Welcome to the mPlane Closing Workshop

mPlane

SEVENTH FRAMEWORK PROGRAMME

Organisers

Tiziana Rolando

NEC

Saverio Niccolini

Mohamed Ahmed

Sabine Schwinn


thank you
danke
謝謝
ngiyabonga
teşekkür ederim
gracias
merci
спасибо
bedankt
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Agenda

Session 1 – Architectures

- 9:20 – Overview of mPlane
- 9:45 – mPlane architecture
- 10:15 - Keynote: "Is measurement still an afterthought?"
- 11:00 
- 11:20 – Live Demo
- 11:45 – Keynote: " Content distribution on next generation cellular networks "
- 12:30 - 

Session 2 - Applications

- 13:30 – mPlane Probes
- 14:00 – mPlane Repositories
- 14:30 – mPlane Reasoners
- 15:00 - Keynote: BGPStream, A framework for the historical analysis and real-time monitoring of BGP data"
- 15:45 – Live demos
- 16:00 
- 19:30 

Goal: present mPlane solutions, stimulating discussions, demonstrating practical solutions, getting feedback

mPlane – Building an Intelligent Measurement Plane for the Internet

Marco Mellia
Politecnico di Torino

mPlane Closing Workshop
November 30, 2015, Heidelberg

mPlane

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mPlane project quick facts

- mPlane is an FP7 Integrated Project
- Project acronym: **mPlane**
- Project full title: “mPlane – an Intelligent Measurement Plane for Future Network and Application Management”
- Grant agreement no: 318627
- Staring Date: November 1st 2012
- Total Cost: 11,274,908.00 €
- Duration: 3 years
- Partners: 16
- Coordinator: **Prof. Marco Mellia** – Politecnico di Torino - IT

Who we are

- 3 operators
- 6 research centers
- 5 universities
- 2 small enterprises

Coordinator

Marco Mellia
POLITO

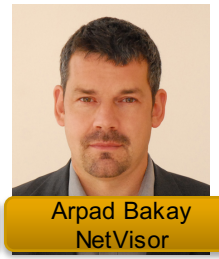
Tech. Coordinator

Saverio Nicolini
NEC

Dina Papagiannaki
Telefonica

Ernst Biersack
Eurecom

Brian Trammell
ETH



Arpad Bakay
NetVisor

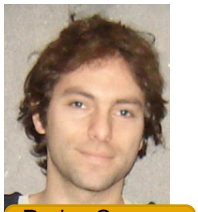
Andrea Fregosi
Fastweb

Dario Rossi
ENST

Fabrizio Invernizzi
Telecom Italia

Guy Leduc
Univ. Liege

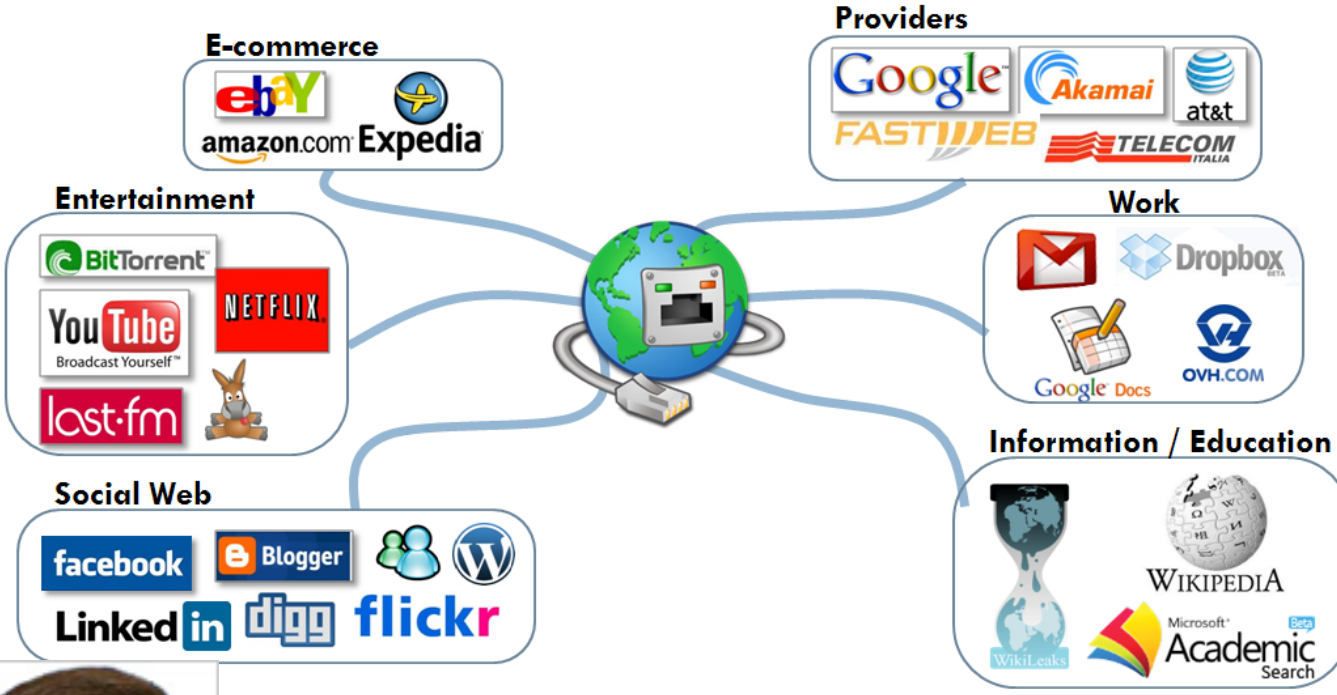
Pietro Michiardi
Eurecom



Pedro Casas
FTW

Which problem(s) mPlane aims at solving

The nowadays Internet



*"The Internet is the first thing that humanity has built that humanity doesn't **understand**, the largest experiment in **anarchy** that we have ever had."*

Eric Schmidt – ex Google Exec. Chairman

A complicated technology…

Internet: *different technologies are combined to offer a plethora of services*

We sorely miss the technology to understand what is happening in the network and thus to optimize its performance and utilization

Specially when something goes wrong!

A complicated technology…

…that no one controls and understands

- Why WhatsApp is not working?
- Which is the best ISP in my area?
- Where is YouTube traffic coming from?
- How to optimize my LTE network for Facebook?

How can mPlane solve the problem(s)?

The mPlane vision

- Goal: design and demonstration of a ***measurement plane for the Internet***
  - A distributed infrastructure for network measurement
  - … which perform passive and active measurements, continuously or on-demand, at a wide variety of scales
  - … with built-in support for iterative measurement and automated iteration.

