Assessment framework for the development of KPIs for the evaluation of e-Infrastructures

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e-IRG
e-Infrastructure Reflection Group

Abstract

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The e-IRG has defined e-Infrastructure Commons. The ultimate vision of these Commons is to reach interoperability and integration in the area of e-Infrastructure services, within and between member states, and on the European level and globally.
This e-Infrastructure Commons, which address the topics Resources, Community and Governance, represent also a solid basis for building the European Data Infrastructure and the European Open Science Cloud, since it contains most of the ingredients needed for an integrated European platform for Open Science.

In this context an ontology for Key Performance Indicators (KPIs) is defined for impact assessment on three levels:

* operational,
* technical and
* socio-economic

This presentation aims at the e-Infrastructure stakeholders (political/funders, e-Infrastructure providers, scientific users, general public) and offers insights on

* how to classify the use, operation and innovation of e-Infrastructures, so that the perspectives of all four stakeholders are addressed
* provide means for an independent evaluation of the efficiency of e.g. investment strategies, based on common metrics and measures.

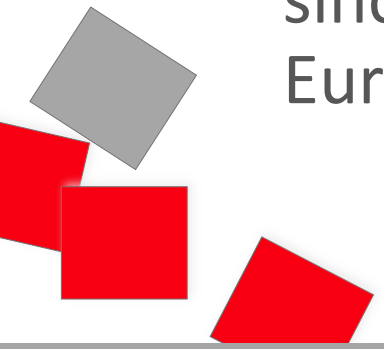
Abstract

- Generally KPIs follow policies and resulting legislations and regulations
- KPIs are mainly a response to some existing requirements resulting from policies or other kinds of rules
- They are an attempt to offer some metrics with the aim to create a structure of reference for evaluating the effectiveness existing policies/rules
- They offer or facilitate comparison
- They are expressions of “values”
- They are instruments for creating statistics
- KPIs are element of a policy, because attempt to steer future developments through their introduction
- They are important tools for management

