NEW CHALLENGES AND OPPORTUNITIES IN CLOUD COMPUTING

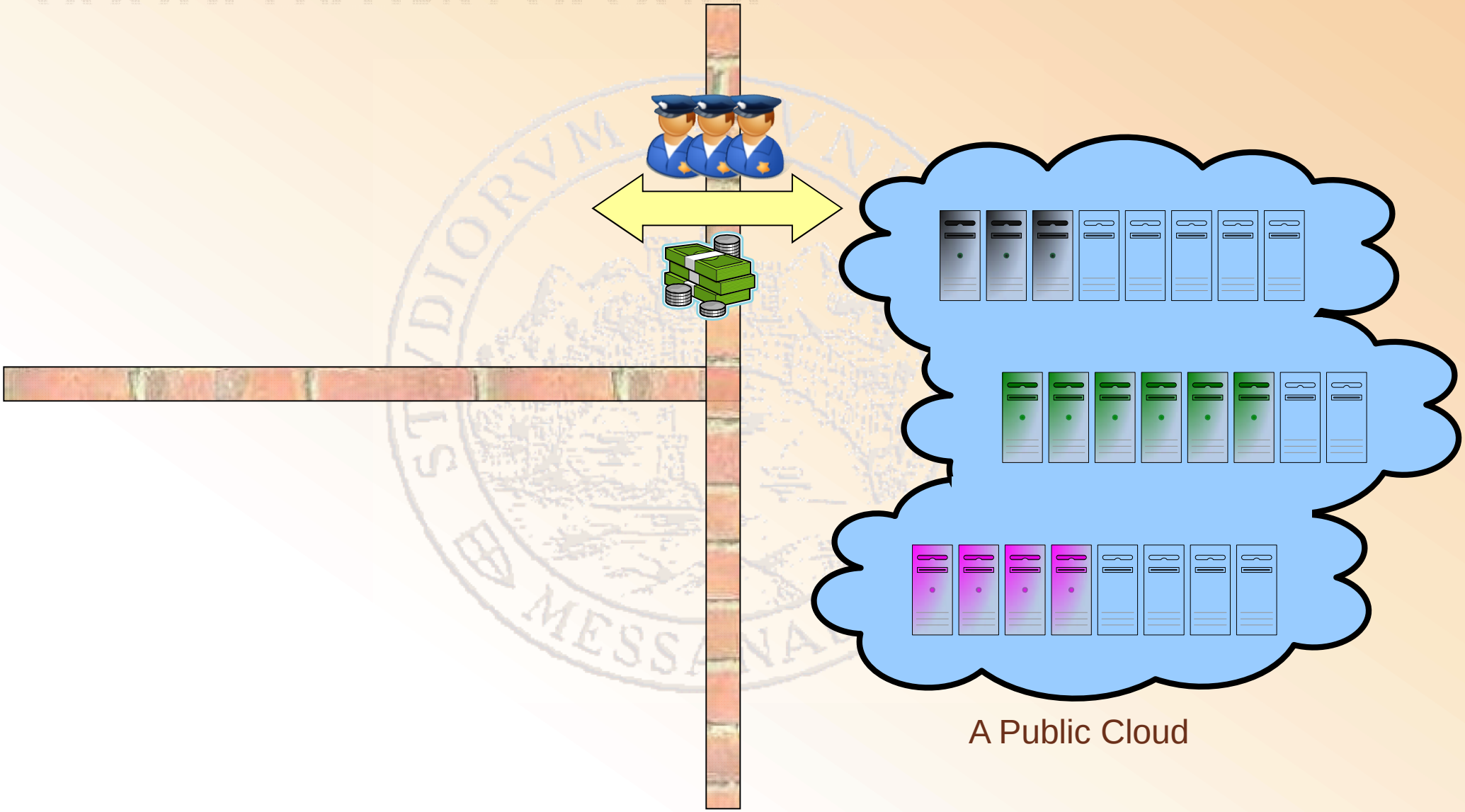
Cooperating Clouds

Cloud and Security

Cloud and Standardization.