- mPlane is about
  - **large scale network measurements**,
  - and **intelligent big-data analysis** for troubleshooting support
  - **embedding measurement into the Internet as an additional capability**

mPlane in a slide

Build a distributed, open, standard measurement infrastructure for the Internet

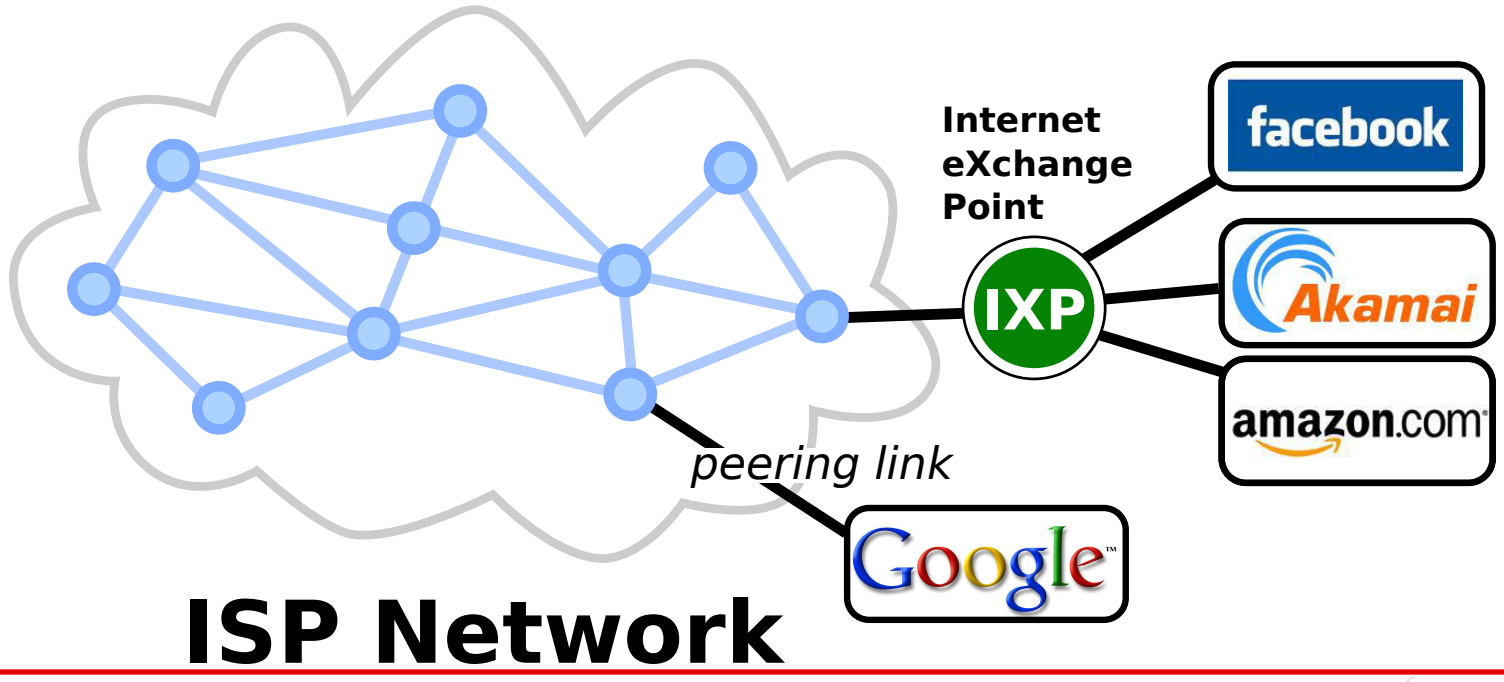
- **Probes (WP2) – get the data**
  - Build on existing tools/methodologies
  - Offer a flexible, programmable, open platform to run and collect passive, active, hybrid measurement
- **Repositories (WP3) – store and preprocess the data**
  - Collect measurement in a standard way
  - Pre-process large amounts of data in efficient ways
  - Grant access to interested parties (ISP, content providers, end-users, regulation agencies, etc.) subject to authorization rules
- **Intelligent reasoner (WP4) – dig into the data**
  - Mine automatically the data and extract useful information
  - Help in drilling down to the root cause of a problem

