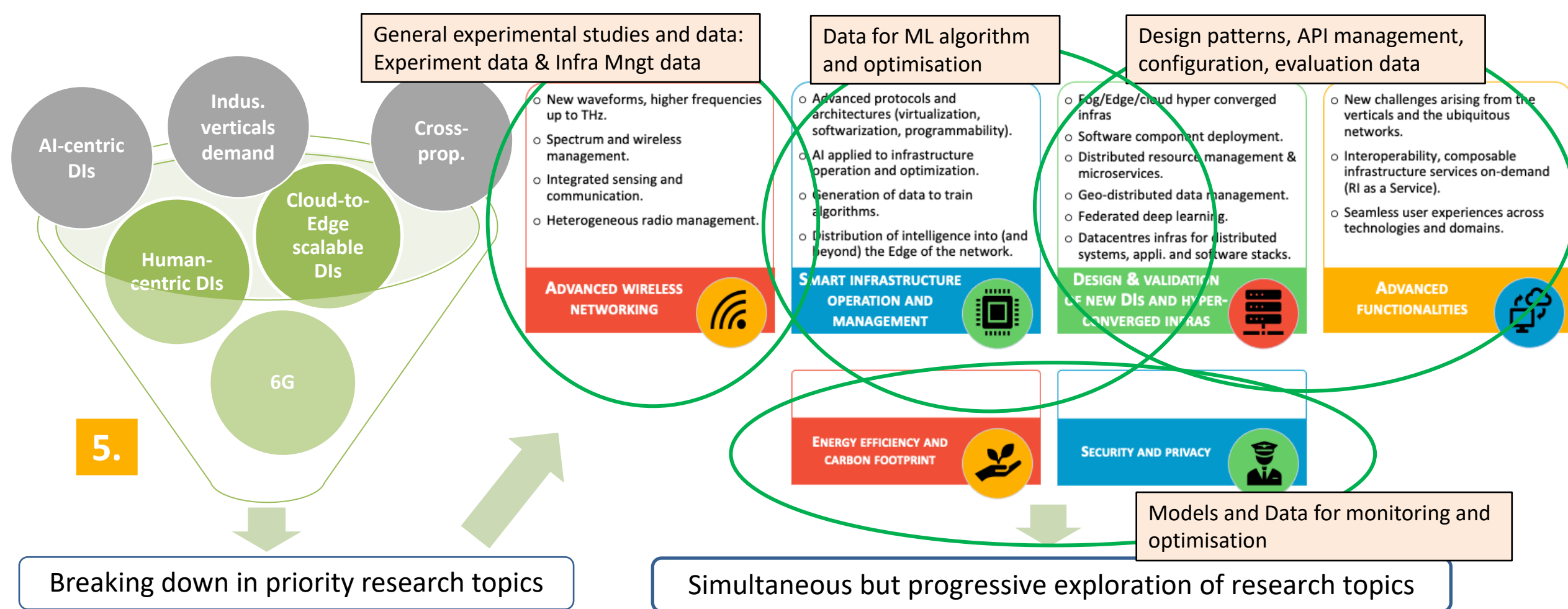


# Experimental Research Reproducibility and Data Management Infrastructure in SLICES-RI

Yuri Demchenko, Cees de Laat, Paola Grosso, Chrysa Papagianni, Wouter Los (University of Amsterdam)

## Different Types of Data for Different Experimental Studies



SLICES-NL Research Topics

General experimental studies and data documentation and publication

**FAIR (Findable, Accessible, Interoperable, Reusable)** data principles are key for experimental data sharing

**Metadata** profiles to be defined for major types of experiments and supported by data and metadata management tools

**Infrastructure management information** to be recorded as experiments environment

**Research Object (RO)** and FAIR Digital Object (being developed by EOSC)

Data produced for AI/ML algorithms training for smart infrastructure optimisation and management (including energy efficiency, performance, resilience, sustainability)

Data modelling and data lineage (staging documenting)

