



GreenDIGIT Project for Greening Future Research Infrastructures

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ICRI2024 Session/Panel “Greening Research Infrastructures”

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GreenDIGIT Project: Founding Digital RIs (ESFRI)

- **EBRAINS** - An open research infrastructure that gathers data, tools and computing facilities for brain-related research
- **EGI** - International federation delivering e-Infrastructure and open solutions for advanced computing and data analytics in research and innovation
- **SLICES** - Scientific Large-scale Infrastructure for Computing and Communication Experimental Studies
- **SoBigData** - Distributed, Pan-European, multi-disciplinary research infrastructure aimed at using social mining and Big Data to understand the complexity of our contemporary, globally interconnected society



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Sustainability Aspects: Energy Efficiency – Decarbonisation – Environmental Impact

- **Energy Efficiency in Digital Infrastructures:**

- **Definition:** This refers to optimizing digital infrastructures to consume as little energy as possible for a given workload or service. It's about achieving more computational or storage results with less energy input.

**Architecture, Design,
Recommendations**

- **Decarbonization of Digital Infrastructures:**

- **Definition:** This specifically targets the reduction of carbon emissions associated with the operation and maintenance of digital infrastructures.

**Operation,
Monitoring, KPI**

- **Reducing Environmental Impact of Digital Infrastructures:**

- **Definition:** This is a more comprehensive consideration of the various ways digital infrastructures might affect the environment, going beyond just energy consumption and carbon emissions.

**Lifecycle, Policy,
Training**



GreenDIGIT project (2024-2027) – Objectives

- **O1: Assess the status and trends** of low impact computing within 4 DIGIT RIs (EGI, SLICES, SoBigData, EBRAINS) and wider ESFRI community, to produce **recommendations and roadmaps** for RIs green transition.
- **O2: Provide reference architecture and design principles**, reflecting on the **whole RI lifecycle** and including the digital infrastructure components.
- **O3: Develop new and innovative technologies, methods, and tools** for digital **service providers** within European Research Infrastructures.
- **O4: Develop and provide for researchers the tools** to support the design and execution of environmental sustainability aware scientific applications with Open Science and FAIR data management considerations.
- **O5: Educate and support RI service providers and researchers** about good practices on environmental impact conscious lifecycle management and operation of infrastructures and services.

Shared Responsibility in Sustainability – Reflecting Operational and Management Aspects and Roles