Prof. Massimo Villari
University of Messina,
Faculty of Engineering
C.da di Dio, 98166 Messina
mvillari@unime.it

COOPERATING CLOUDS



A Public Cloud

CURRENT SECURITY ISSUES

CURRENTLY, THE SECURITY MODEL FOR CLOUDS SEEMS TO BE RELATIVELY SIMPLER AND LESS SECURE THAN THE SECURITY MODEL ADOPTED BY GRIDS.

RISKS

Security is one of the largest concerns for the adoption of Cloud Computing.

- Recovery
- Investigative support
- Long-term viability

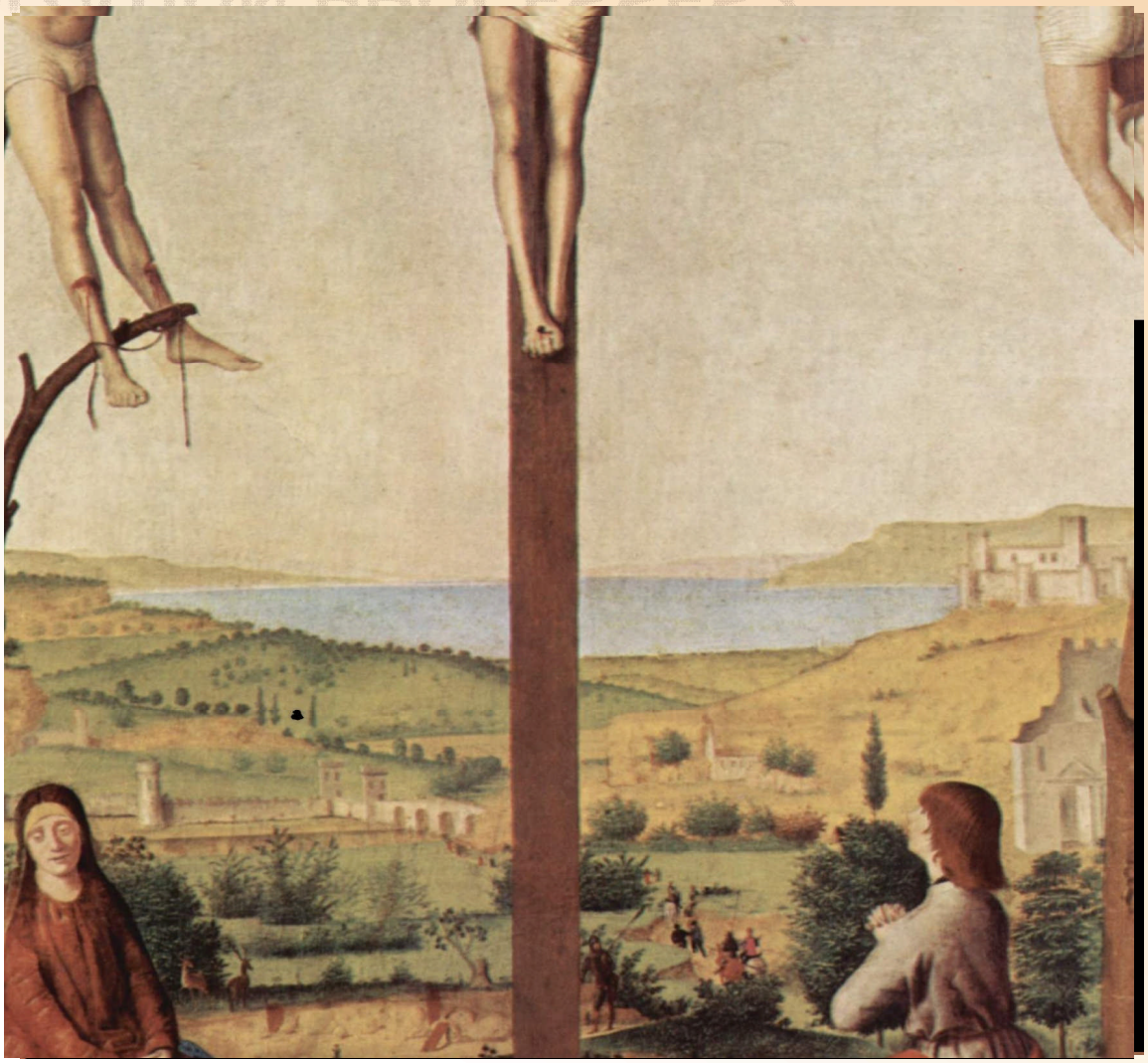
THE METHAFOR: THE PAINTER AND HIS PAINTINGS

