ENVRI

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OEILM

A SEMANTIC LINKING FRAMEWORK FOR ENVIRONMENTAL RESEARCH INFRASTRUCTURES

Planet Earth

www.envri.eu
is the laboratory of environmental sciences

ENVIRONMENTAL RESEARCH INFRASTRUCTURE

ICOS
www.icos-infrastructure-transition.eu

EURO-Argo
www.euro-argo.eu

EISCAT-3D
www.eiscat3d.se

LifeWatch
www.lifewatch.eu

EPOS
www.epos-eu.org

EMSO
www.emso-eu.org

The EU FP7 project ENVRI, namely the "Common Operations of ENVironmental Research Infrastructures", focuses on synergies between advanced developments, not only among the infrastructure facilities but also for data driven experiments which require multidisciplinary sciences.

OEILM
OPEN E-SCIENCE INFORMATION LINKING MODEL

Fresh water
Global warming
Earthquakes
Food supplies
Pollution
Climate change
Volcanoes
Epidemic diseases
Biodiversity loss
Deforestification

System level of sciences on the earth are key approaches to understanding global environmental problems. Environmental Research Infrastructures interface large scale deployed sensors, and provide advanced facilitates for scientists to perform advanced research. The OEILM links different ontolotgies in the ENVRI.
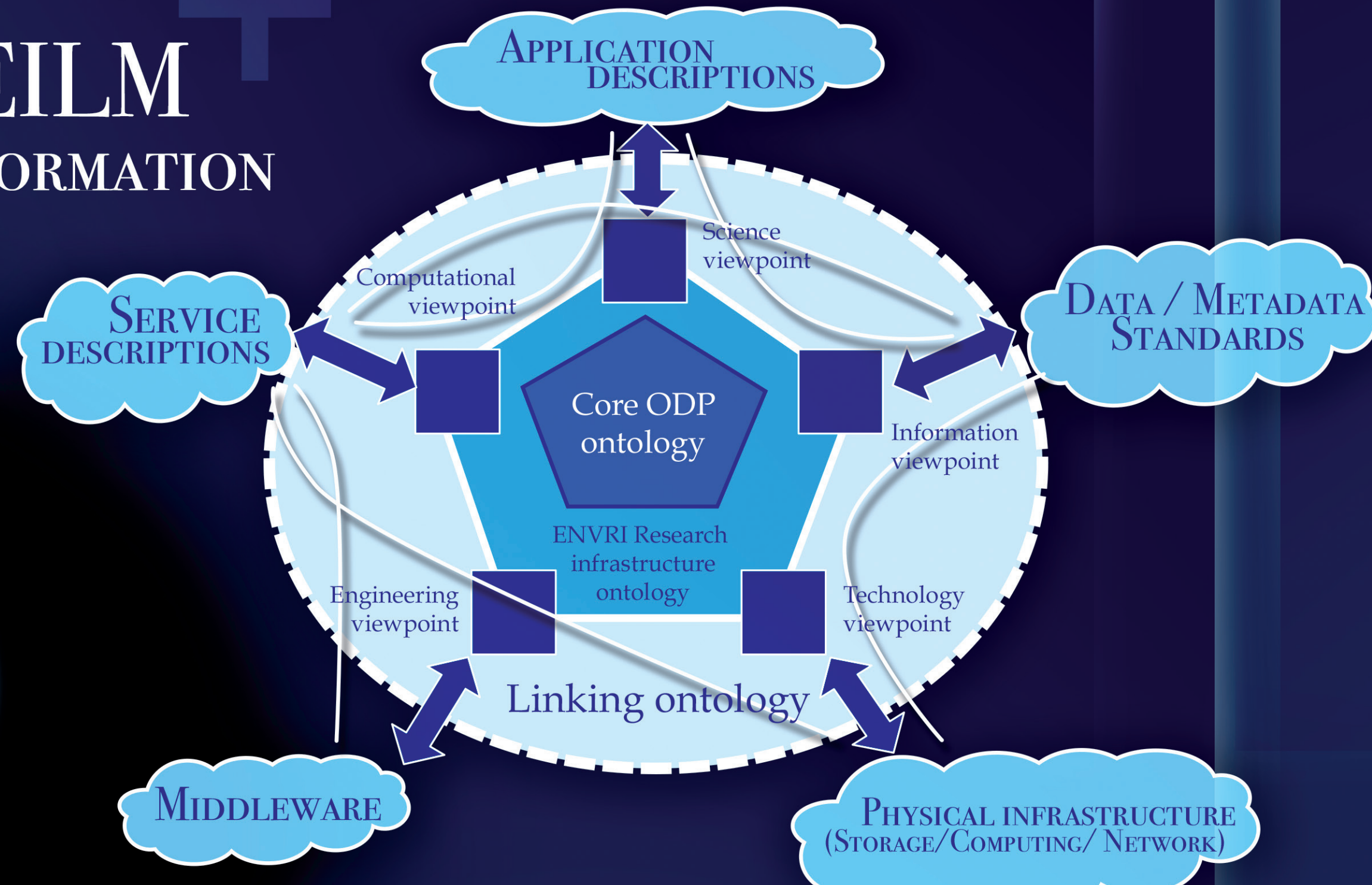
USE CASE

