Virtual Research Environments as integral to e-Infrastructure Commons

Dr Dimitris Koureas
Lead, Research data & Partnerships
Natural History Museum London

Coordinator, Distributed System of Scientific Collections (DiSSCo) initiative
Executive Secretary, Biodiversity Information Standards (TDWG)
Co-chair, RDA BDI IG & ASDOC WG

@DimitrisKoureas

Strong political commitment

Digital Agenda

European Open Science Cloud

Over the last years investments have focused towards **robust, reliable and interoperable services** that generate global solutions for data sharing and preservation, high performance and cloud computing, user-authorisation and authentication

A strong investment programme

Previous investments in e-infrastructures

2007-2013 (FP7): *€572m*

2014-**2015** (H2020): *€170m*

How does success look like?

1. Improvement of technological readiness levels
2. Number of engaged users
3. Change in the scientific mode of operation
4. Faster and more robust scientific innovation

Researchers still reluctant to engage

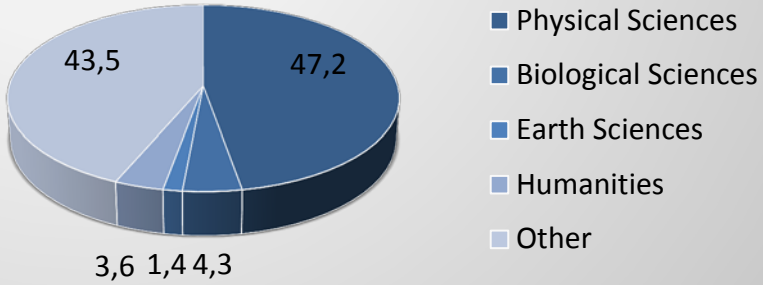
Main barriers for researchers to engage with ‘open science’ practices (**>80% agree**)
Science Europe Survey 2015

(i) Quality assurance
(ii) Attribution
(iii) Integration between infrastructure components
(iv) Limited awareness

Not all communities are created equal

Striking discrepancies in uptake rates →
Different communities require different approach

Users percentage per domain (2015)

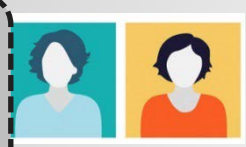


Socio-cultural (less technical) distance

Backbone service Bus

EOSC

Generic interfaces



physics,
astronomy,
bioinformatics

Humanities,
Social studies

Community engaging mechanisms

Koureas D. et al. 10.3897/rio.2.e9933

The ‘last mile’ challenge for research e-infrastructures

- Borrowed from telecommunications and transportation
- Cost and complexity of ‘connecting’ end-users to the backbone (core) infrastructures is high when compared to the core infrastructure itself.

Virtual Research Environments act more as the **socio-cultural and less as technical brokers**.

Intermediate environments that connect communities of practice to a common e-infrastructure landscape (e-Infrastructure Commons).

Community vetted mechanisms (quality assurance) to organically develop new practices

Virtual Research Environments?

