


NOVI
Federating Future Internet platforms

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NOVI

Networking innovations Over Virtualized Infrastructures

The project

- Project type:
  STREP
- Contract nr:
  FP7 – 257867
- Project website:
  www.fp7-novi.eu
- Project start date:
  September 2010
- Duration:
  30 months

Future Internet Platforms

Towards a future where network, computing and storage are much more integrated.

Think of programmability.

The driver is:

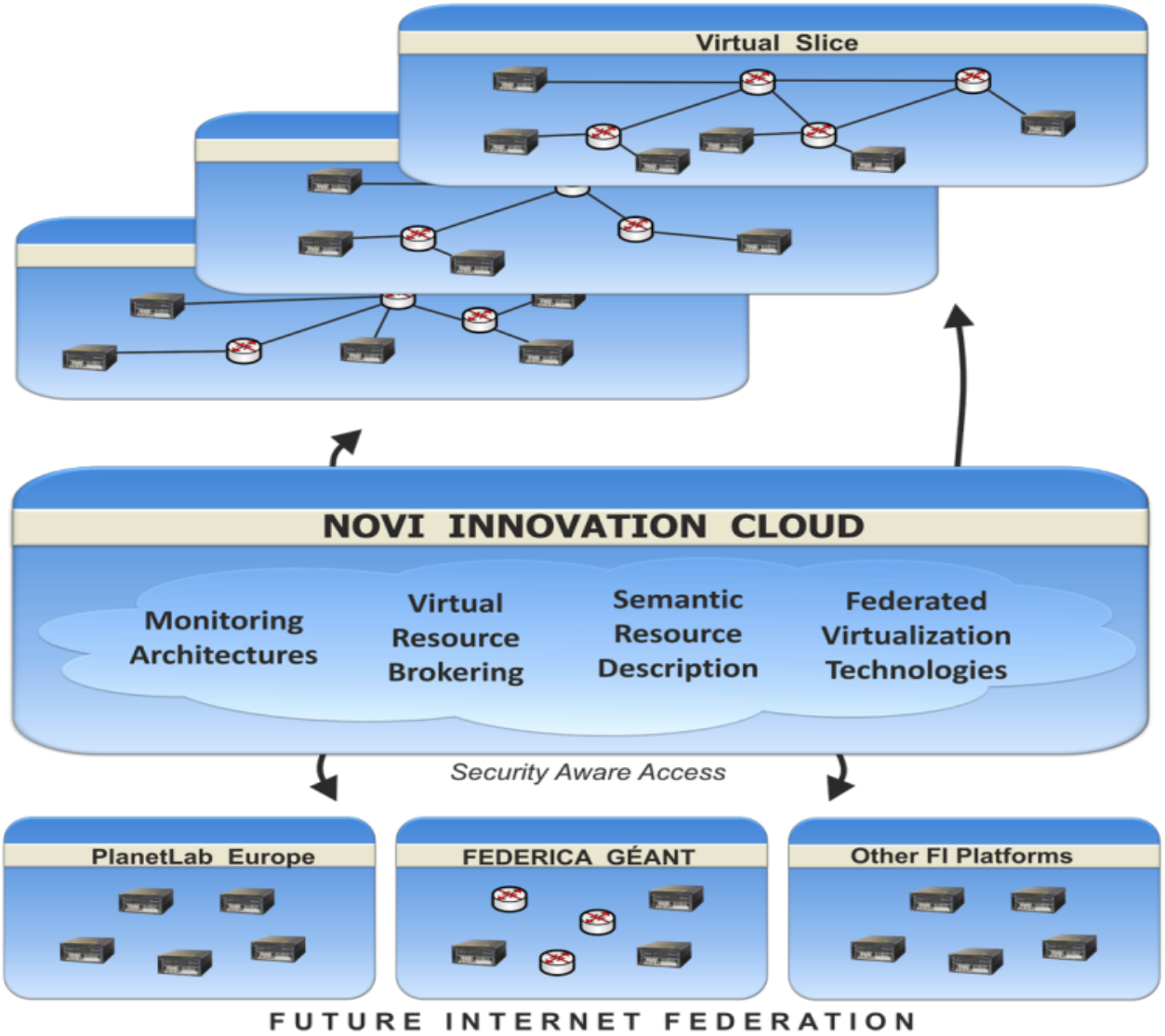
experimentally-driven research*, combining visionary academic research with the wide-scale testing and experimentation that is required for industry*

NOVI concentrates on:

1. efficient approaches to compose virtualized e-Infrastructures towards a holistic Future Internet (FI) cloud service;

2. methods, information systems and algorithms that will enable users with composite isolated slices, baskets of resources and services provided by federated infrastructures.

NOVI innovation cloud



Current NOVI platforms

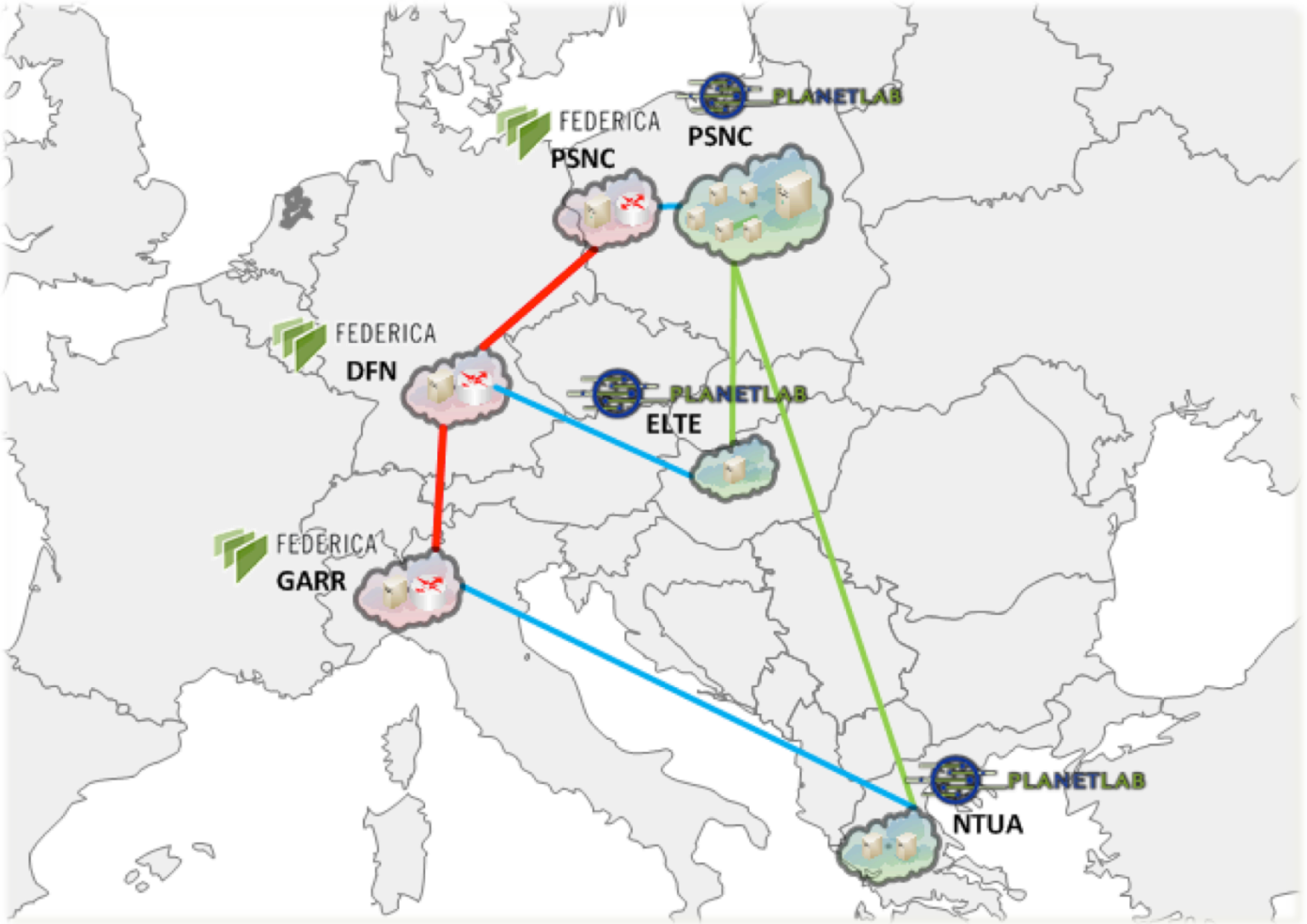
Provides virtualized computing resources:

