COMMIT/

ONTOLOGY SESSION
THURSDAY SEP. 17

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ONTOLOGY SESSION AGENDA

Introduction to the session

- General Overview of the OMN Ontology Motivation and Progress
- On the OMN Ontologies, Their Hierarchy and Tooling
- Concrete Usecases: on Lifecycle Ontology and on Wireless
- Building Efficient Support for Semantics in Networked Infrastructure Systems
- Needs for next generation heterogeneous control/coordination systems
- Towards an Ontology-savvy Aggregate Manager API

Open discussion and next steps.

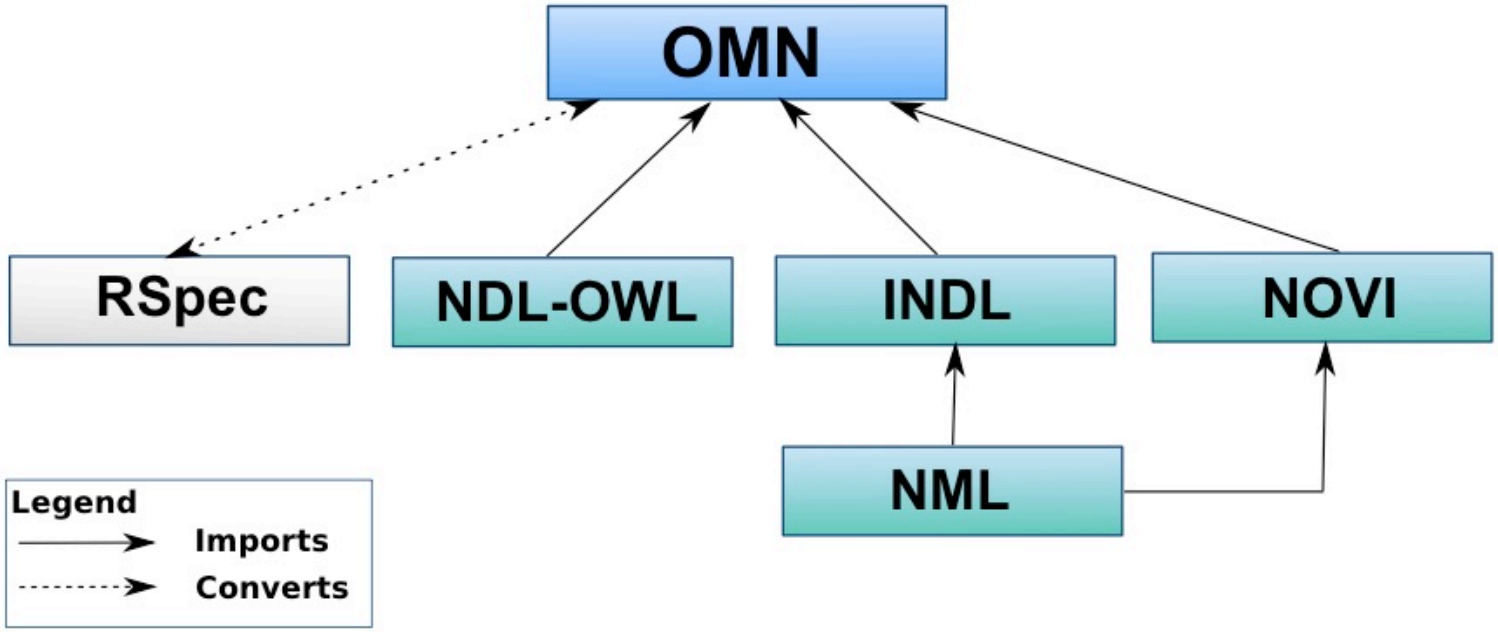
MOTIVATION

To gain scientific knowledge from these experiments, control frameworks are needed to support the experimental life cycle in an automated and reproducible manner.

This includes authentication, authorization, resource description, discovery, reservation, orchestration, provisioning, monitoring, and release, as well as experiment control and measurement. Within a federated environment, these procedures become even more complex.

Given the heterogeneity of the resources on offer in the testbeds, one particular issue that emerges is the description of these offerings. Currently, XML-based GENI Resource Specifications (RSpecs) with arbitrary exten- sions are being used to meet this objective. However, such a tree-based data structure doesn't define explicit semantics and therefore aggravates interoperability within a federation rather than enhancing it.

