

An Internet measurement platform for the e-learning community

Olivier.Fourmaux@upmc.fr

Timur.Friedman@upmc.fr



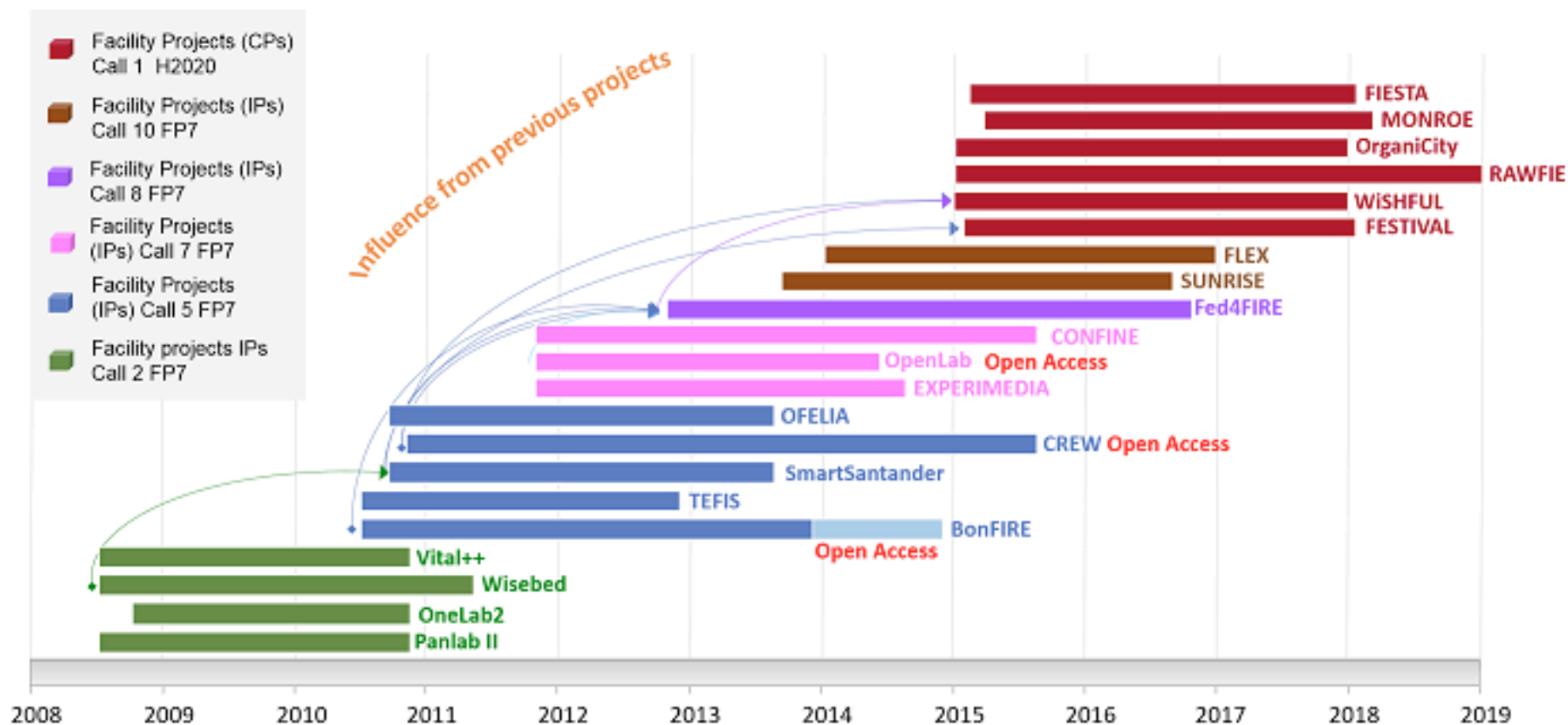


Future Internet
Research and
Experimentation

- European research initiative
- Promotion of **wide-scale federations testbed and experimentation facilities** for Internet and network-related research.
- €20 million investment since 2010
- 27 projects founded

