

# Measurements and measurement tools in OpenLab

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# Motivation

- **There are monitoring tools in every testbed to obtain network measurements**
  - Packet delays and losses, link bandwidth usage, routing, etc.
- **It is important for the testbed users to have an integrated view of their experiments measurements**
- **But each monitoring tool provides its own view**
  - Most times, very similar information, but different representation
- **How do we integrate such measured information?**


# OpenLab approach



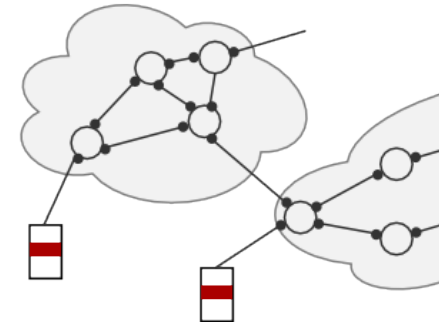
Experimenters



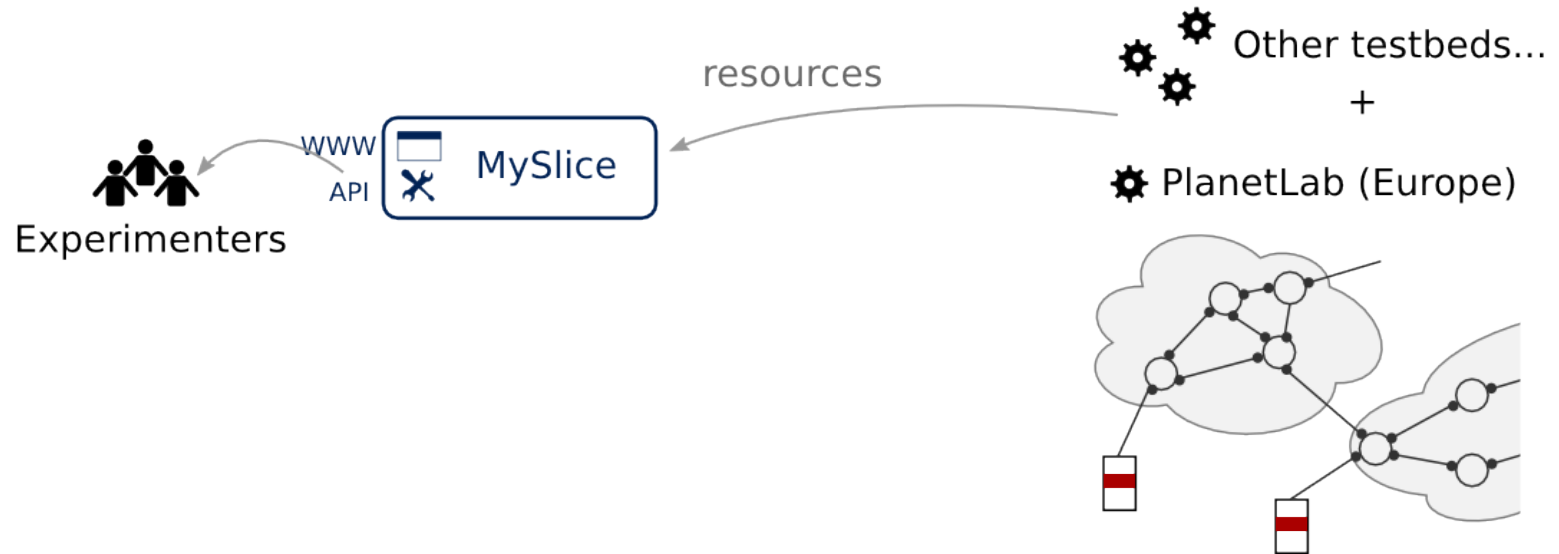
Other testbeds...  
+



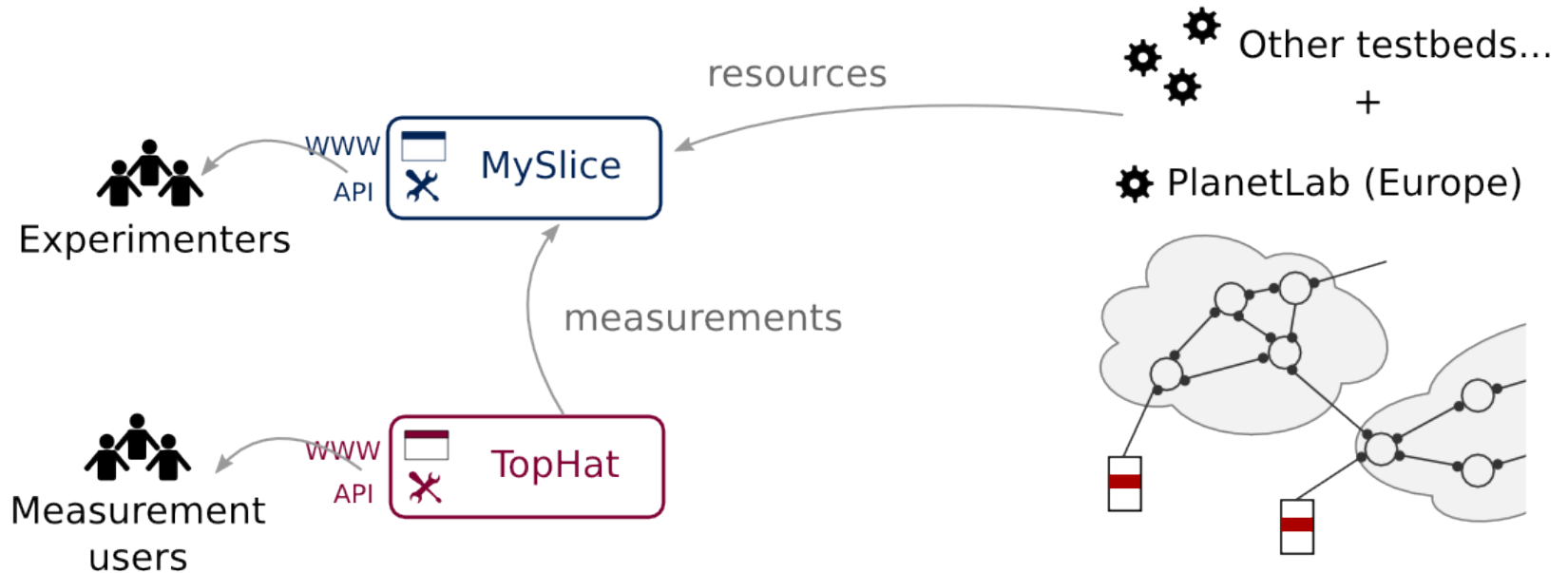
PlanetLab (Europe)