- Virtual machines

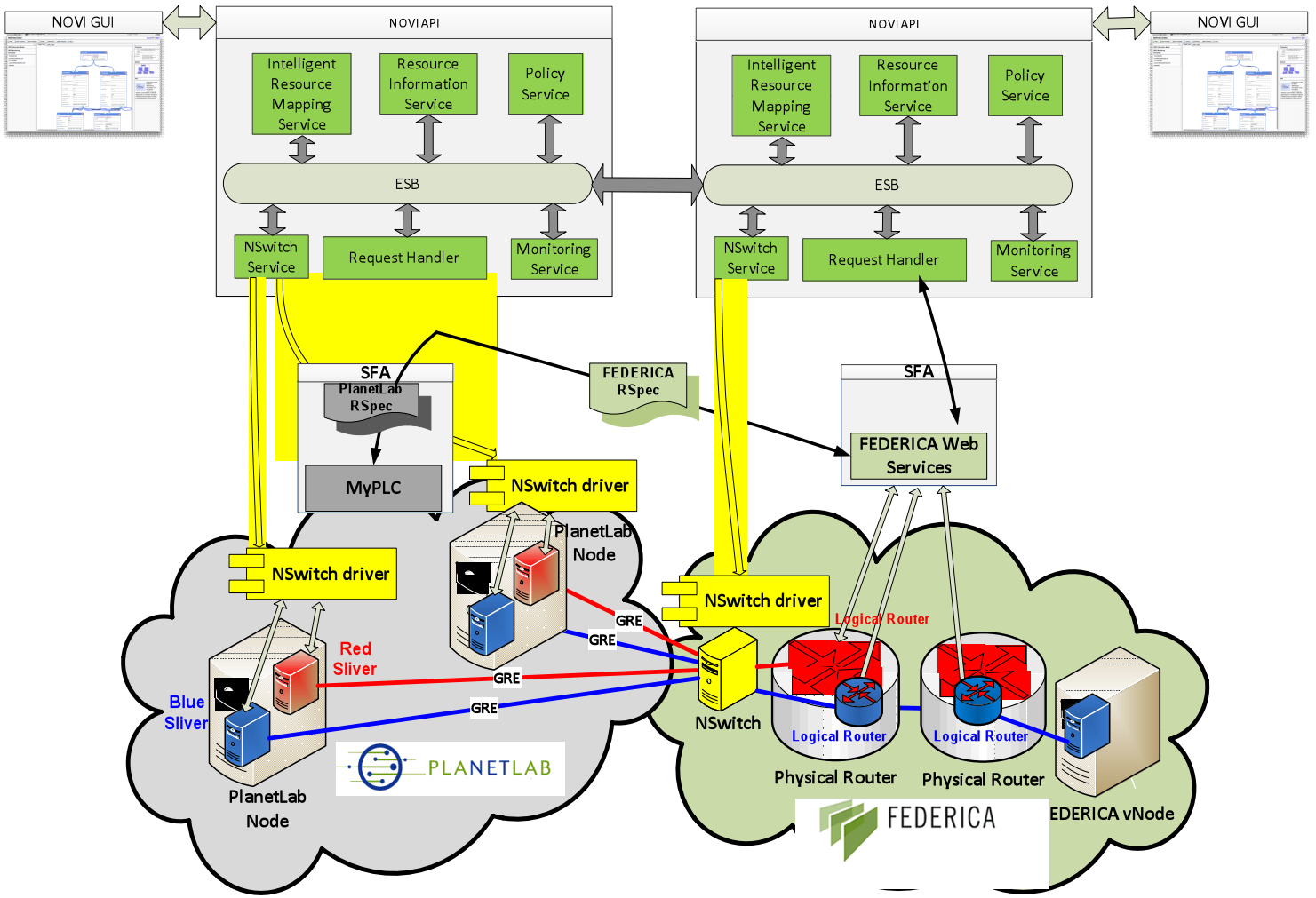
Provides virtualized networking resources:

- Logical routers

Experimentation environment



NOVI Service Layer



NOVI INFORMATION MODEL

How can you identify, select and monitor federated resources without a common language?

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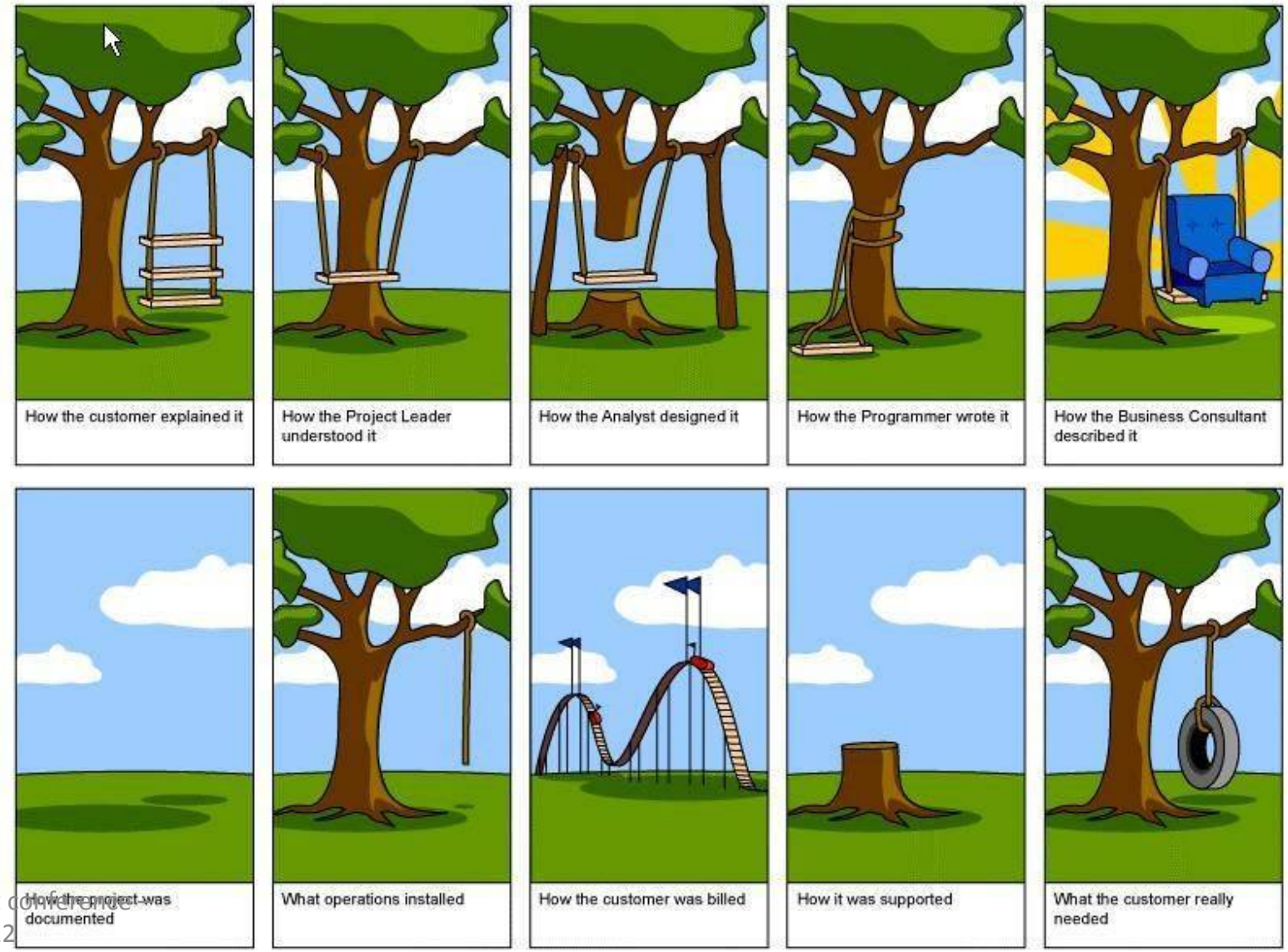
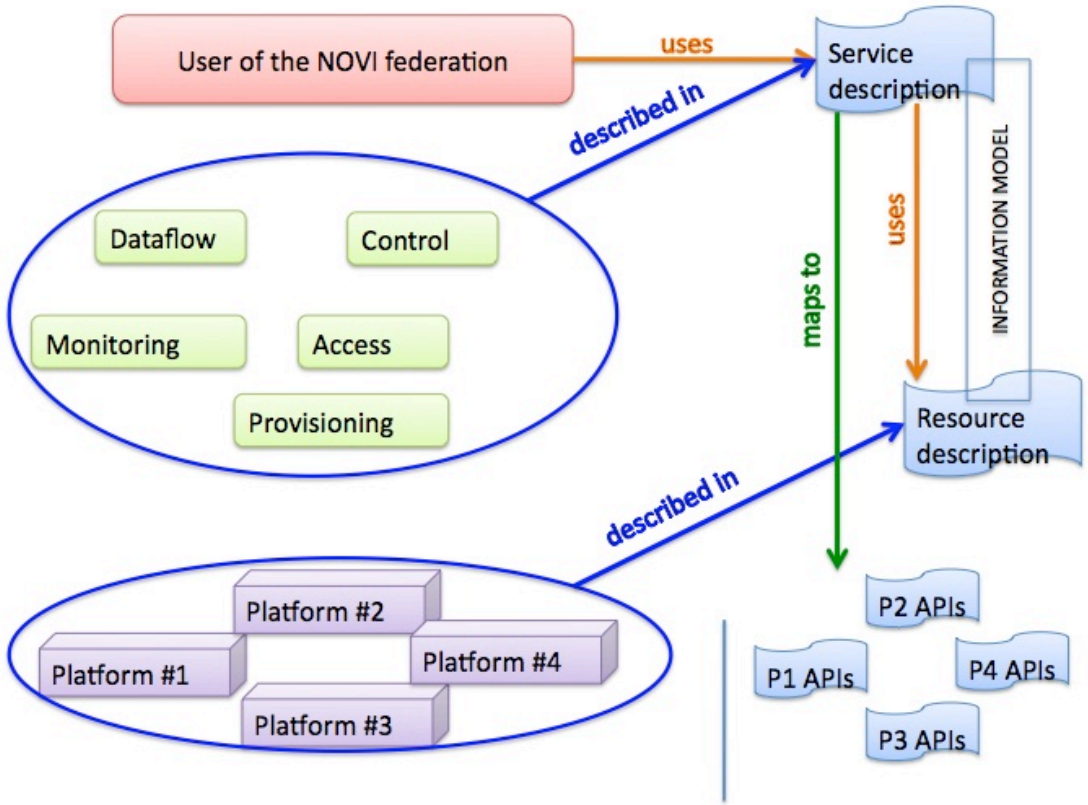
In lack of a common model