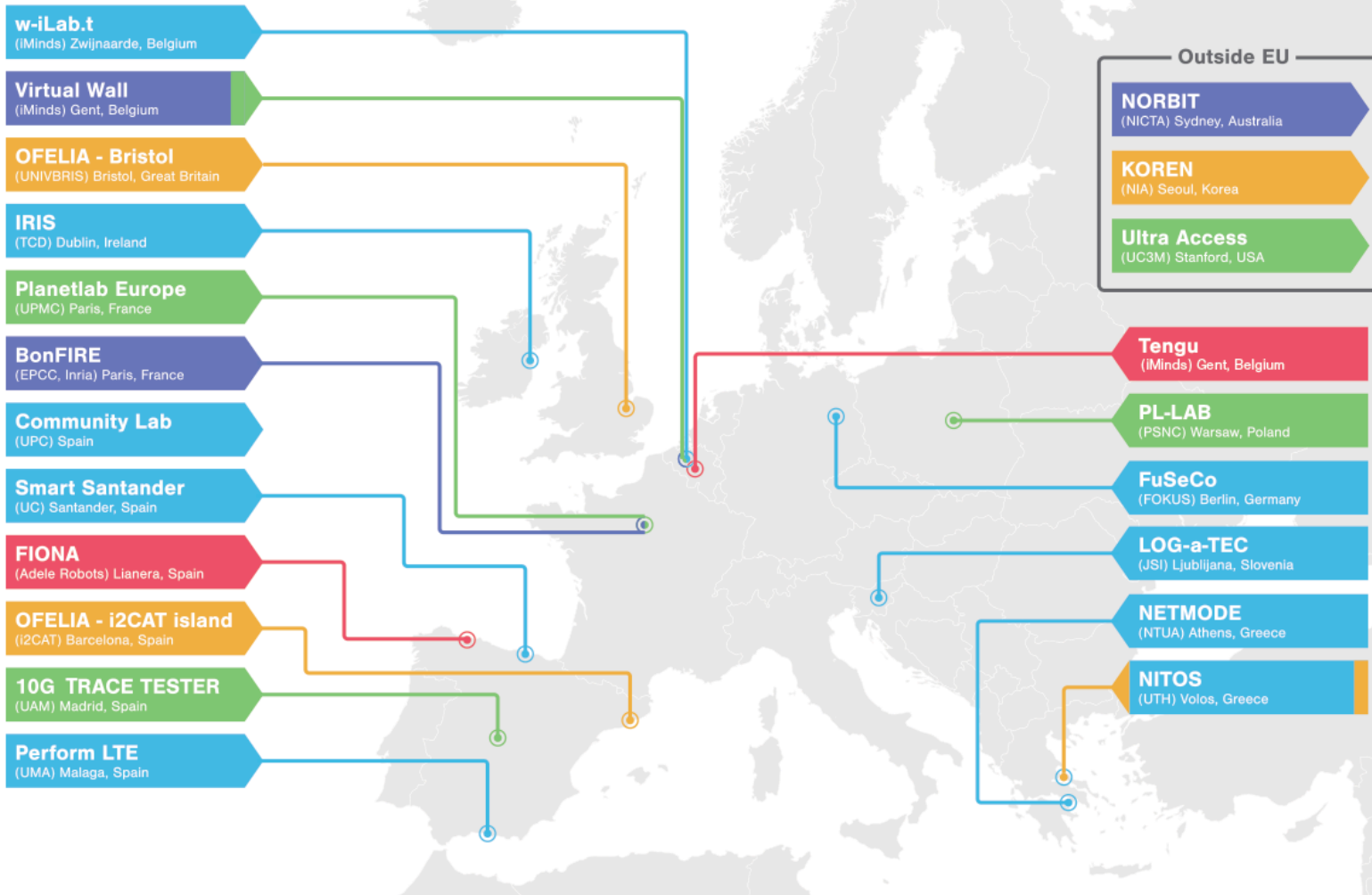


Some FIRE projects...



