EGI: Building a European Cloud through Federation

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e-infrastructure

- A long time ago in a galaxy far, far away....
  - Running big applications → HPC Centres
  - No fast networking → No application mobility
- Disruption from:
  - Open Source Software → Linux, etc.
  - Commodity Computing → Intel, AMD, Myrinet

Distributed computing led to the need to federate resources... and so for researchers to exploit these resources the Grid was born!

European Grid Infrastructure
(July 2011 and increase from Apr 2010)

Federation of institutional compute & storage resources (Supported by 4yr EGI-InSPIRE project)

Logical CPUs (cores)
- **248,424 EGI (+29.3%)**
- **337,608 All**

106.7 PB disk and 112.8 PB tape

Resource Centres
- **329 EGI**
- **346 All (+6.8%)**
- **93   supporting MPI (+6.8%)**

Countries (+11.5%)
- **50 EGI**
- **57 All**

38 NGIs providing resources
- **26 National Operations Centres**
- **12 NGIs in 4 Federated Operations Centres**

1 EIRO providing resources (CERN)

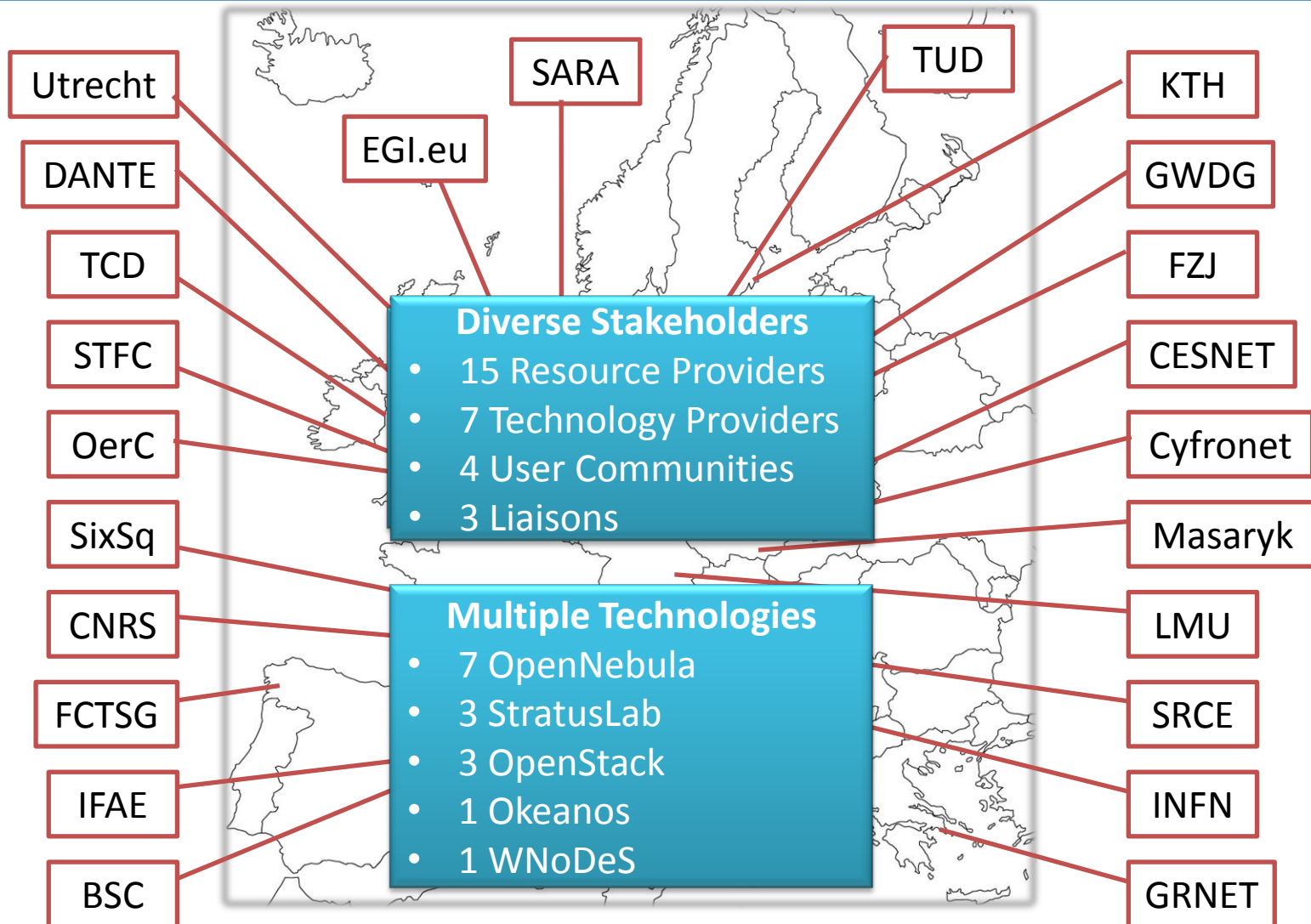**19 countries in 4 non-European Operations Centres**