Antonello da **MESSINA**
in the Later Middle Age

Messina, 1429

Messina February 1479

WHAT ARE THE PROBLEMS IN THE STANDARDIZATION PROCESSES?

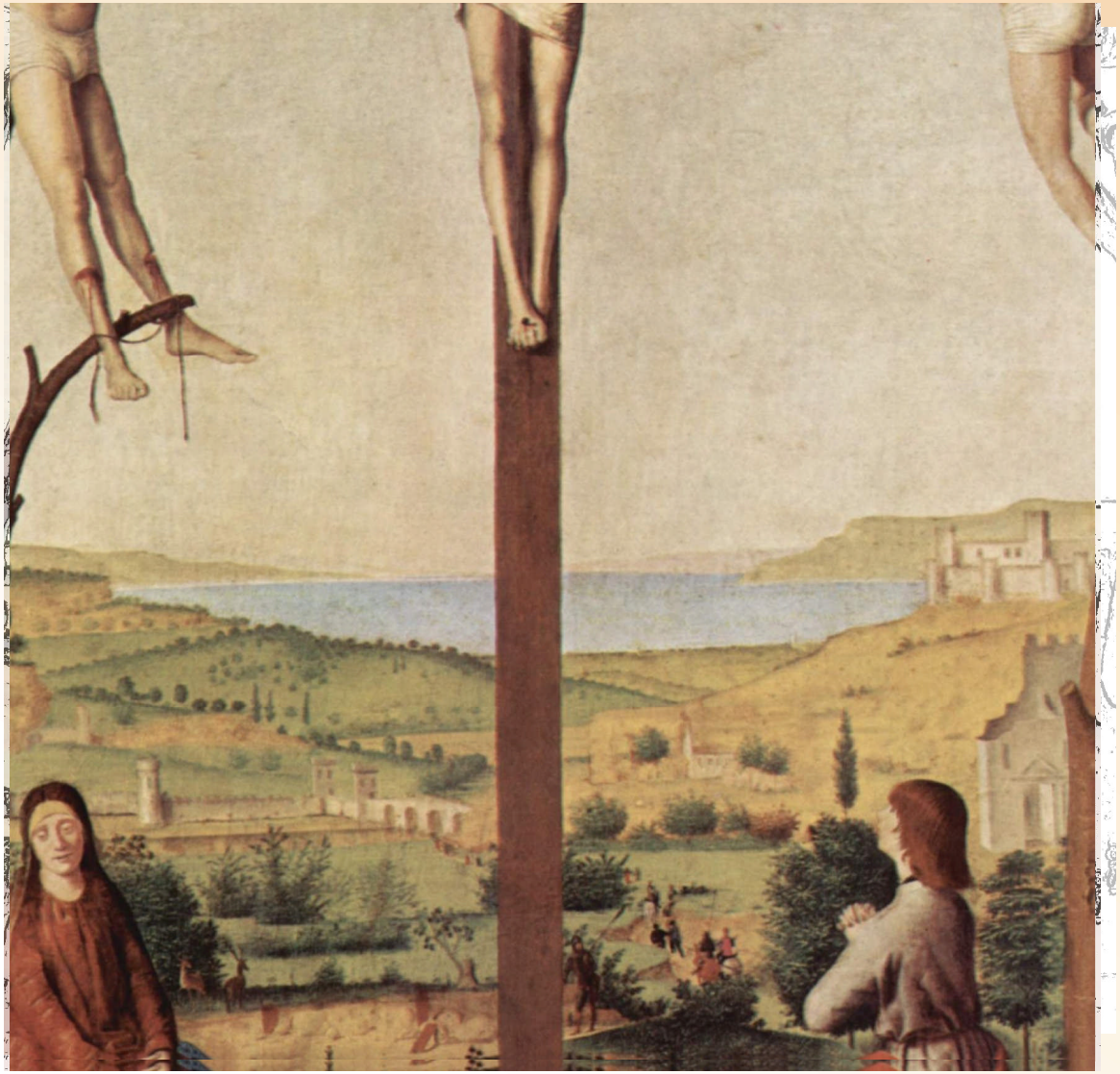


TIME (t)

TIME (t)

TIME (t)

WHAT IS THE POSSIBLE SOLUTION FOR IT MARKETS?



possible
BUSINESS
and
real
SECURITY
PRIVACY
.....