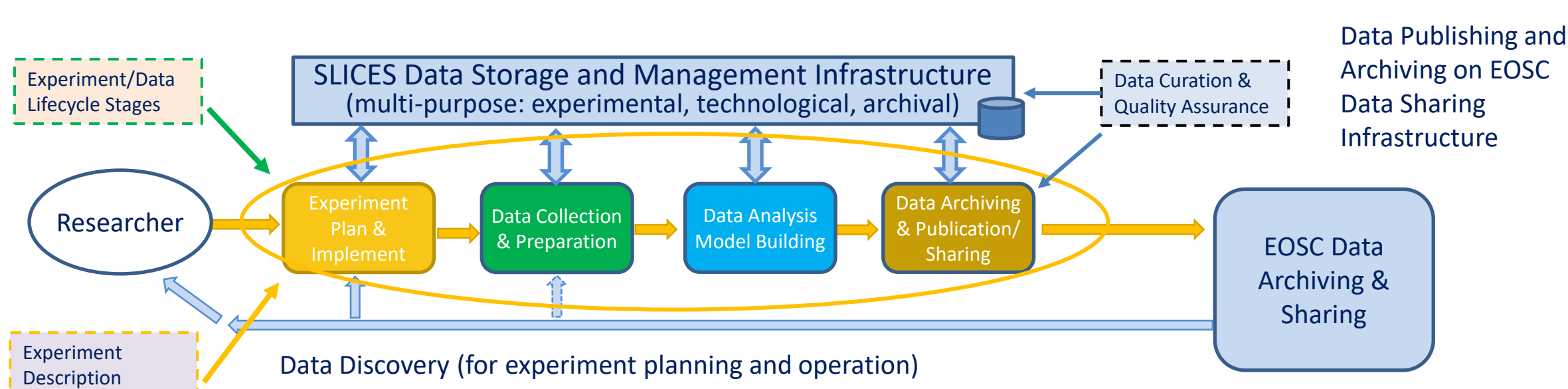
AI/ML models serialization and portability