BUILDING ON PREVIOUS WORK



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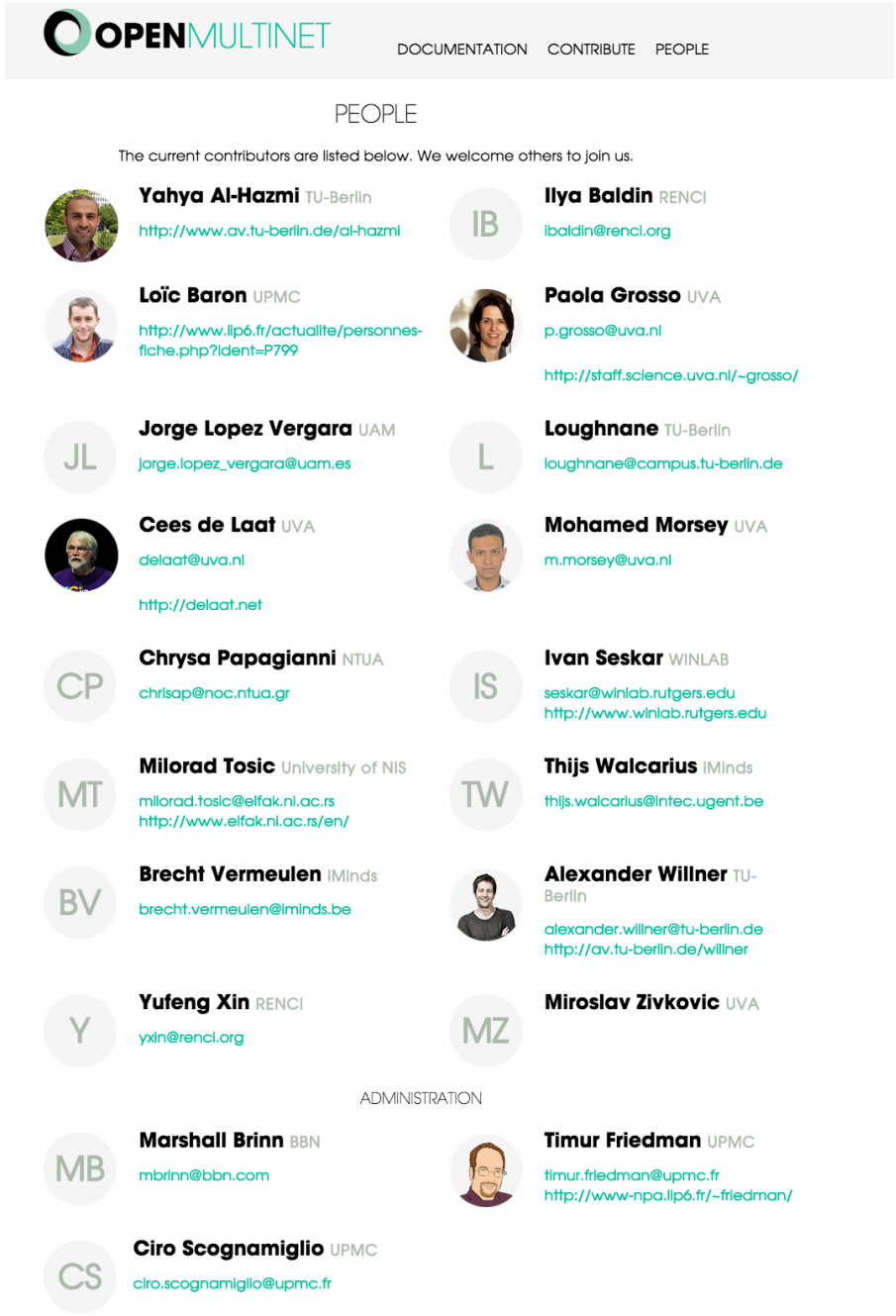
WHO'S WHO?

http://open-multinet.info/

- Meeting regularly (monthly) via conf call; Active mailing list;
- Skype group.