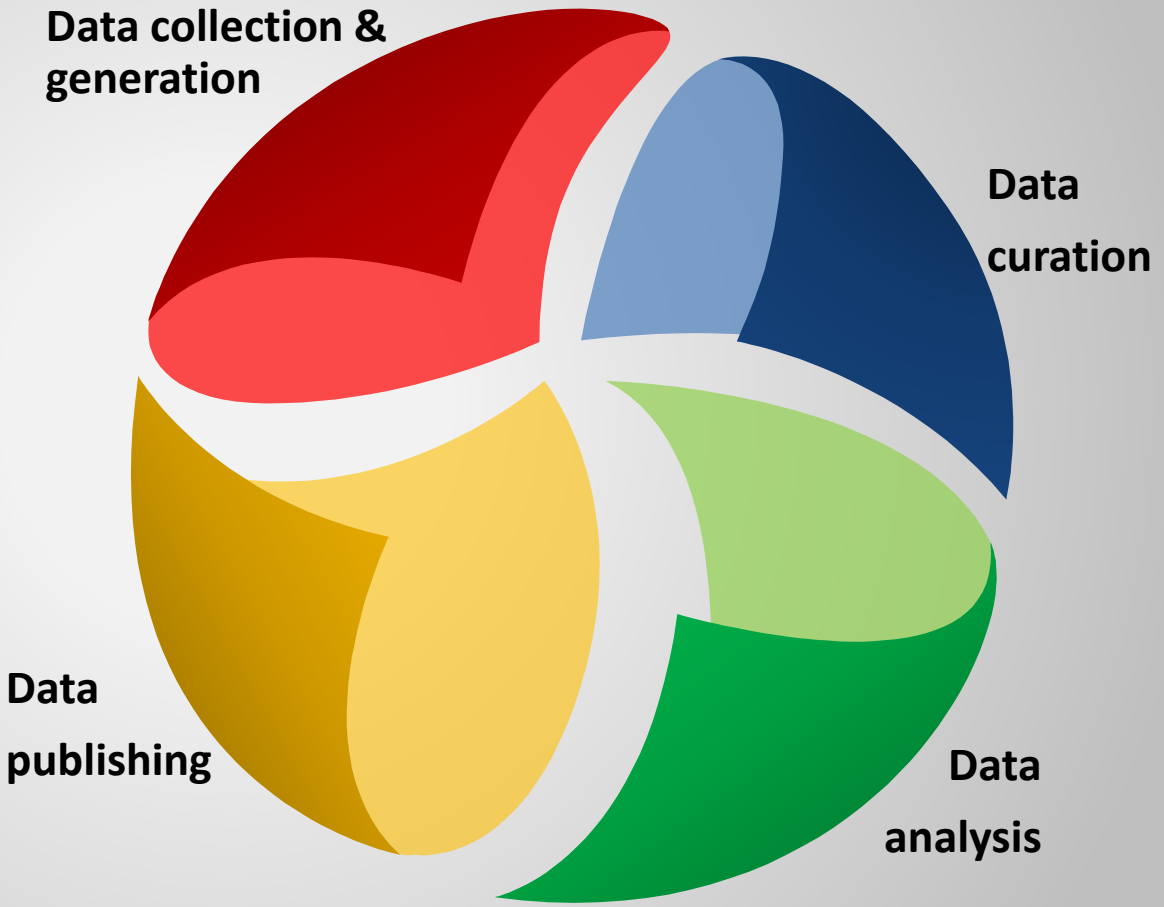
aka
Virtual Labs
Science Gateways

- Envisaged as community supporting mechanisms to **enable digital collaboration**
- Predominantly **domain-specific solutions** that played a key role in bridging the gap between traditional and digital research practices
- Received significant investments between **2005-2015** (e.g. EC, national funds)