New Digital Infrastructure architecture elements and design patterns

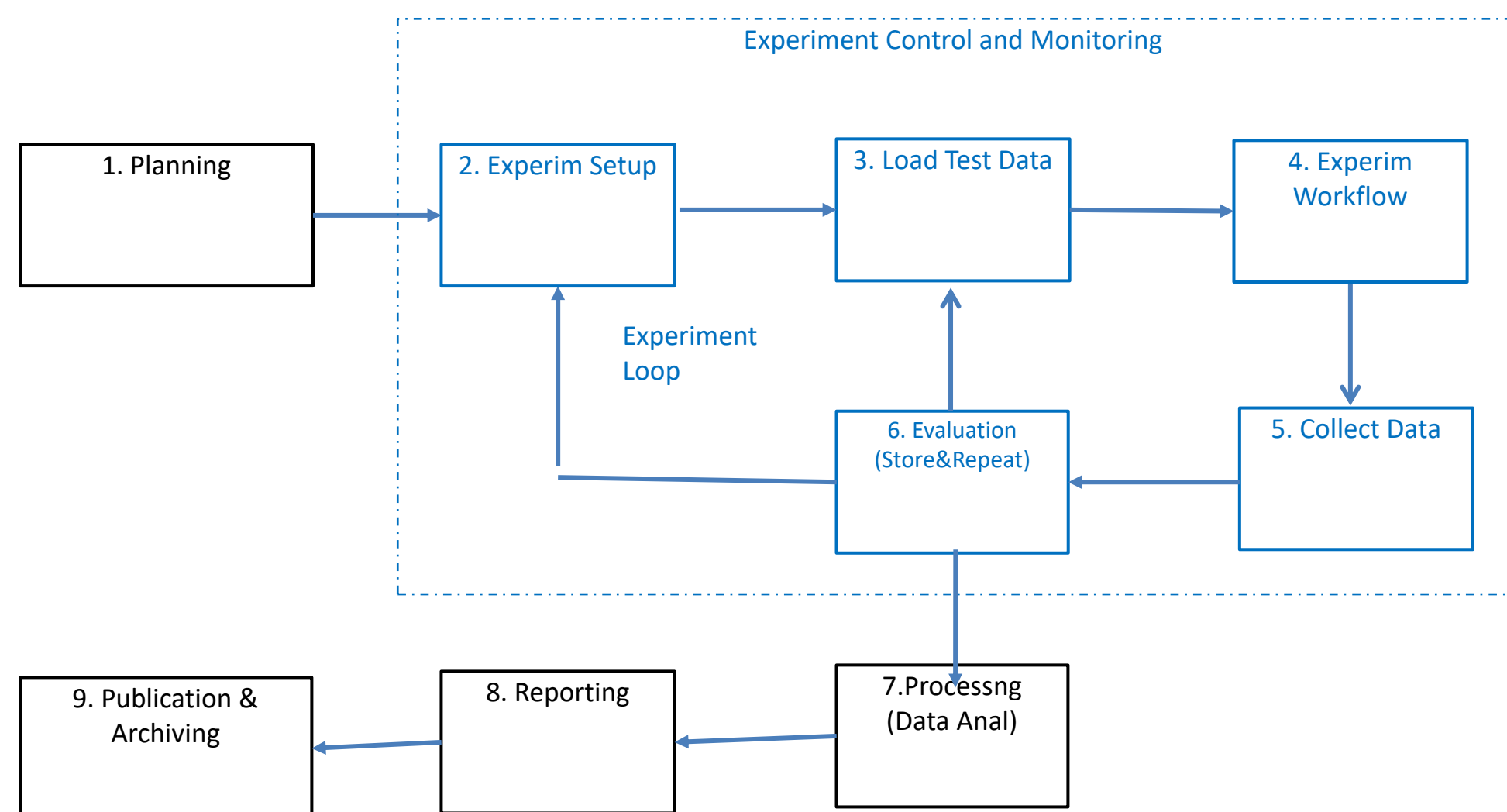
Infrastructure and design patterns

Metadata for API description, identification, composability

## SLICES-RI Interconnection Architecture



## Platform Research Infrastructure as a Service (PRIaaS)



SLICES to support experiments reproducibility to comply with Open Science

Focus on **repeatability** and **reproducibility** with the future support of **replicability**

Robust, reproducible experiments

- Documenting all relevant parameters and environment for experiments
- Automate the documentation of experiments
- Well-structured experiment workflow may serve as documentation

Benefits for research community

- Reduce amount of work for experimenters to create reproducible experiments
- Reduce amount of work for other researchers to recreate and re-run experiments
- Make reproducibility an integral part of experiment design
- Automate entire experiment (setup, execution, evaluation)

