TopHat meets mPlane

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mPlane plenary meeting – October 21-22, 2013 – Barcelona, Spain

Context: The OneLab ecosystem

Measurements & Monitoring

Large scale distributed measurements

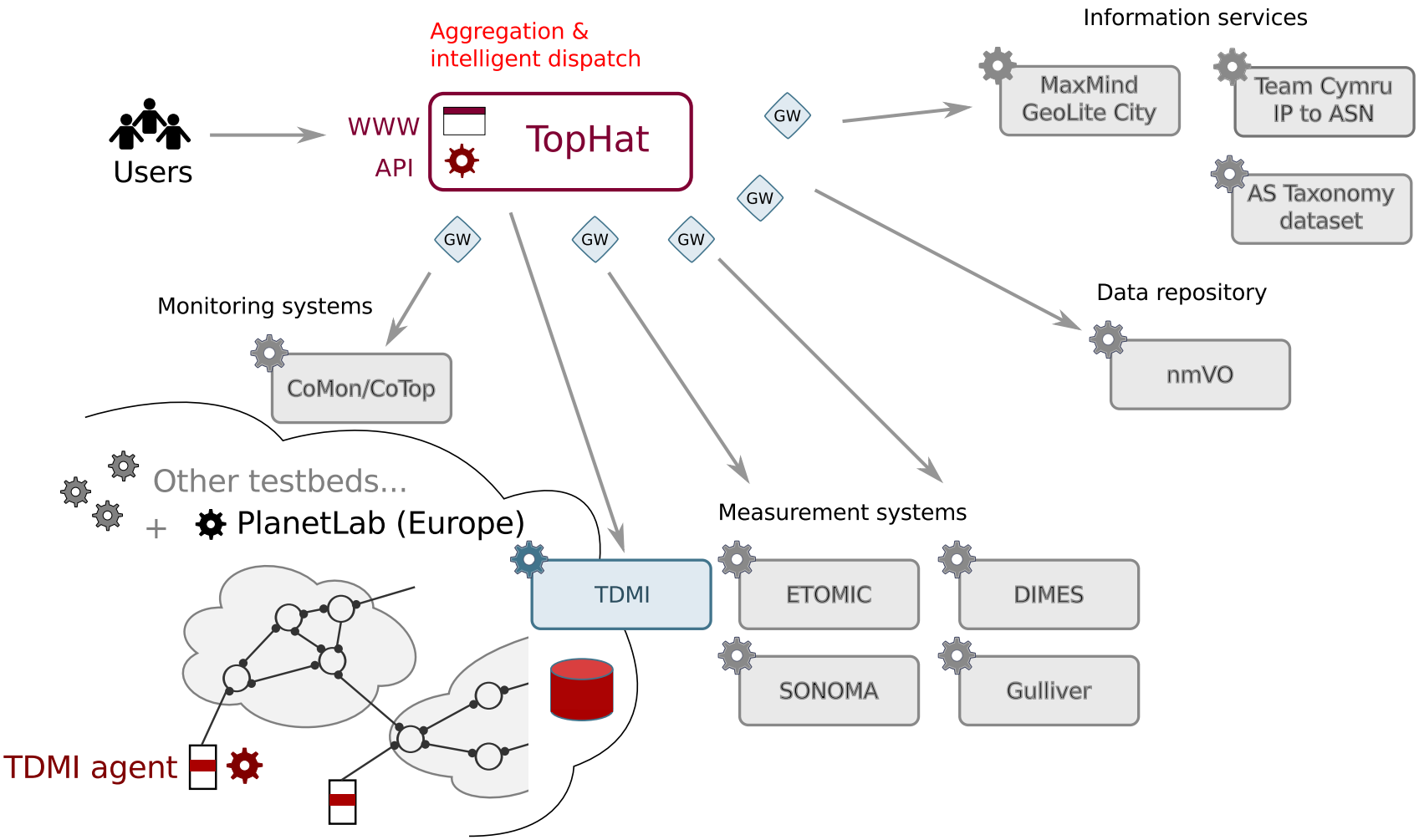
- High frequency snapshots
- Multiple facets
  BGP & IP paths, delays, etc.