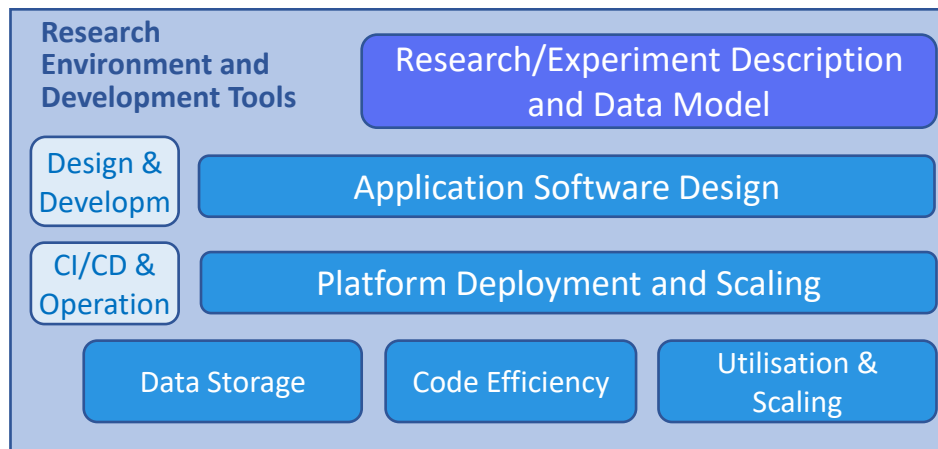


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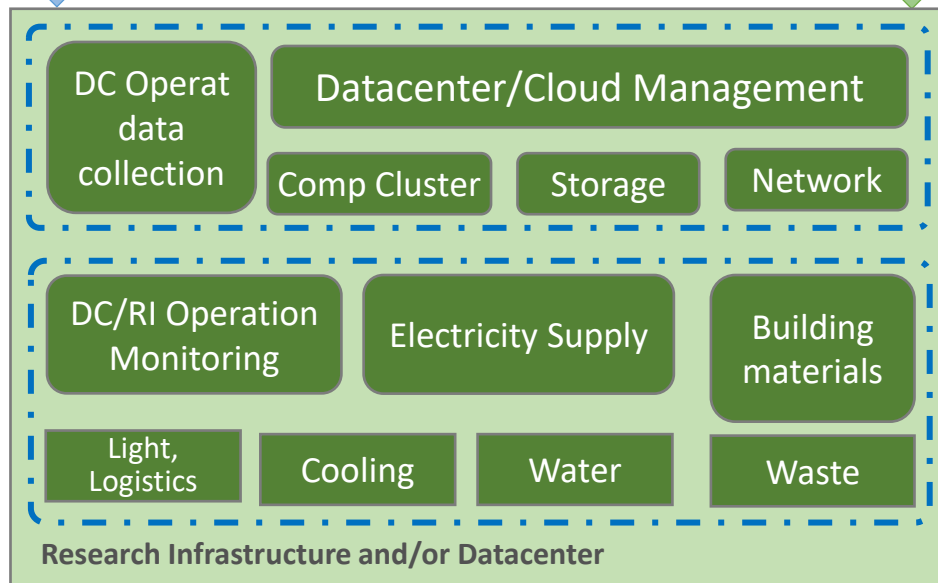
Users responsible for sustainability **on** the RI



Providers responsible for the sustainability **of** the RI



Exchange resources availability and status, monitoring metrics and KPI (API, Info model)



Standards and regulations
Software Development
Quality and Design Patterns

Project/Researcher Responsibility:
Applications Development, Deployment, Operation, Energy usage and KPI monitoring

Provider/Operator Responsibility:
Research Infrastructure or Datacenter, Monitoring Energy and environmental impact metrics and KPI

Standards and regulations
Datacenter and RI Building and Operation

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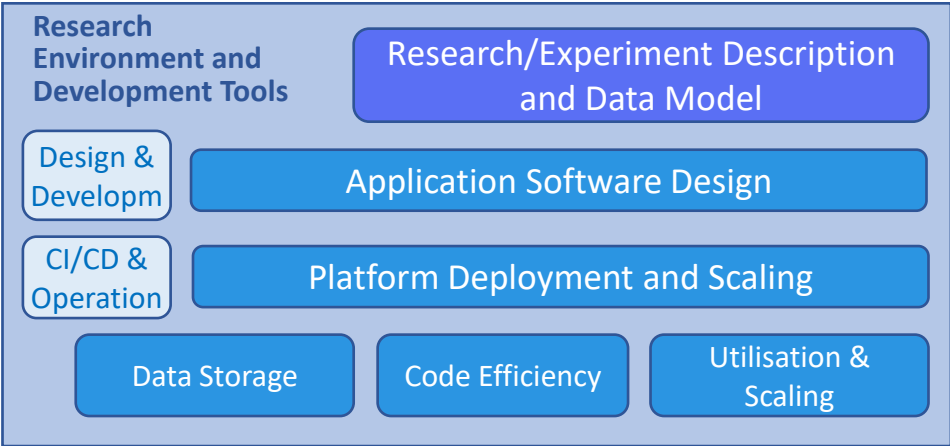


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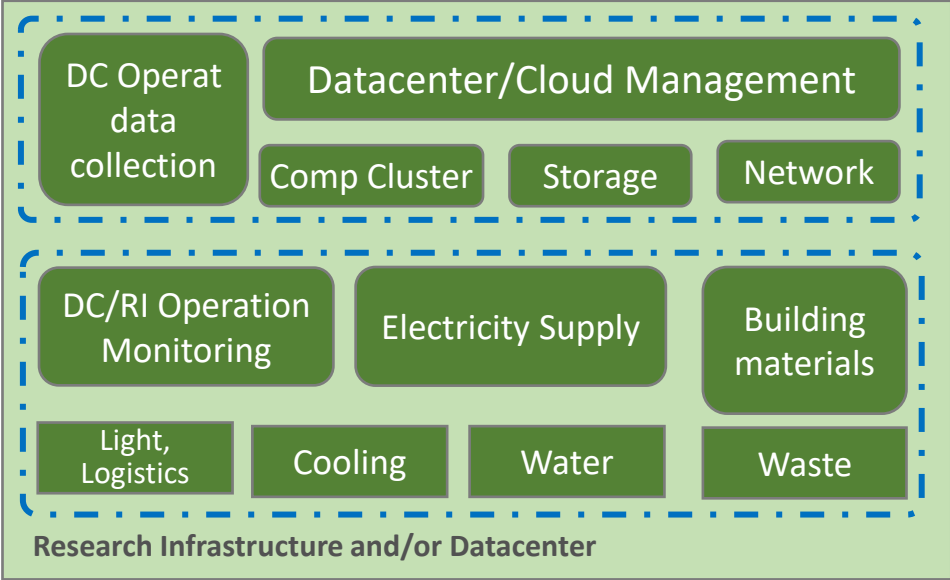
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Sustainability by Design