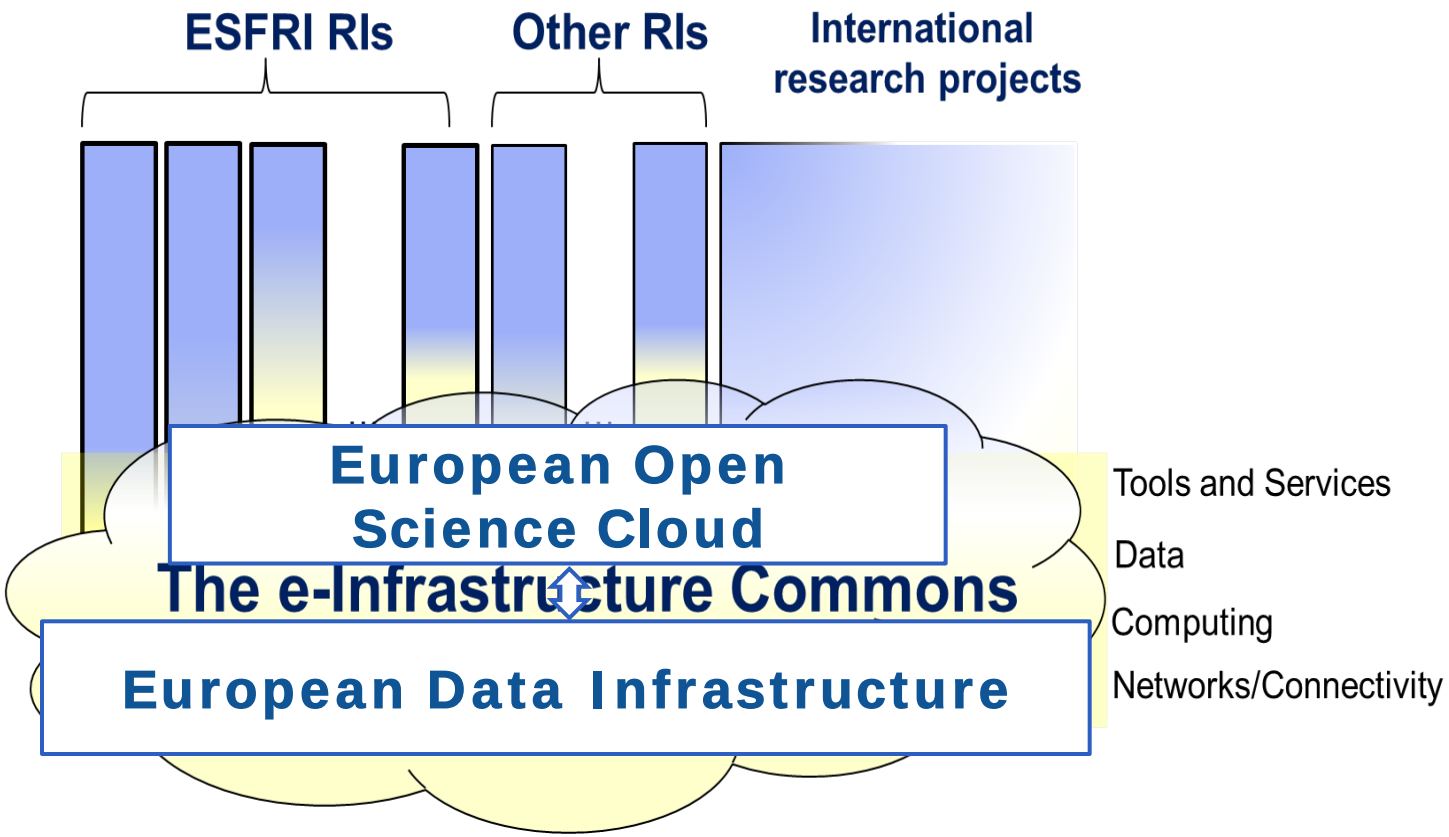
e-Infrastructure Commons

The ultimate vision of the Commons is to **reach interoperability and integration in the area of e-Infrastructure services**, within and between member states, and on the European level and globally.

This e-Infrastructure Commons is also a **solid basis for building the European Data Infrastructure** and the **European Open Science Cloud**, since it contains most of the ingredients needed for an integrated European platform for Open Science



e-Infrastructure Commons



e-Infrastructure Commons

e-IRG's concept of an integrated, horizontal service layer („broker" and „orchestration") for vertical, domain-specific research infrastructures

Three functions:

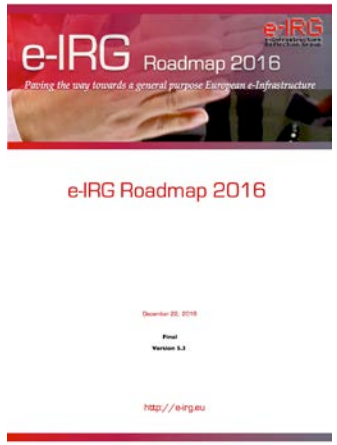
- Platform for coordination of services
- Provisioning of sustainable and inter-operable e-infrastructure services
- Implementation of innovation projects

Three elements:

- resources
- communities
- governance

Published in e-IRG's Roadmap 2012, White Paper 2016, Roadmap 2016

e-Infrastructure Commons Elements - **Resources**



- Research network (Communication Commons),
- Computational resources,
- Data capacities
- Services
- Providers of the e-Infrastructure components are implicitly included
- Constitute the main building blocks, shared within the community
- The infrastructure commons offer a number of universal services, or generic services (keep in mind: not all services are universal, since they depend on discipline)
- Part of the resources could be dedicated to a domain-specific community.

e-Infrastructure Commons Elements - **Community**

- Primarily the pan-European scholarly community,
  - domain-specific, regional,
  - extended to education and innovative research communities.
  - should also include communities more interested in the long tail
- Continuously widening
  - geographical
  - and application-specific coverage.
  - extension towards innovation, as well as towards industrial, health care, or public administration areas represents just specific examples of this widening.

Sometimes this community relation is legally formalised using e.g. an MoU, a cooperative, or an ERIC.

e-Infrastructure Commons Elements - **Governance**

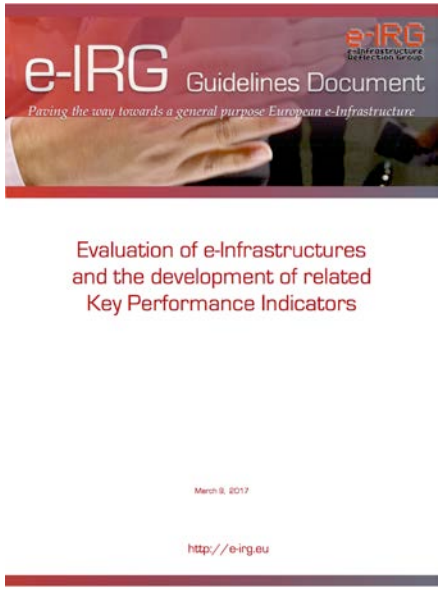
- Policy-aspect for e-Infrastructures
  - Access: Open, Restricted, Closed
  - Open Science
- All stakeholders are represented and have a say in the definition of the governance rules, and in the rules of engagement
- Open approach,
  - not necessarily free access,
  - rather non-discriminatory use of the resources
    - to the extent possible and not restricted by legal or other regulatory constraints.

e-Infrastructure Assessment

e-Infrastructure stakeholders are keen to understand

- how to assess the use, operation and innovation of e-Infrastructures
- assess the efficiency of e.g. their investment strategies, based on common metrics and measures.