Federation of testbeds

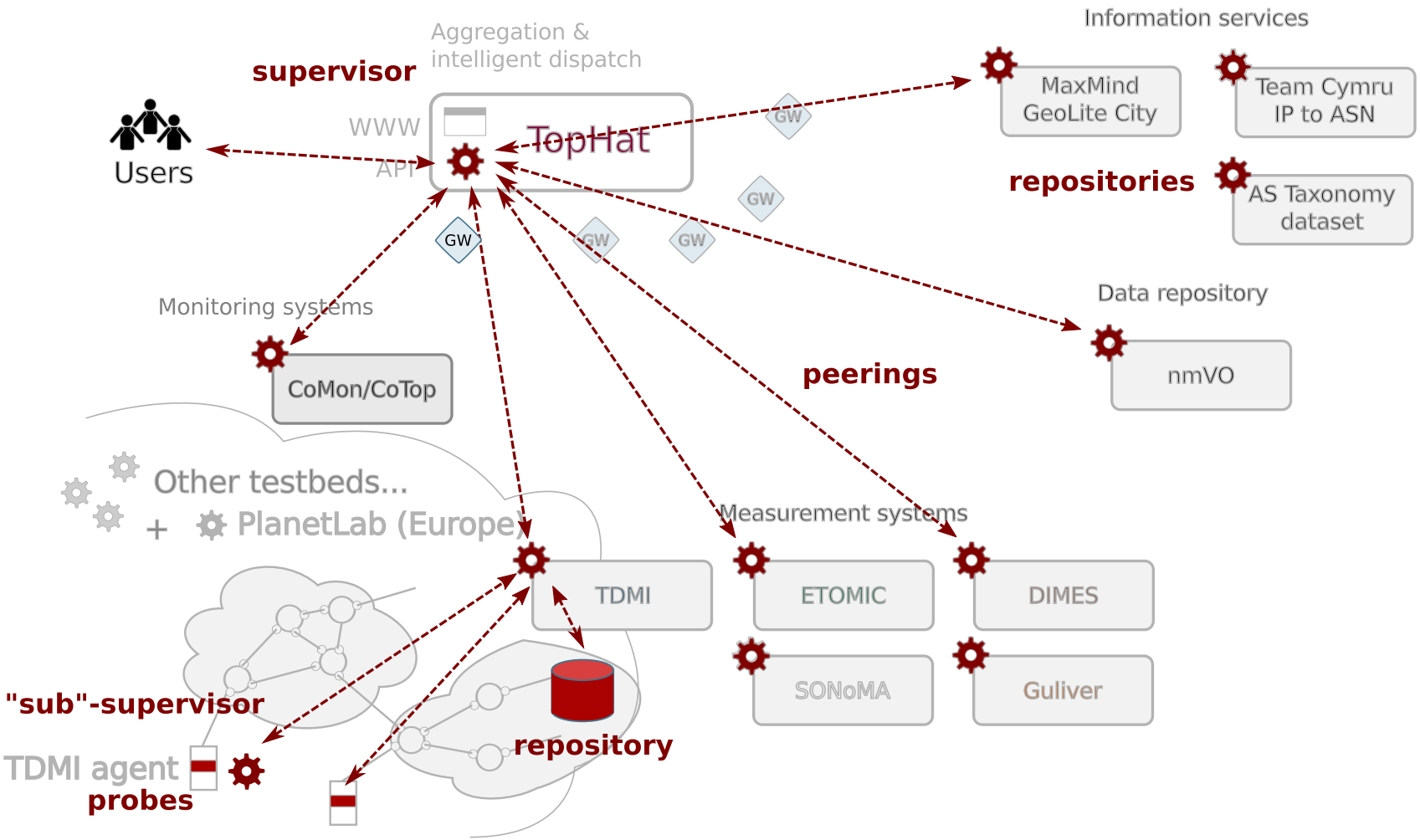
Support experimenters with measurements

- OneLab experimental facility
- PlanetLab Europe

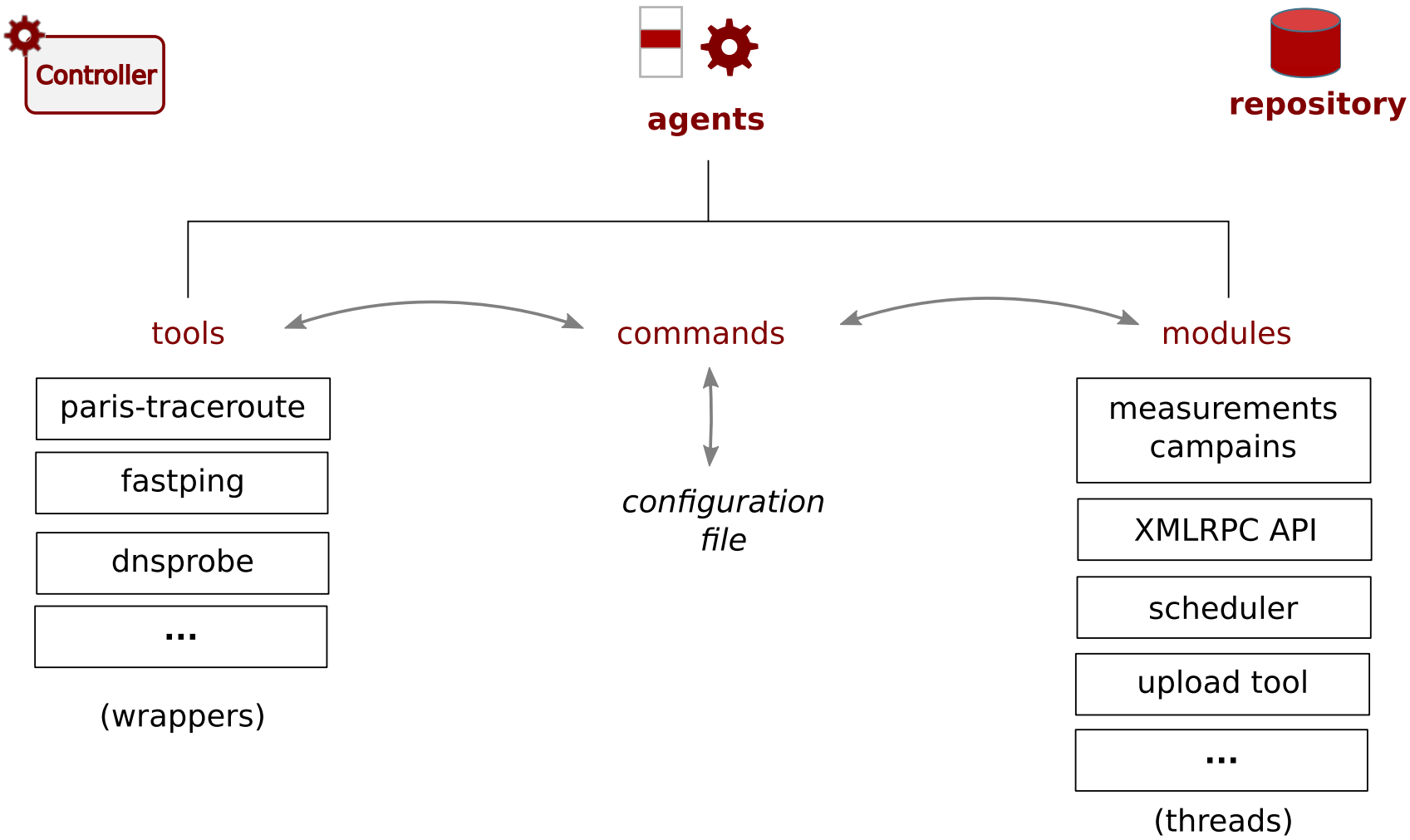
TopHat & TDMI architecture



TopHat & TDMI architecture



TopHat Dedicated Measurement Architecture



Challenges: the PlanetLab use-case

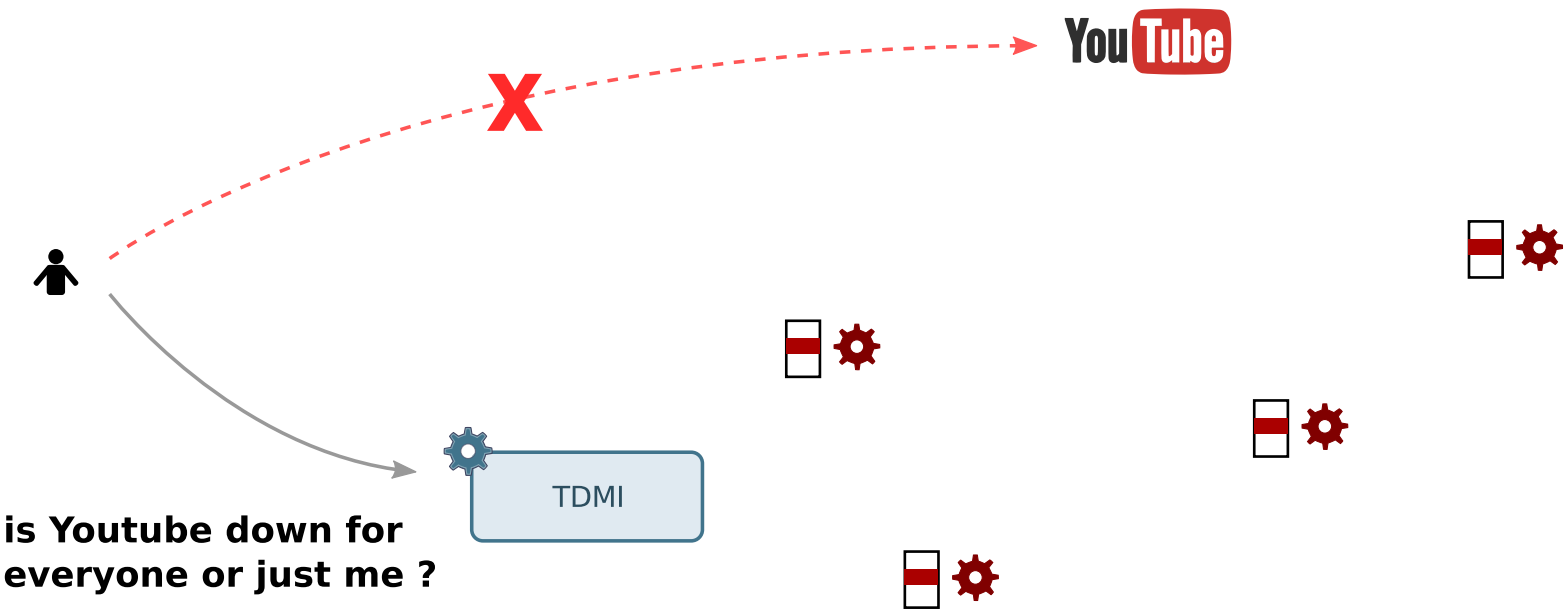
Context

- Full mesh traceroute measurements / 5 min.
- 1000 nodes $= 1O^6$ traceroute / 5min.
- $+$ external destinations

Challenges

1. Agent management: operation & security aspects
2. On demand measurements (API)
3. Network load: efficient distibuted algorithms
4. Processing redundancy: distributed on agents
5. Concurrent connections (FTP vs hierarchical overlay)
6. Storage (Compression, intervals and partitioning)

a mPlane use-case ?



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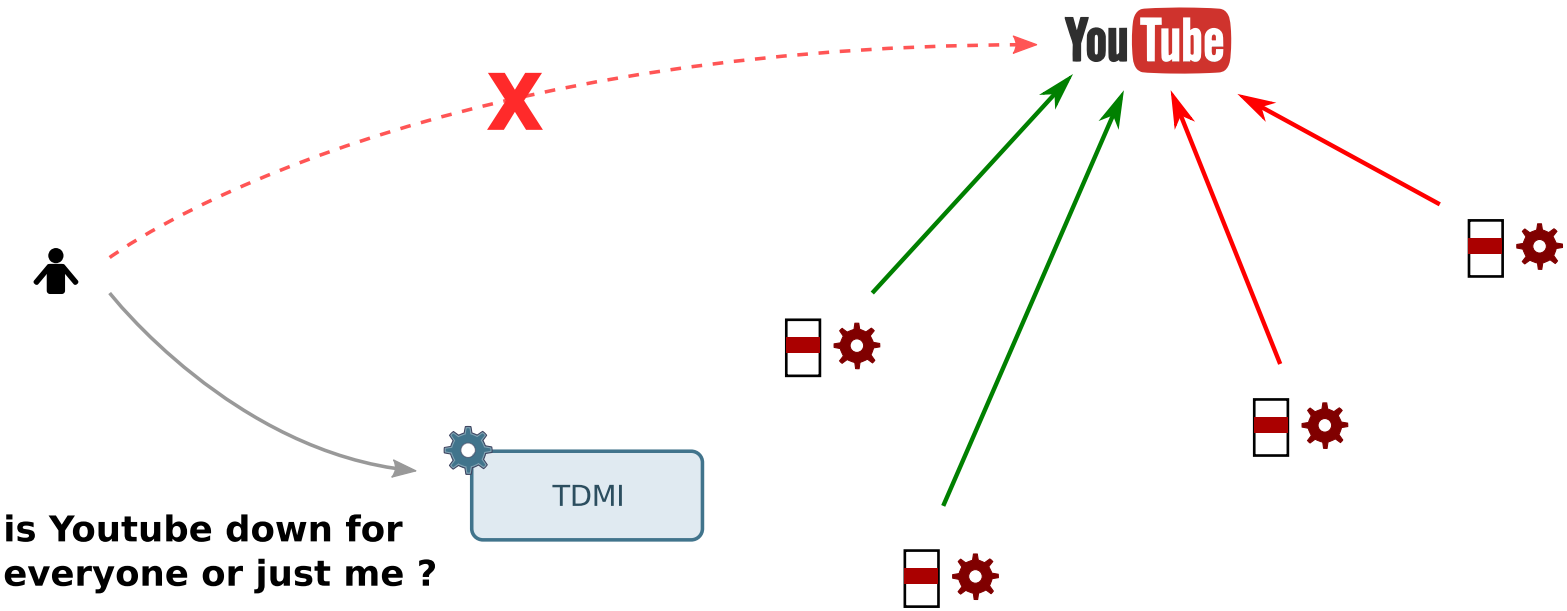
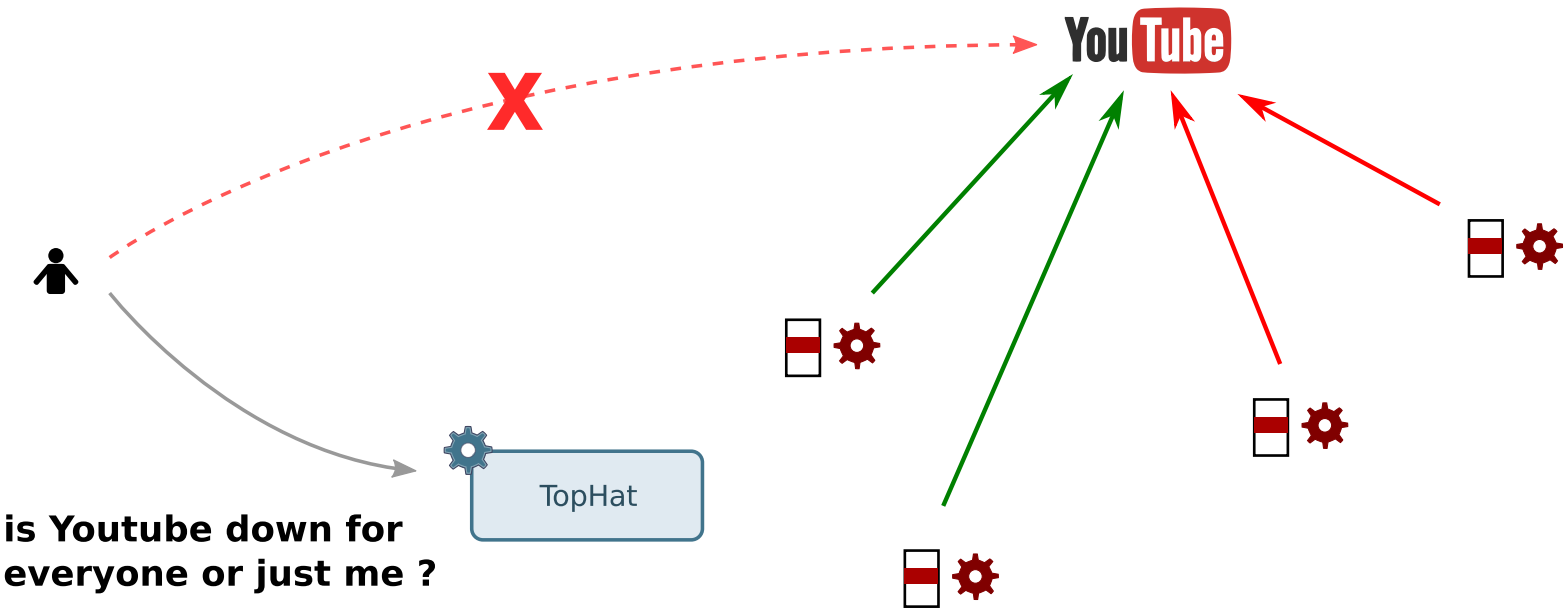


is Youtube down for everyone or just me ?