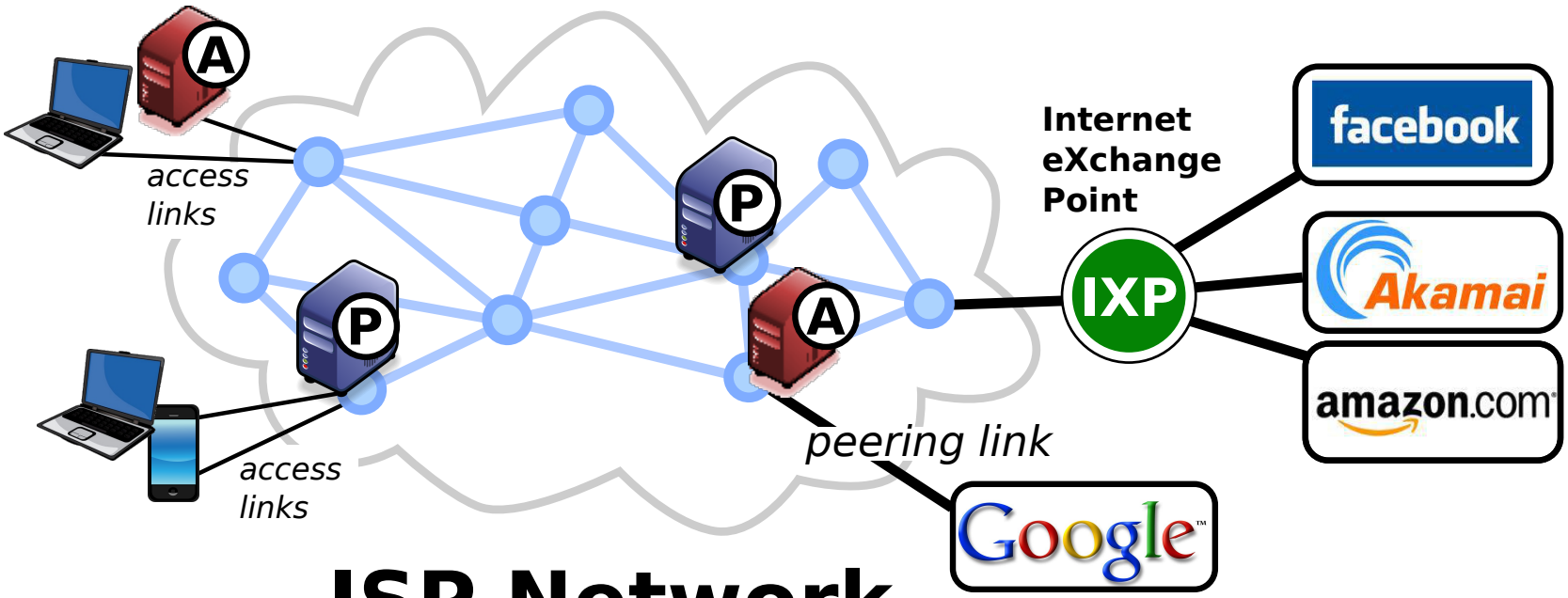
Aprad Bakay

Pietro Michiardi

Pedro Casas

mPlane architecture




active probe
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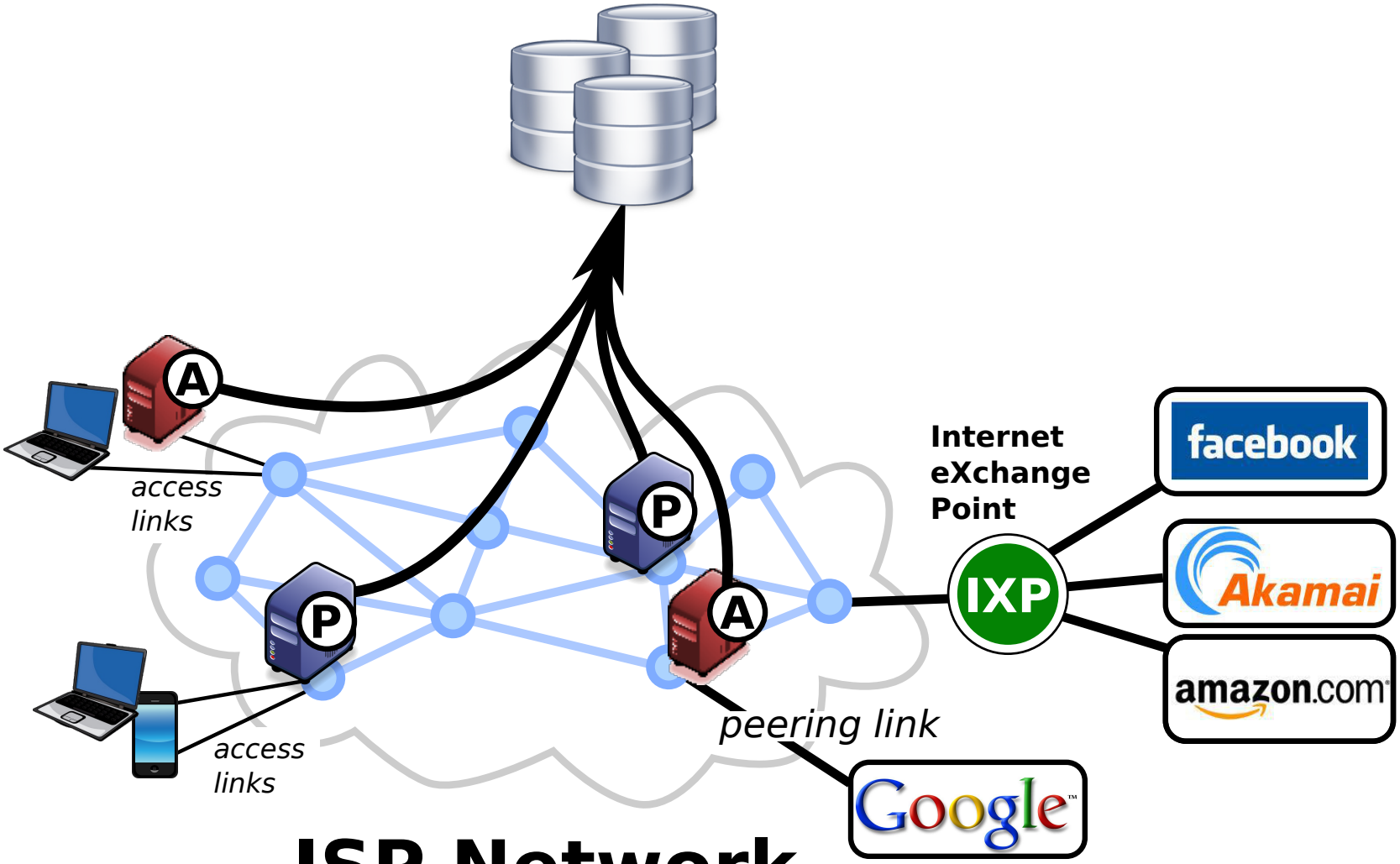
IXP
facebook
Akamai
amazon.com
Google

ISP Network

Repository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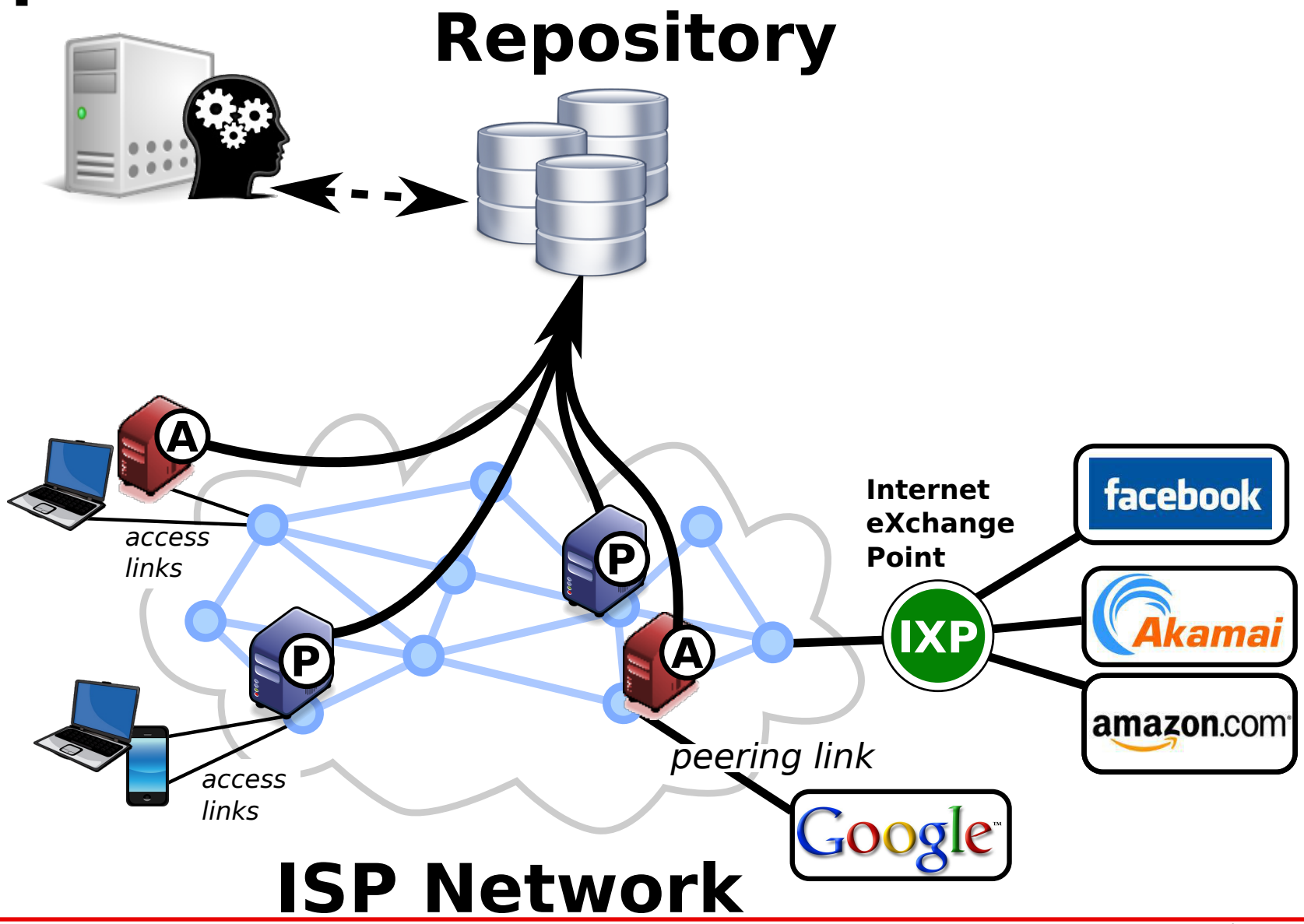
ISP Network

