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Research Infrastructure Intelligence in National CRIS Systems

Lessons from European Roadmapping Practice

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OPENING

A national CRIS, built under fire

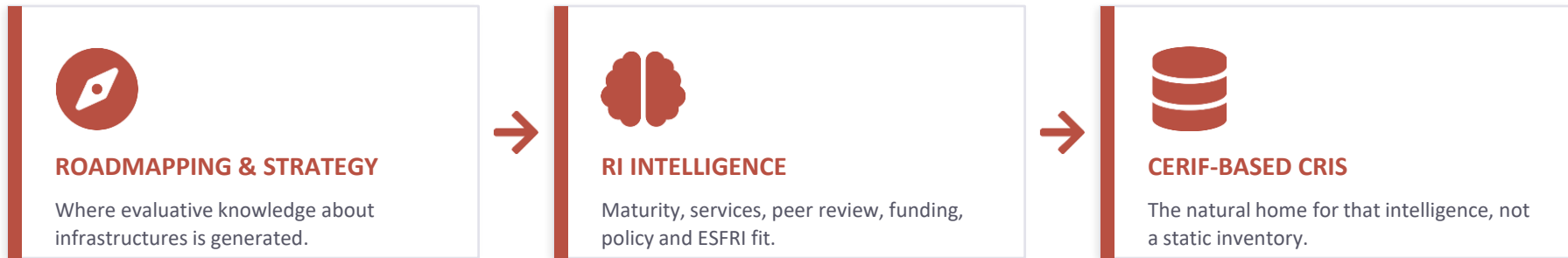
Ukraine is building the **Science Map of Ukraine** inside its national CRIS, URIS, in the middle of war, and with one eye on reconstruction.

It forces a question this room knows well:

what does a CRIS actually need to *know* about a research infrastructure?

Two communities, one question

I come to this as an infrastructure person, not an information systems engineer. The dialogue between our two worlds is the point, and I am here to learn as much as to argue.



WHERE WE ARE GOING

What infrastructures now are, where their intelligence is generated, why mapping keeps failing, what good capture looks like today, what AI changes, and what all of this means for Ukraine.

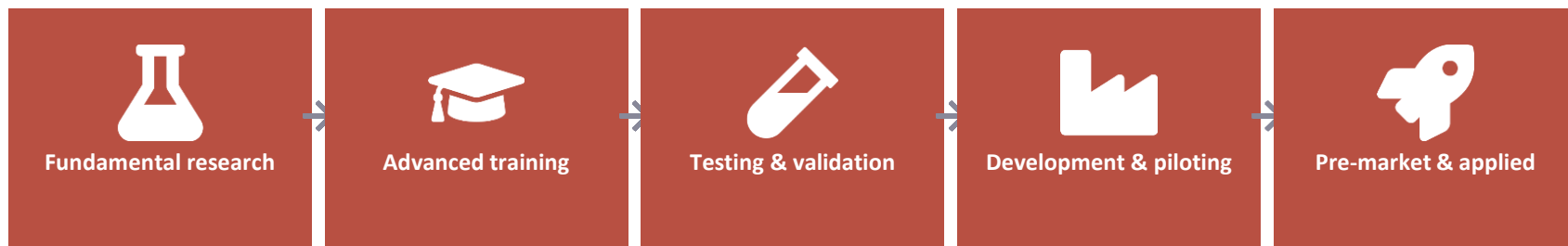
From RI to RTI: the European Strategy on Research and Technology Infrastructures

The 2025 Strategy widens the frame from research infrastructures to **research and technology infrastructures**, and organises action around five areas. I had the privilege of contributing to this direction as a member of the European Commission Expert Group on Technology Infrastructures.

- 1 Strengthening the ecosystem**
- 2 Simplifying access**
- 3 Attracting and retaining talent**
- 4 Improving governance**
- 5 Strengthening resilience and international reach**

Defined by what they do, not by what they are

The centre of gravity moves from the asset to the service. An infrastructure is increasingly understood as a portfolio of services along the research and innovation pipeline.



The forms this takes: large RIs (single-sited and distributed), smaller RIs, and test beds, pilot lines, pilot plants, demonstration facilities, cleanrooms and living labs. The value lies in helping users de-risk and accelerate, not in the asset itself.

If infrastructures are services, the unit of description changes

FROM THE FACILITY

A place, equipment, a contact point. A record that tells you the infrastructure exists.

TO THE SERVICE

Disruptive research, support to advanced training, testing, piloting, validation, with a readiness level, an access modality, and a sector served.