=> not just you

a mPlane use-case ?



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=> not just you

=> unreachable from France, AS 5511

TDMI
+ MaxMind GeoLite City
+ Team Cymru IP-to-ASN

Towards a generic measurement infrastructure

What we have ?

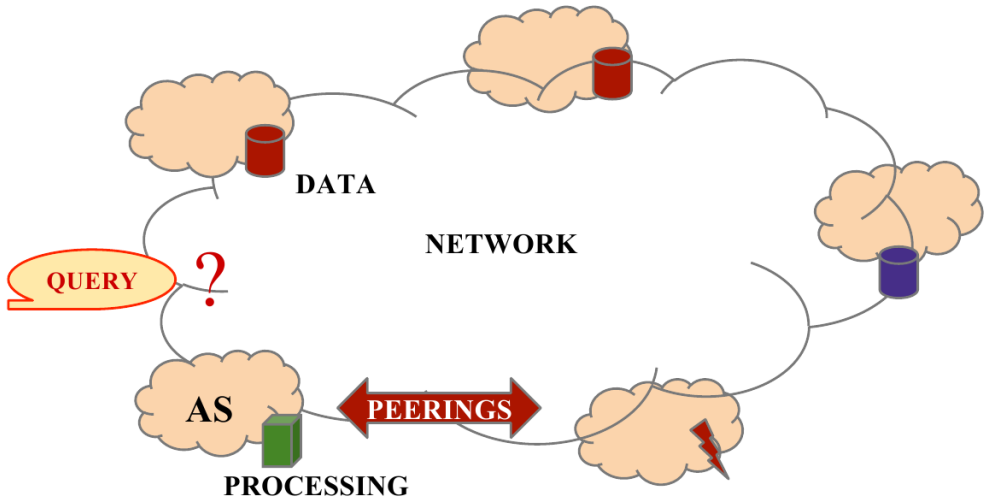
- TDMI: a modular distributed measurement platform
- Similar to a single administrative domain (AS)

The need for federation

- multiple AS with resources, users, competencies, etc.
- build a measurement ecosystem
- decouples producers and consumers of data

Need for standard interfaces (cf BGP)

The TopHat measurement ecosystem



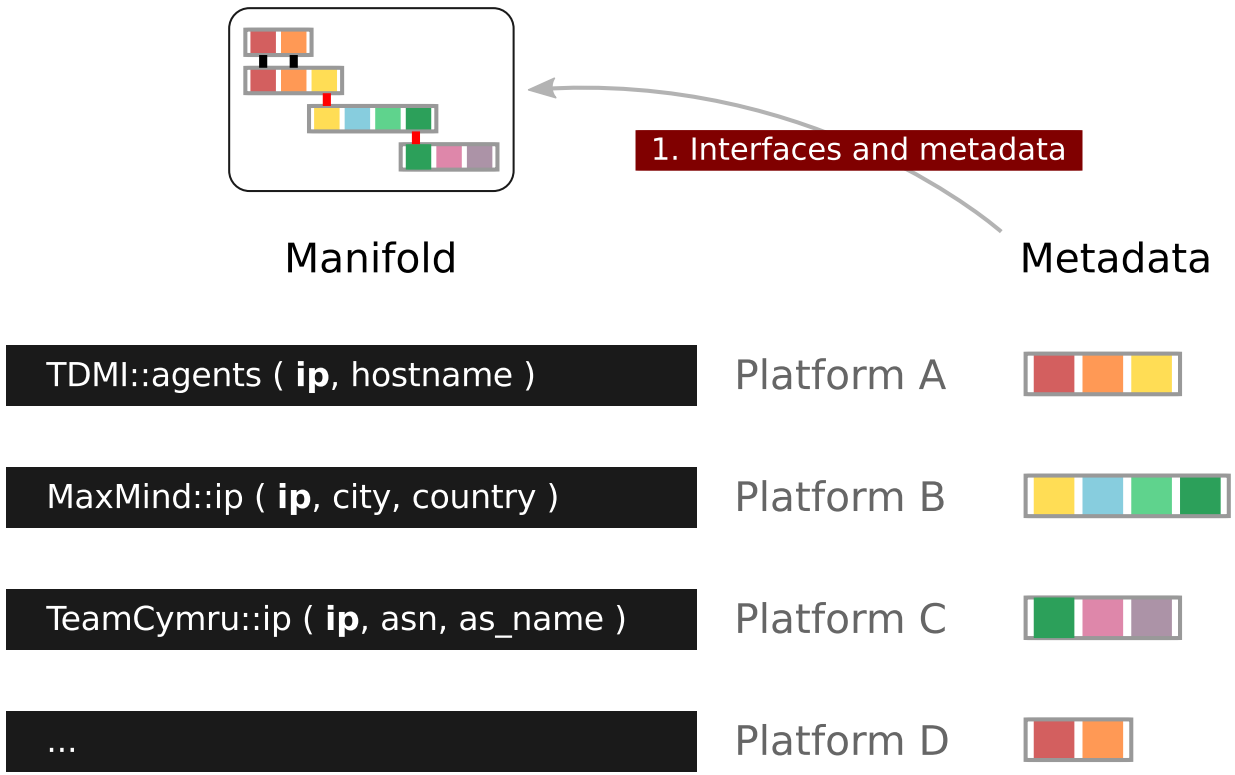
Cooperation

- inter-domain
- complementarity

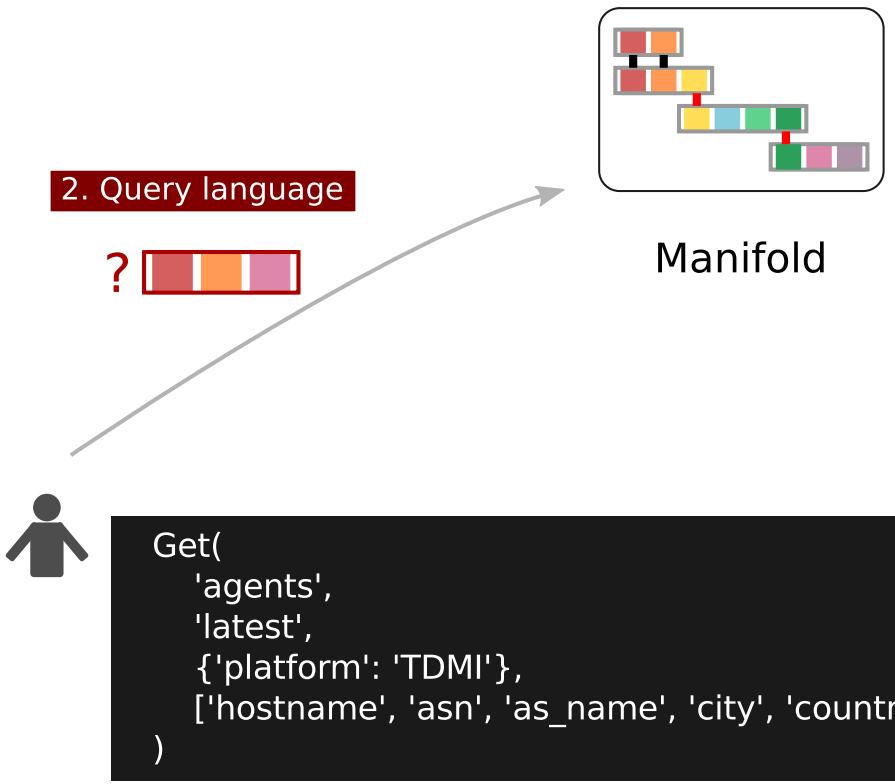
Composition (enhance value)

- traceroute + IP-to-ASN mapping = AS level traceroute
- testbed activity + geolocalization = usage monitoring on a map

