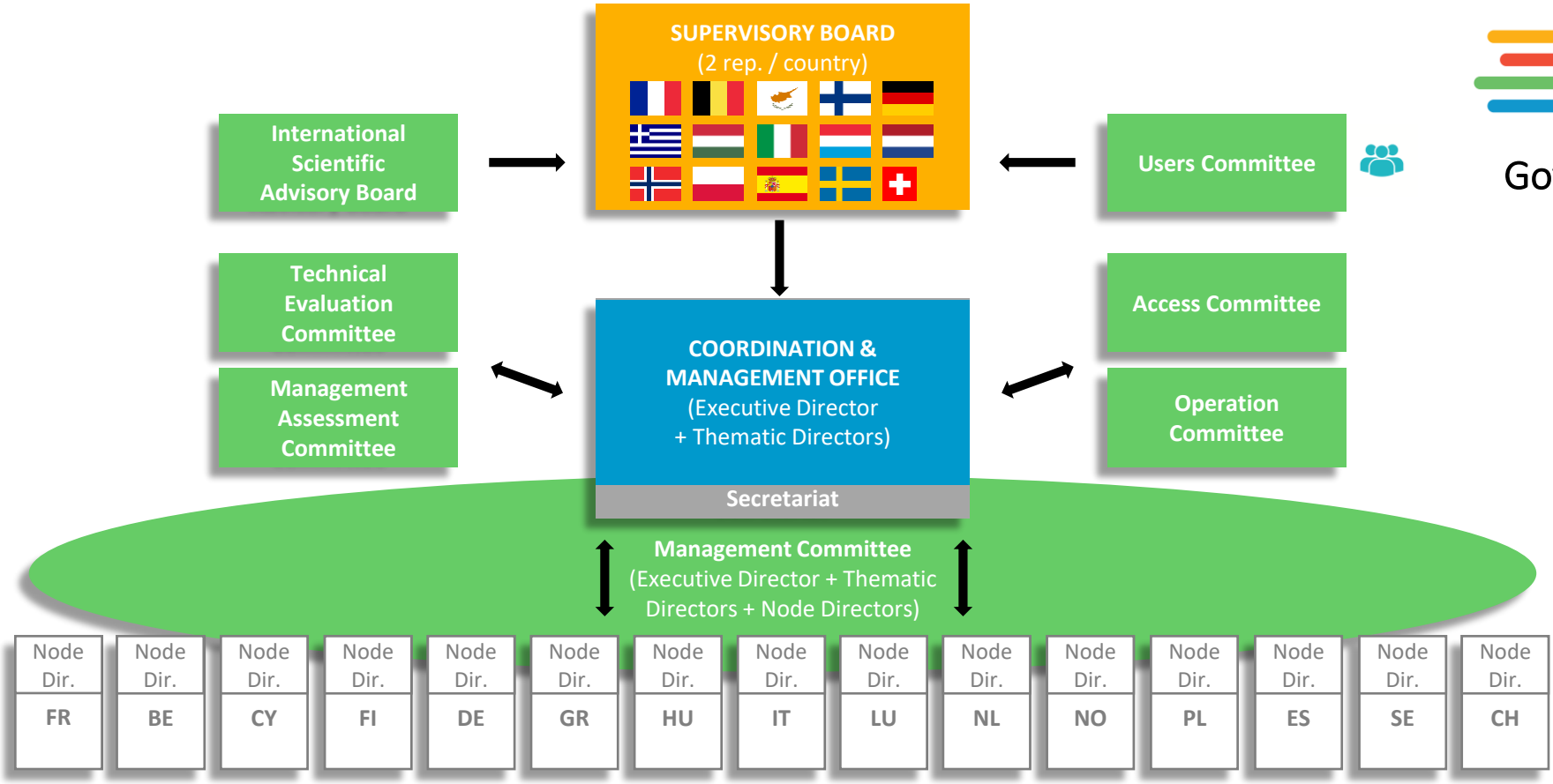
Joint investment strategy

Decisions on new nodes

Decisions on core functions and data centre

Optimize the distribution of resources according to needs and competences: control plane, edge computing and slicing, terahertz, MIMO, ….

End Design & Preparation - Q1 2022



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Governance structure

Impact assessment

A real challenge

Important “competition”

Large Scale Infrastructures as a support to the design and validation of systems

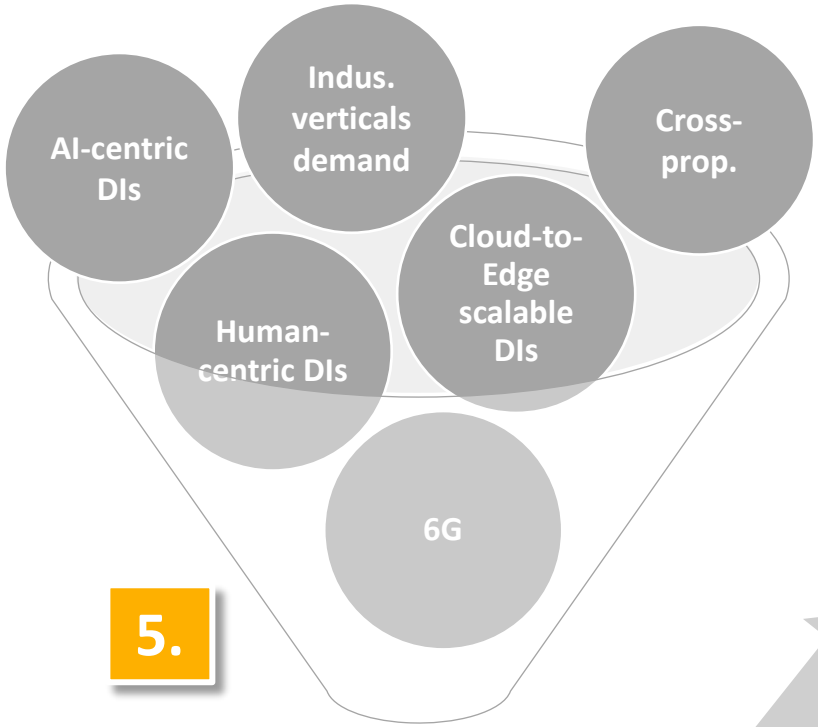
- ACM SigComm scientific publications
- See Facebook Terragraph Lab
- etc.