The question for a CRIS is no longer only where the facility is, but what it can do, for whom, at what readiness, on what terms. In CERIF terms, **cfServ moves from the margin to the centre**. This is precisely where I most need this community's expertise.

Europe is already organised around roadmaps

24

active national RI roadmaps

in EU and Associated Countries

63

ESFRI research infrastructures

41 Landmarks and 22 Projects

€25B

pan-European investment

agenda coordinated by ESFRI

31

countries engaged

in RI roadmapping overall

FOUR LEVELS, ONE LOGIC

Global (CERN, ESO, SKA). **European** (ESFRI, ERICs). **National** (Czech 43 RIs, Portugal 56 RIs). **Regional and institutional** (RIS3).

Each national roadmap is a structured evaluation exercise, which is precisely why it generates intelligence worth capturing.

What every roadmap shares, and where they diverge

ALL ROADMAPS HAVE

- ✓ Open calls for proposals
- ✓ Prioritisation based on evaluation
- ✓ Scientific peer review
- ✓ Monitoring of projects and RIs
- ✓ Independent national and international experts

BUT THEY DIVERGE ON

Frequency of calls	Annual (Austria) to once a decade (Spain)
Panel composition	National only to international heavy (CZ, PT, NO)
Criteria weighting	Science 40 to 60%, feasibility 20 to 40%, strategy 20 to 30%
Funding linkage	Automatic funding, or an input to a decision
RIs on the roadmap	12 large (Germany) to 70 across scales (Poland)
Update cycle	Every 2 years (Norway) to 8 years or more (Austria, Spain)

Czech Republic, Portugal, Norway

CZECH REPUBLIC

43 RIs

International evaluation panels,
with strong landscape analysis
feeding prioritisation.

PORTUGAL

56 RIs

Explicit link to smart specialisation
(RIS3), international panels,
strategic fit weighting.

1st Edition, not subsequent

NORWAY

2-year cycle

A short update cadence keeps the
intelligence current, so the data
never goes stale.

Three different designs, but each produces the same kinds of evaluative knowledge about its infrastructures.

Funding is an information problem too

RI managers face a fragmented and opaque funding landscape, with little transparency on the instruments available across the lifecycle. **FUND-RI**, which INESC TEC coordinates, reframes infrastructures by their contribution to value chains rather than by cost.



A fragmented landscape

Capital, access and operations are funded through disconnected instruments at EU, national and regional levels.



A lifecycle logic

Investment needs to follow design, construction, operation and renewal, not single moments.



An information gap

Systemic investment needs lifecycle, services and funding intelligence in one place, which is exactly what a CRIS could hold.

Everyone wants a map. Why now?



Industrial access

SMEs, start-ups and scale-ups need to find services for testing, piloting and validation.



Strategic autonomy

Competitiveness and sovereignty depend on knowing what capacity exists, and where.



Evidence for investment

Funders and smart specialisation need to see gaps, overlaps and complementarities.



Recovery and resilience

In reconstruction, a map is how a country decides where to rebuild science first.

Why earlier maps did not last: MERIL and its national cousins

MERIL, the Mapping of the European Research Infrastructures Landscape, was a serious effort built on CERIF. Yet, like many national exercises, it was a **static directory**. It is no longer actively maintained. The reasons are instructive.



A snapshot, not a system

It recorded a moment, with no mechanism to stay current.



Voluntary updates

Maintenance depended on goodwill, so the data quickly went stale.



No strategic dimension

It recorded existence, not worth, lifecycle or evaluation standing.



Heterogeneous taxonomies

Different schemes across countries blocked genuine comparison.



No governance or financing

No ownership, no obligation, and no sustained funding after the project.

A map is not a directory



LIVING

Updates arrive as a by-product of normal work, not as a separate chore.



GOVERNED

Clear ownership, obligation and accountability for what the record says.



STRATEGIC

Tied to evaluation and investment cycles, so it carries worth, not just existence.



SERVICE-ORIENTED

Describes what an infrastructure does, at what readiness, and for whom.

CERIF already has the entities

CERIF 1.6, relevant entities

cfServ

the services the RI provides

cfFacility

the infrastructure itself

cfEquip

laboratory equipment

cfGeoBBox

geolocation of the RI

Under the services turn, cfServ is no longer a footnote.

AND IT LINKS OUTWARD

Classifications: ESFRI domains, plus national schemes such as research fields and RIS3.

Core entity links: Organisation, Project, Researcher, so an infrastructure's intelligence is connected to who runs it, what funds it, and who uses it.

FRIS: the governed golden record

Where MERIL relied on goodwill, **FRIS relies on governance**. A 2019 funding law and agreements with the Research Foundation Flanders made reporting infrastructures to FRIS an obligation, and the data flows automatically from each institution's own CRIS, in CERIF.