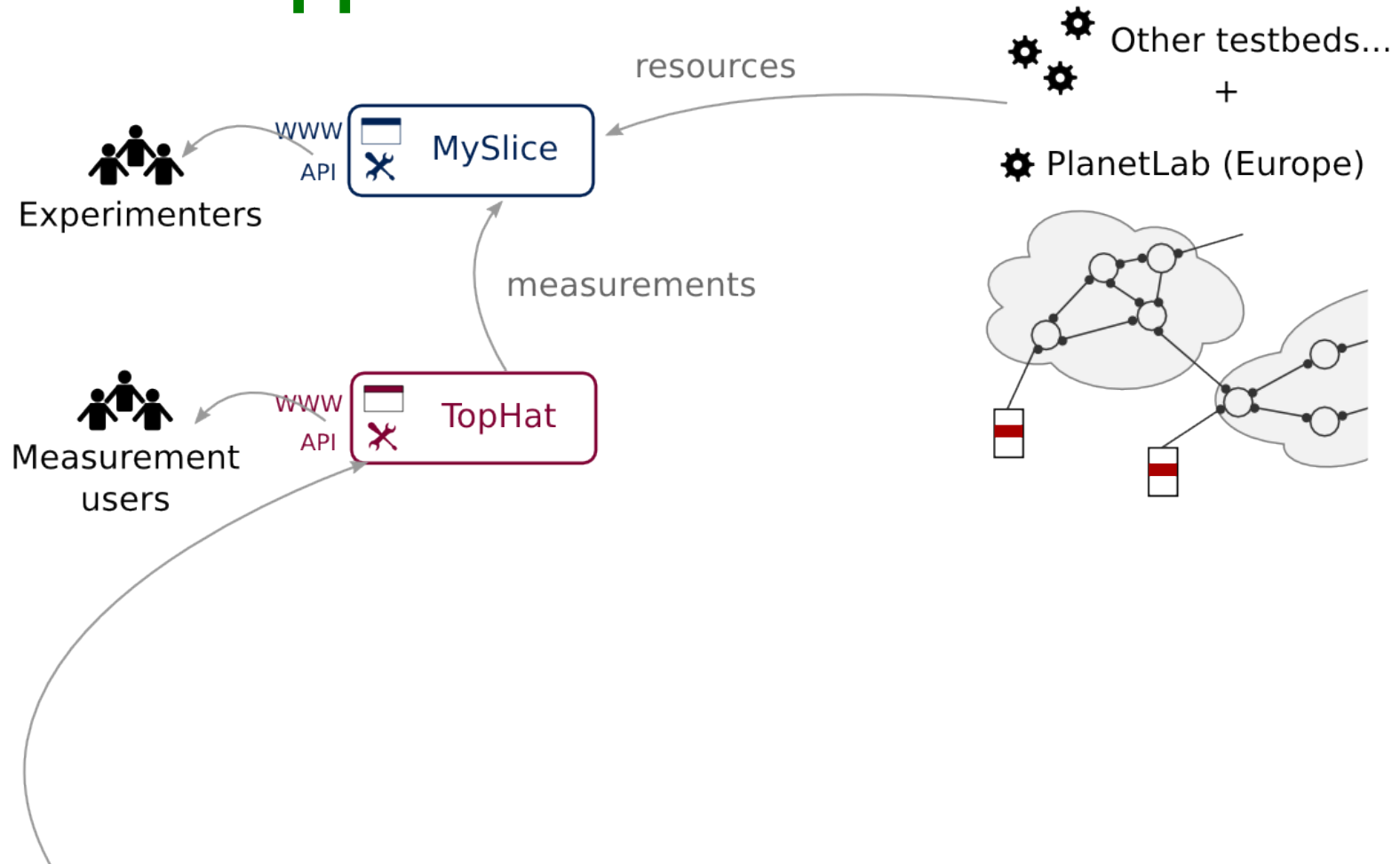
# OpenLab approach



# OpenLab