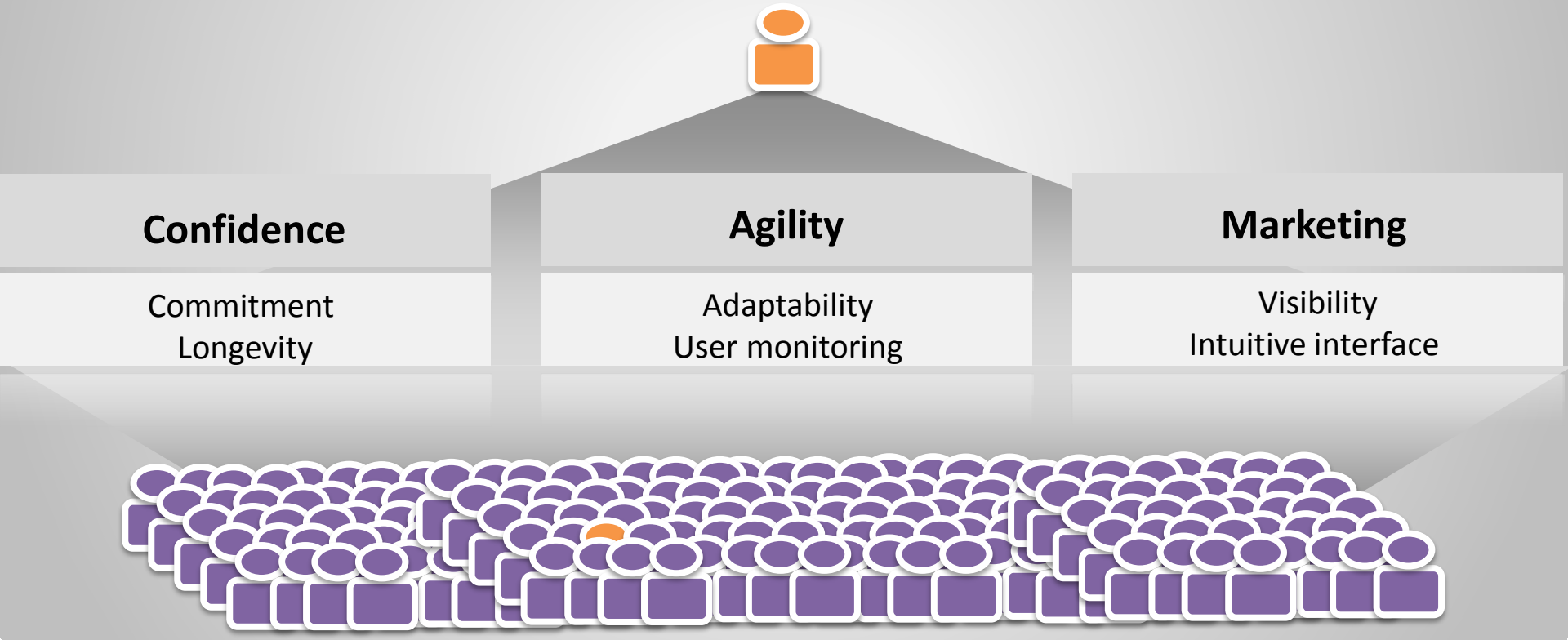
Facilitate the research data lifecycle

Functional and operational characteristics differ significantly according to the communities of practice addressed

VREs enabled communities to transfer their typical scientific practice into the digital realm



VREs enable researchers to organically change their *modus operandi*



An example from the Biodiversity domain

Scratchpads

biodiversity online

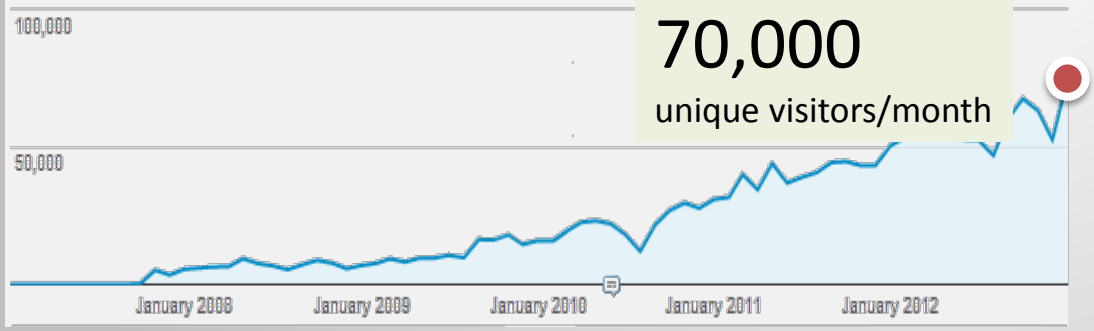
650 Scratchpads Communities

by **7,500** active registered users

covering **125,000** taxa

in **1,200,000** pages.