- Disruptive technology across all sectors
  - Easier to understand (& use?) than the Grid?
- Isolated institutional clouds emerging
  - Federate these islands for efficient use

Digital Agenda
1010111011100001002010-2020
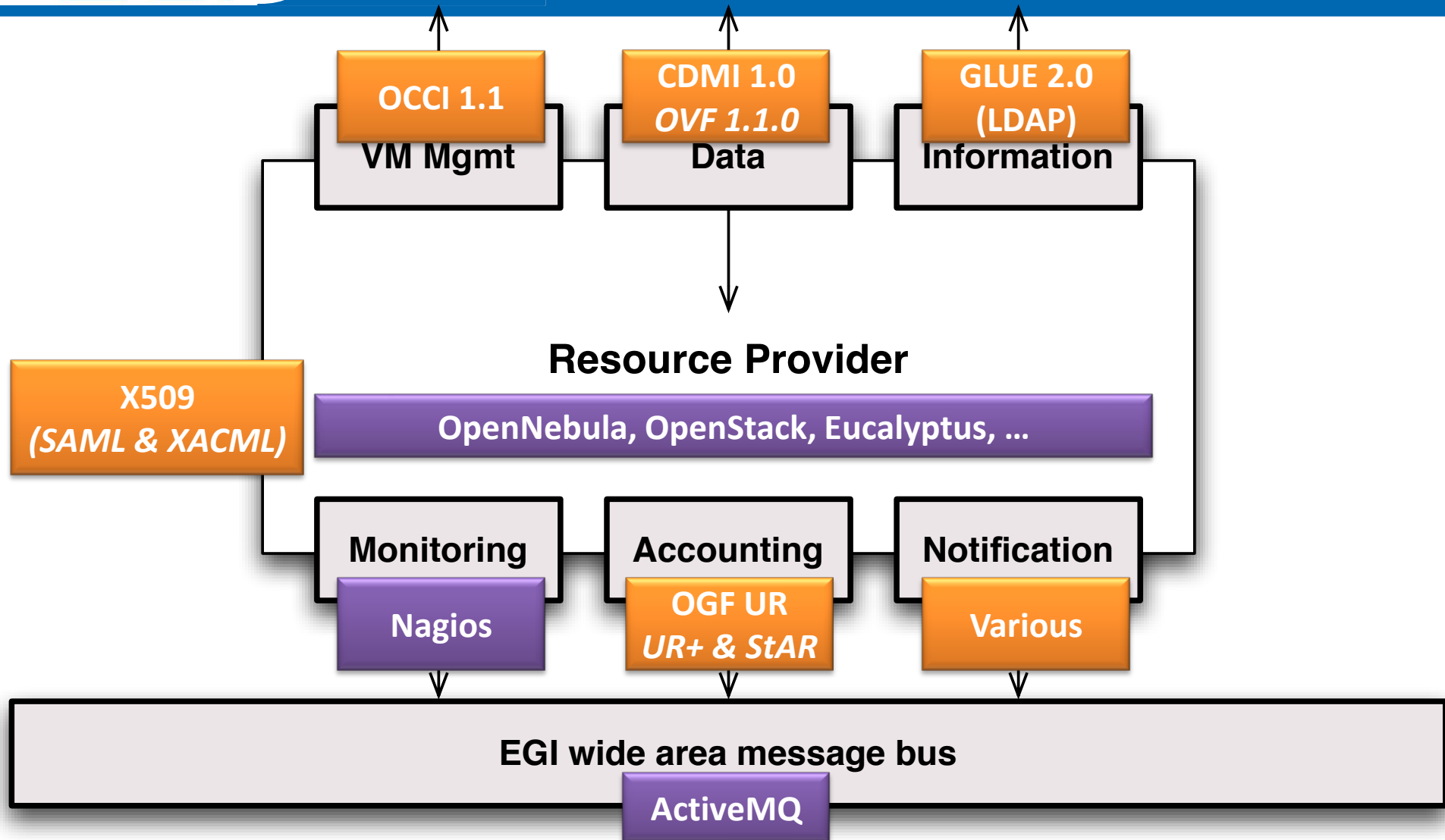for Europe