The role of the NOVI information model



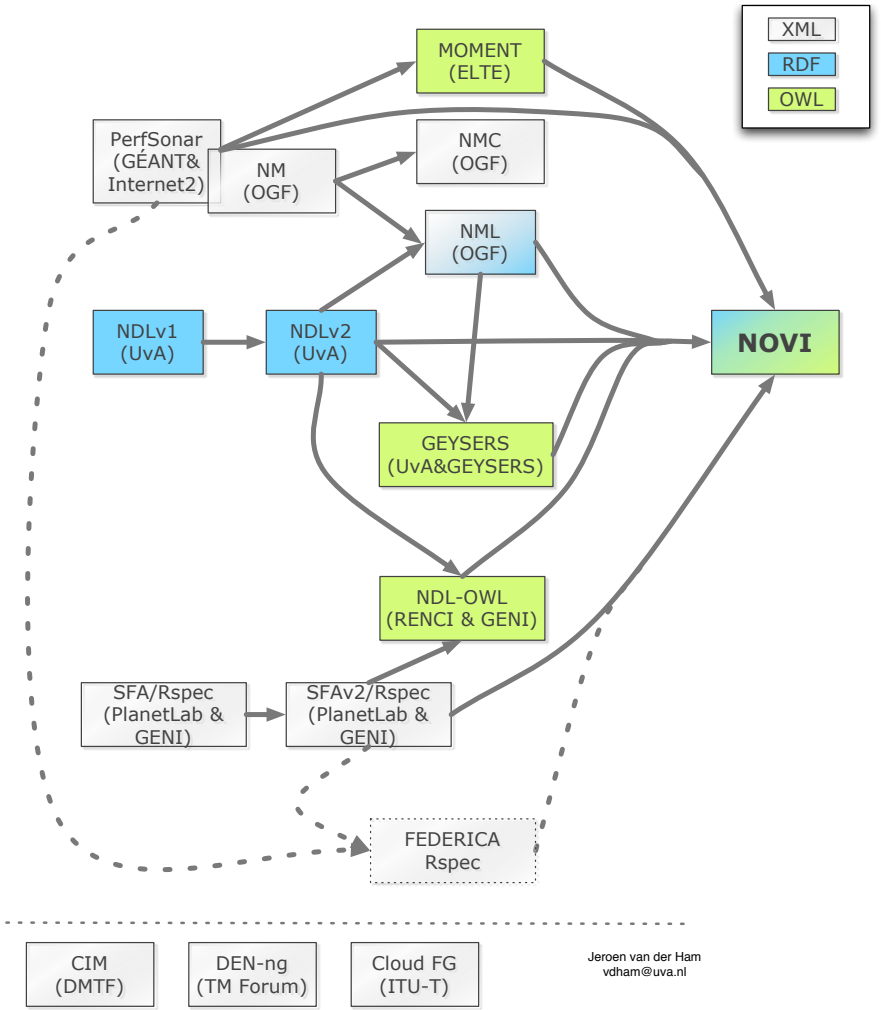
NOVI information model background

We conducted an extensive overview of IM/DM in the Future Internet area:

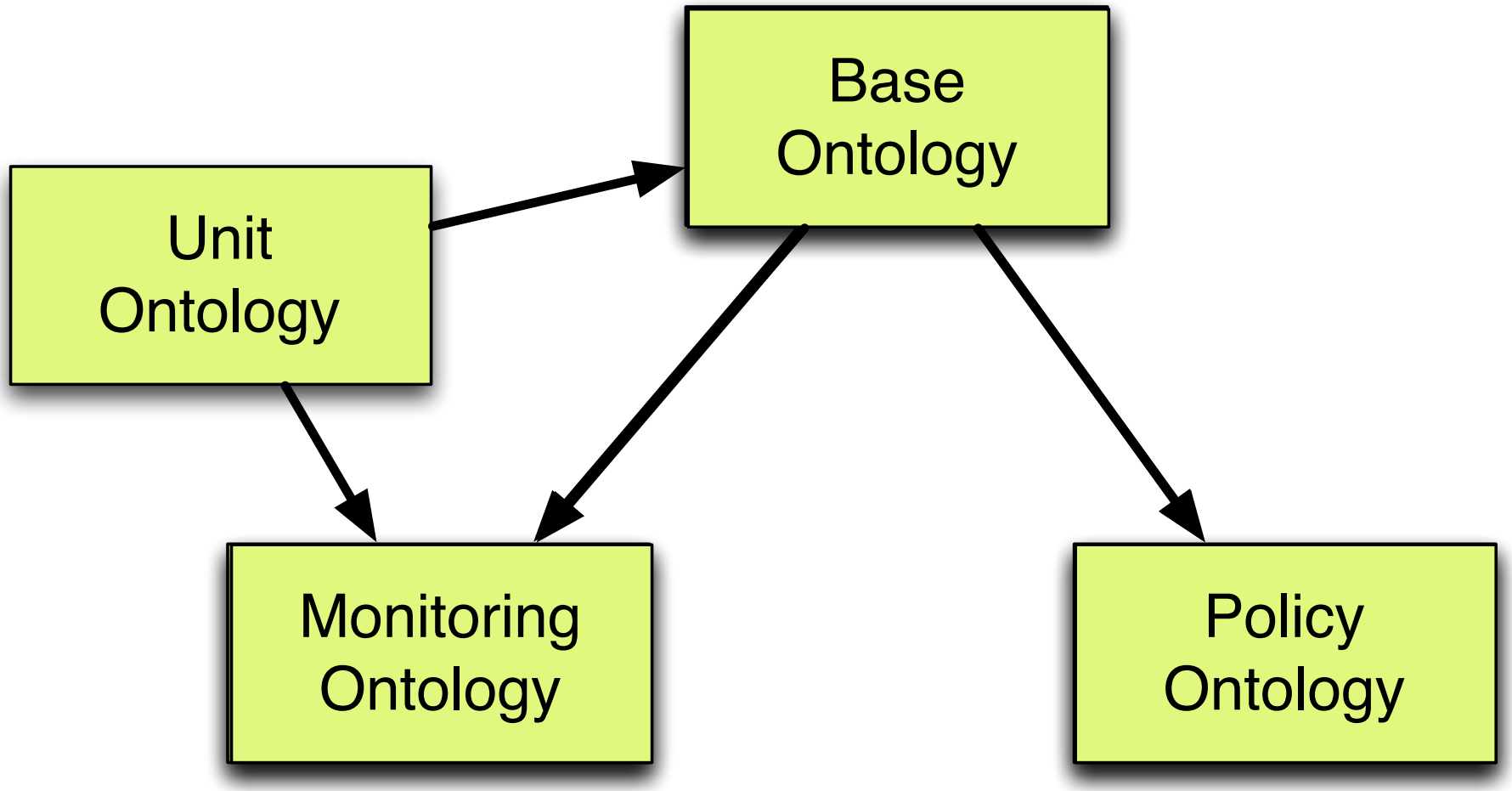
- CIM
- DEN-NG
- NDL
- MOMENT

and the models used in various FI initiatives.

We started to build the NOVI IM using some of them.



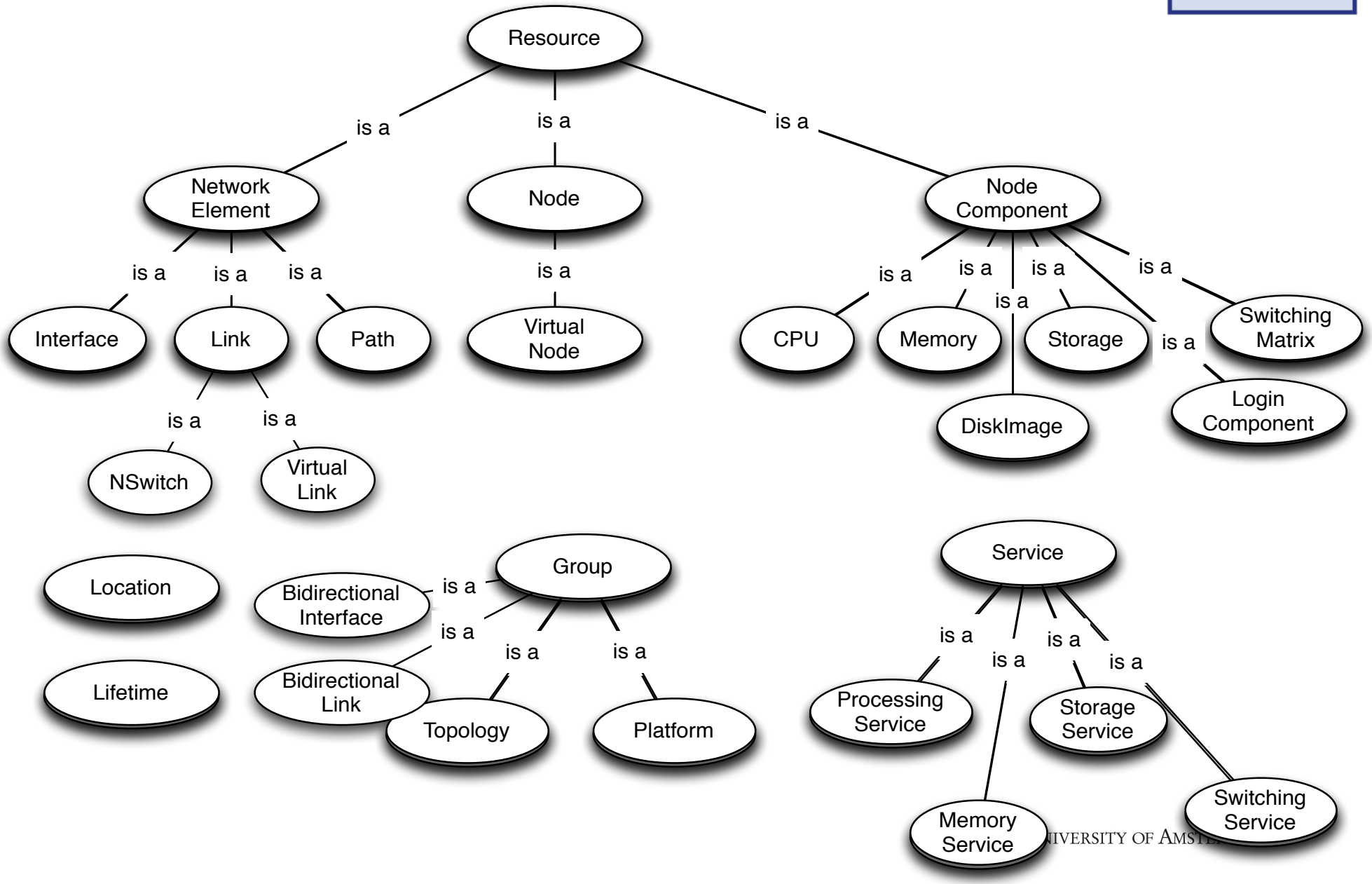
NOVI IM Ontologies



Features of NOVI IM

- Support for Virtualization Concepts
- Semantics and Context –awareness
- Support for Vendor Independency
- Support for Monitoring and Measurement Concepts
- Support for Management Policies

NOVI IM – Resource Classes



Literature

Challenges of an Information Model for Federating Virtualized Infrastructures: the NOVI usecase

Jeroen van der Ham, Chrysa Papagianni, Jozsef Steger, Peter Matray, Paola Grosso, Leonidas Lymberopoulos, Yiannos Kryftis

In: 5th International DMTF Academic Alliance Workshop on Systems and Virtualization Management: Standards and the Cloud

Towards an Infrastructure Description Language forModeling Computing Infrastructures

Mattijs Ghijsen and Jeroen van der Ham and Paola Grosso and Cees de Laat,

In: 10th annual IEEE International Symposium on Parallel and Distributed Processing with Applications (ISPA 2012), Madrid July 2012

RESOURCE SELECTION

How does a NOVI user get the resources he wants?