Supervisor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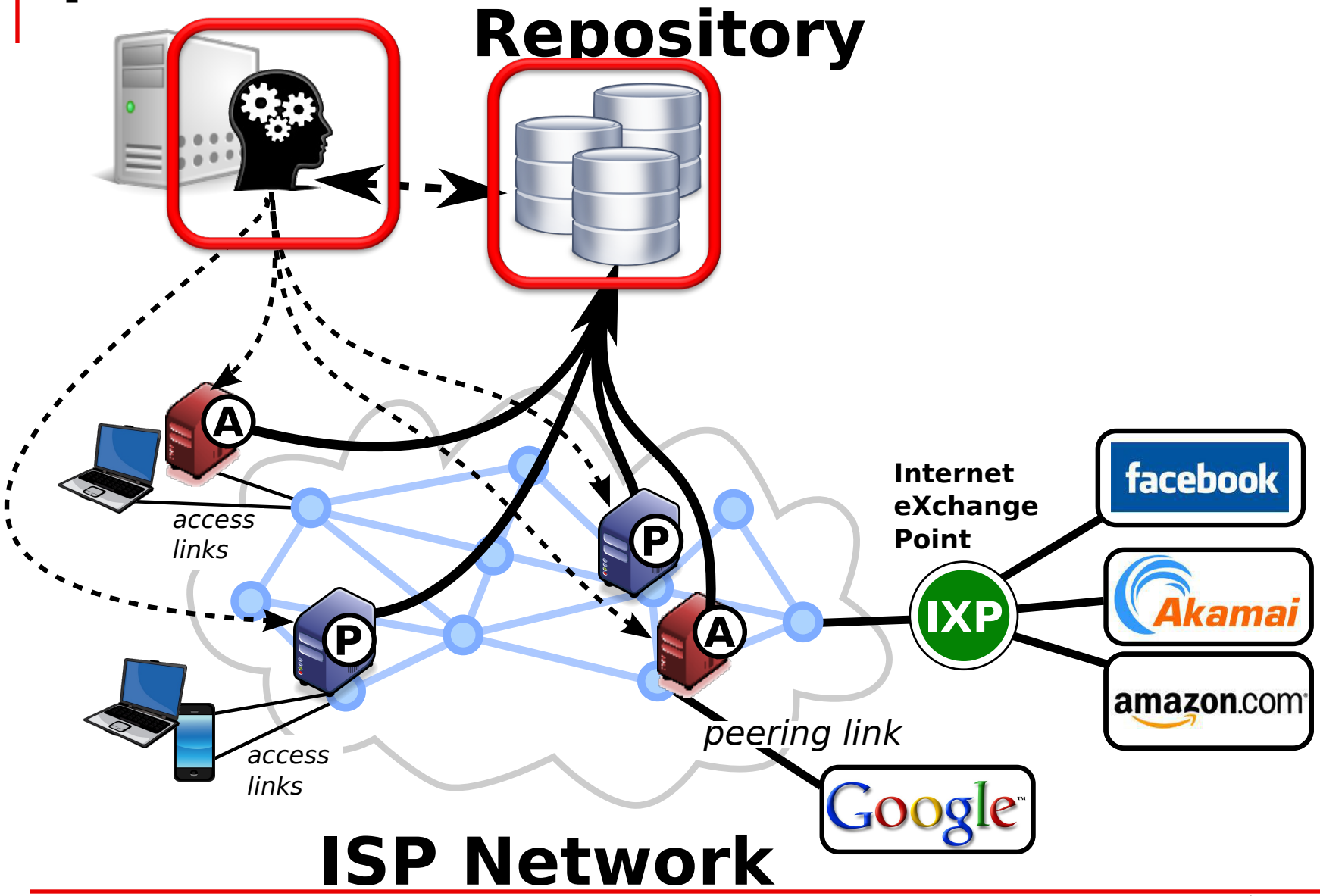
Supervisor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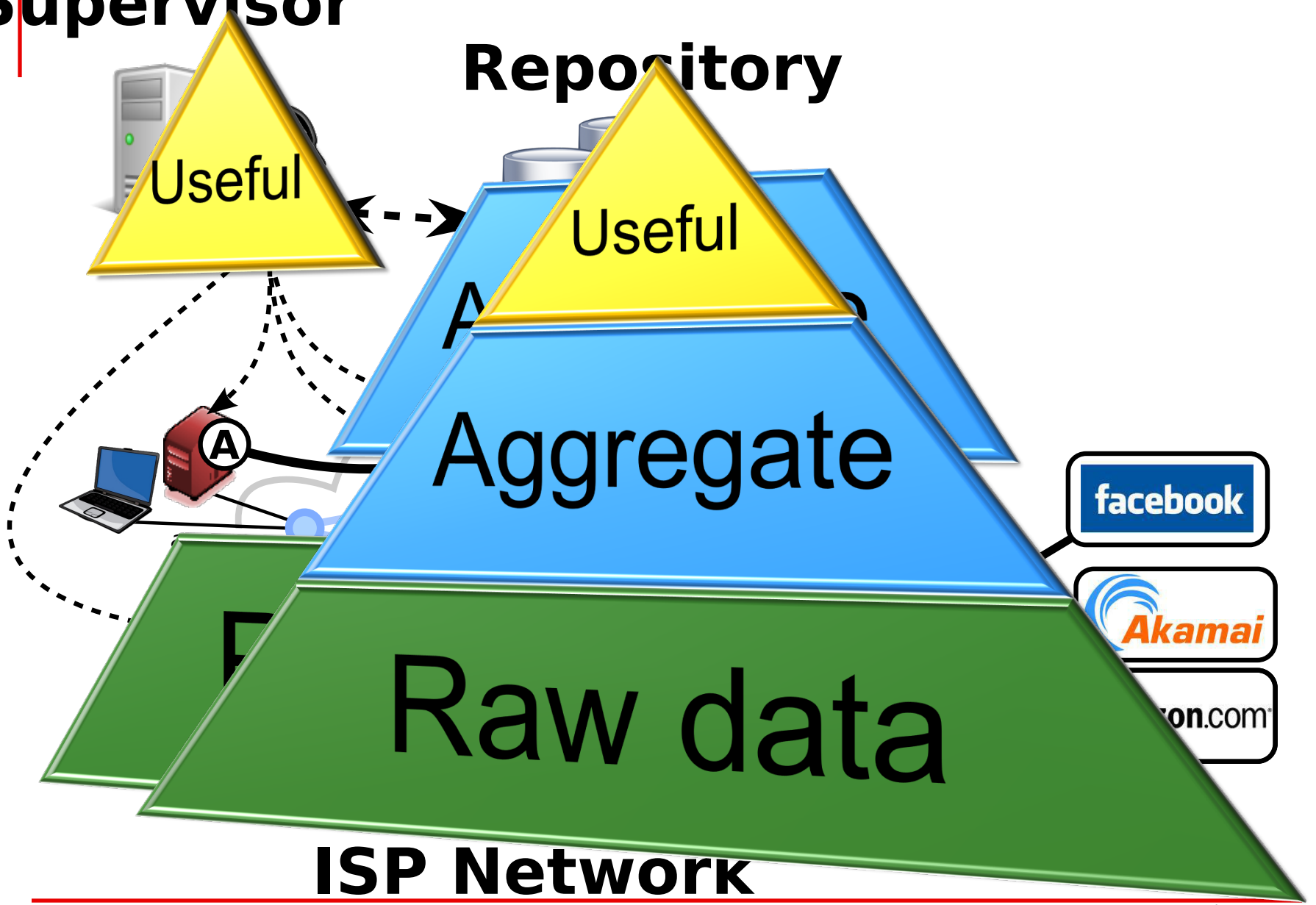
Supervisor