We prototype a data delivery scenario of OEILM using the test bed provided by the OpenLab facilitate in University of Amsterdam.

The OEILM links 1) application descriptions (QoSAWF.owl), 2) service descriptions (CDL.owl), 3) CineGrid movie metadata (Content.owl), and 4) network topology descriptions (NDL.owl). An application planning service NEWQoSPlanner selects network paths for data delivery between different sources and destinations. The network is controlled using Network Service Interface and Floorlight (openflow) [6]. A user can describe application requirements via a web GUI, and the planning component plans data flows, deliver services, and network paths.
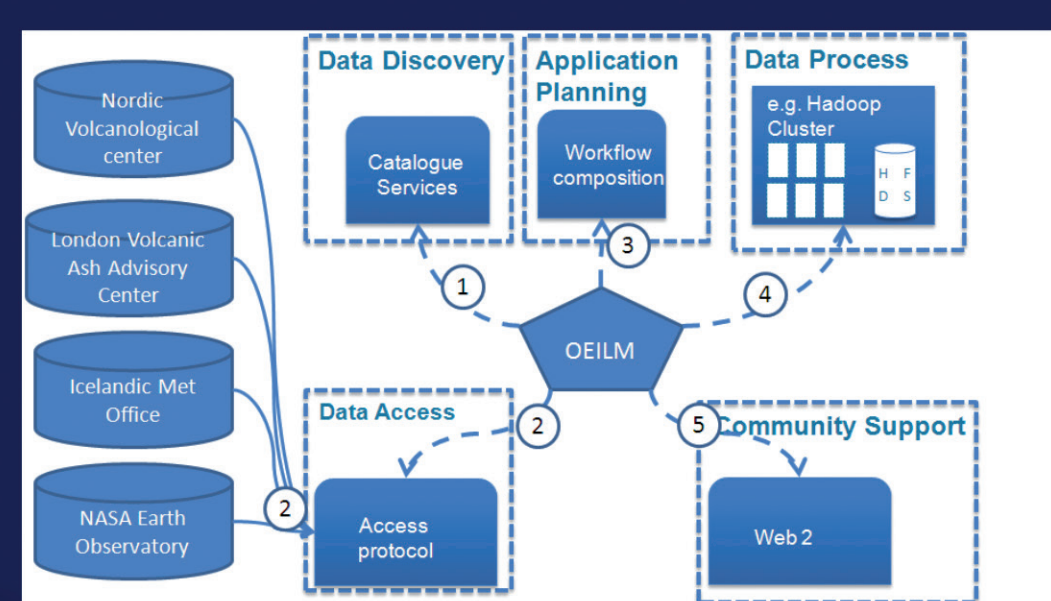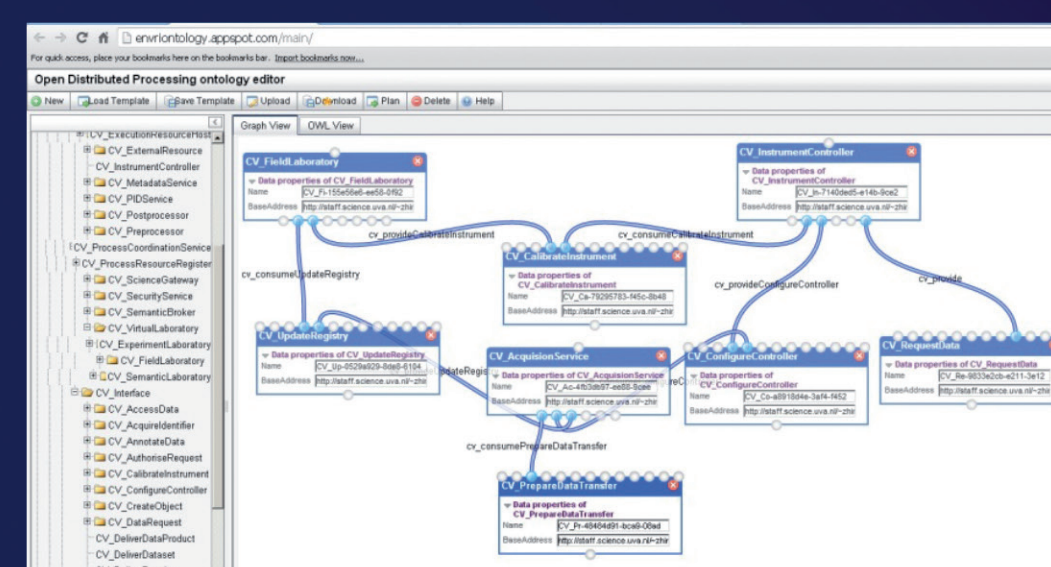
An Openflow switch for path selection