approach



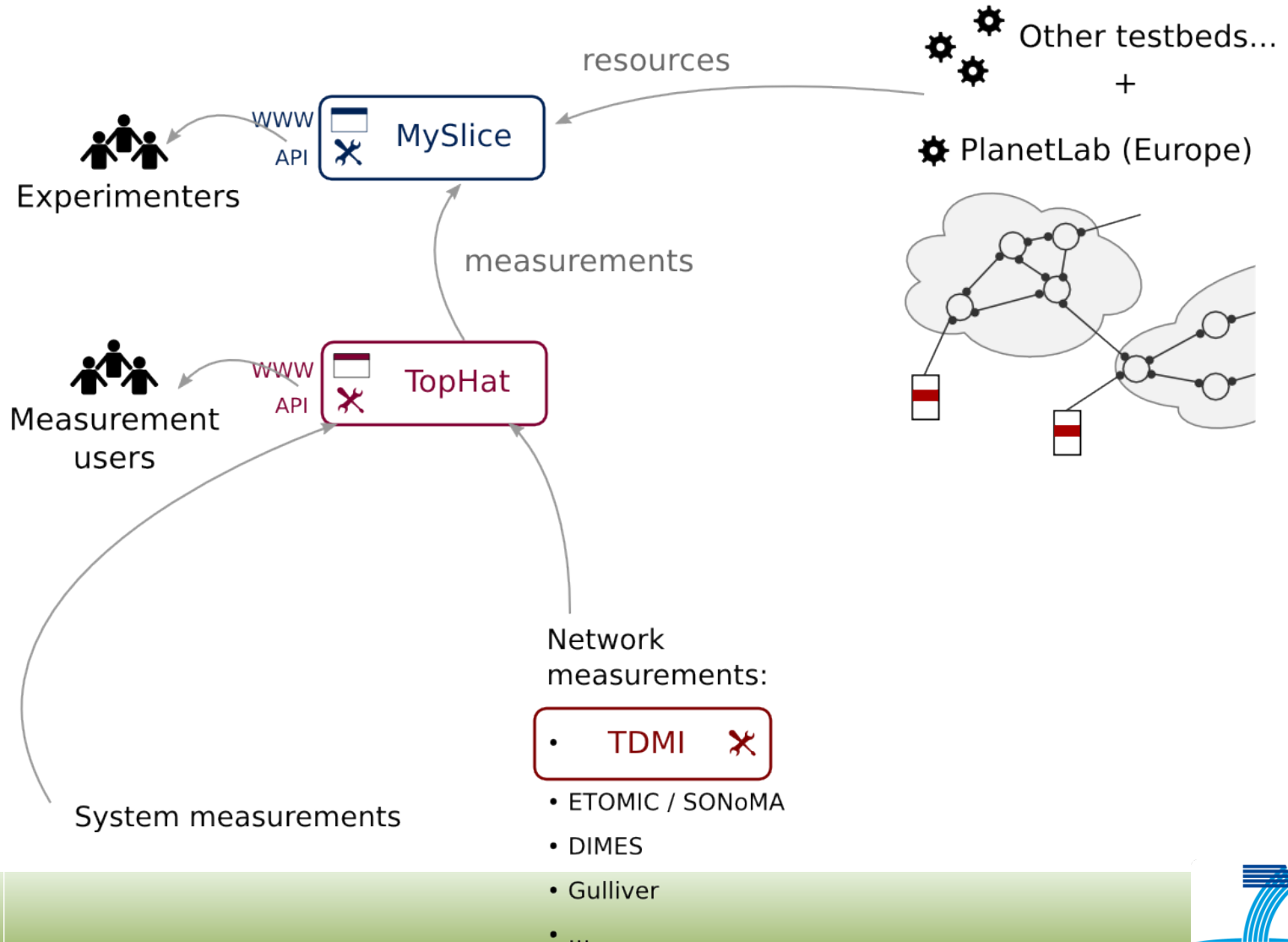
# OpenLab Approach