Repository
Useful
Useful
Aggregate
Raw data
A
facebook
Akamai
ISP Network

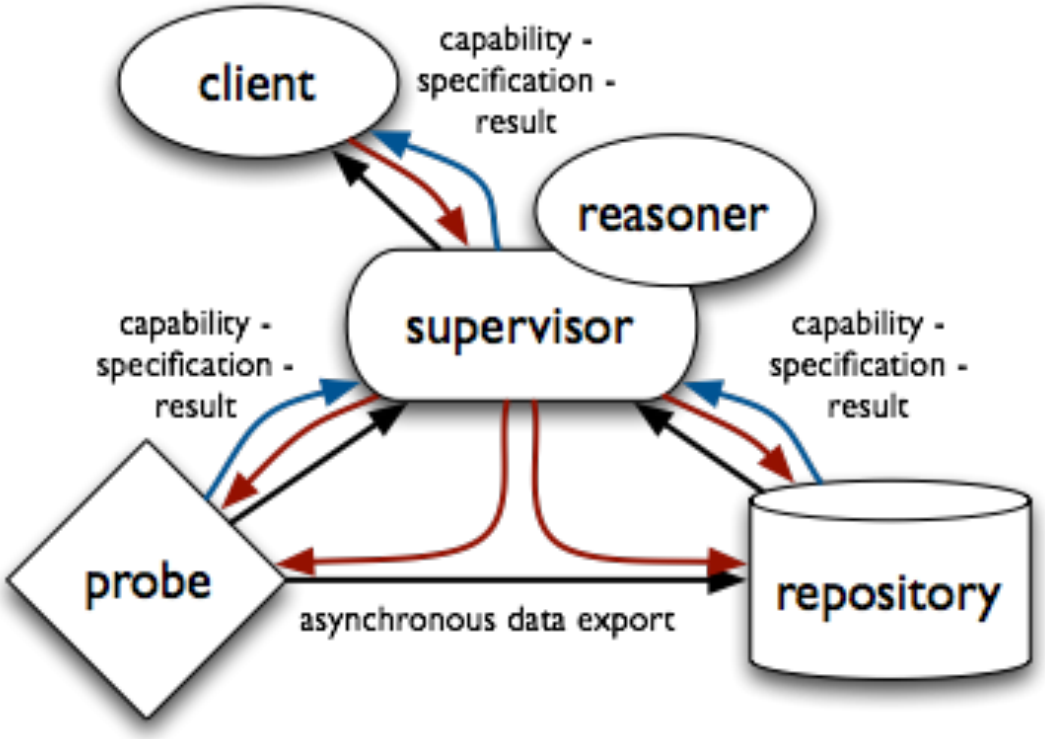
mPlane architecture

How to glue everything together?