Interconnection framework



Interconnection framework



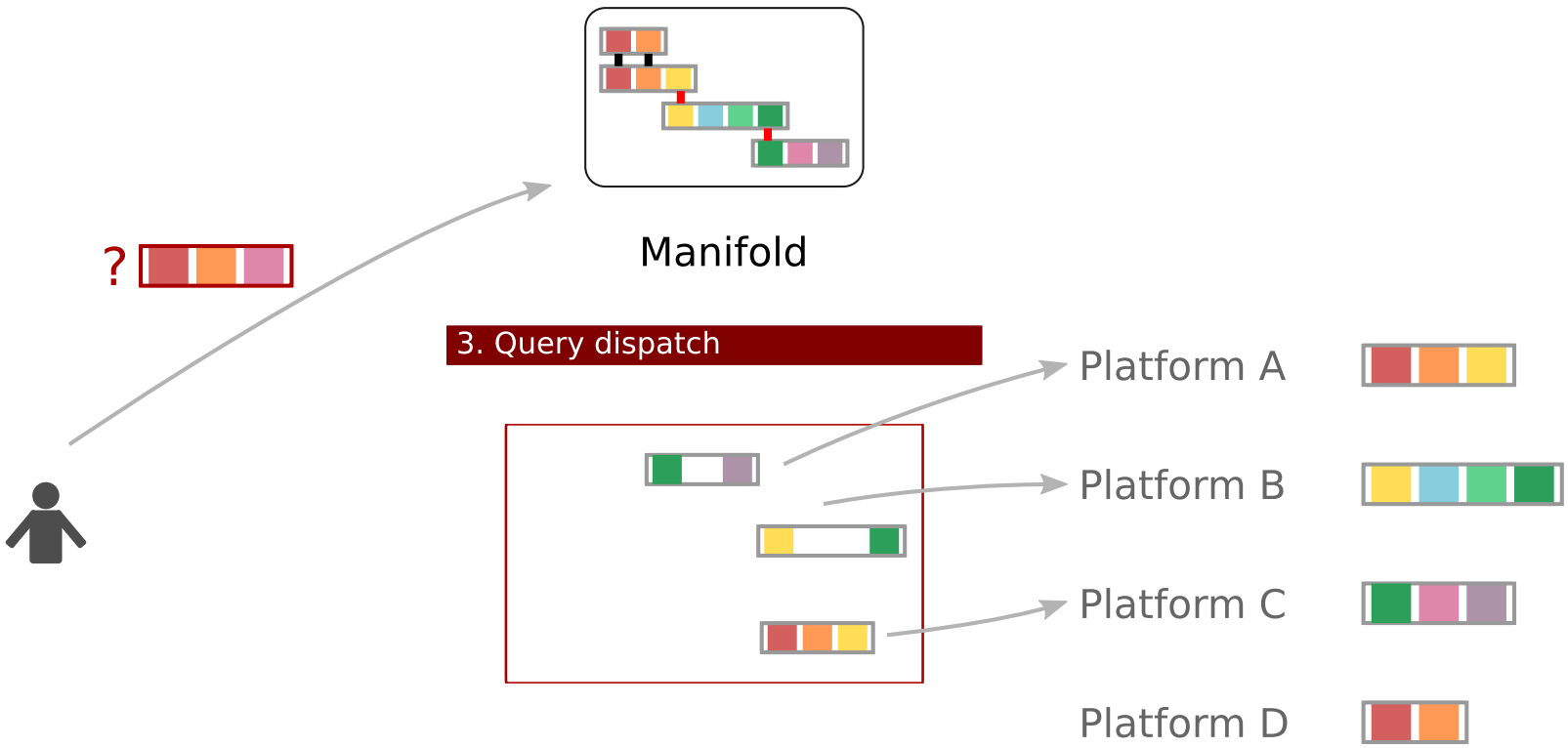
Platform A

Platform B

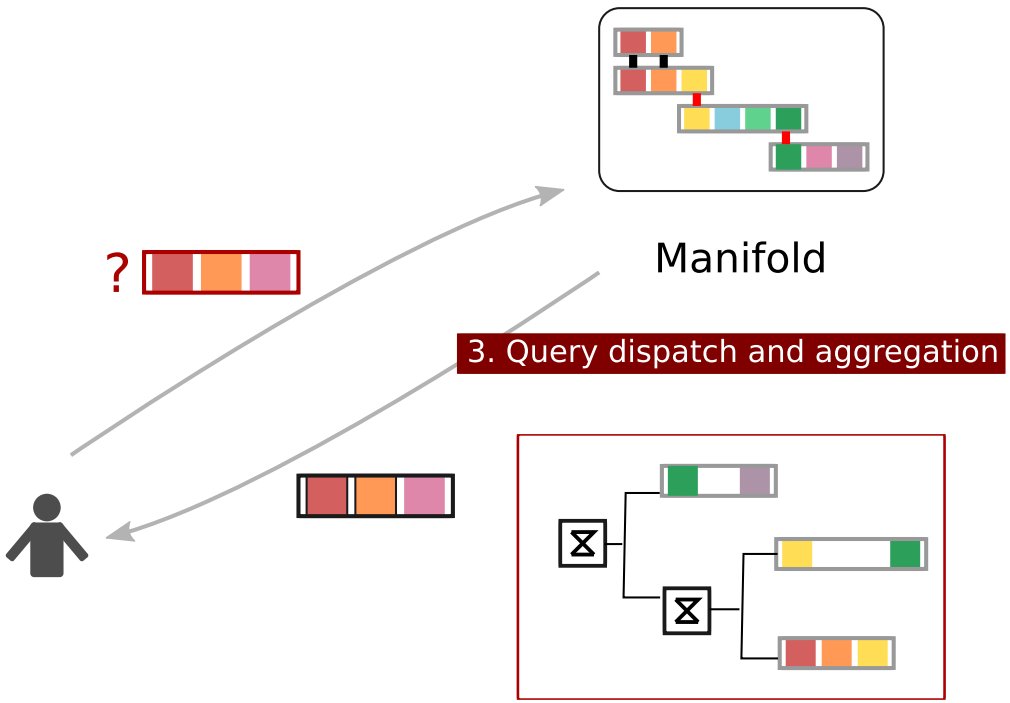
Platform C

Platform D

Interconnection framework



Interconnection framework



Platform A

Platform B

Platform C

Platform D

TopHat meets mPlane

Ingredients

1. Shared protocol (API)
2. Data model (inspired from DDBS and OO models)
3. Semantic (we assume the use of ontologies at the edge)

Babelfish

mPlane	TopHat	Details
Wrapper	Gateway(/wrapper)	Translate TopHat queries into platform(/tool) queries
Capability	Metadata	Schema of available data + processing capabilities
Specification	Query	SQL-like request
Result	Result	A set/stream of records (table)

Example: TDMI gateway

FINAL WORDS

TopHat/TDMI & mPlane partially overlap

- offer capabilities (no shipping code around)
- instantiated in measurement specification (on demand)
- access to results in band (probe) or out of band (repository)
- avoid reinventing the wheel, offer a common API interface
- delegation/routing through supervisors

TopHat/TDMI and mPlane partly differ

- TopHat automatically resolves SQL-like queries from multiple databases (=probes/repositories)
- mPlane has a focus on Intelligent reasoner with expert knowledge
- mPlane extensively use MapReduce to analyze large quantities of data
- mPlane also extensively develop passive tools (while these are just repos in TopHat/TDMI)

TopHat/TDMI vs mPlane integration

case 1 : minimalistic approach (=ENST develops mPlane gateways for its own TopHat tool, fair enough but limited benefit)

case 2 : interest is shared across consortium (=TopHat becomes a natural interface to launch active experiments)

In case 2, both benefit:

- mPlane (= gaining PlanetLab hosts & federated platforms) and
- TopHat/TDMI (= gaining mPlane hosts and services)

Conclusion

Website: `http://www.top-hat.info`

Contact: `info@onelab.eu`, `support@top-hat.info`

Documentation (trac):

- `http://trac.top-hat.info/`
- `http://trac.myslice.info/wiki/Manifold`
  - generic interconnection component + API + GUI
  - TopHat service = manifold component + gateways

Source code (GPL): `https://git.top-hat.info`

BACKUP SLIDES

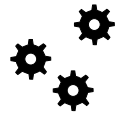
API reference

```
Action(auth, method, filters, params, fields, ts, callback)
```

Action	method	filters	params	fields	ts	callback
CREATE	✓			✓		!
GET	✓	✓		✓	✓	!
UPDATE	✓	✓	✓	✓		!
DELETE	✓	✓				!
EXECUTE	✓	✓	✓	✓		!

Overview

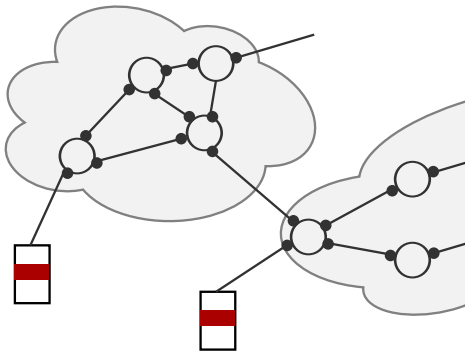
Testbed users



Other testbeds...

+

PlanetLab (Europe)