DEISA

Distributed European Infrastructure for Supercomputing Applications

ComputationWorld 2010, Lisbon, November 21 - 25, 2010

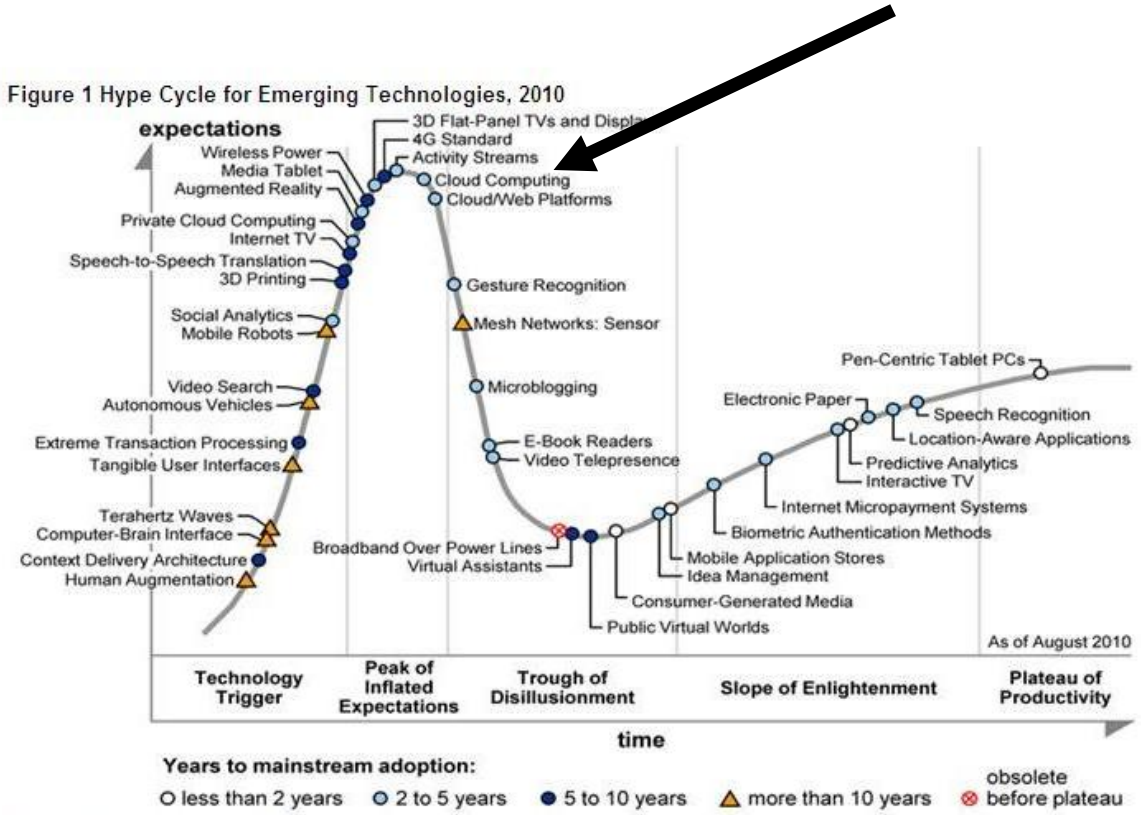
Challenges in the Cloud

Wolfgang Gentzsch