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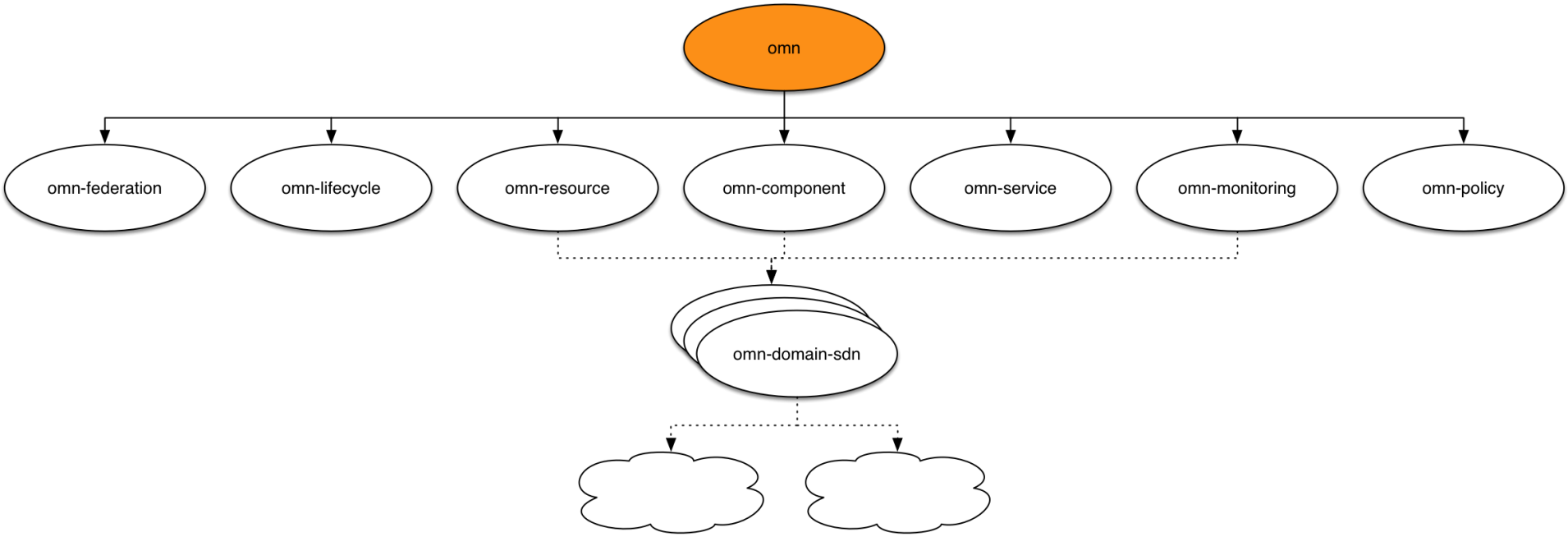

https://github.com/open-multinet
https://github.com/open-multinet/playground-rspecs-ontology/tree/master/omnlib/ontologies

DOCUMENTATION

Documentation is available at
http://open-multinet.github.io/playground-rspecs-ontology/

Documented the omn upper ontology according to ReSpec template
Started propagating the documentation template to the other ontologies

MOTIVATION

Motivation to move beyond the ‘federation’ community:

- Our work gets known and used which leads to more citations to our papers;
- Our ontology becomes the de facto ontology in our field, and it constitutes the reference to anyone who wants to do a similar work;
- We will get feedback both from LOV maintainers and the Semantic Web community in general which helps a lot in continuously improving and extending our ontology.

THE SEMANTIC WEB COMMUNITY: W3C AND LOV

1. Established a W3C working group for OMN (with the other OMN group members)

2. Close to ‘move’ the ontologies in the WC3 github
(soon: https://github.com/w3c/omn)

1. Submitted the OMN ontology to Linked Open Vocabularies (LOV) repository:
2. http://lov.okfn.org/dataset/lov/vocabs/omn

SCIENTIFIC VISIBILITY

- ***The Open-Multinet Upper Ontology - Towards the Semantic-based Management of Federated Infrastructures***

A. Willner, C. Papagianni, M. Giatili, P. Grosso, M. Morsey, Al-Hazmi Y., I. Baldin
The 10th International Conference on Testbeds and Research Infrastructures for the Development of Networks & Communities (TRIDENTCOM 2015), Vancouver, Canada, June 2015.

- ***Software Defined Bearer Intercloud Networks Semantic-based Network Exchange for the IEEE P2302 Intercloud Approach***

Vij, D.; Morsey, M.; Grosso, P.; Willner, A.; Magedanz, T., in Electrical Engineering/Electronics,
Computer, Telecommunications and Information Technology (ECTI-CON), 2015 12th International Conference on , vol., no., pp.1-6, 24-27 June 2015

- ***SemNaaS: Add Semantic Dimension to the Network as a Service***

M.Morsey, Hao Zhu, I.Canyameres and P.Grosso
In: ESWC 2015

OMN RESOURCE ONTOLOGY

- Co-developed the OMN upper ontology
- Developed the OMN Resource ontology
  - It defines the entities that can be provisioned/controlled/measured by APIs

SEMNAAS AND MOTE

Transitioning from OpenNaas to SemNaaS

Developed a semantic enabled Network-as-a-Service (NaaS) system
Applied NML2/OMN on that system.