EGI Federated Cloud TF

- Building on prior experience
  - Standards critical for open federation

- Interoperable cloud standards exist now
  - Ahead of grids at a comparable time

- Federation driven by public sector concerns
  - EGI's experience in grids is a unique asset

- Re-use existing technology
  - Builds on a decade of experience from EGI

- Integration:
  - Integrate virtualised resources into EGI
- End-user requirements:
  - Elicit requirements for customer facing services
- Technical feedback:
  - To technology providers on gaps and issues
- Early adopters:
  - Identify and work with interested research groups
- Recommendations:
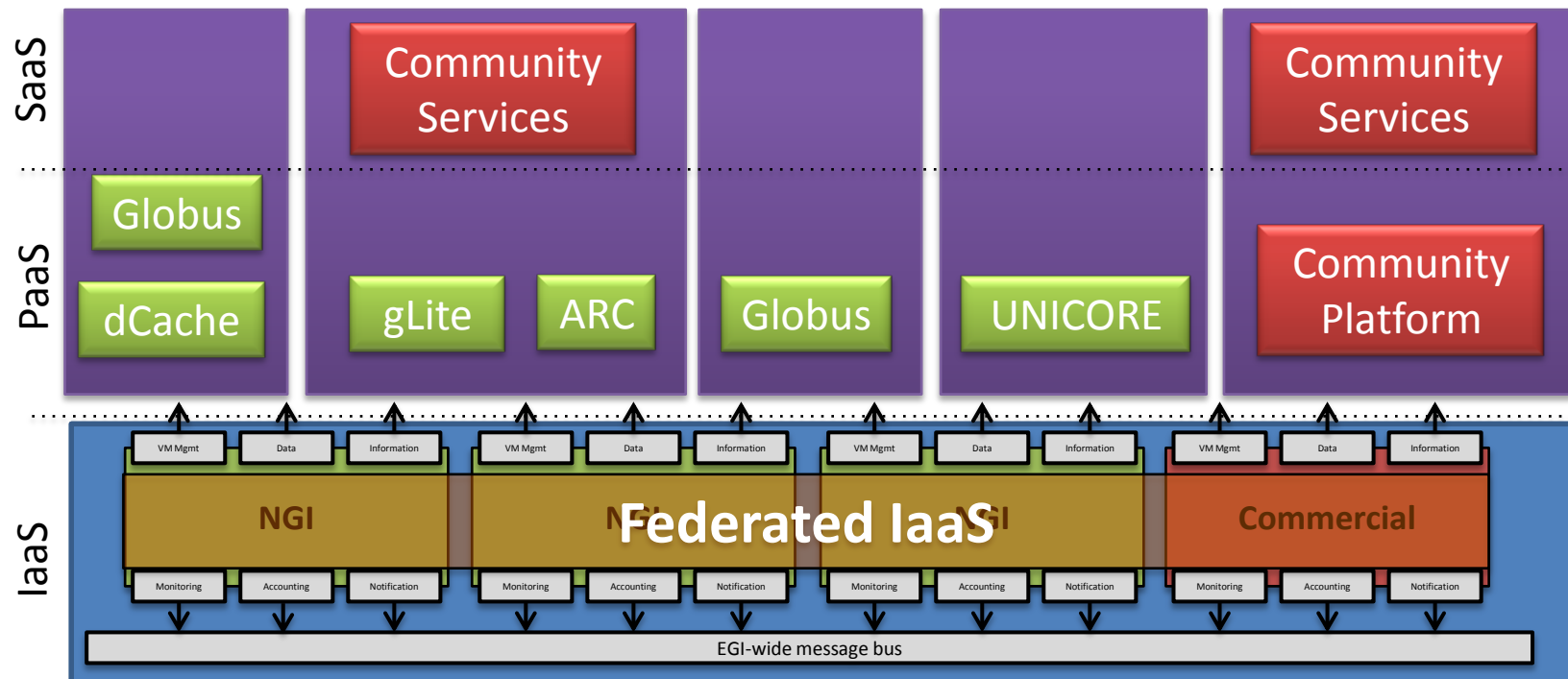 - For policies, operations, support and dissemination