FIRE facilities

● Wired
 ● Wireless
 ● Openflow
 ● Cloud
 ● Other



PlanetLab Europe



- European portion of PL (since 2008)
- Operated by UPMC
 - In collaboration with INRIA, U. Pisa and Hebrew U.
- ~350 nodes at ~200 sites





FORGE project



ΠΑΝΕΠΙΣΤΗΜΙΟ
ΠΑΤΡΩΝ
UNIVERSITY OF PATRAS



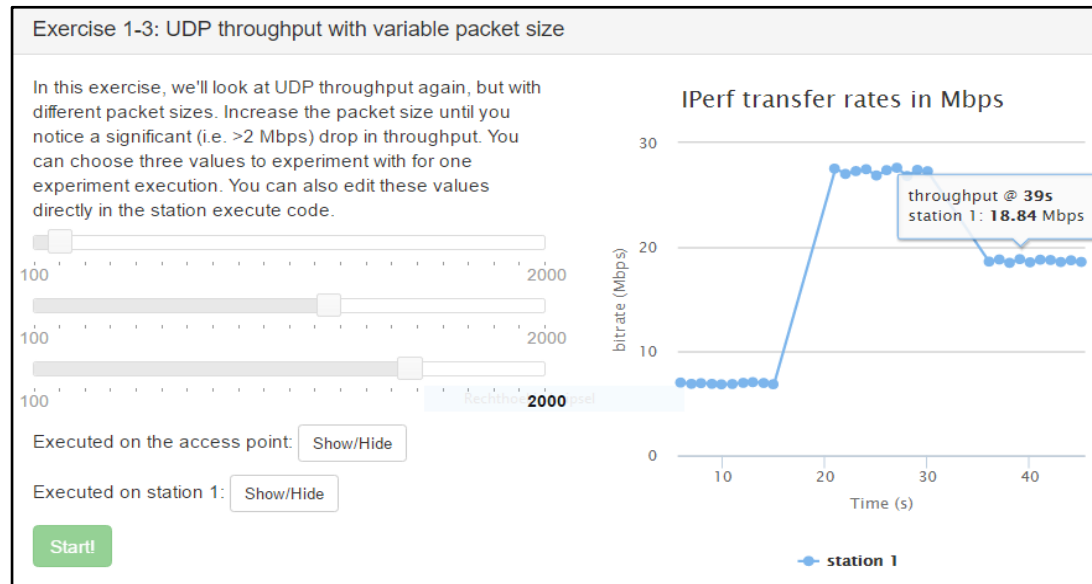
TRINITY COLLEGE DUBLIN
COLÁISTE NA TRÍONÓIDE, BAILE ÁTHA CLIATH

THE UNIVERSITY
OF DUBLIN

- Educational Layer over FIRE facilities
 - Transforms FIRE testbeds into learning resources for education
- Similar usage patterns between researcher & educational learner
 - Resources are discovered, selected, reserved, provisioned
 - Experiment executed, controlled, monitored, results collected
 - Resources release.