Obligation, not goodwill

Reporting is required, so the data is supplied and kept current.



Owned by the institutions

The contract is with the institutions, with no manipulation of their data.



One golden record

Records are merged through shared identifiers into a single authoritative view.



Separate underneath

Each source is kept distinct below, reconciled on top, so provenance is never lost.

SK CRIS: a working national instance

~0000s

research infrastructures, laboratories and
devices recorded

CERIF 1.6, in test operation

A relational data model

Built to maximal CERIF 1.6 compatibility.

Two intake routes

Online forms for organisations, plus APIs from grant agencies.

Dual classification

International schemes and national research areas.

Linked to the core

Tied to the Organisation, Project and Researcher entities.

MATCHER: a service discovery system, not a directory

A recent EU call asked for the mapping of Europe's technology infrastructures. **MATCHER**, a Danish-led consortium. Its premise: companies search for services, not for infrastructures.

HOW IT PROPOSES TO USE AI



Harvests, not waits

An AI agent reads providers' own websites and documents, in any EU language, and a language model extracts structured records with provenance.



Grounded, not free-floating

Answers are constrained to validated records and linked source evidence, with confidence-aware fallback when evidence is thin.



Support, not oracle

Natural-language matchmaking couples a need to a service. AI assists, it does not decide, and critical records are validated by people.

Open source, an open API interoperable with EIB TechEU, and a commitment to operate it for at least five years.

A national exercise, and its CRIS backbone

INESC TEC is preparing a national platform with two faces, designed to sit on the national CRIS backbone rather than beside it.

A TECHNOLOGY PORTFOLIO

Federated from the catalogues of technology transfer offices, normalised by readiness level, licensing and protection.

A SERVICES CATALOGUE

The testbeds, pilot lines, living labs and cleanrooms, organised for the user by technology domain.

AI inside, CRIS underneath. Intelligent, semi-automated ingestion and validation of existing data, and intelligent matchmaking between supply and demand. It is being designed to rest on the national CRIS framework, **PTCRIS** and **CIENCIAVITAE**, rather than to reinvent it.

Five honest questions for this community

1 Inventory, or intelligence?

AI harvests what exists. It cannot harvest what an infrastructure is worth. Does it solve the easy layer and leave the hard one untouched?

2 Whose infrastructures become visible?

A crawler reads what is digitally visible. Do we quietly render the under-resourced, and a country at war, invisible?

3 Extraction, or golden record?

A golden record is owned and reconciled. An extraction is a probabilistic reading of a marketing page. What is its standing in a national CRIS?

4 Where does curation go?

If updating is automated but assurance stays human, does AI remove the sustainability problem, or simply move it?

5 Does the map shape the territory?

Once maps steer investment, visibility becomes a gatekeeper. Does governance of the map then matter more, not less?

Alignment beats more indicators



Reporting burden on RI managers falls when CRIS systems align with **roadmap and monitoring evaluation cycles**, rather than imposing bespoke indicator sets on top of them.

THE CONCERN

RI managers face proliferating, overlapping KPI frameworks. Each new request adds collection effort with little reuse.

THE FINDING, AND A LIVE TEST

When the CRIS captures what the evaluation already needs, reporting becomes a by-product. FORWARD applies exactly this logic to Ukraine's ERA Roadmap monitoring.

From roadmapping to a monitoring system Ukraine owns

RIFF brought the roadmapping. **FORWARD** goes further: not a parallel structure, but support to Ukraine's own monitoring of its Roadmap for Integration into the European Research Area to 2027.

MESU	the policy owner, ensuring alignment with national priorities
UkrISTEI	building the operational monitoring system and its indicators
State Scientific & Technical Library	the data, metadata and analytics backbone
MUNI, INESC & others	continuity from the RIFF roadmap process

In reconstruction, a map of research infrastructure is how a country decides where to rebuild science first.

Intelligence is the substrate AI needs

AI cannot conjure the worth of an infrastructure. It can only reason over what we have already structured. **RTI intelligence, codified in CERIF, curated in national CRIS, and described at the level of services, is the substrate that makes machine reasoning over the research and innovation landscape meaningful rather than noisy.**



A structured substrate

Curated, governed records give AI something trustworthy to reason over.



Interoperable by design

Shared classifications let intelligence travel across borders.



A shared task

The two communities must build this together, infrastructure and CRIS alike.



Build CRIS to carry intelligence, not just inventory.

Roadmaps and the European Strategy generate it. CERIF can hold it. FRIS and MATCHER show how.

Ukraine shows why it matters most when the stakes are highest.

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