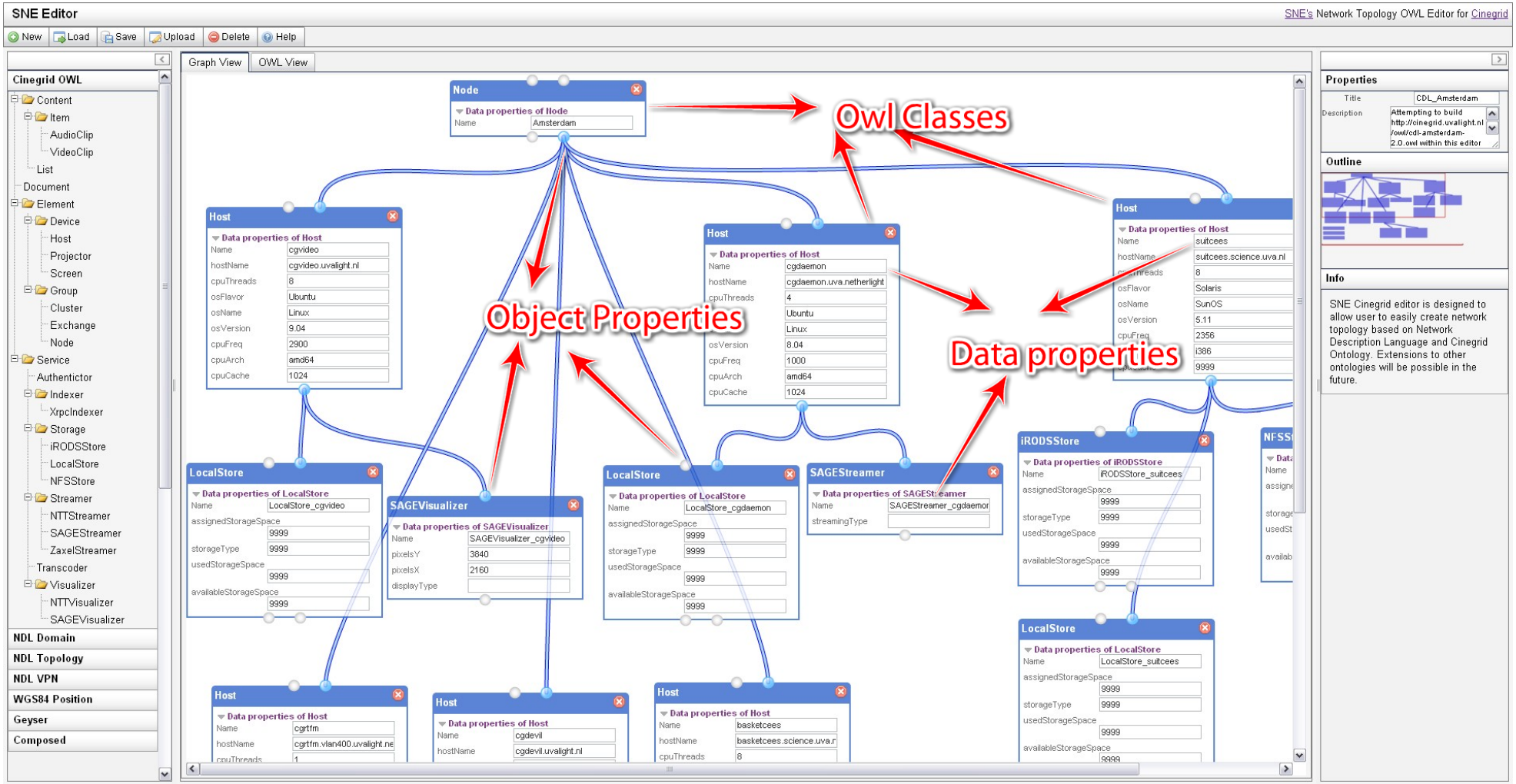
How does NOVI finds the resource needed for the request?

User requests

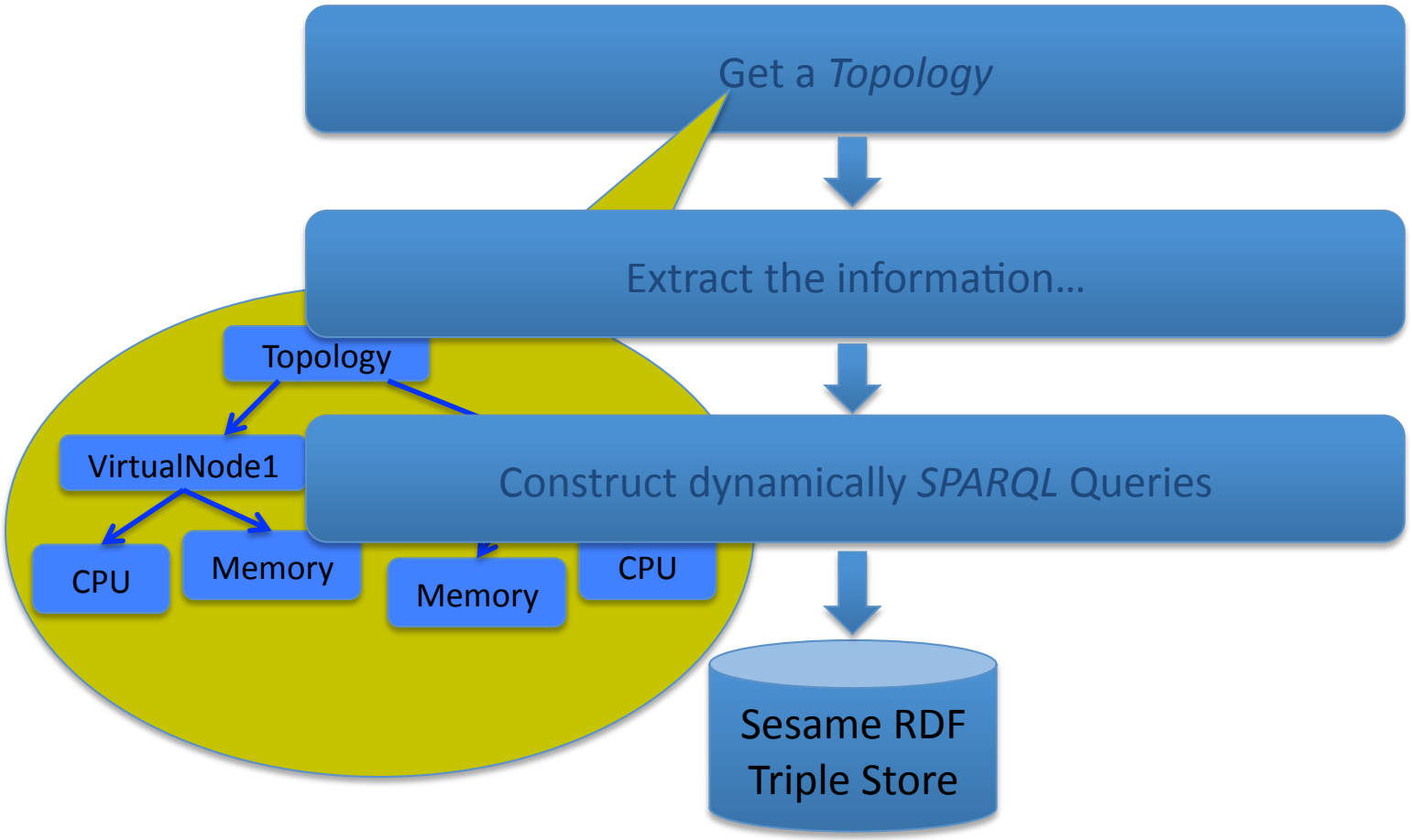
Different types of control from the user when requesting resources:

- Bound
  - Mapping between virtual resources and physical resources is **explicit.**
- Unbound
  - No mapping specifies
- Partially bound
  - In between, some is free and some is defined.