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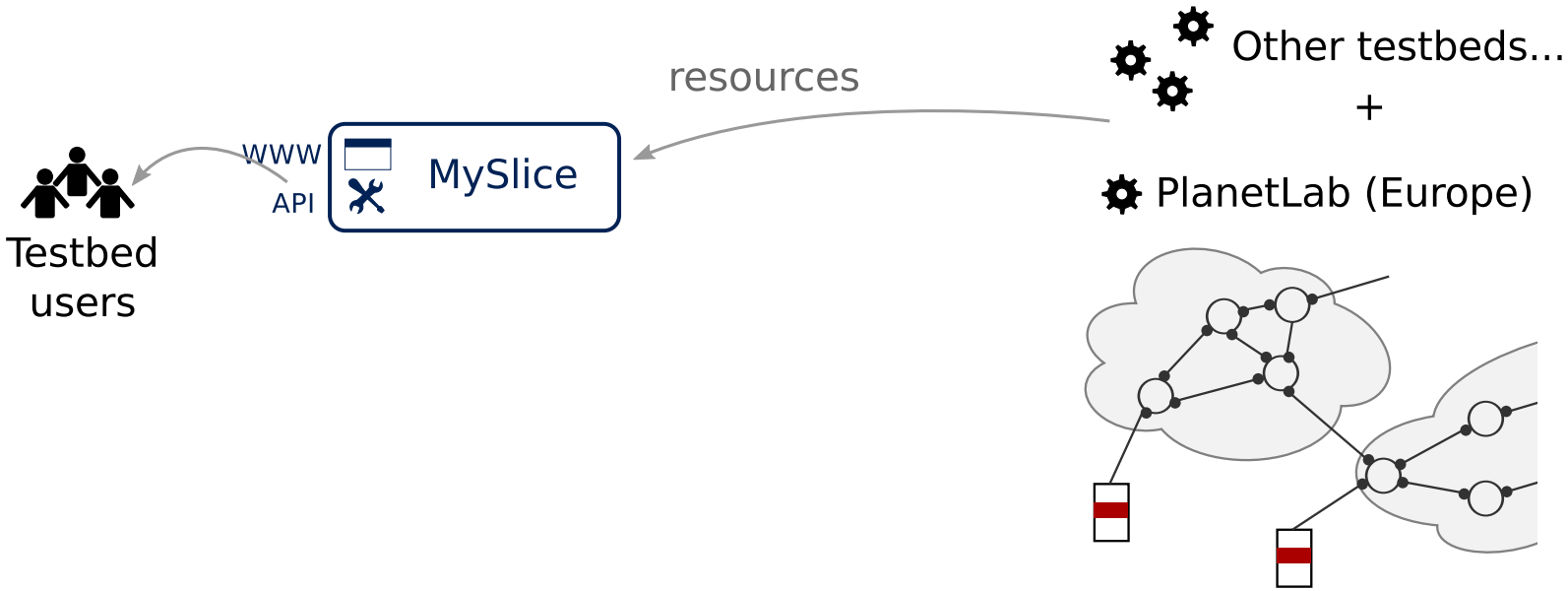
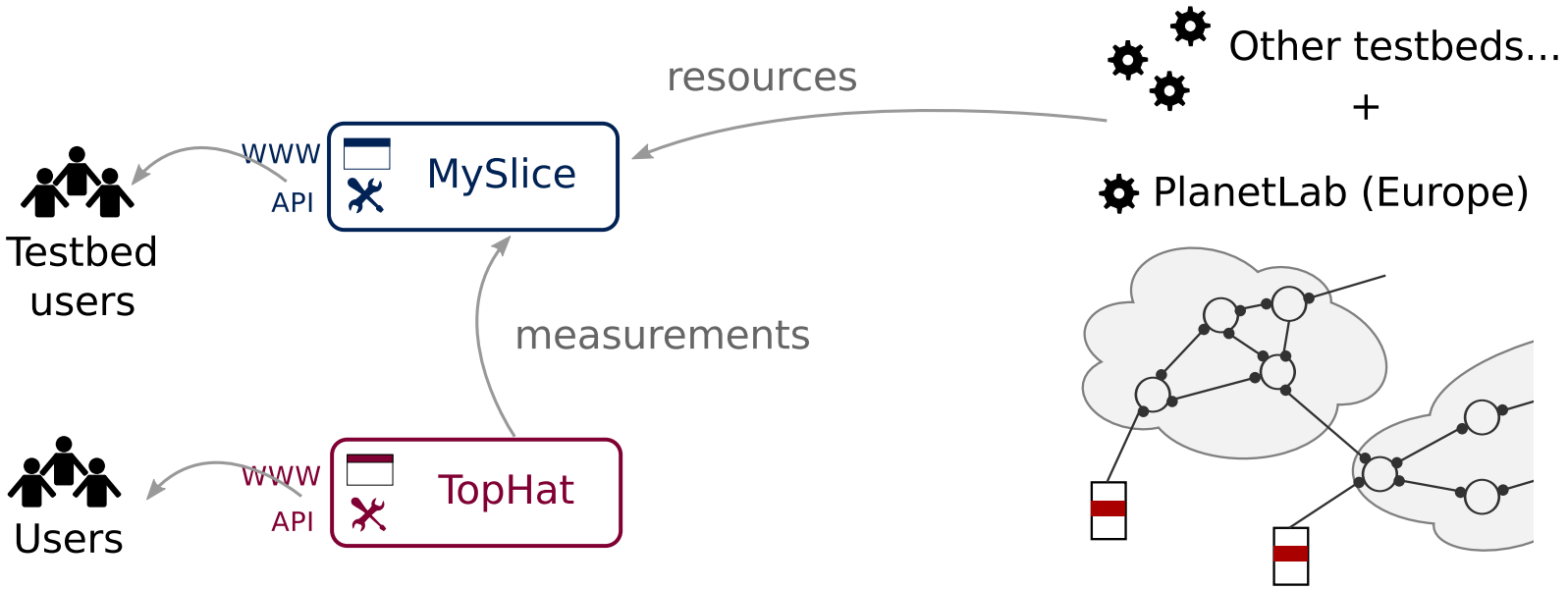

resources
Other testbeds...
+
PlanetLab (Europe)
WWW
API
MySlice
Testbed
users

Overview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resources
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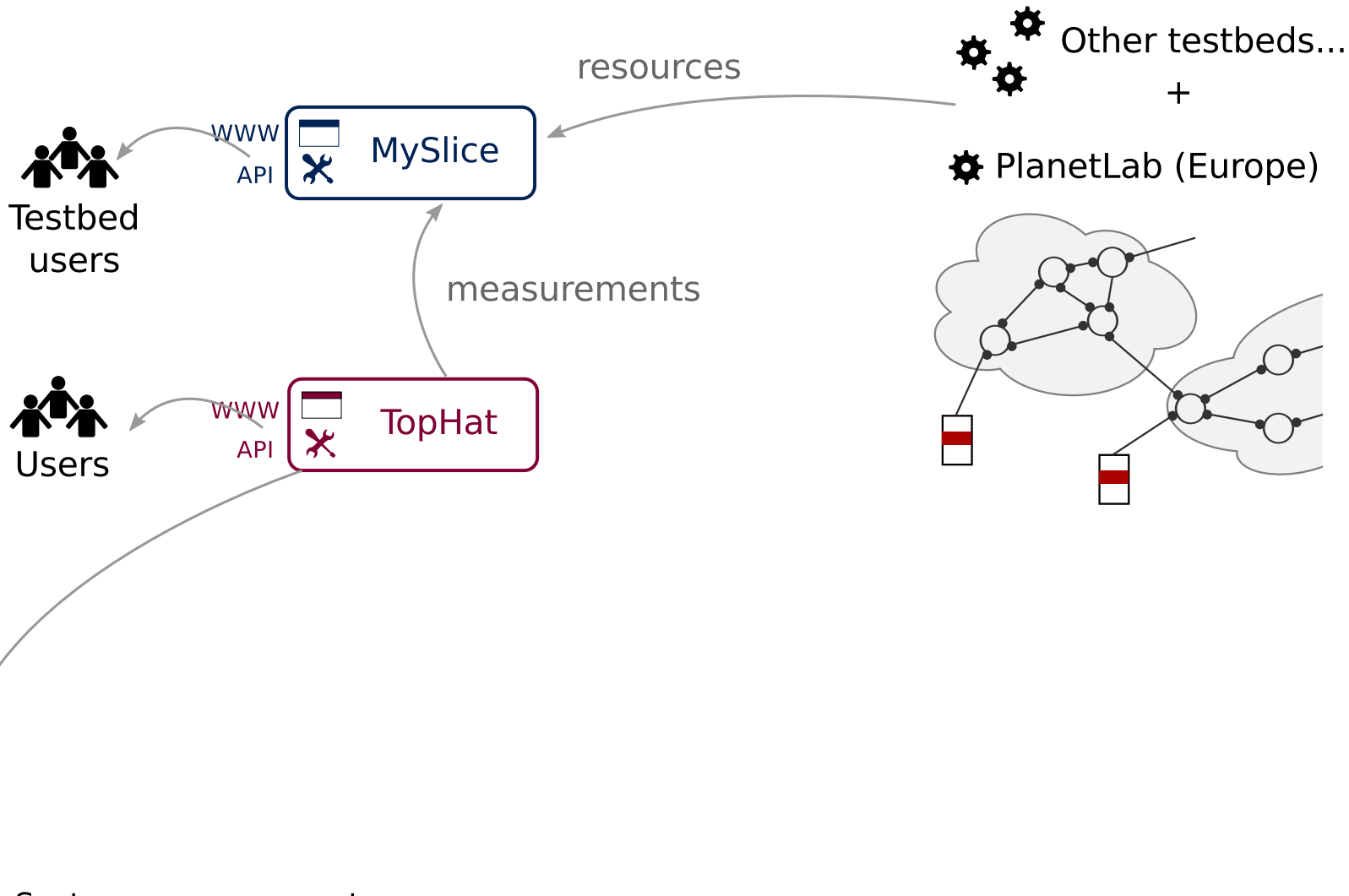
API
Testbed
users
measurements
TopHat
WWW
API
Users