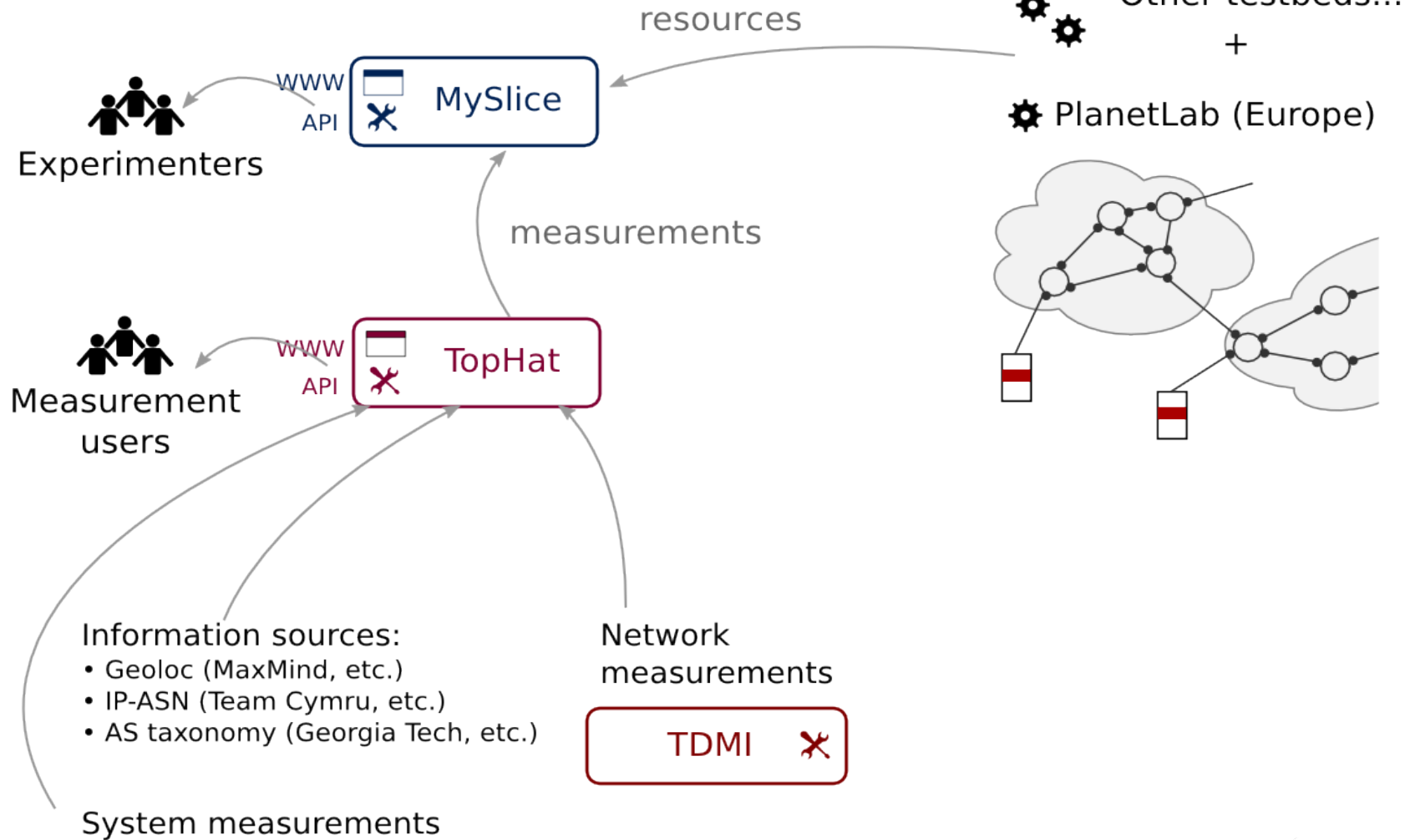
System measurements:

- CoMon
- CoTop
- etc.