Community Engagement

Utrecht

DANTE

TCD

STFC

OerC

SixSq

CNRS

FCTSG

IFAE

BSC

SARA

EGI.eu

TUD

KTH

GWDG

FZJ

CESNET

Cyfronet

Masaryk

LMU

SRCE

INFN

GRNET

Diverse Stakeholders
- 15 Resource Providers
- 7 Technology Providers
- 4 User Communities
- 3 Liaisons

Multiple Technologies
- 7 OpenNebula
- 3 StratusLab
- 3 OpenStack
- 1 Okeanos
- 1 WNoDeS

OCCI 1.1

CDMI 1.0
OVF 1.1.0

GLUE 2.0
(LDAP)

VM Mgmt

Data

Information

Resource Provider

X509
(SAML & XACML)

OpenNebula, OpenStack, Eucalyptus, …

Monitoring

Accounting

Notification

Nagios

OGF UR
UR+ & StAR

Various

EGI wide area message bus

ActiveMQ

EGI's Cloud Strategy

Personalised environments for individual research communities in the European Research Area
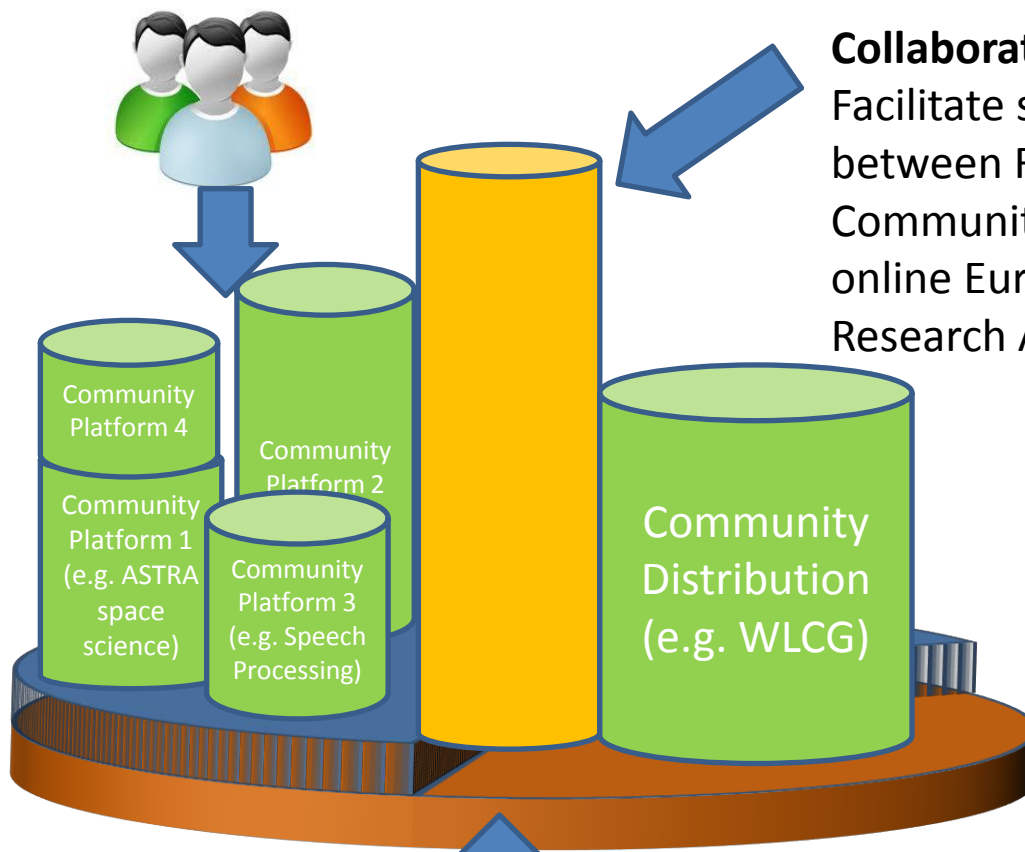