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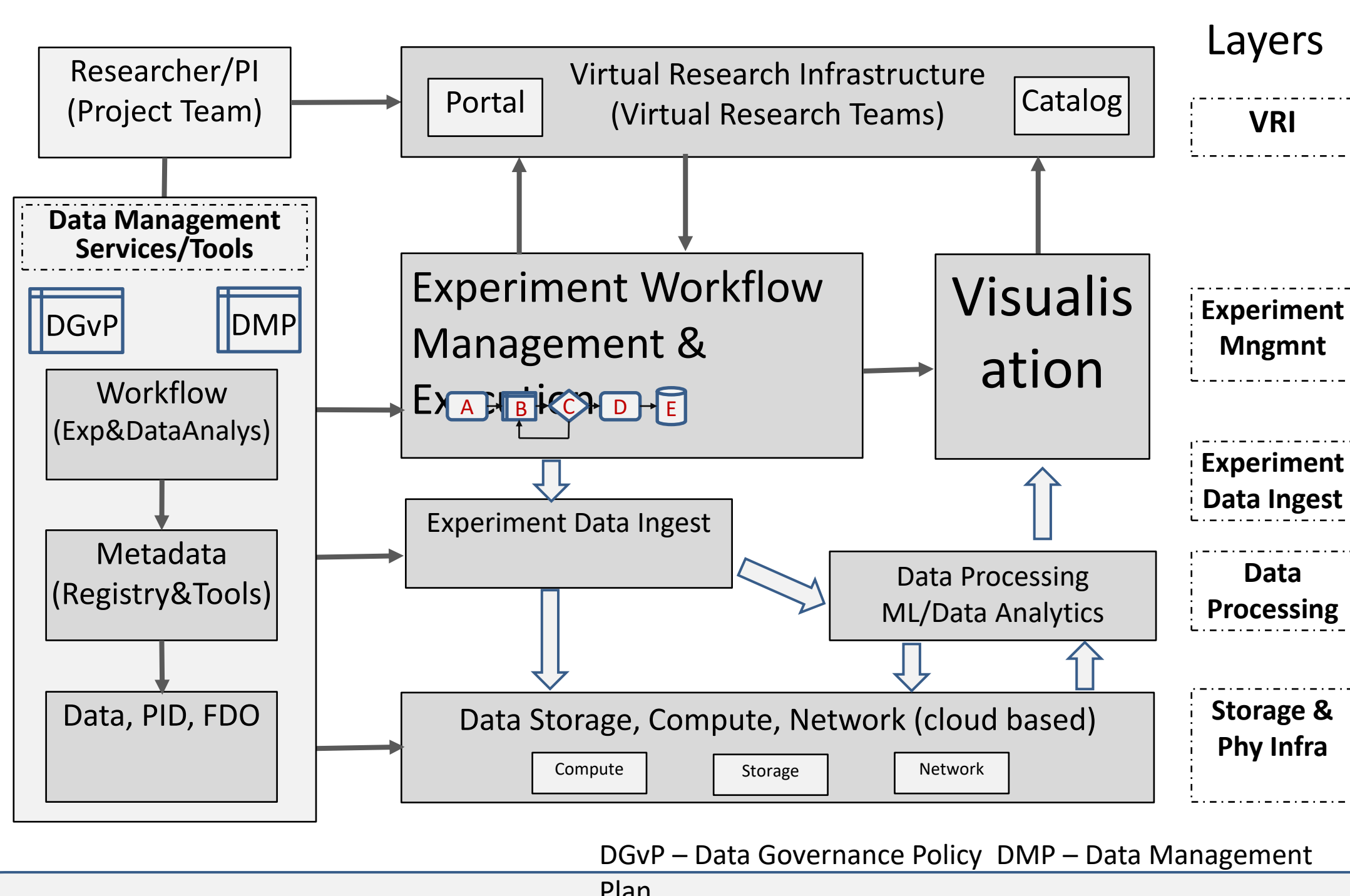
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## Experimental Data Management Infrastructure



## Data Management Infrastructure Layers

Data Management Infrastructure Layers to separate data management and governance concerns and actors/roles

Layer 4 - Experiment Infrastructure configuration and management

Layer 3 - Experimental data collection/recording

Data models, metadata

Layer 2 - Data processing

Data analysis, Process/ML models building, portability

Layer 1 - Data Storage, Archiving, Exchange

Datasets, metadata publication

Data Management Services and Tools (Data Management Plane)

Data Management Plan and Data Quality Assurance, FAIR compliance

Metadata registries and tools

Data Security and Data protection, GDPR

## SLICES-RI is an ESFRI Roadmap 2021 Project and Initiative

- SLICES is a flexible platform designed to support large-scale, experimental research focused on networking protocols, radio enable experiments on novel Digital Infrastructure (DI) solutions and applications

## References

Future Scientific Data Infrastructure: Towards Platform Research Infrastructure as a Service (PRIaaS), by Yuri Demchenko, Cees de Laat, Wouter Los, Proc. The International Conference on High Performance Computing and Simulation (HPCS 2020), 10-14 Dec 2020.

SLICES-RI - <https://slices-ri.eu/> EOSC FAIRsFAIR - <https://www.fairsfair.eu/>

ESFRI Roadmap 2021 - <https://www.esfri.eu/esfri-roadmap-2021>

IG1157 Digital Platform Reference Architecture Concepts and Principles v5.0.1, 21 July 2020 [online] <https://www.tmforum.org/resources/reference/ig1157-digital-platform-reference-architecture-concepts-and-principles-v5-0-0/>

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