# OpenLab Approach

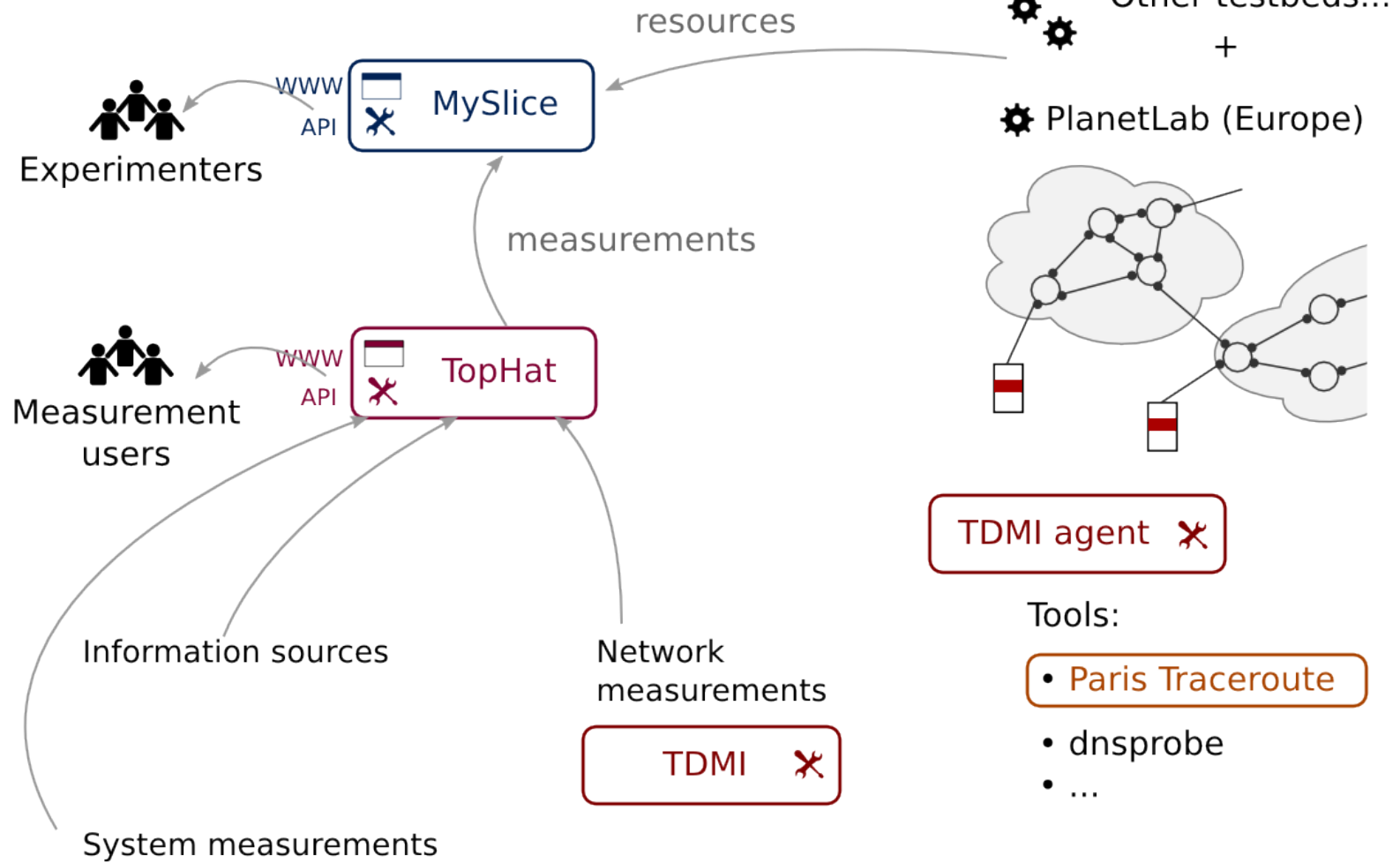


# OpenLab approach





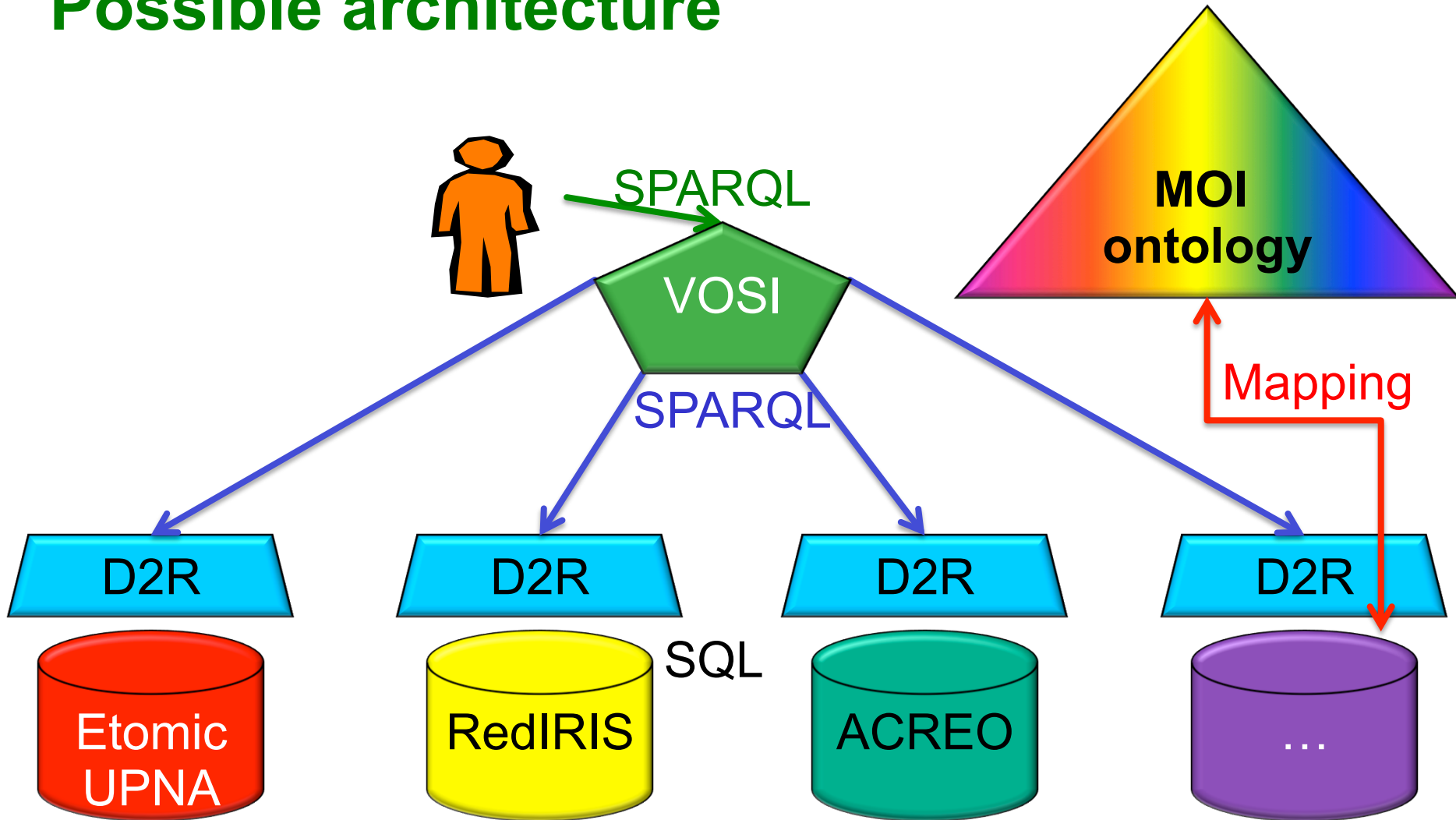
# OpenLab approach



# Integration of heterogeneous measurements

- **Agree on a common ontology for network measurements**
  - ETSI has an ISG defining a Monitoring Ontology for the Internet (MOI) – **You are invited to join!**
- **Define mappings between each database schema and the common ontology**
- **Define mechanisms to distribute a semantic query among every data sources containing the monitored information**
  - The user finally gets the integrated view s/he needs!

# Possible architecture

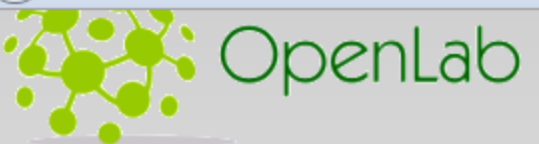


# Conclusions

- **OpenLab efforts aim at providing a federated control and data integration framework**
- **If interested visit <http://www.top-hat.info>**
- **Join us at the Measurement Ontology working group at ETSI!**

**Thank you**

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Main page

Demostration Queries

Use continuation tickets here:  Continue

System Monitor

Add SPARQL Endpoint

Mediated SPARQL Endpoints

- Jump to [Query 1](#)
- Jump to [Query 2](#)
- Jump to [Query 3](#)
- Jump to [Query 4](#)
- Jump to [Query 5](#)

Query 1 List all network names

Query 2 Obtain link usage measurements and their timestamp for the  network (try "uib" or "and")

Query 3 Find link usage between  and  (times must be given in unix timestamp format, try 1266199500 and 1288486800)