Overview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WWW
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Testbed
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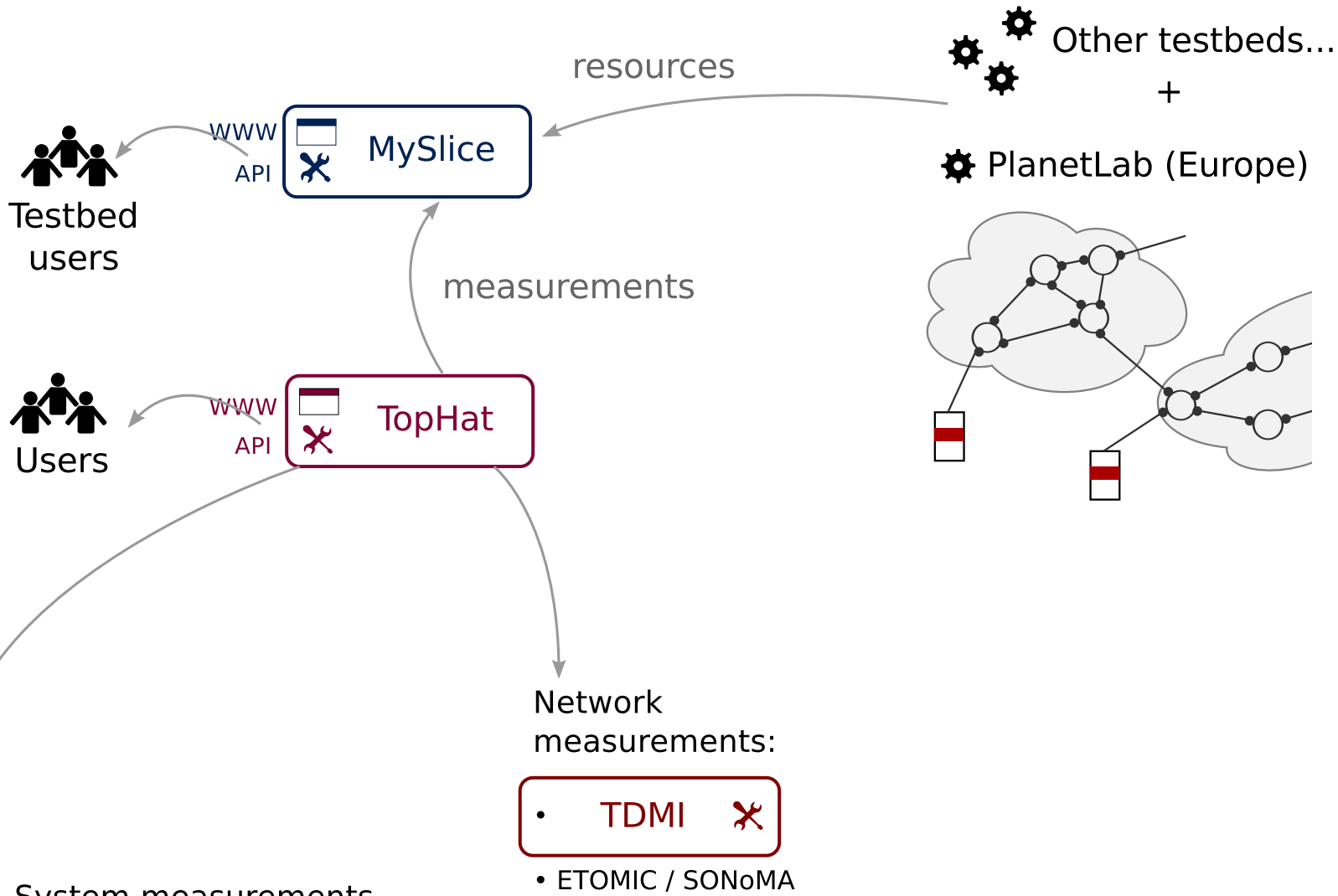
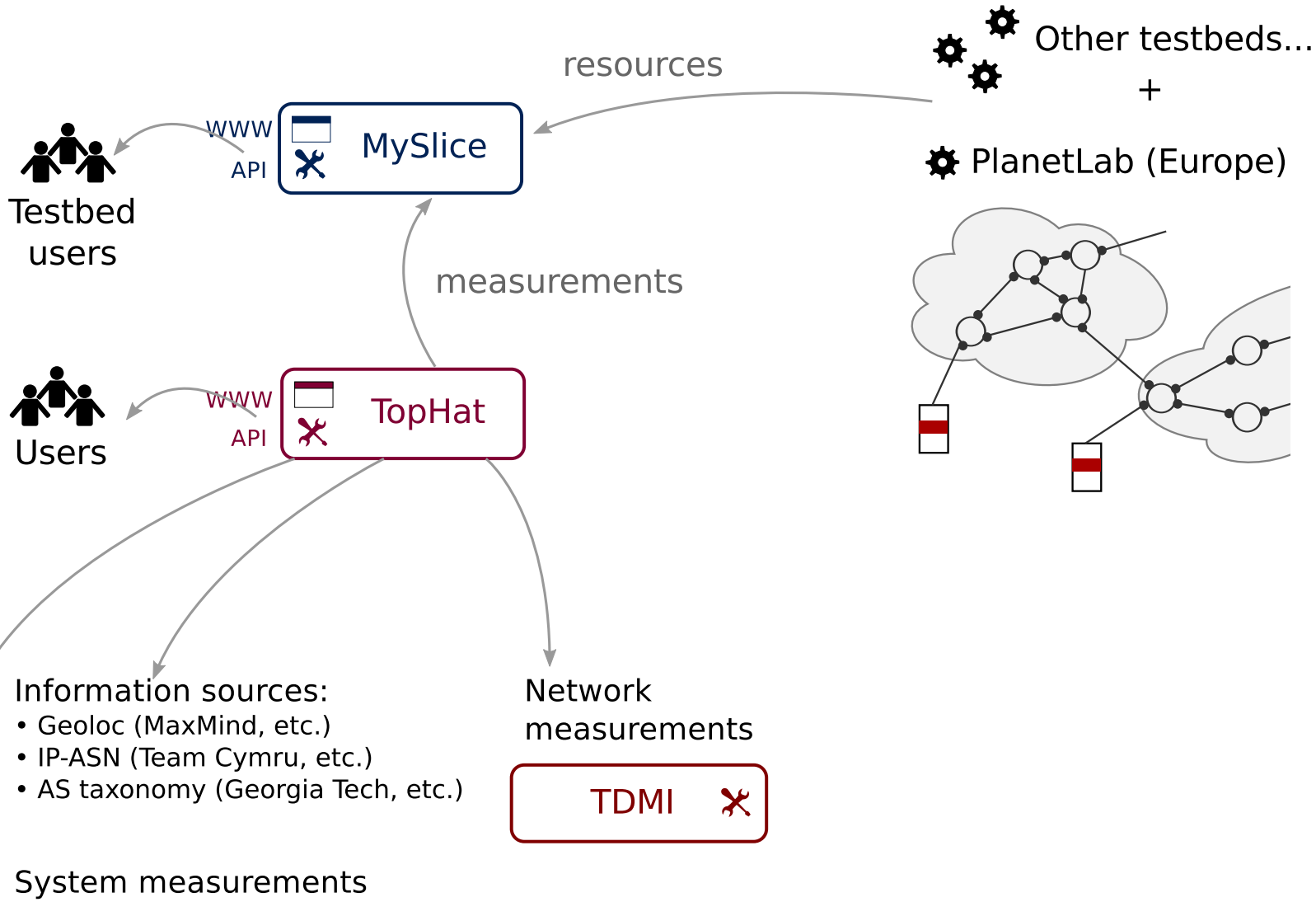
measurements
TopHat
WWW
API
Users
System measurements:
• CoMon
• CoTop
• etc.

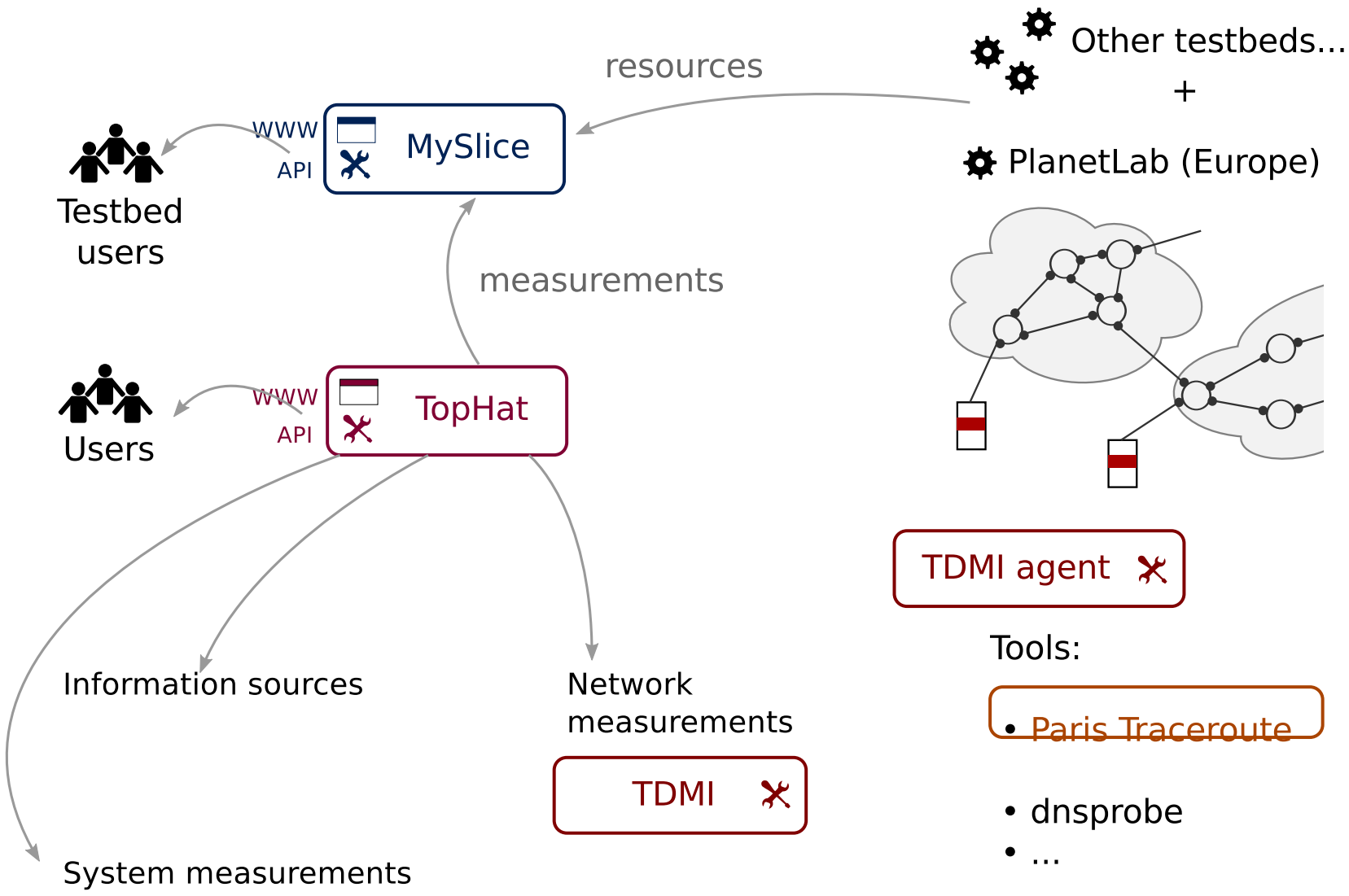
Overview


resources
Other testbeds...
+
PlanetLab (Europe)
WWW
API
MySlice
Testbed users
measurements
Users
WWW
API
TopHat
Network measurements:
• TDMI
• ETOMIC / SONoMA
• DIMES
System measurements

Overview


Other testbeds...
+
PlanetLab (Europe)
resources
WWW
API
MySlice
Testbed
users
measurements
Users
WWW
API
TopHat
Information sources:
• Geoloc (MaxMind, etc.)
• IP-ASN (Team Cymru, etc.)
• AS taxonomy (Georgia Tech, etc.)
Network
measurements
TDMI
System measurements