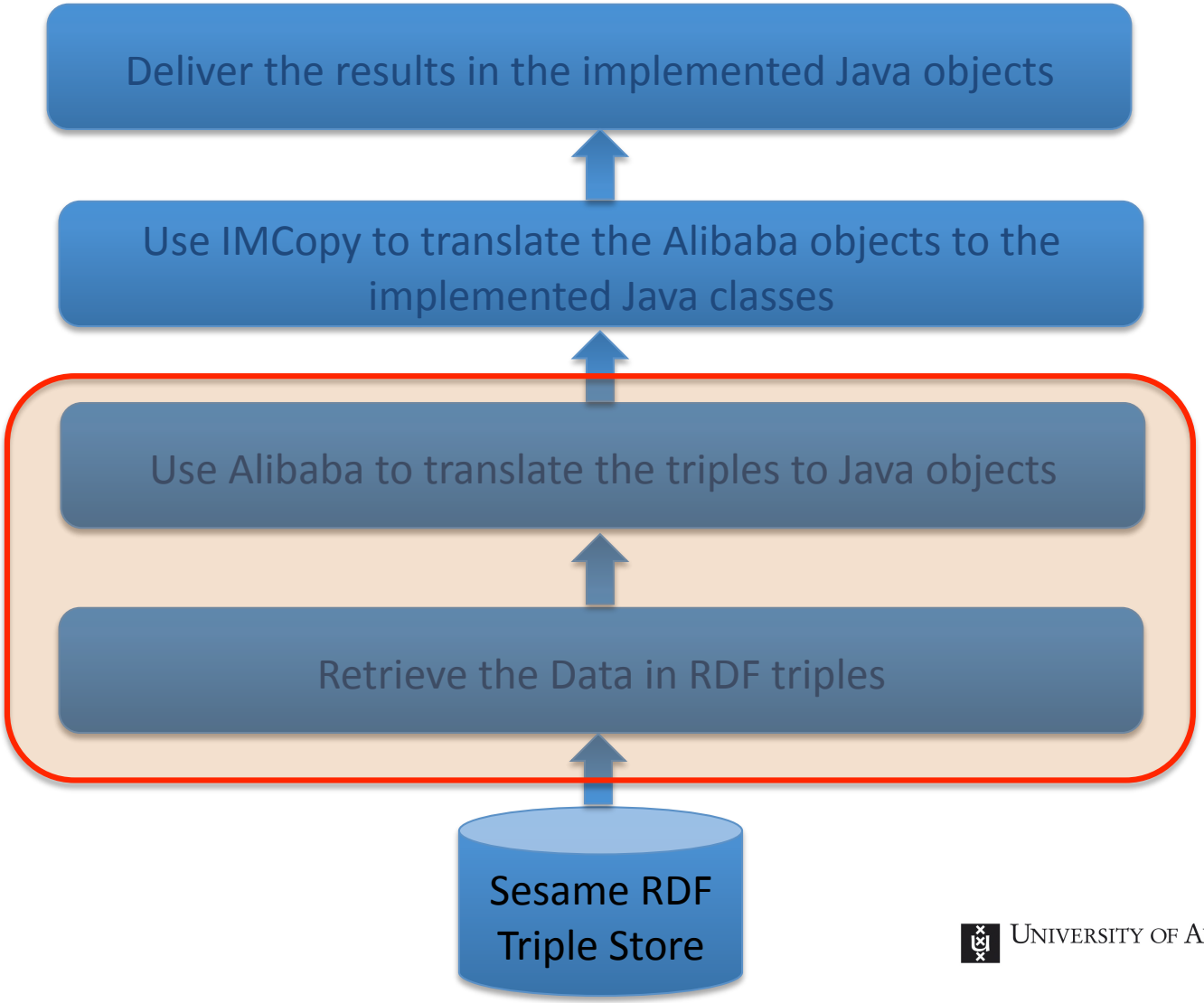
NOVI GUI


SNE Editor
SNE's Network Topology OWL Editor for Cinegrid
New
Load
Save
Upload
Delete
Help
Graph View
OWL View
Cinegrid OWL
Content
Item
AudioClip
VideoClip
List
Document
Element
Device
Host
Projector
Screen
Group
Cluster
Exchange
Node
Service
Authentictor
Indexer
XrpcIndexer
Storage
iRODSStore
LocalStore
NFSStore
Streamer
NTTStreamer
SAGEStreamer
ZaxelStreamer
Transcoder
Visualizer
NTTVisualizer
SAGEVisualizer
NDL Domain
NDL Topology
NDL VPN
WGS84 Position
Geyser
Composed
Owl Classes
Object Properties
Data properties
Properties
Outline
Info
SNE Cinegrid editor is designed to allow user to easily create network topology based on Network Description Language and Cinegrid Ontology. Extensions to other ontologies will be possible in the future.

Retrieving Information



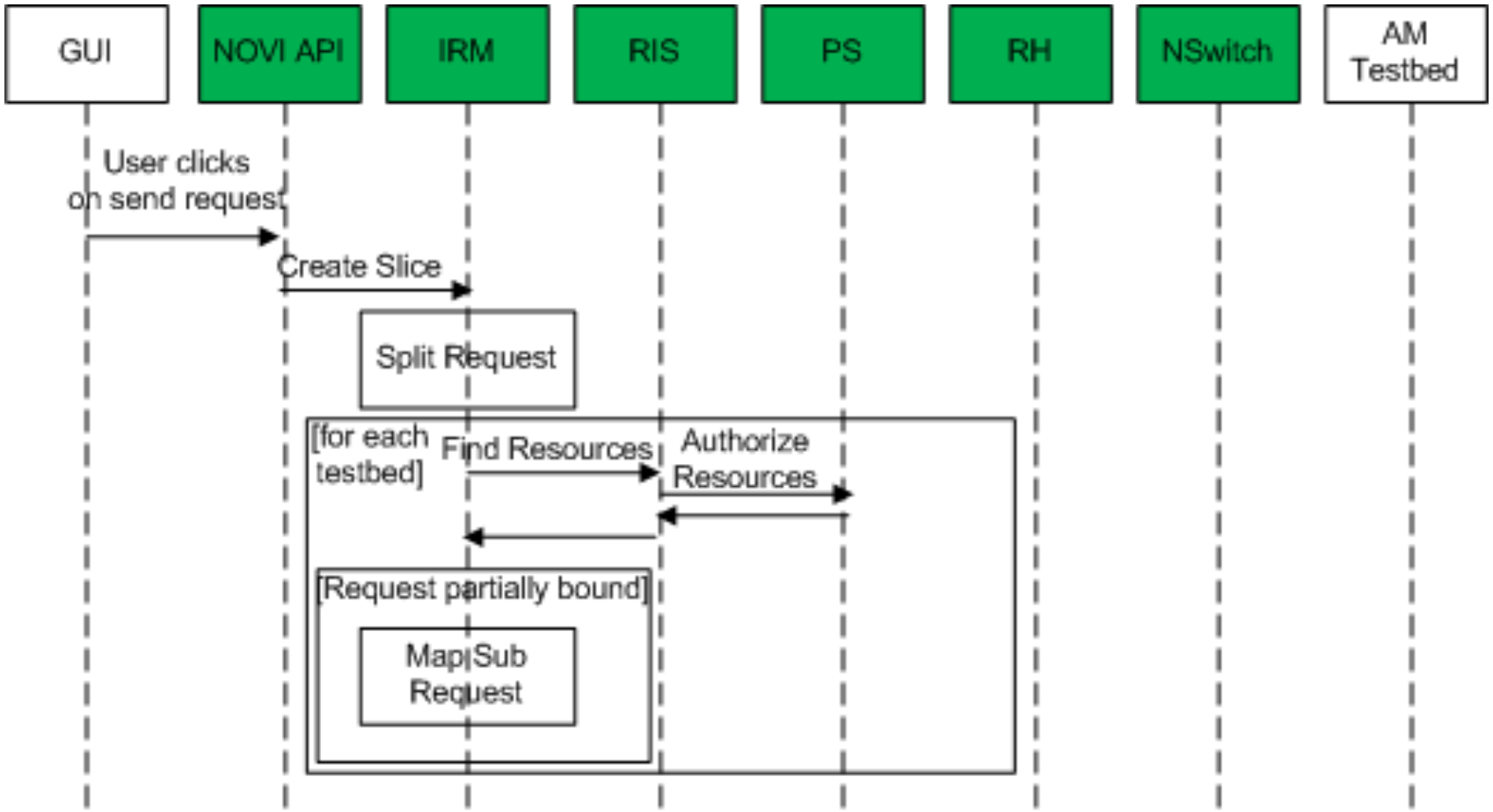
Retrieving Information (2)