Open source software and network disaggregation

A community responsibility: International cooperation

Prioritisation of research topics

What's the methodology behind it?



5.

- New waveforms, higher frequencies up to THz.
- Spectrum and wireless management.
- Integrated sensing and communication.
- Heterogeneous radio management.

ADVANCED WIRELESS NETWORKING

- Advanced protocols and architectures (virtualization, softwarization, programmability).
- AI applied to infrastructure operation and optimization.
- Generation of data to train algorithms.
- Distribution of intelligence into (and beyond) the Edge of the network.

SMART INFRASTRUCTURE OPERATION AND MANAGEMENT

- Fog/Edge/cloud hyper converged infras
- Software component deployment.
- Distributed resource management & microservices.
- Geo-distributed data management.
- Federated deep learning.
- Datacentres infras for distributed systems, appli. and software stacks.

DESIGN & VALIDATION OF NEW DIS AND HYPER-CONVERGED INFRAS

- New challenges arising from the verticals and the ubiquitous networks.
- Interoperability, composable infrastructure services on-demand (RI as a Service).
- Seamless user experiences across technologies and domains.

ADVANCED FUNCTIONALITIES

ENERGY EFFICIENCY AND CARBON FOOTPRINT

SECURITY AND PRIVACY

Breaking down in priority research topics

Simultaneous but progressive exploration of research topics

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“The Network is the Computer”

John Gage, Sun Microsystems, 1984

“We will think of a network as a programmable platform” …
“We will no longer think in terms of protocols. Instead, we will think in terms of software.

Nick McKeown, ONF Connect, 2020

“The network will be programmed by many and operated by a few ».

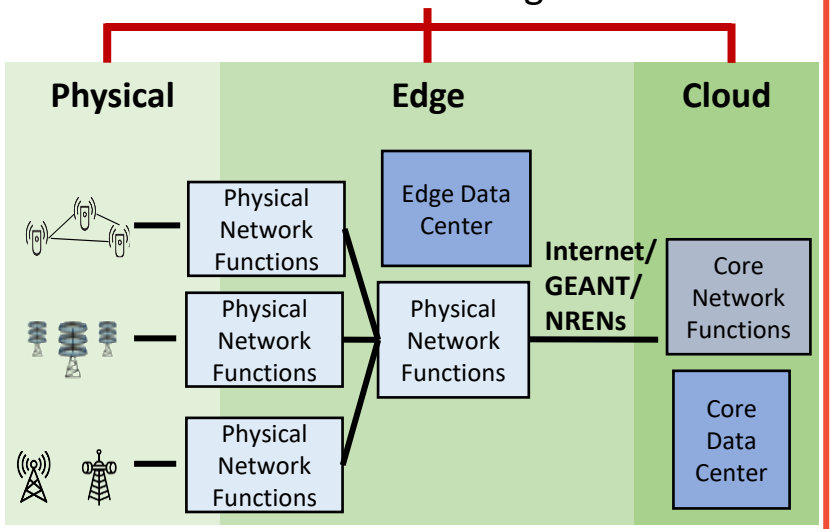
Nick McKeown, NetworkingChannel, March 2021

SLICES Full research lifecycle
Open data & Reproducibility

SLICES contribution to the development of the EOSC

Objectives: **federate existing research data infrastructures in Europe** and **realise a web of FAIR data** and **related services for science.**

#1 Enable experimentation at multiple network levels through **SLICES RI**



Allow experimentation with future/emerging digital, IT and network technologies (e.g., 6G, IoT, Edge, AI, hyper-converged infrastructure).

#2 EU-wide availability of **unique Software and App Repositories**

- ICT research-related services (e.g., testing new infrastructure and network solutions);
- Applications deployed within SLICES;
- Simulation tools;
- Data analysis tools.

Published in the EOSC Catalog and Marketplace and accessible with different access options.

open access

Orderable via provider channel

Orderable via EOSC hub

#3 Interoperability with **Open and FAIR data**

- Producers of unique data;
- Maximize data reuse by adopting of FAIR data principles in Data Management and Governance;
- Processing of sensitive and personal information.

#4 Integration of the **SLICES communities to EOSC**

- SLICES community building
  - More than 120 participants to the 1st SLICES workshop;
  - Thousands of users of existing infrastructures.
- Training services

A reference architecture

Open-RAN/Core/Edge Solutions for Cloud-Native Telco Experimental Platforms

Thanks for your attention

For more information, please contact:
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