NSI for light path reservation

THE ODP CORE ONTOLOGY

The Open Distributed Processing (ODP) modeling approach captures the design and development issues in complex distributed systems from five corresponding viewpoints:

1/ The **enterprise viewpoint** models organizational issues of the system.

2/ The **informational viewpoint** models the information objects and schemas.

3/ The **computational viewpoint** models functional components and binding interfaces.

4/ The **engineering viewpoint** describes the construction of the system.

5/ The **technological viewpoint** describes required technologies in the development.

THE ENVRI REFERENCE MODEL ONTOLOGY

The ENVRI Reference Model (RM) follows the ODP approach and models data life-cycles observed in all existing ESFRI.

1/ The science (enterprise) viewpoint identifies communities, and roles and behaviours of each community.

2/ The Information viewpoint identifies information objects, behaviour and schemas of the research infrastructure.

3/ The computational viewpoint models computational objects, binding interfaces, and interactions between computational objects.

4/ The Engineering viewpoint models five sub systems: data acquisition, data curation, data access, data processing and community support.

THE LINKING ONTOLOGY

The linking ontology models the relations between the ENVRI RM and the external information models:

1/ **Application schemas** for (semi) automatic workflow composition based on the constraints in application descriptions.

2/ **Data and metadata standards** for data discovery across infrastructures.

3/ **Service description schemas** for service discovery and selection across research infrastructures.

4/ **Middleware descriptions** for inter infrastructures resource selection and scheduling for application execution.

5/ **Infrastructure descriptions** for including physical or virtualized services in resource planning.

SUMMARY

An effective reference model synchronizes terminologies defined in different environmental RIs, and guides the further development of the common operations and functional components in the infrastructure. A semantic linking framework is important for realizing interoperability among research infrastructures, and Open e-Science Information Linking Model is evolving in this direction.

[1] Chen, Y. et al., Building a common reference model for environmental science research infrastructures. In Proceedings of EnviroInfo2013, 2013

[2] Zhao, Z., et al, (2012). Quality guaranteed media delivery over advanced network, chapter in book Next Generation Content Delivery Infrastructure ISBN 978-1-4666-1794-0

[3] Openlab at university of Amsterdam, http://sne.science.uva.nl/openlab/

[4] OEILM Ontology: staff.science.uva.nl/~zhiming/Ontology

[5] Use case GUI: newqosplanner-demo.appspot.com

[6] NSI and Openflow in data intensive workflow demo in SC13, USA, 2013