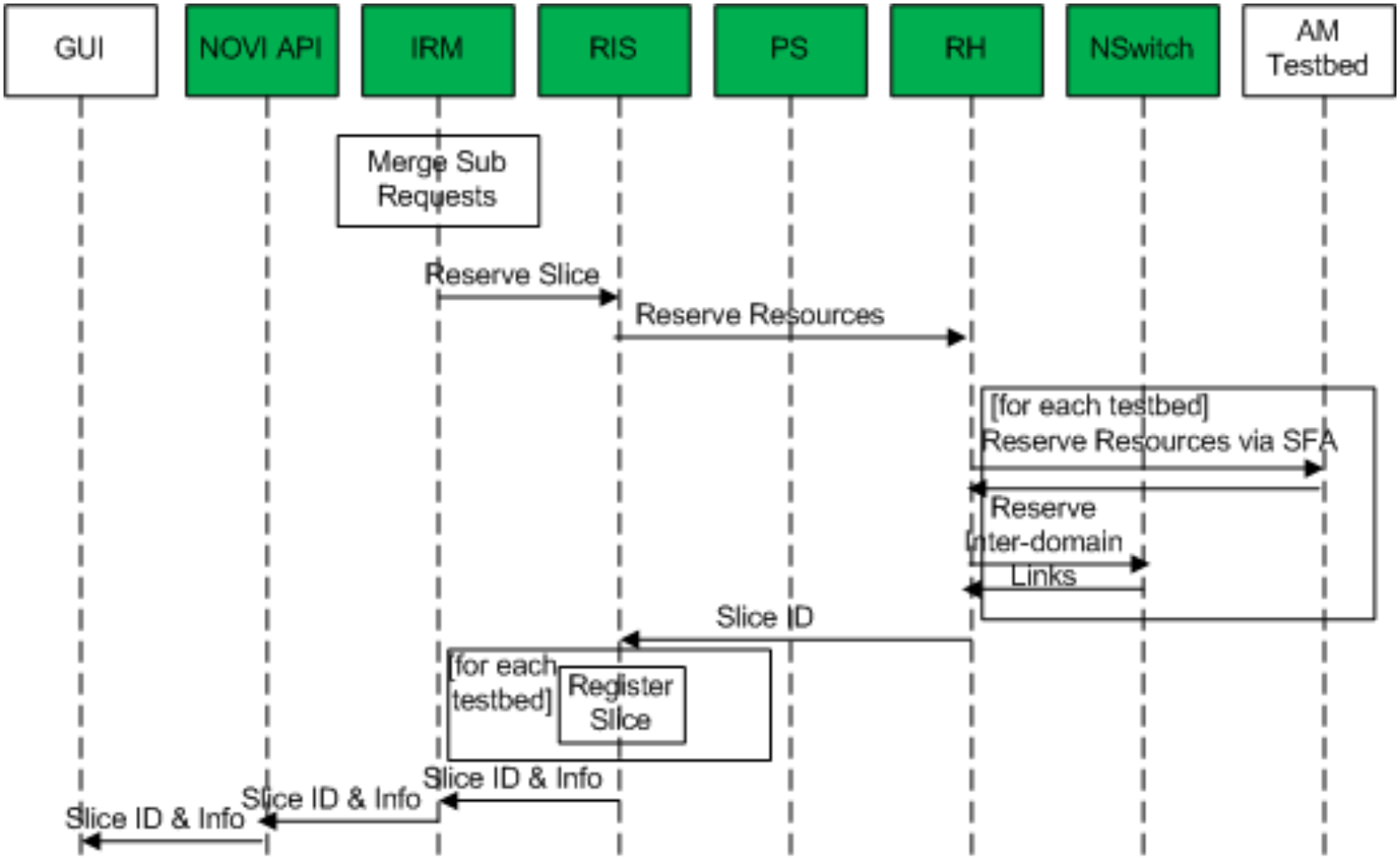
SLICE CREATION

How does a slice gets created?

Slice creation: local resources



Slice creation: federated resources



Virtual network embedding

Goal is to support embedding user requests for virtual resources nested within a federated shared physical substrate.

Two phases:

- ***Virtual Network Partitioning***

  Splits VN requests between testbeds - members of the NOVI federation

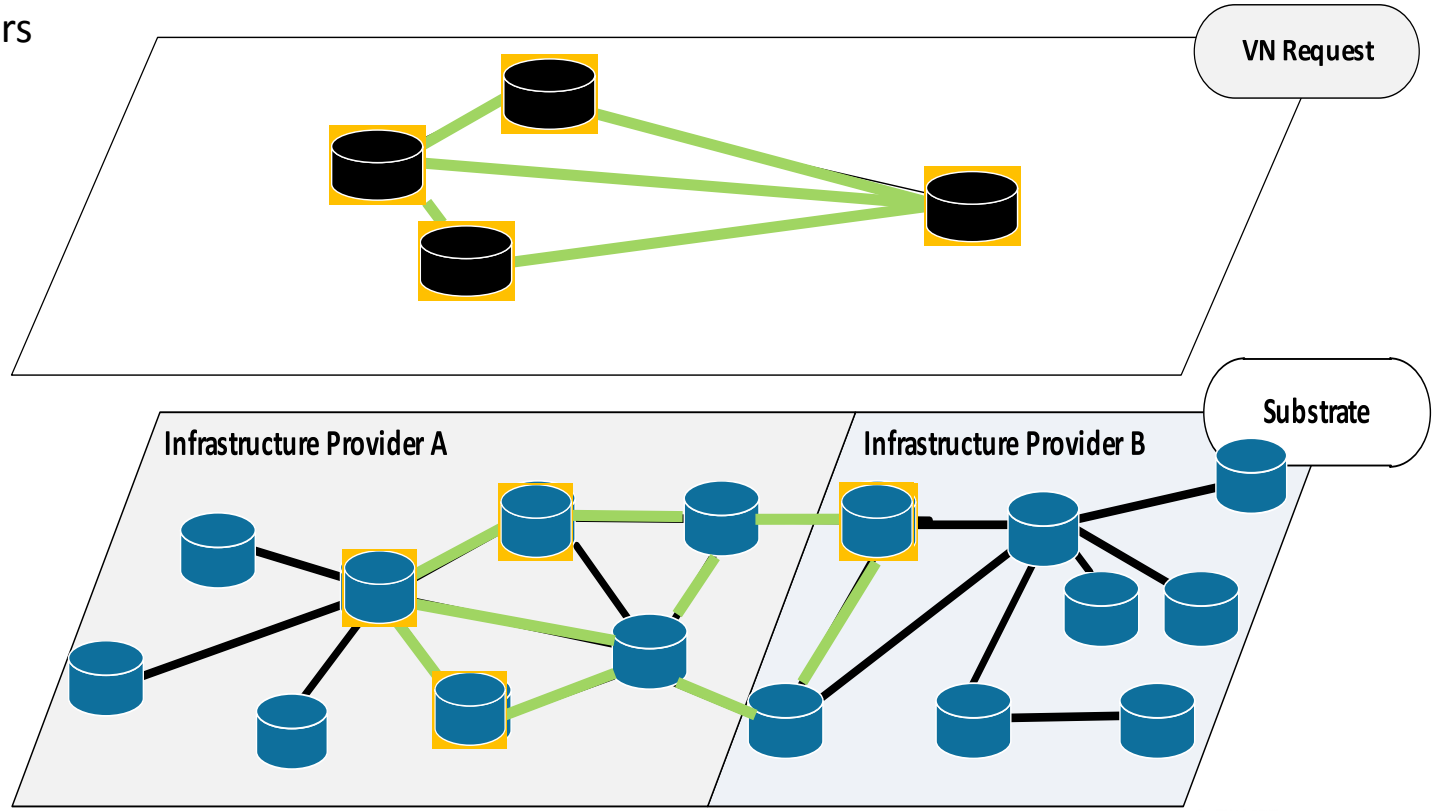
- ***Virtual Network Embedding***

  Provides a mapping of Virtual Network requests to specific substrate nodes and links within a single administrative domain

  Different embedding strategy for each testbed.