Per month unique visitors to Scratchpads sites



70,000
unique visitors/month

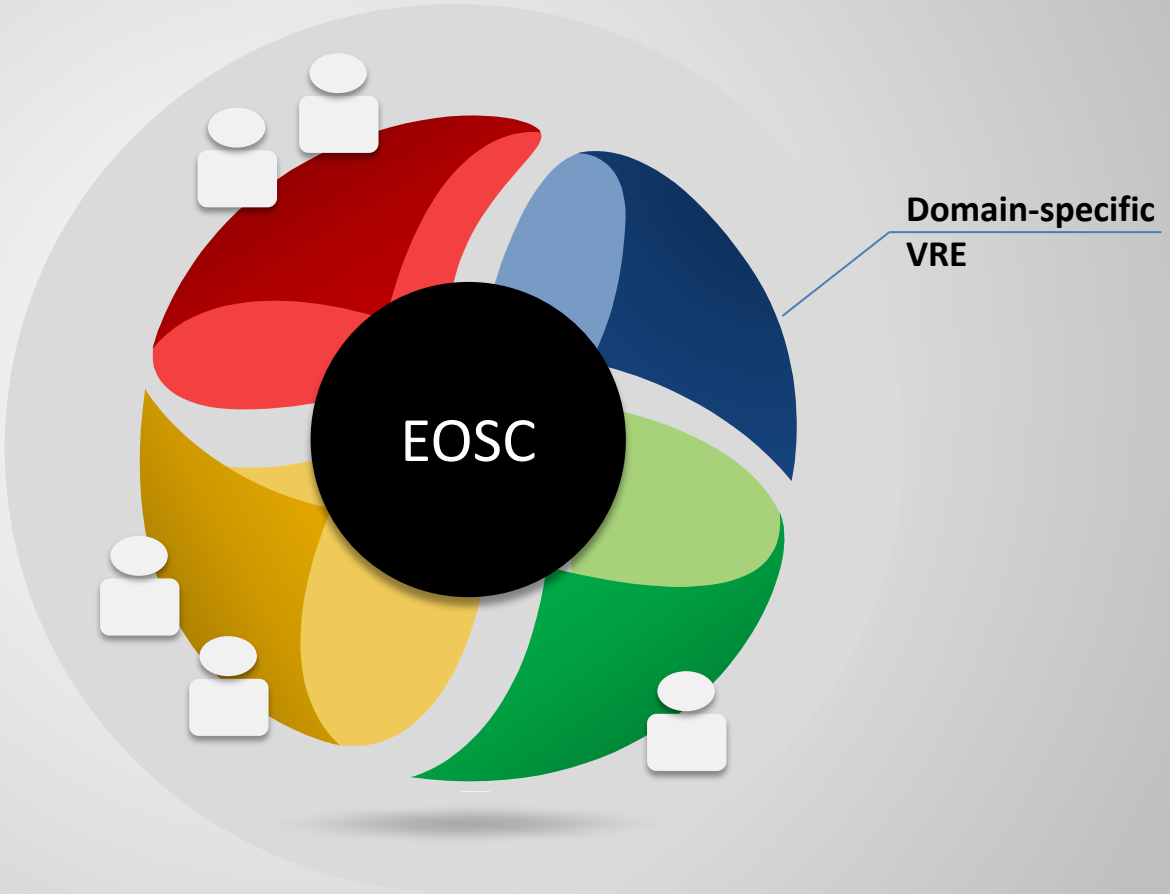
In total more than

5,000,000 visitors

The challenges with VREs

- Built in isolation
- Developed redundant technological solutions for storage, authentication, computing
- Failed to develop good sustainability models
- (failed to attract users)

Re-inventing Virtual Research Environments as integral to the e-Infrastructure Commons



E-Infrastructure Commons considers community engaging mechanisms as integral to its operation

EOSC benefits

The development of EOSC does not reduce the importance of VREs

In fact, it strengthens it. As **they become the needed mechanisms that enable communities of practice to engage with core services**

VREs benefit

The EOSC **reduces the operational costs of VRE up-keeping** and hardwires interoperability minimising fragmentation and redundancy

Recommendations

for integrating community-specific services
to the European e-infrastructure Commons

User communities need to be able to:

(i) articulate and communicate their community-specific needs in regards to data and services, and
(ii) translate these needs into clear functional requirements that will drive the development of VREs.

