

The background of the slide features a complex, abstract network diagram. It consists of numerous nodes, represented by small circles of varying sizes and colors (white, grey, black), interconnected by thin, grey lines. Some lines are thicker and more prominent, creating a sense of depth and connectivity. The overall structure is organic and sprawling, filling the upper and left portions of the frame.

Core Skills for a Digital Economy

Alberto Di Meglio
CERN openlab Head



CERN openlab in a nutshell

A science – industry partnership to drive R&D and innovation with over a decade of success

Evaluate state-of-the-art technologies in a challenging environment and improve them

Test in a research environment today what will be used in many business sectors tomorrow

Train next generation of engineers/scientists

Disseminate results and outreach to new audiences



ORACLE

SIEMENS



BROCADE



Yandex



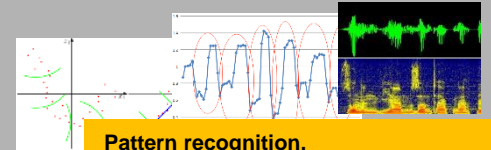
Bigger+Faster+Smarter

Information



Applications designed for "big data" (business processes, decision support systems, etc.)

Value
Veracity
Variability
Variety
Volume
Velocity

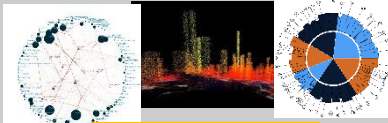


Pattern recognition, machine learning, predictive analytics



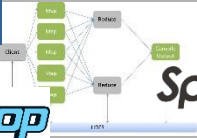
Distributed Computing and Data Grids, Clouds, HPC, Crowd Computing

Software



Data visualization, representation

ROOT

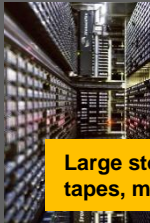


Spark

hadoop

Data analysis and analytics platforms

Platform



Large storage (disks, tapes, memory)



Fast data acquisition systems



Flexible networks

OPEN DAYLIGHT

OpenFlow

Infrastructure

Open Science Cloud

CERNopenlab

users

Big Science Small and Medium Scale Science Other market sectors



Hybrid cloud platform

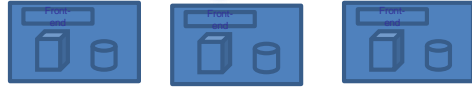
Commercial/GEANT
Netw

Analyse, share

Data from instruments, devices, sensors, metadata, simulations



Publicly funded



Commercial



EGI PRACE

Information Technology Research Areas



Data acquisition and filtering



Computing platforms, data analysis, simulation



Data storage and long-term data preservation



Compute provisioning (cloud)