MOTE – GN3plus Open Call project

To allow the Network Services Interface to support OpenFlow or other SDN technologies, there must
be a method for describing and exchanging topologies of these kinds of networks.

COMMIT/ UVA RELATED WORK

Extending on the :
OpenNaaS system developed in Mantychore projects and GN3plus

SemNaaS supports several features

- Request validation
- Connectivity checking
- It is pluggable
- Semantic enabled report generation

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SemNaaS: Add Semantic Dimension to the Network as a Service

Mohamed Morsey, Hao Zhu, Isart Canyameres, Paola Grosso
Informatics Institute, University of Amsterdam
i2CAT Foundation, Barcelona

Objectives

- Applying Semantic Web on Network as a Service (NaaS).
- Utilizing Network Markup Language (NML) ontology to support NaaS operation.
- Developing a Semantic Web based system called SemNaaS, which applies Semantic Web technologies on NaaS.

Introduction

- The underlying network connecting (cloud) data center or within a single site is still less malleable and programmable than the other parts of the infrastructure.
- New frameworks are emerging to define and create such dynamic network services;these frameworks in essence support Network as a Service (NaaS) operations.
- The emerging NaaS software systems require powerful and rich vocabularies, such as the ones that can be provided by Semantic Web ontologies.
- OWL ontologies have several advantages as models for NaaS; i.e. they are easy to extend, they allow for automatic validation of both requests and provisioned services, and they enhance network resource discovery.

Network Markup Language

- Network Markup Language (NML) ontology constitutes the information model for describing and defining computer networks.
- NML is revised, i.e. more classes and properties are devised, and enhanced the existing ones.

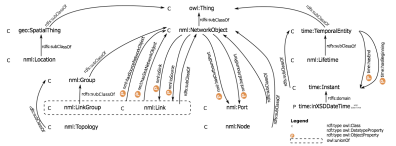

Fig. 1: NML ontology visualization

SemNaaS Architecture

- SemNaaS consists of four components:
  1. request validation and connectivity checking component;
  2. OpenNaaS component, which is a pluggable component, that supports the network resources provisioning;
  3. monitoring component;
  4. report generation component.

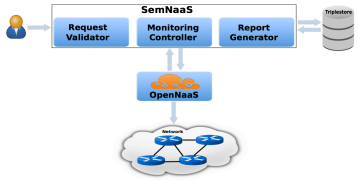

Fig. 2: SemNaaS system architecture.

SemNaaS Components

- Request Generation and Validation Component.
  - → SemNaaS performs two levels of validation, namely request validation, and connectivity check.
  - → It uses SPARQL to detect unreachability among various nodes.
- Monitoring Component.
  - → A network resource may experience failure conditions as well, e.g. network connectivity failure.
  - → Whenever a change occurs in the resource status, SemNaaS tracks that change.
- Report Generation Component.
  - → SemNaaS supports generating reports about the whole resource reservation process.
  - → Reports enable system administrator to identify the problematic resources of OpenNaaS.

Interconnection of Distributed NaaS Instances

- OpenNaaS faced the problem of maintaining the uniqueness of the IDs assigned to the various network components.
- SemNaaS utilizes URIs to identify various components, e.g. `http://ivi.fnwi.uva.nl/sne/resource/host1`, and `http://www.i2cat.net/resource/host1`.

Use Case

- The Virtual Routing Function use case aims to implement inter-domain routing through OpenNaaS over an OpenFlow infrastructure.

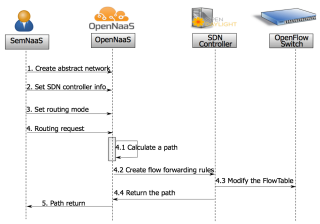

Fig. 3: Sequence diagram for Virtual Routing Function (VRF).

Conclusion and Future Work

- SemNaaS fuses Semantic Web with NaaS to develop an intelligent NaaS system.
- SemNaaS resources can be interlinked to LOD cloud.
- OpenMultinet initiative leverages ontologies for interlinking heterogeneous networks, thus SemNaaS can control heterogeneous networks, `http://open-multinet.info`.