- Key Performance Indicators (KPIs) as means for impact assessment:
  - operational,
  - technical and
  - socio-economic



e-Infrastructure Assessment

e-Infrastructures

- are large-scale resources built with initial capital investments,
- generate no or just small profits by themselves
- have the most value indirectly as spillovers

Users' experience, support and satisfaction

- are mandatory elements to define KPIs, and
- to evaluate and improve added value or 'return on investment'.

Political Goals I

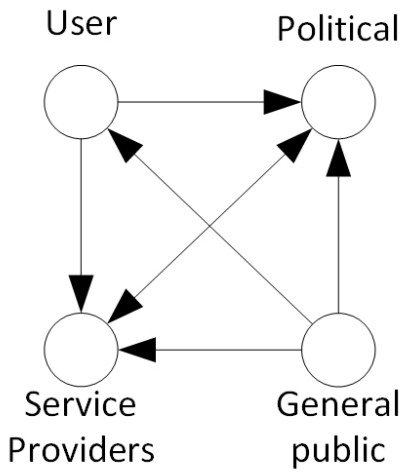
1. Offer access to state-of-the-art infrastructure and high-quality services
2. Meet the users' needs and enable them to conduct excellent research
3. Provide access to results of research (stressing the re-use of data/content, based on the recently adopted FAIR-principles)
4. Increase the efficiency, effectiveness and excellence of public research system
5. Provide high-speed, secure and trustworthy infrastructures and content services
6. Reinforce trust and security in digital services and in the handling of personal or sensitive data

Political Goals II

7. Open national systems to each other and to the world, in order to be more inter- connected and more inter-operable
8. Offer participation in the developed e-Infrastructure to other stakeholders (“citizen science”; corporations according to accepted EOSC governance models)
9. Governance to guarantee long-term sustainability and enable stakeholders’ trust

Different perspectives

- **Political perspective** – need to justify spending in e-Infrastructure operation and development (why is public money spent?)
- **e-Infrastructure provider perspective** – need to justify spending in hardware, services and people (how is the money spent?)
- **User perspective (researchers and others, eg industry)** – does the spending support my needs in an optimal way?
- **General public perspective** – what is eventually the outcome of the spending and how are societal challenges addressed (including innovation aspects)?



Evaluation of e-Infrastructures and development of related KPIs

Class	Category	Metrics (to be harmonized)
Political/funders expectations towards e-Infrastructures and the (scientific users)		
e-Infrastructure providers operational success (expectations towards the political domain and (scientifc) users)		
Scientific users expectations towards the service providers and the politics/funders		
General public expectations to e-Infrastructure providers and (scientific) users		

Evaluation of e-Infrastructures and development of related KPIs

Class	Category	Metrics (to be harmonized)
Political/funder expectations towards e-Infrastructures and the (scientific users)		
	Federation / interoperability	Service Level Agreements Standards used
	Long-term sustainability	guaranties for provision of resources
	Bottom-up governance	user representatives in governing bodies
	leverage of Member States investments	national research programs (compliance)

Evaluation of e-Infrastructures and development of related KPIs

Class	Category	Metrics (to be harmonized)
e-Infrastructure providers operational success (expectations towards the political domain and (scientifc) users)		
	technical indicators	eg # of CPUs, bandwidth, amount of storage
	operational indicators	number of up- and downtime availability
	scientific outcome	number of MSc and PhD thesis scientific publications, patents, peer reviewed materials Number of underlying datasets related to publications

Evaluation of e-Infrastructures and development of related KPIs

Class	Category	Metrics (to be harmonized)
Users expectations towards the service providers and the politics		
	User satisfaction	active vs passive users long-term vs short-term users feedback and responsiveness to user feedback
	User development	trainings days, number of attendees number of users (increase, decrease, stagnation) number of scientific domains
	Service requests	number of service requests
	e-Accessibility and barrier free indicators	adaptability to modify accessible needs adaptability to different end-user devices adaptability to multilingual settings Inclusion factors

Evaluation of e-Infrastructures and development of related KPIs

Class	Category	Metrics (to be harmonized)
General public expectations to e-Infrastructure providers and (scientific) users		
	Knowledge transfer	number of events
	Socio-economic impact	attraction of industry (involvement factor?) attraction of citizens (involvement factor?)
	Innovation aspects	→ Different categories to be defined e.g. number of innovation awards

Next steps

- eInfraCentral and e-IRGSP5 are currently working on the topic (see presentation later)
- e-IRG document „Evaluation of e-Infrastructures and development of related KPIs“ (http://e-irg.eu/kpi)
- Email to contact: kpi@e-irg.eu

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