EU DEISA Project & Board of Directors of OGF
gentzsch at rzg.mpg.de

IARIA

Gartner Hype Curve 2010

Distributed European Infrastructure for Supercomputing Applications

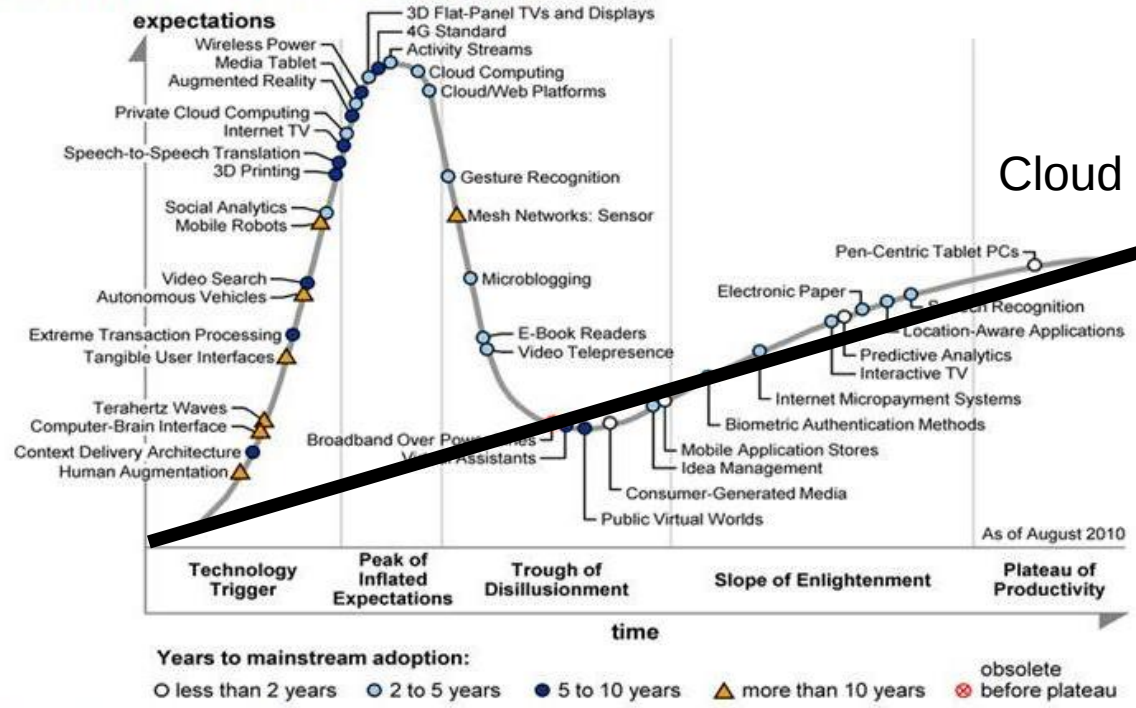


Source: Gartner (August 2010)