Overview


resources
Other testbeds...
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PlanetLab (Europe)
WWW
API
MySlice
Testbed users
measurements
Users
WWW
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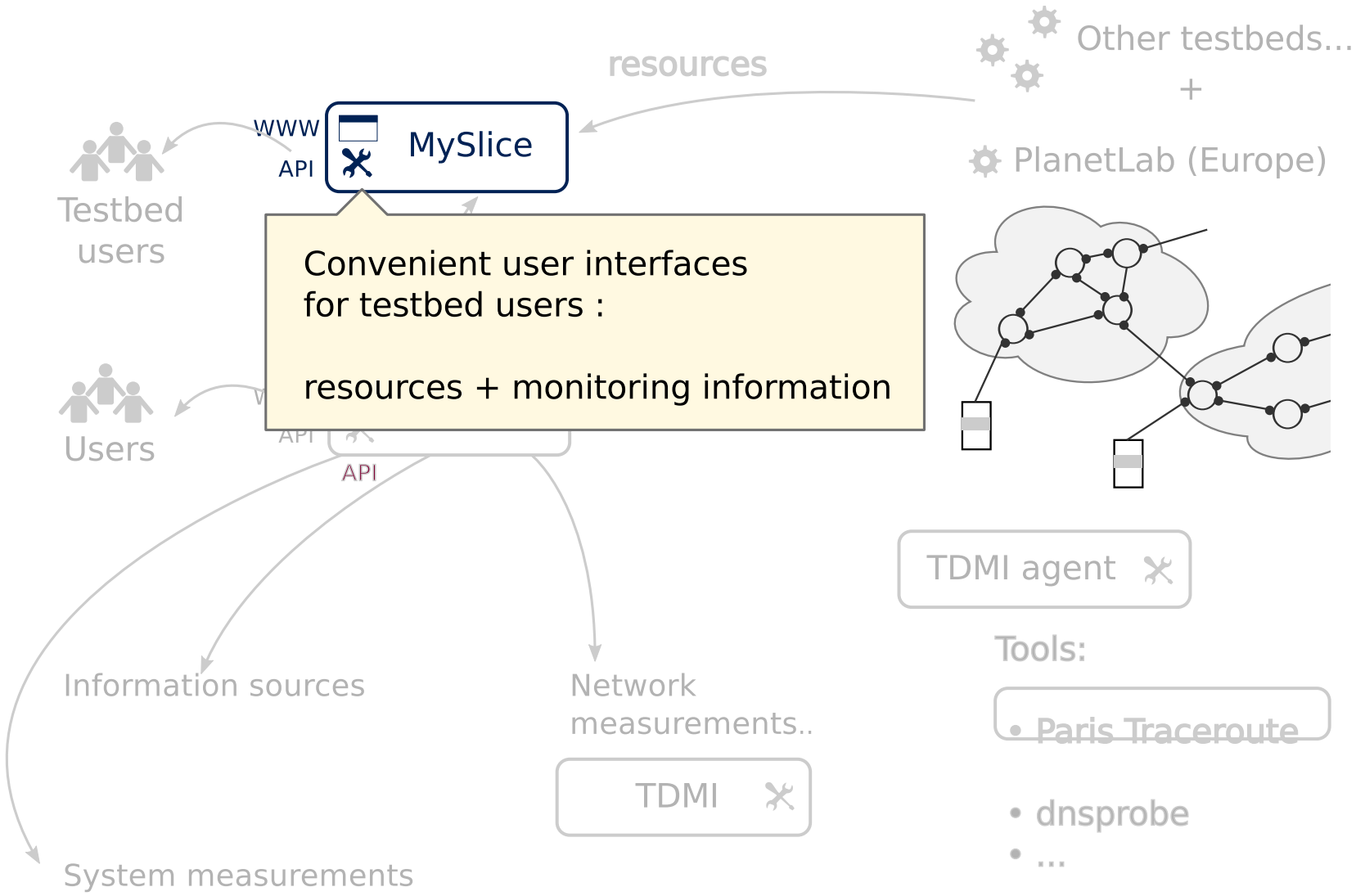
TopHat
TDMI agent
Tools:
• Paris Traceroute
• dnsprobe
• ...
Information sources
Network measurements
TDMI
System measurements

Overview


resources
Other testbeds...
+
PlanetLab (Europe)
WWW
API
MySlice
Testbed users
Convenient user interfaces
for testbed users :
resources + monitoring information
Users
API
API
TDMI agent
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Information sources
Network measurements..
TDMI
System measurements

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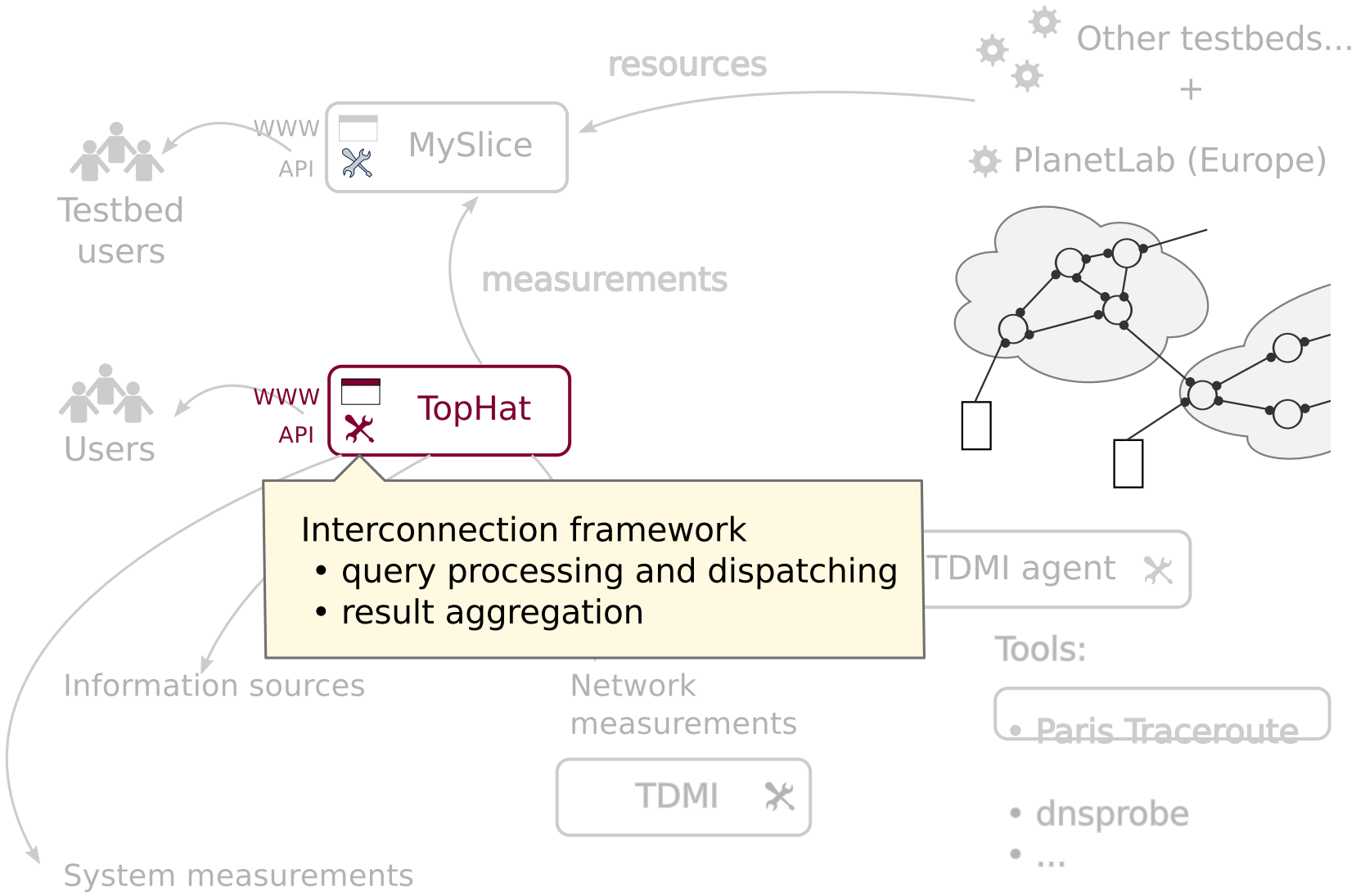
Other testbeds...
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resources
WWW
API
MySlice
Testbed users
measurements
Users
WWW
API
TopHat
Interconnection framework
• query processing and dispatching
• result aggregation
TDMI agent
Tools:
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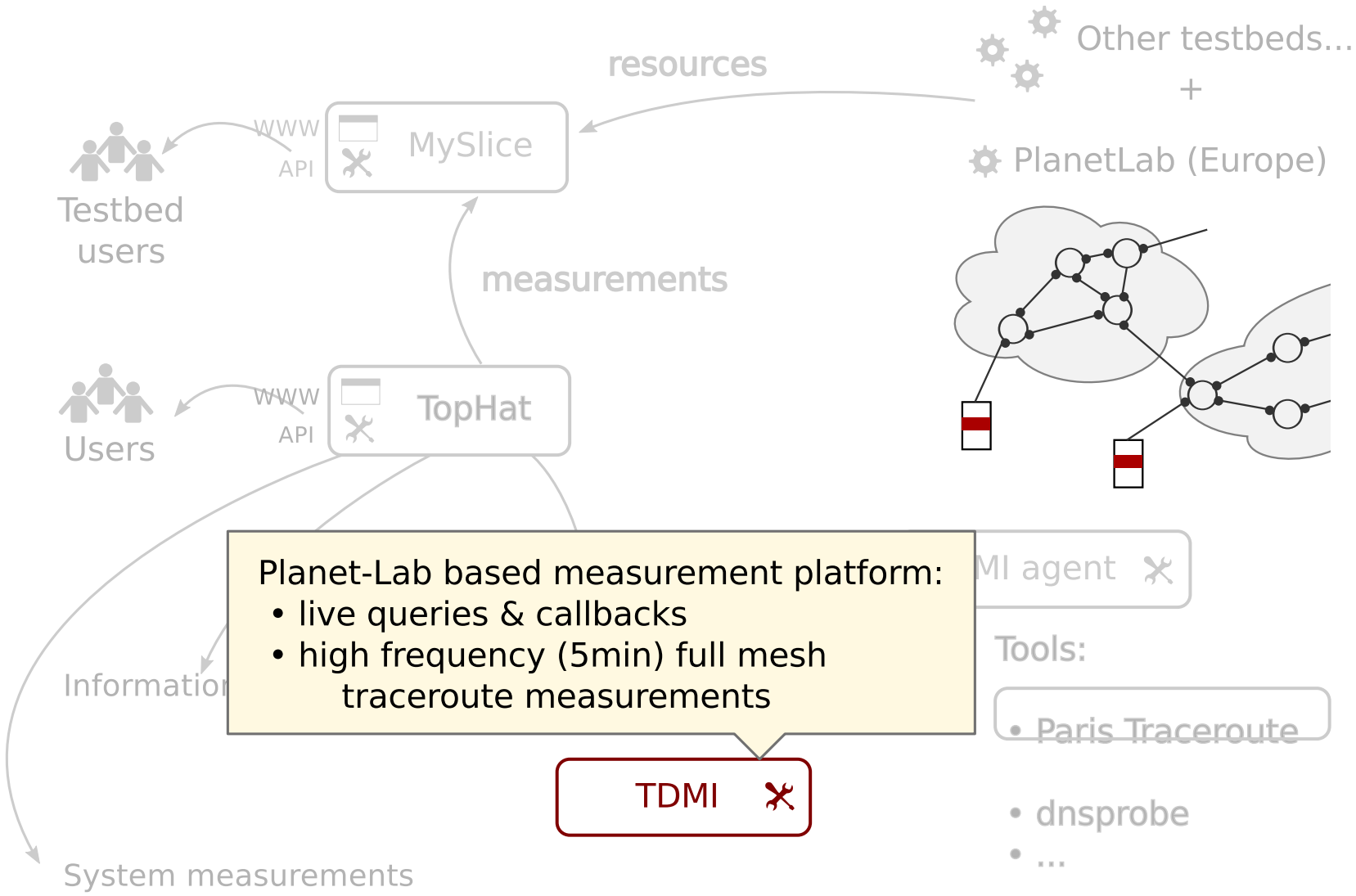
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MI agent
Tools:
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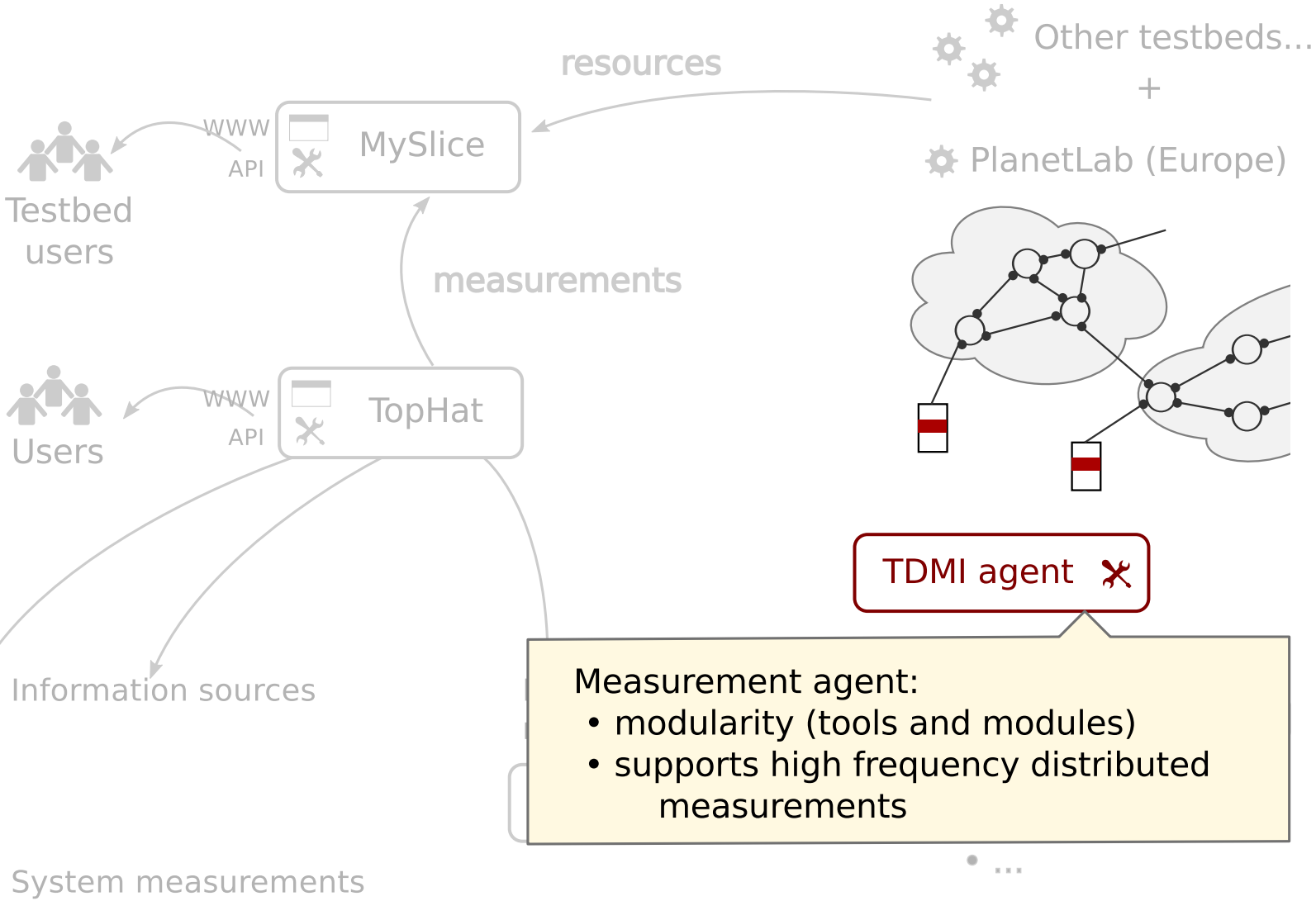
Information
System measurements
Planet-Lab based measurement platform:
• live queries & callbacks
• high frequency (5min) full mesh traceroute measurements
TDMI