Digital Agenda for Europe 2010–2020

SaaS
- Community Services
- Community Services

PaaS
- Globus
- dCache
- gLite
- ARC
- Globus
- UNICORE
- Community Platform

IaaS

| VM Mgmt | Data | Information | VM Mgmt | Data | Information | VM Mgmt | Data | Information | VM Mgmt | Data | Information |

Federated IaaS

NGI — NGI — NGI — Commercial

| Monitoring | Accounting | Notification | Monitoring | Accounting | Notification | Monitoring | Accounting | Notification | Monitoring | Accounting | Notification |

EGI-wide message bus

EGI.eu Coordination

Core Software & Support

Refactoring for EU 2020

Community Platforms
Domain-specific access to distributed resources. Promote sharing and reuse through a 'Platform Store' in a diverse ecosystem of platform integrators ,deployers & operators

Collaboration Services
Facilitate synergies between Research Communities in the online European Research Area

Community Platform 4

Community Platform 1 (e.g. ASTRA space science)

Community Platform 2

Community Platform 3 (e.g. Speech Processing)

Community Distribution (e.g. WLCG)

Infrastructure Platform
Consistent federated IaaS access to physical resources through Virtualisation

Physical Resources:
- Public and commercial mix
- Different countries (35+) and admin domains (350+)

Current Testbed Status

Host ↑↓	Service ↑↓	Status ↑↓	Last Check ↑↓	Duration ↑↓	A
cagnode42.cs.tcd.ie	StratusLab OpenNebula proxy	OK	02-22-2012 17:35:56	9d 4h 19m 55s	1
carach5.ics.muni.cz	OCCI 0.8	OK	02-22-2012 17:31:31	9d 5h 39m 20s	1
	OCCI 1.1	OK	02-22-2012 17:36:50	9d 5h 49m 1s	1
	OCCI 1.1 VM Test	OK	02-22-2012 17:27:57	0d 4h 12m 54s	1
	Web interface	OK	02-22-2012 17:31:04	9d 5h 39m 47s	1
meghacloud.cesga.es	OCCI 0.8	OK	02-22-2012 17:29:10	9d 8h 26m 41s	1
	OCCI 1.1	OK	02-22-2012 17:39:11	22d 22h 46m 41s	1
	Web interface	OK	02-22-2012 17:27:11	8d 1h 28m 40s	1
occi.cloud.gwdg.de	OCCI 0.8	OK	02-22-2012 17:31:09	12d 7h 24m 42s	1
	OCCI 1.1	OK	02-22-2012 17:33:22	2d 4h 7m 29s	1
	OCCI 1.1 VM Test	OK	02-22-2012 17:18:26	0d 18h 52m 25s	1
	Web interface	OK	02-22-2012 17:39:52	15d 2h 30m 59s	1

- EGI has a European wide national network
  - National Grid Initiatives (NGIs) federate locally
  - EGI.eu coordinates European wide federation
- EGI's Distributed Operational Infrastructure
  - Builds on a decade of experience & tools
  - Cross-domain accounting, monitoring & support
  - Integrating clouds and other resources

Will allow researchers to deploy the environments they need where they need to

- **Reusing existing assets**
  - Expertise within EGI
  - Expertise from DCIs
  - Produce blueprint & profile
- **Thanks to EGI FCTF**
  - Matteo Turilli (OeRC)
  - Michel Drescher (EGI.eu)
  - And many other partners
- **EGI Community Forum**
  - http://cf2012.egi.eu