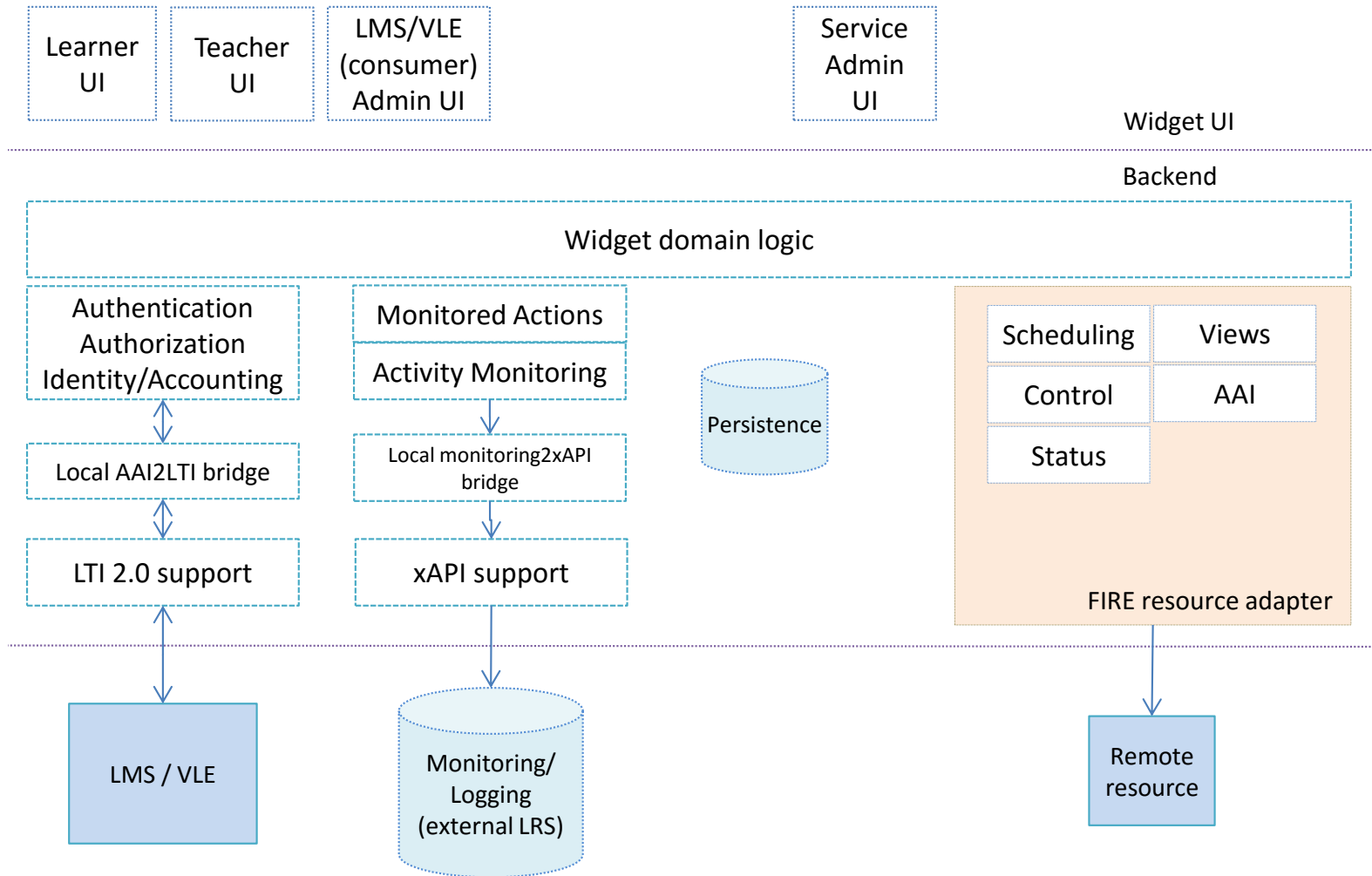


FORGE: Hidden Complexity



- Steps are preconfigured and automated
 - **Teacher:** discover, select reserve, provision resources
 - **Student:** web based control and monitoring elements
- Supported by:
 - **Widgets:** micro-applications that perform a dedicated task
 - **Adapters:** Backend scripts that interact with FIRE testbed facility

FORGE : Reference Architecture



FORGE Courses

- Prototypes courses:
 - TCP congestion control
 - Wireless LAN throughput
 - Network router configuration
 - Introduction to OFDM
 - ...
- Opencall courses:
 - **Metrology of the Internet**
 - Project-based learning for master level students
 - GÉANT Testbeds Service – User Certification Programme
 - FORGE-based Local Area Networks
 - ...



M00C "Internet Measurements: a Hands-on Introduction"



Timur Friedman

Associate Professor in Computer Networking
Université Pierre et Marie Curie



Renata Teixeira

Senior Researcher
Inria Paris

- Week 1: Introduction
- Week 2: Topology and routes
- Week 3: Connectivity, losses, latency, and geolocation
- Week 4: Bandwidth
- Week 5: Traffic measurements