Contact Information

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http://ivi.fnwi.uva.nl/sne
http://www.commit-nl.nl

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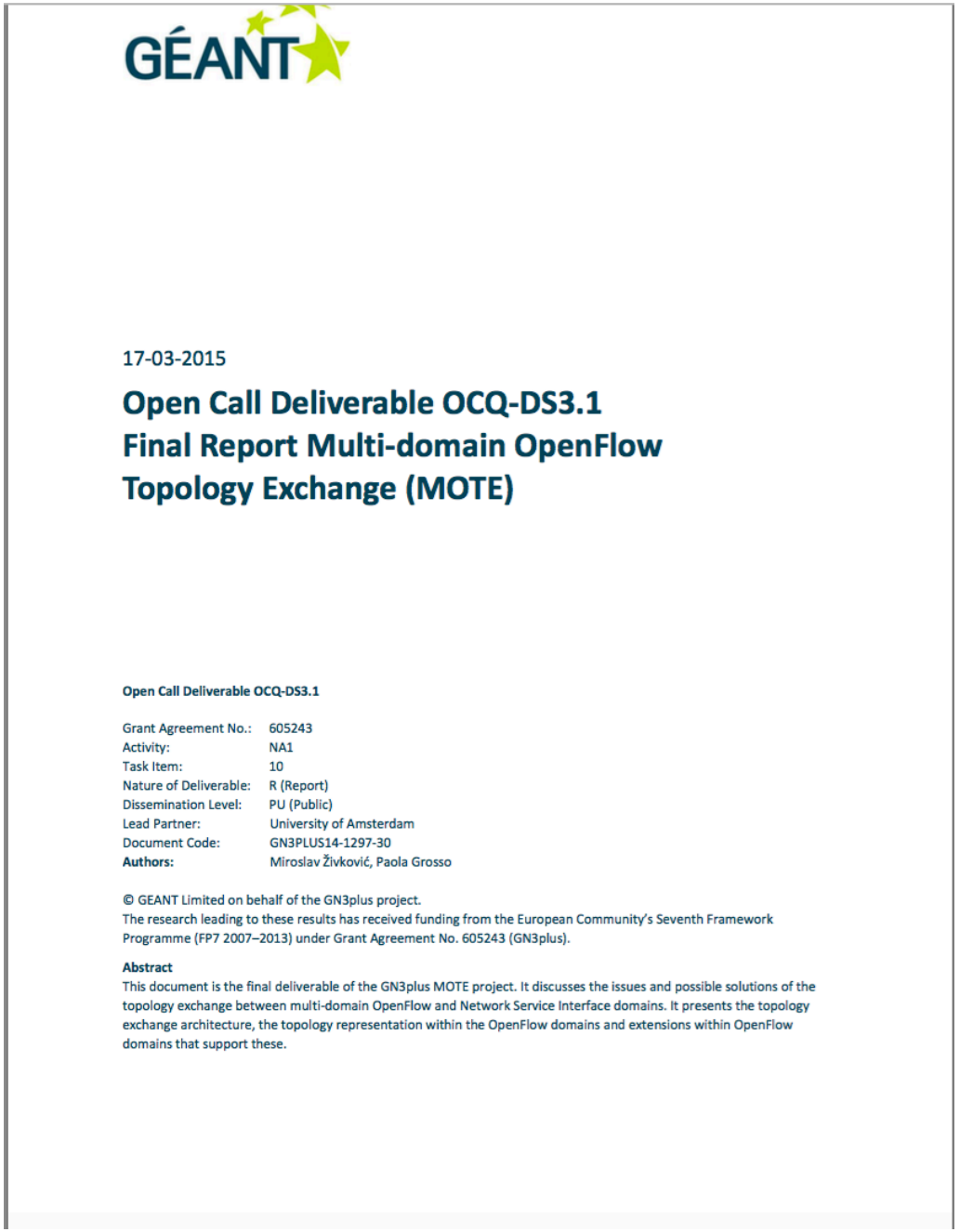
COMMIT/ UVA RELATED WORK

MOTE

Tackling extension of NML to support OpenFlow operations.

http://www.geant.net/Resources/Open_Call_deliverables/Documents/MOTE_final_report.pdf



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Open Call Deliverable OCQ-DS3.1
Final Report Multi-domain OpenFlow Topology Exchange (MOTE)

Open Call Deliverable OCQ-DS3.1

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Abstract
This document is the final deliverable of the GN3plus MOTE project. It discusses the issues and possible solutions of the topology exchange between multi-domain OpenFlow and Network Service Interface domains. It presents the topology exchange architecture, the topology representation within the OpenFlow domains and extensions within OpenFlow domains that support these.

FUTURE OF OMN

Lets discuss after the talks.