Query 4 List all known IPs (some values may be encrypted)

Query 5 Maximun Incoming traffic flows greater than (>) than  hns (for example 100) since





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## Query Results

Original query was:

```
Select ?name {
?a a MD:NetworkName;
```

The SPARQL-XML query results are included in the following text-area for copy/paste:

```
<?xml version="1.0"?>
<sparql xmlns="http://www.w3.org/2005/sparql-results#">
  <head>
    <variable name="name"/>
```

Tabular results from the SPARQL query:

[CENTER AND EXPAND TABLE](#)

"name"
unican
ua
upm
cesga
ara



# OpenLab

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## Query using SPARQL

```

PREFIX MD: <http://www.fp7-moment.eu/MomentDataV2.owl#>
PREFIX MGC: <http://www.fp7-moment.eu/MomentGeneralConcepts.owl#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>

SELECT ?name ?ts_value ?linkusage_value
WHERE
{
  ?x rdf:type MD:MRTGMeasurement ;
    MD:hasMeasurementData ?a ;
    MD:hasMeasurementData ?timestamp ;
    MD:hasMeasurementData ?linkusage .

  ?timestamp a MGC:TimeStamp ;
    MGC:timestamp ?ts_value .

  ?linkusage a MD:LinkUsageMeasurement ;
    MD:PathUsageMeasurementValue
?linkusage_value .

  ?a rdf:type MD:NetworkName .
  ?a MD:NetworkNameValue ?name .
FILTER (?name = "uib"^^xsd:string)
} LIMIT 100

```

Human readable output:  If set output will be a HTML page, not XML used by computer programs

Disable cache:  If set queries will be distributed and won't be resolved against the temporal knowledge base, slowing the query



The whole execution took: 902 ms to complete

The generated individual stats are included bellow:

Server	Elapsed time	Result count	Generated query
TEMPORAL KNOWLEDGE BASE	59	0	<pre> PREFIX MG: &lt;http://www.fp7-moment.eu/MomentGeneralConcepts.owl#&gt; PREFIX rdfs: &lt;http://www.w3.org/2000/01/rdf-schema#&gt; PREFIX MU: </pre>
Acreo	7	0	<pre> PREFIX MG: &lt;http://www.fp7-moment.eu/MomentGeneralConcepts.owl#&gt; PREFIX rdfs: &lt;http://www.w3.org/2000/01/rdf-schema#&gt; PREFIX MU: </pre>
ETOMIC-UPNA	10	0	<pre> PREFIX MG: &lt;http://www.fp7-moment.eu/MomentGeneralConcepts.owl#&gt; PREFIX rdfs: &lt;http://www.w3.org/2000/01/rdf-schema#&gt; PREFIX MU: </pre>
naiveMRTG	101	100	<pre> PREFIX MG: &lt;http://www.fp7-moment.eu/MomentGeneralConcepts.owl#&gt; PREFIX rdfs: &lt;http://www.w3.org/2000/01/rdf-schema#&gt; PREFIX MU: </pre>

Tabular results from the SPARQL query:

[CENTER AND EXPAND TABLE](#)

CENTER AND EXPAND TABLE

<i>"name"</i>	<i>"ts_value"</i>	<i>"linkusage_value"</i>
uib	1266201600	16855590.934
uib	1266211200	14777947.17
uib	1266208500	15380709.227
uib	1266197700	16653832.458
uib	1266214500	15358614.682
uib	1266199500	16438880.003
uib	1266207600	14701557.029
uib	1266213000	14713779.961
uib	1266211500	15212749.852
uib	1266215100	16108438.768
uib	1266209400	15616372.972
uib	1266210600	15485795.446
uib	1266211800	14823816.115
uib	1266210300	15833878.092
uib	1266202500	16215552.01
uib	1266219600	16166194.63
uib	1266197100	16478653.865
uib	1266210900	15546717.974
uib	1266222900	16360475.504
uib	1266217800	14893945.875
uib	1266218700	15055470.391
uib	1266206100	15594864.795