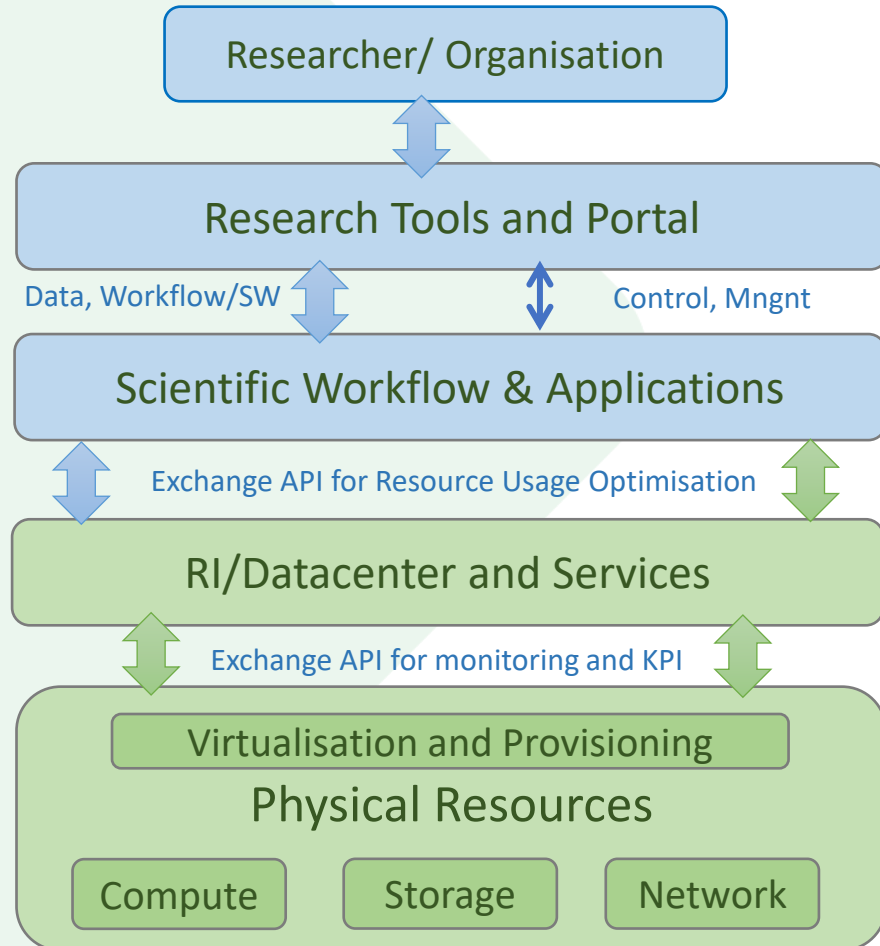
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RI Sustainability by Design Components/Aspects

Data Management (FAIR)



Dev Tools,
IDE/SDK,
Advice/
Assess

- **Architecture for Sustainability by Design**
 - Functional components, layers, API, Requirements
- **Software and application components that can be optimised during design and controlled during operation**
 - Green aware API including necessary energy, performance, environment information
- **Common information/data model and metadata (naming)**
 - Including Requirements, KPI, Metrics + FAIR
- **RI and applications lifecycle**
 - RI lifecycle stages (concept, design, development, deployment, operation, decommissioning) and scientific workflow and research data



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Discussion Topics to Facilitate Environmental Sustainability of RIs

- Energy efficiency **on/of** Research Infrastructure/Research Environment
 - Environmental Sustainability and emerging GenAI/LLM powered science
- **Shared Responsibility** in Environmental Sustainability
- Research community cooperation and **co-development** for targeting and achieving environmental sustainability
 - Joint workshops and events are an effective way to go