MOOC : PLE Measurement Platform

Week 1: Introduction

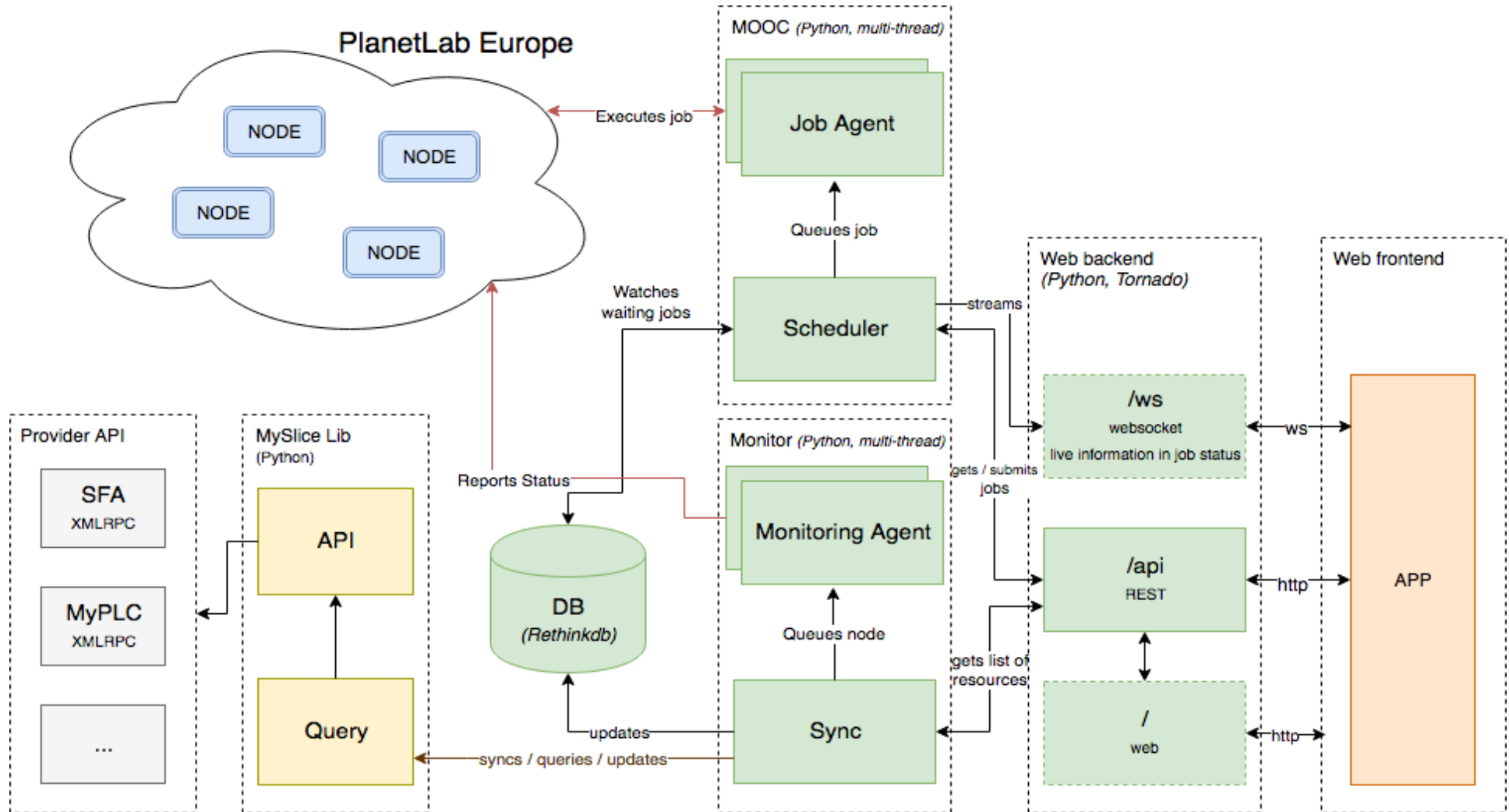
1. Motivation
2. Background: Internet infrastructure and traffic
3. Types of measurements
4. Measurement platforms
 - A. Overview
 - B. PlanetLab Europe**
5. Sound measurement practices
6. Ethical issues

Timur Friedman

INTERNET MEASUREMENTS: A HANDS-ON INTRODUCTION



PLE widget architecture



Client/server architecture (MOOC/PLE widget)

- MOOC maintain its students' privacy
 - Student authenticate themselves to the MOOC
 - The MOOC request measurement on its behalf (not revealing their identity)
 - Chain of accountability in case of disruptive measurement
- PLE to preserve its resources
 - Queuing of requests
 - Execution of measurement at a predefined rate
 - Sanity check
- Extensibility
 - Other clients, other measurement systems...