mPlane

SEVENTH FRAMEWORK PROGRAMME

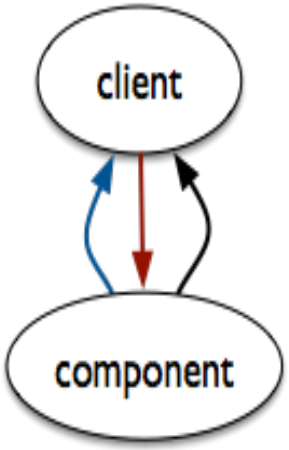
Basic architecture



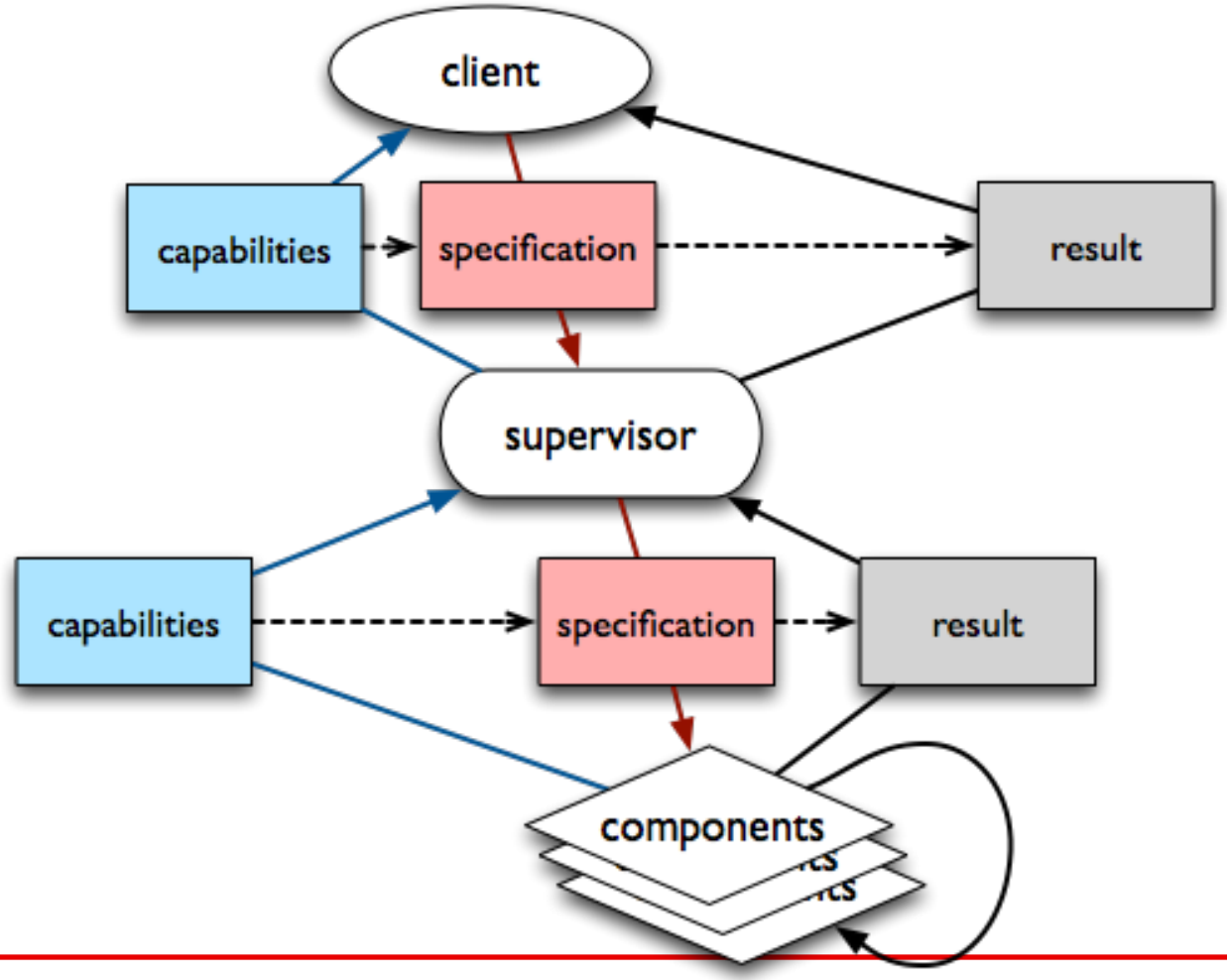
- Probes measure
- Repositories collect and analyze
- Supervisor controls
- Reasoners automates iteration

Everything's a component

- A ***component*** implements the mPlane control interfaces:
  - advertises its ***capabilities***,
  - accepts measurement ***specifications***,
  - provides ***results*** (or *receipts* therefor), and
  - may participate in brokered asynchronous data export.
- A ***client*** uses these interfaces to direct the components to perform a measurement.
- ***Supervisor*** = component + client with algorithms for mapping higher-level to lower-level specifications, consolidating results from lower-level components.



Measurement Workflow

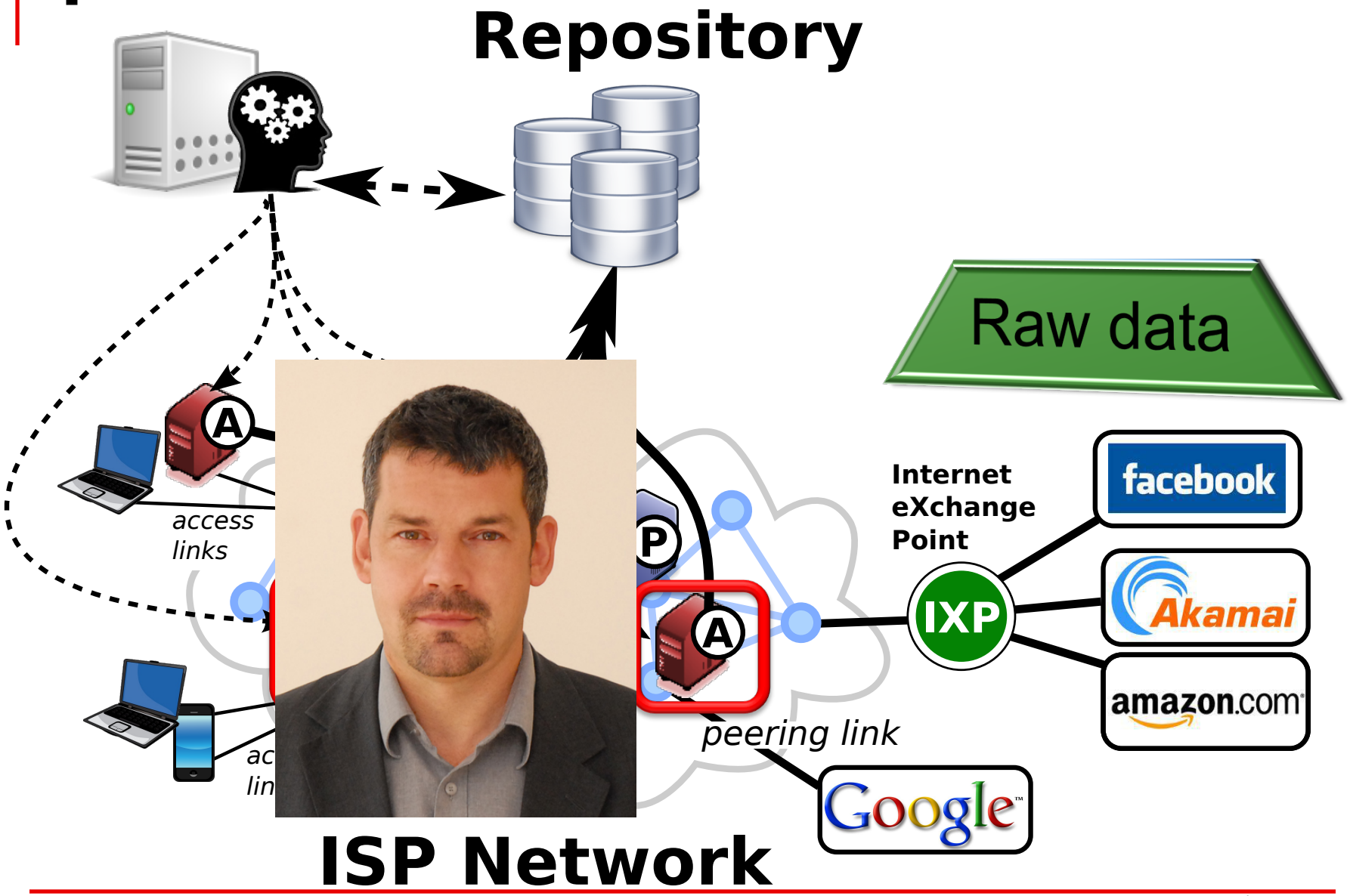


In more details

- See the glue master talk after this talk

Brian Trammell

Supervisor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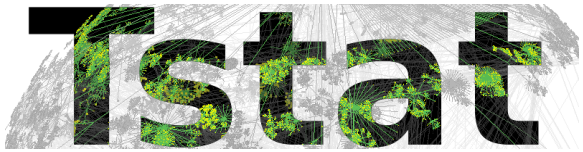
Probes