Evolution 2005 - 2010

Distributed European Infrastructure for Supercomputing Applications

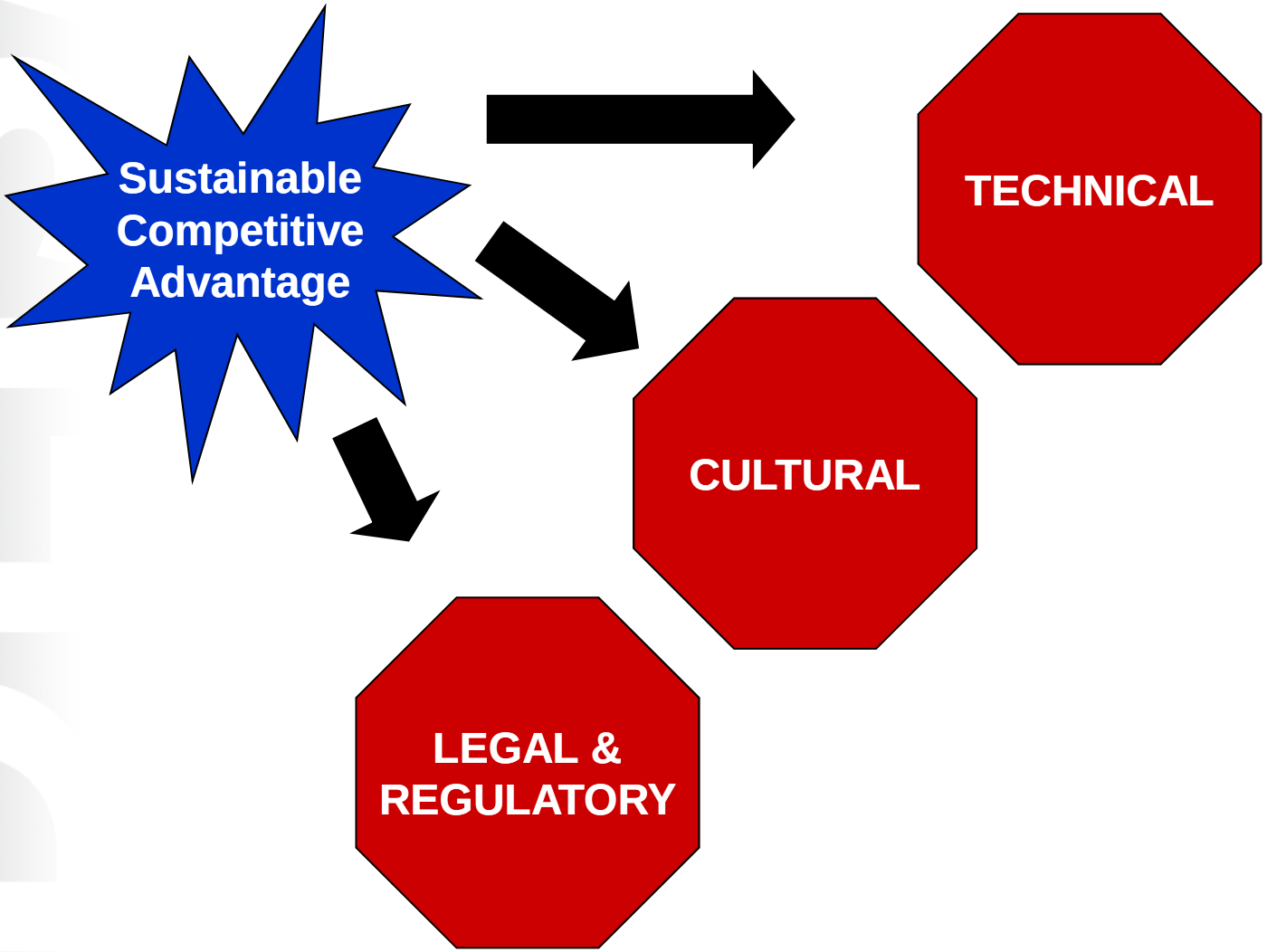
Figure 1 Hype Cycle for Emerging Technologies, 2010



Source: Gartner (August 2010)