Results of the first MOOC execution

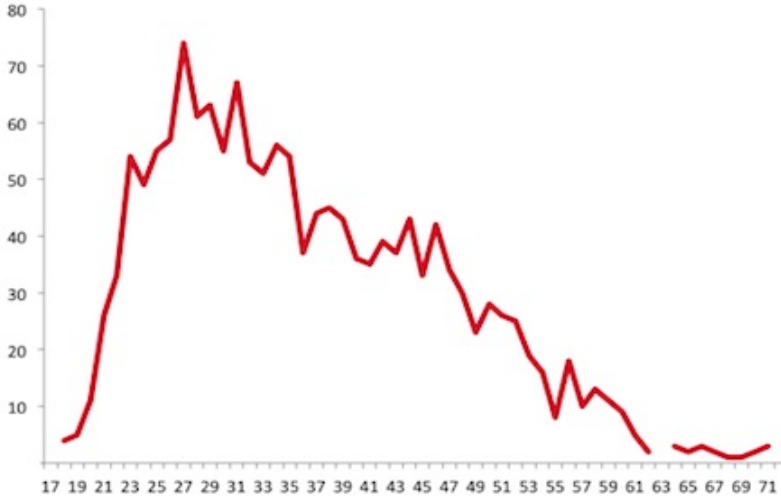


1824
enrollments



156
certificates
delivered

Average age = 35



A very good satisfaction rate



Perspectives

- PLE Widget operational
 - MOOC: Next session 2017
 - Web client for classical labs
 - TCP/IP course
 - Advance course on Internet measurement
- Extensions of the PLE Widget
 - New PLE commands (DNS, HTTP and packet capture)
 - Integration of new measurement platforms ?



Additionnals slides



MetroM00C PLE Interface

[Experiment overview](#) [New experiment](#) ⌂

Experiment name









PlanetLab Europe node

Command name

Arguments

Destination



Pin	Name	Date & time	Status	Details
	iperf 1 thread TCP example	8 months, 3 weeks ago	job completed	View
	iperf 4 thread TCP example	8 months, 3 weeks ago	job completed	View
	iperf 8 thread TCP example	8 months, 3 weeks ago	job completed	View
	iperf UDP example 2	8 months, 3 weeks ago	job completed	View
	iperf UDP example 1	8 months, 3 weeks ago	job completed	View
	Ping example	9 months, 2 weeks ago	job completed	View
	Traceroute example 2	9 months, 2 weeks ago	job completed	View
	Traceroute example 1	9 months, 2 weeks ago	job completed	View
	test-tr-lip6	1 day, 10 hours ago	job completed	View 
	test-lip6	1 day, 10 hours ago	job failed	View 