- Passive probes



DATI

QoF

MobileProbe

- Active probes

YouTubeProbe

FireLog Project

*Fast*Ping

mSLACert

PerformanceVisor

https://www.ict-mplane.eu/public/software

Supervisor

y

Aggregate

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access links

access links

Internet eXchange Point

IXP

facebook

Akamai

amazon.com

peering link

Google

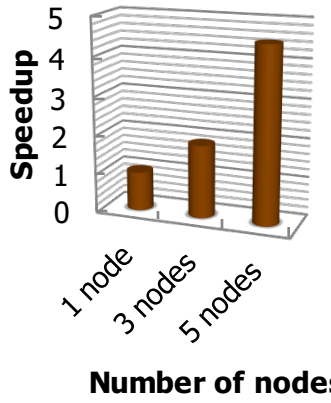
ISP Network

Repositories

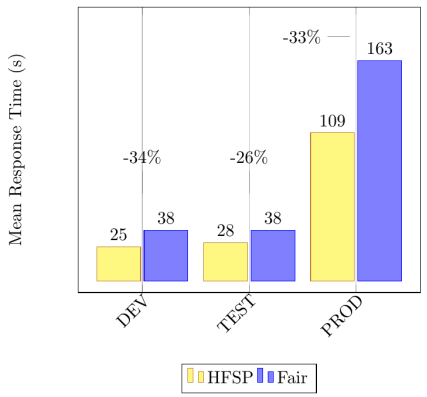
- DISC
  - Import data via Flume, store on HDFS
- NAS
  - Import Tstat logs with different time granularities
- DBStream
  - A data stream warehouse
  - Process and combine data from multiple sources
- BlockMon
  - Stream processing

Algorithms

- Rule mining on Hadoop



- Size-Based scheduling



Aggregate *mean* response times for all workloads.