Overview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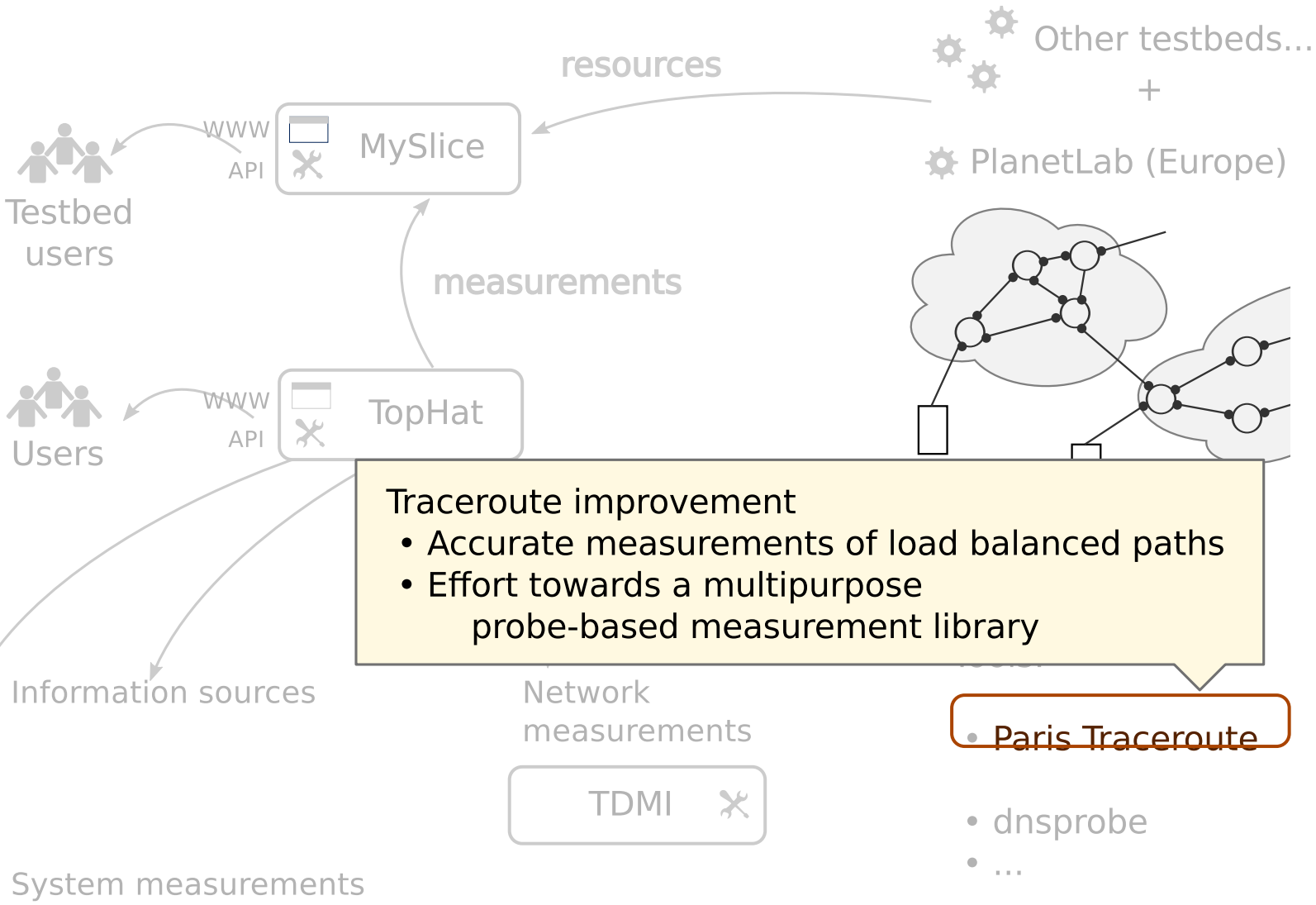
TopHat
Information sources
System measurements
TDMI agent
Measurement agent:
• modularity (tools and modules)
• supports high frequency distributed measurements
...

Overview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Users
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API
TopHat
Traceroute improvement
• Accurate measurements of load balanced paths
• Effort towards a multipurpose
probe-based measurement library
Information sources
Network
measurements
TDMI
System measurements
• Paris Traceroute
• dnsprobe
• ...