Inter-domain VNE

C.Papagianni, A. Leivadeas, S. Papavassiliou, V. Maglaris, C. Cervello-Pastor and A. Monje.
"On the optimal allocation of virtual resources in cloud computing networks",
Under Revision, IEEE Transactions on Computers



MONITORING

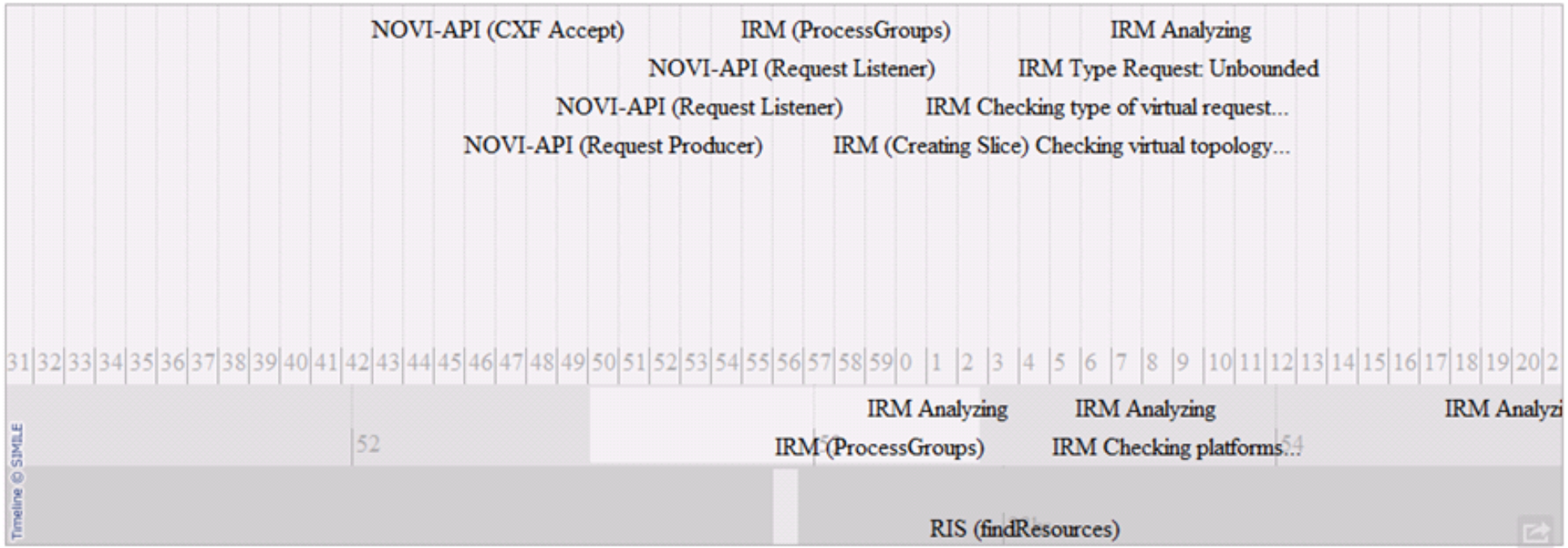
How do you provide feedback to users?

How do you monitor resources?

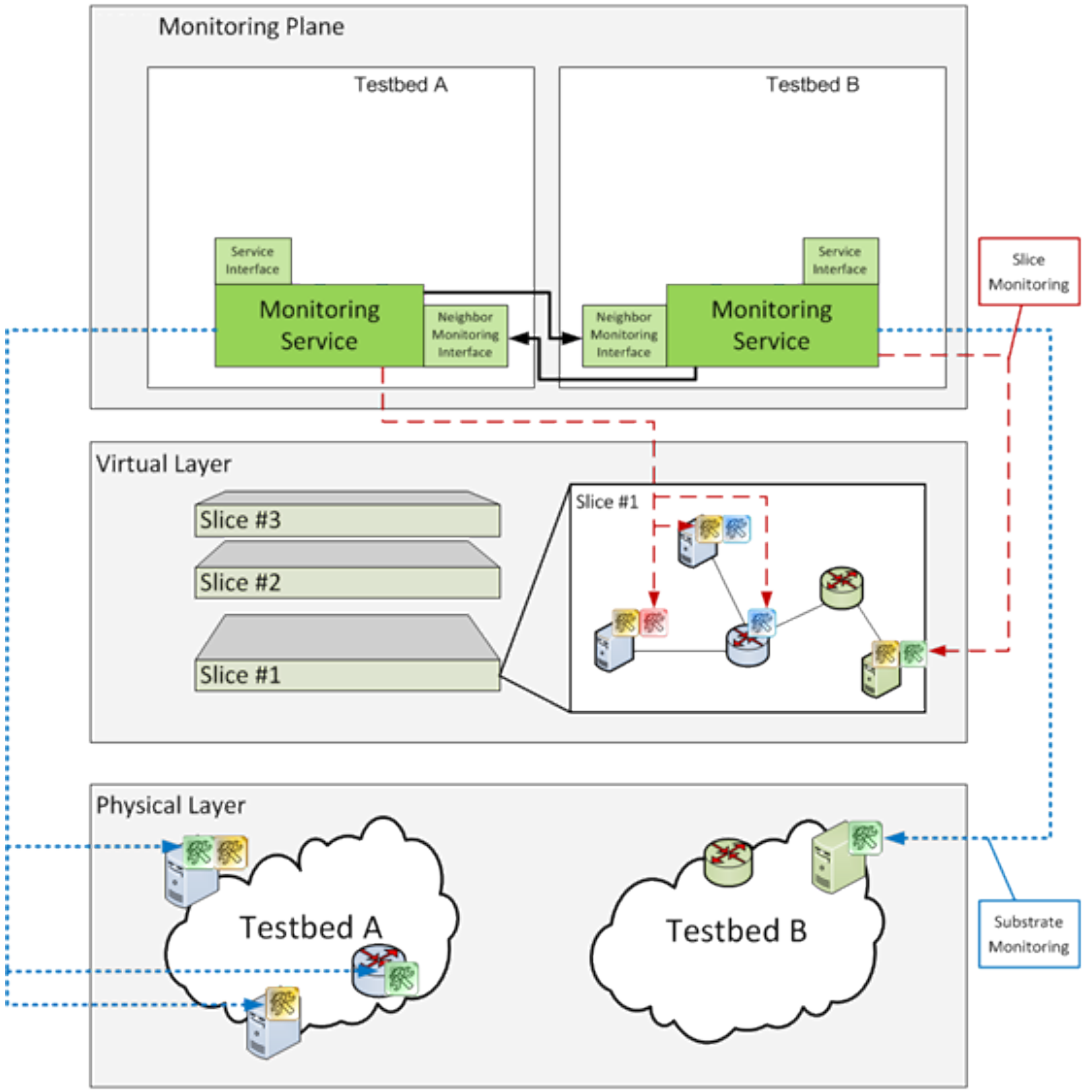
User feedback

150.254.160.28:8080/feedback/timeline/41f8e220-af2a-4a72-9151-8d103e624d95

User Feedback on Request ID : 41f8e220-af2a-4a72-9151-8d103e624d95



Resource Monitoring



NEXT

What more we want to achieve in the project?

Using NOVI Software Layer

- Integration of software components
- Getting more experimenters using the software and the underlying platforms.

- The IM is available for other projects to experiment with.

Want to know more?

The official project website:

- http://www.fp7-novi.eu/

- A summary publication:

NOVI tools and algorithms for Federating Virtualized Infrastructures

L. Lymberopoulos, M. Grammatikou, M. Potts, P. Grosso, A. Fekete, B. Belter, M. Campanella and V. Maglaris, "NOVI Tools and Algorithms for Federating Virtualized Infrastructures,"

In: Future Internet – From Technological Promises to Reality, Springer Lecture Notes in Computer Science, pp. 213-224, 2012.

THANKS to all colleagues in NOVI

And in particular to my UvA colleagues:

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- Adianto Wibisono