A majority of male learners



73%
men



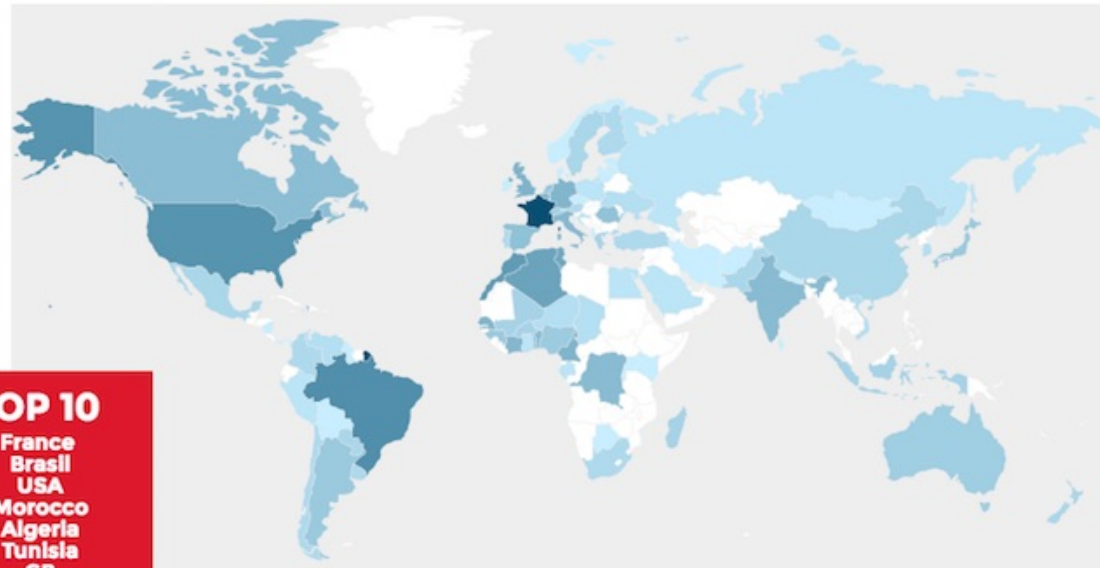
16%
women

Average age = 35



MOOC : Participants profile

95 different countries



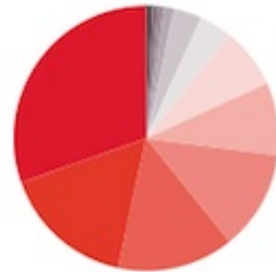
TOP 10

France
Brasil
USA
Morocco
Algeria
Tunisia
GB
Senegal
Cameroon
Germany

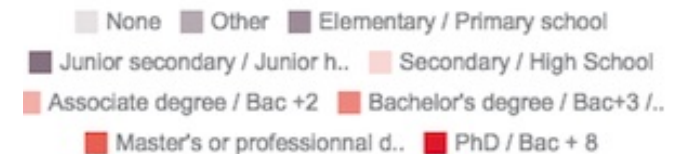


M00C : Participant profile

59% have a professional activity

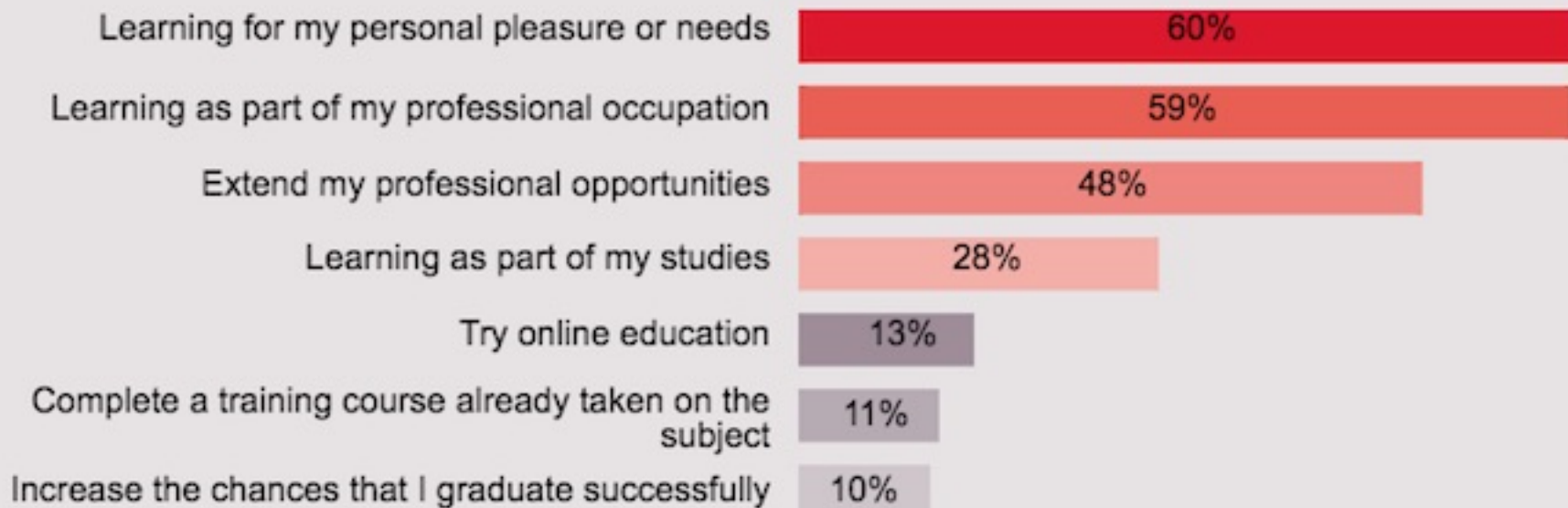


A majority holds a Master's degree



M00C : Participant motivation

Motivations and expectations regarding the course



MOOC: Stress on PLE