Recommendations

for integrating community-specific services
to the European e-infrastructure Commons

VRE operators need to:

(i) VREs looking beyond the ephemeral timeframes of project-based approaches,
(ii) Build public-public and public-private partnerships that ensure sustainability and,
(iii) Link VREs with existing underlying e-infrastructure, building on top of available backbone services.

Recommendations

for integrating community-specific services
to the European e-infrastructure Commons

Funders need to:

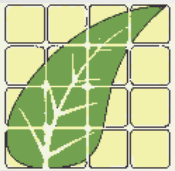
(i) further acknowledge the pivotal role of VREs in support of user community engagement and,
(ii) develop, with a particular eye to long-term sustainability, dedicated VRE funding programmes with targeted calls to discipline-specific communities.

Thank you

@DimitrisKoureas
d.koureas@nhm.ac.uk

Successful examples of VREs across disciplines

Past Projects (EC-funded)



Current Projects (EC-funded)

VI-SEEM
MuG
OpenDreamKit
BlueBRIDGE
VRE4EIC
West-Life

Despite their success for Virtual Research Environments to continue serving their communities we need to reinvent their role within the ever developing research e-infrastructures landscape

Developing the European Open Science Cloud

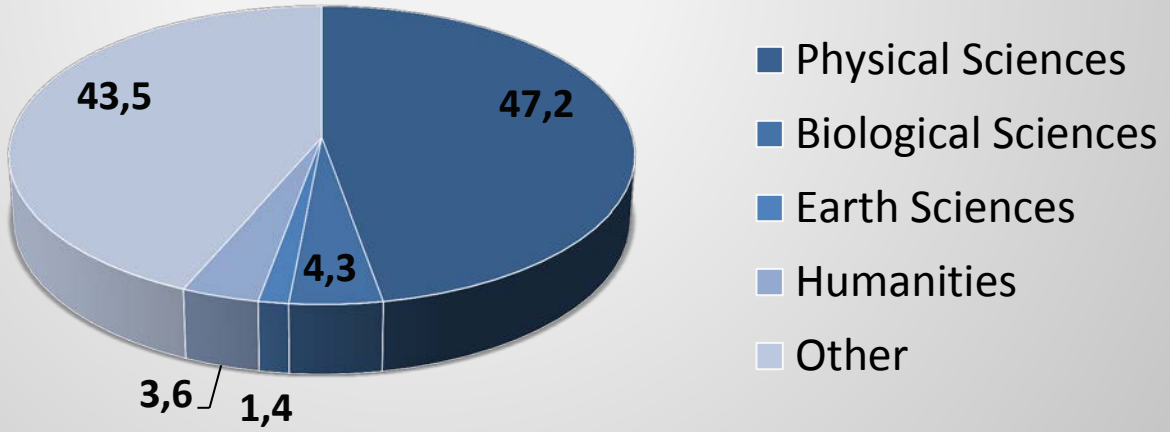
A set of robust, sustainable infrastructures that provide cloud services (authorisation, storage, computing)

An ecosystem of common backbone services

Researchers are still reluctant to engage

European Grid Infrastructure (a flagship initiative that delivers integrated computing services to European researchers) announced (Dec 2015) a user base of 35,959 (European Grid Infrastructure 2015)

Users percentage per domain



Not all research communities are ‘created equal’

For instance, researchers working on genomics, physics or astronomy have long appreciated the value of data sharing. By nurturing a culture of shared physical and computational infrastructure, open-source software and open data, they have embraced the principles of open science.

The need to respect diversity and continuously developing needs

Research communities are developing new practices organically and that they are best placed to explore which of these contribute to the advancement of their discipline

A global priority of changing the *modus operandi* of science

Investments in development of e-infrastructures

Provision of tools and services

Training and incentives

Digital Agenda for Europe

Digital Collaborative Data-intensive research

When Bell invented the telephone…

"The Americans have need of the telephone, but we do not. We have plenty of messenger boys." – Sir William Preece, Chief Engineer, British Post Office, 1878

"This telephone has too many shortcomings to be considered as a means of communication. The device is of inherently no value to us." – Western Union internal memo, 1876