Networks

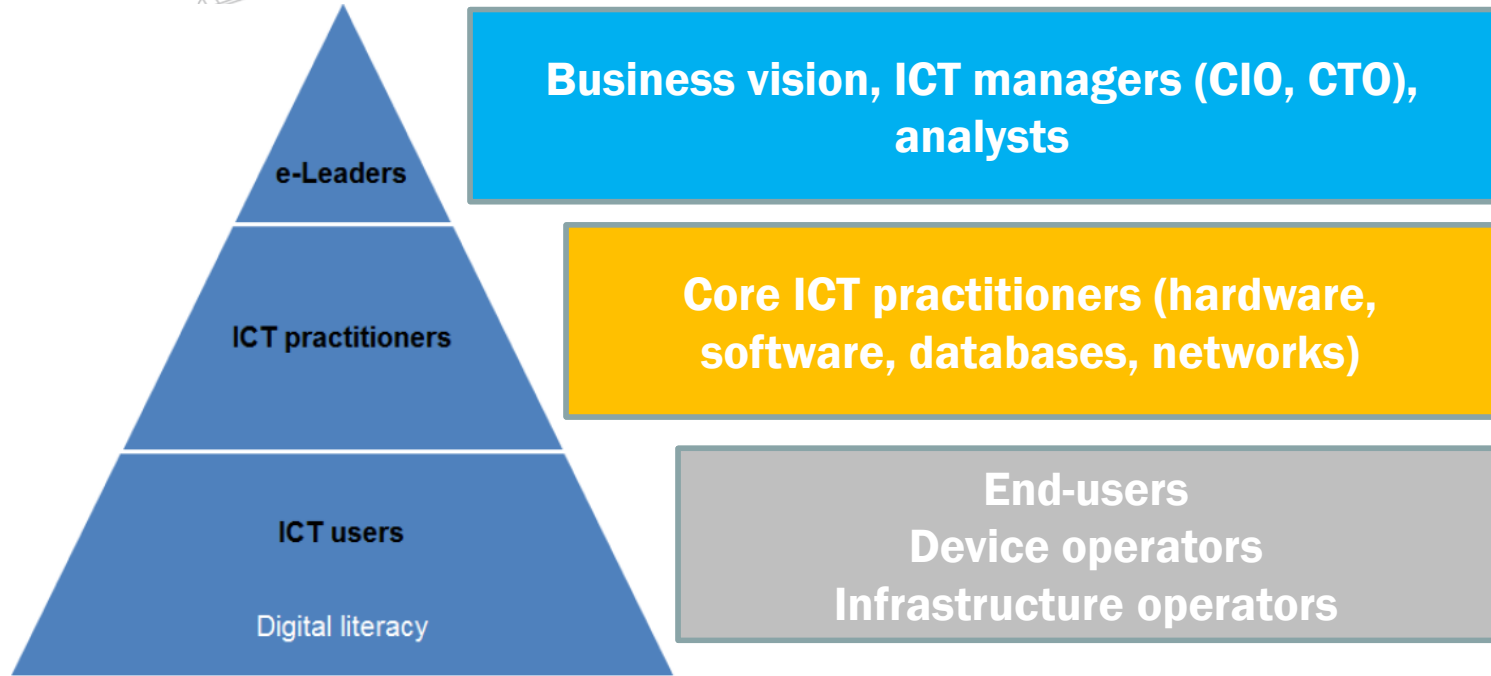


Data analytics

Innovation &
Management

The e-Skills Pyramid

CERNopenlab



A. Richier – e-Skills for the 21st Century
E-Skills for Jobs High-Level Conference
Riga, 16 June 2015

eSkills Profiles

Multicore CPU programming, graphical processors (GPU), parallel programming

Software & Computing Engineers

Data analysis technologies, tools, data visualization, monitoring, security, etc.

Data Scientists/Engineers

Computing and data services definition, procurement, deployment, benchmarking, monitoring

Cloud Services Managers

Applications of physics to medical research (hadron therapy, etc.), simulation software

Multidisciplinary Researchers

Knowledge and innovation exploitation, e-business management

Entrepreneurs

European Initiatives



CERNopenlab

- e-Skills for Competitiveness and Innovation (<http://www.eskills-vision.eu/>)
- E-Leadership (<http://www.eskills-guide.eu/> and <http://www.eskills-lead.eu/>)
- European e-Competence Framework (<http://www.ecompetences.eu/>)
- E-Skills for Jobs (<http://eskills4jobs.ec.europa.eu/>)
- EIT Digital (<https://www.eitdigital.eu/>)

The CERN openlab Educational Program

> **At CERN**

- Regular workshops
- Special workshops and lectures
- Requirements workshops
- Training courses on hardware platforms,
- Parallel programming, etc.

> **Outside the lab:**

- CERN School of Computing in Portugal (August 2014)
- Thematic CSC in Split (June 2014)

> **Summer student program**

> **The ICE-DIP project**



Programs is highly structured, with different tiers and specializations – students, young researchers, professional researchers and experts - including summer student lectures as well as numerous invited talks at CERN

Summer Student Programme

› Work programme

- Individual project in collaboration with industrial companies
- 15 lectures by experts from CERN and other labs on applied IT
- Lightning talks sessions
- Published technical reports



› Summer student program 2014

- 850+ applicants
- 23 selected candidates

› Summer student program 2015

- 1580+ applicants
- 40 selected candidates
 - 36 co-funded by CERN openlab companies and the IT Department
 - 3 special scholarships from the CERN DG
 - 1 Oracle/MTN scholarship for a Nigerian student



Started February 2013

Recruited 5 fellows

Model can be extended to other areas (e.g. data analytics)



ICE-DIP 2013-2017:

The Intel-CERN European Doctorate Industrial Program

» A public-private partnership to research solutions for next generation data acquisition networks, offering research training to five Early Stage Researchers in ICT



Research topics:

- ▶ Silicon photonics systems
- ▶ Next generation data acquisition networks
- ▶ High speed configurable logic
- ▶ Computing solutions for high performance data filtering

Innovation and Entrepreneurship

- **CERN openlab/Intel Innovation and Entrepreneurship Project**
 - Define a process for creating awareness, stimulate talent, support innovation and entrepreneurship
- **IT Lightning Talks Programme**
 - A bimonthly series of 5-minute elevator pitches to propose ideas
- **IdeaSquare Challenge-Based Innovation (CBI)**
 - Dedicated MSc-level program targeted to multidisciplinary student teams
- **Entrepreneurship Meet-ups**
 - Organized by CERN KT to support future entrepreneurs

Concrete Examples

CERNopenlab

- 12 years of projects
- 50+ Fellows
- 160+ Summer Students
- 82 registered alumni



A.H., Fellow 2003
Senior HPC Solutions Engineer, Intel



X.G., Fellow 2006
Chief Data Scientist, Dassault Systèmes



A.U., Fellow 2003
Project Manager, Nagravision



M.H., Fellow 2007
Software Architect, Tyler Capital



J.D., Summer Student 2006
Senior Software Engineer, EMBL-EBI



M.L., Fellow 2012
Business Data Analyst, SITA OnAir

EXECUTIVE CONTACT

Alberto Di Meglio, CERN openlab Head
alberto.di.meglio@cern.ch

TECHNICAL CONTACT

Fons Rademakers, CERN openlab CTO
fons.rademakers@cern.ch

COMMUNICATION CONTACT

Mélissa Gaillard, CERN openlab Communication Officer
melissa.gaillard@cern.ch

ADMIN CONTACT

Kristina Gunne, CERN openlab Administration Officer
kristina.gunne@cern.ch