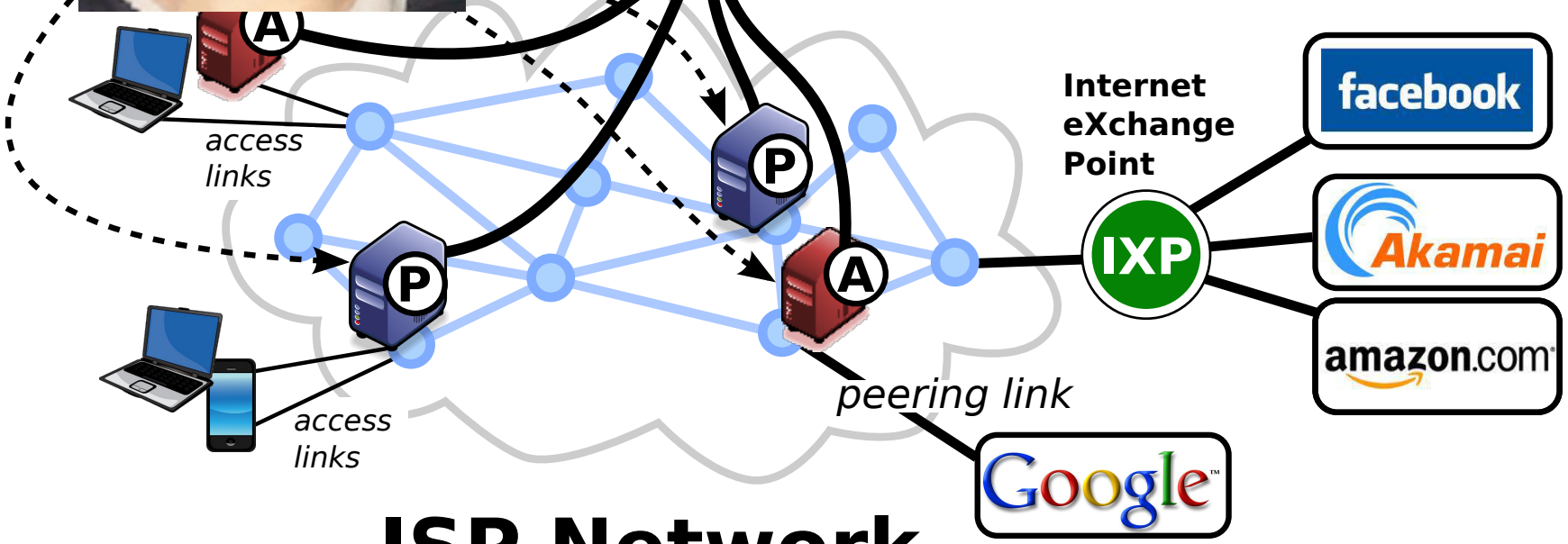
ADTool

repoSim

Supervisor

Repository

Useful



ISP Network

Supervisor and reasoner

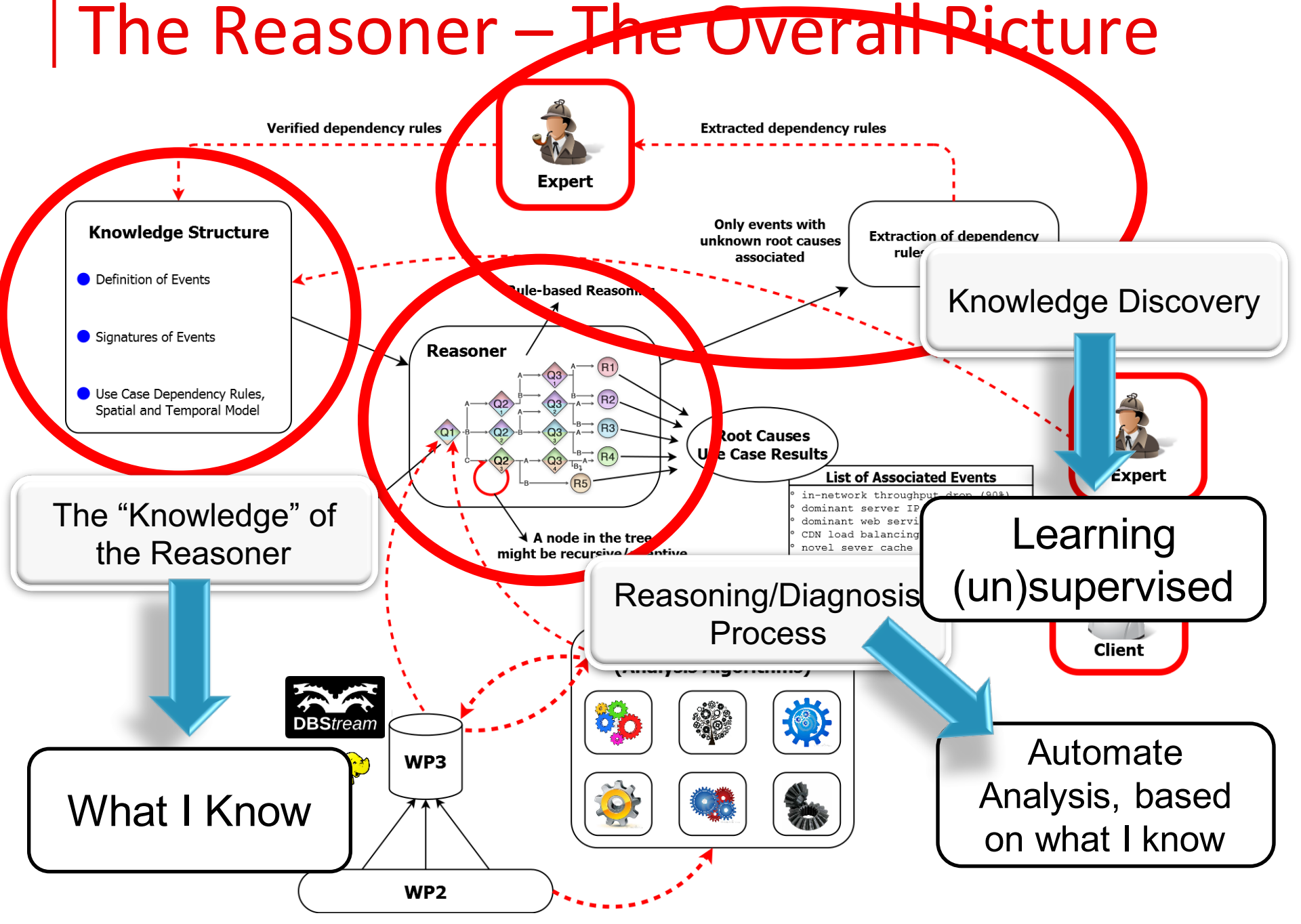
The supervisor

- Orchestrate components
- Provides Access, Authorization functionalities
- Offers capabilities to clients
- Allows inter-AS communications

The reasoner

- Allows semiautomatic processing
- Based on events
- Follows a decision tree-like approach
- For **troubleshooting support**
  - iteratively find the Root Causes of the associated problems
- For **measurement analysis**
  - automate the iterative process

The Reasoner – The Overall Picture



Use cases

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- **16:00 – Live demos**
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Goal: present mPlane solutions, stimulating discussions, demonstrating practical solutions, getting feedback

Some of the mPlane Use Cases

1. Estimating content and service popularity for network optimization
2. Passive content curation
3. Active measurements for Multimedia Content Delivery
4. QoE for web browsing
5. Mobile network performance issue cause analysis
6. Anomaly detection and root cause analysis in large scale networks
7. Verification and certification of Service Level Agreement
8. Anycaster
9. GLIMPSE
10. ECN path transparency

Social Dinner

- 19:30 at the “Heidelberger Kulturbrauerei”
  - Leyergasse 8

Some of the mPlane Use Cases

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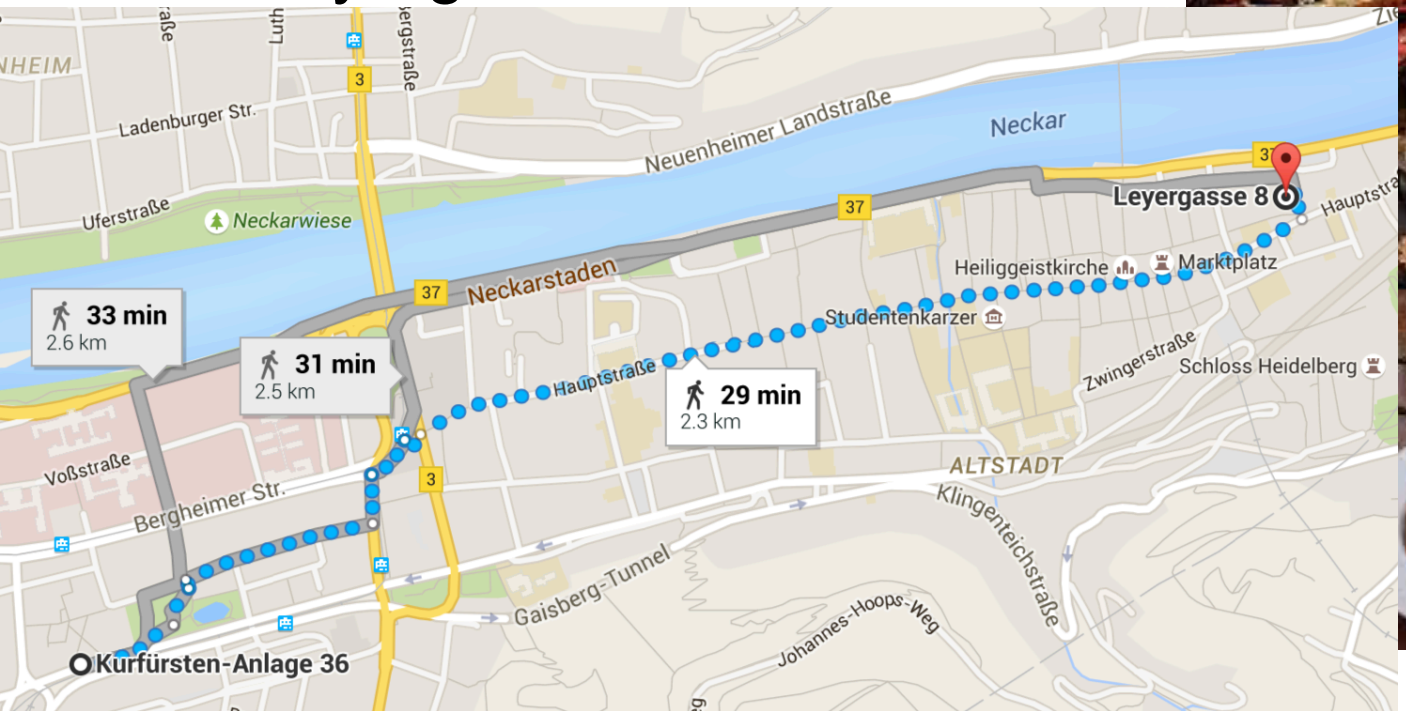
GO and check with then

- Ask questions
- Be nasty
- Interact with people
- …
- And give us your feedback

Social Dinner

- 19:30 at the “Heidelberger Kulturbrauerei”
  - Leyergasse 8



mPlane

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