There are still many challenges with Clouds

Distributed European Infrastructure for Supercomputing Applications



RI-222919

Challenges in Grids

Distributed European Infrastructure for Supercomputing Applications

- Sensitive data, sensitive applications (med.patient records)
- Different organizations have different ROI
- Accounting, who pays for what (sharing!)
- Security policies: consistent and enforced across the grid !
- Interoperability of components and grids (standards ?)
- Current IT culture is not predisposed to sharing resources
- Not all applications are grid-ready or grid-enabled
- Open source is not equal open source (read the little print)
- SLAs based on open source (liability?)
- "Static" licensing model don't embrace grid
- Protection of intellectual property
- Legal issues (FDA, HIPAA, multi-country grids)

Challenges in Clouds

Distributed European Infrastructure for Supercomputing Applications

- Sensitive data, sensitive applications (med.patient records)
- Different organizations have different ROI

- Security – end to end
- Interoperability of Clouds
- Current IT culture is not predisposed to loosing control
- Not all applications are cloud-ready or cloud-enabled

- SLAs
- "Static" licensing model don't embrace cloud
- Protection of intellectual property
- Legal issues (FDA, HIPAA, location of cloud resources, multi-country clouds, etc)

Challenges in Clouds

Distributed European Infrastructure for Supercomputing Applications

- Sensitive data, sensitive applications (med.patient records)
- Different organizations have different ROI
- **PERFORMANCE – latency and bandwidth**
- Security – end to end
- Interoperability of Clouds
- Current IT culture is not predisposed to loosing control
- Not all applications are cloud-ready or cloud-enabled
- **Moving data to application OR application to data**
- SLAs
- "Static" licensing model don't embrace cloud
- Protection of intellectual property
- Legal issues (FDA, HIPAA, location of cloud resources, multi-country clouds, etc)

COOPERATIVE USERS IN CLOUD

Goran Martinović

Department of Computer and Software Enineering Systems
Faculty of Electrical Engineering
J. Strossmayer University of Osijek
Kneza Trpimira 2b, 31000 Osijek, Croatia
goran.martinovic@etfos.hr

Panel CLOUD and Supporting TOOLS
New Challenges and Opportunities in Cloud Computing
CLOUD COMPUTING 2010
IARIA Computation World 2010
Lisabon, Portugal, November 20-26, 2010

HETEROGENEOUS COMPUTING ENVIRONMENT

- cloud: virtually not heterogeneous, really very heterogeneous

RESOURCES

- COMPUTERS AND SOFTWARE (PROCESSING AND STORAGE)
- DATA
- KNOWLEDGE, COOPERATION CAPABILITY
- SERVICES
- ....

RESOURCE MANAGEMENT AND DEPLOYMENT– HARD

- HETEROGENEITY ACCORDING TO A GREAT NUMBER OF PARAMETERS
- HIGH LEVEL OF PARAMETER DYNAMICS
- NOT PROBLEMS FOR USERS, BUT PROBLEMS FOR DEVELOPERS

PANEL DISCUSSION

WHY ONLY DEDICATED RESOURCES?

WHY NOT NON-DEDICATED RESOURCES?

- OVERDIMENSIONED OR IDLE, BUT RENEWABLE
- MUTUAL HIRING/RENTING/SELLING OF RESOURCES
- USERS CAN HAVE INFLUENCE TO CLOUD DEVELOPMENT AND WEB ACCESSIBILITY FOR PROBLEM SOLVING (E.G. CONSUMER ORIENTED DESIGN – SPECIFIC KNOWLEDGE, GADGETS, WIDGETS, ...)

MAIN IDEA

- ENGAGE AS MANY **NON-DEDICATED RESOURCES**

↓

- SAVING MONEY (high performance machine is too expensive)
- GIVEN **VIRTUAL MACHINE** MORE SUITABLE FOR COMPUTER INTENSIVE AND USER REQUIRED SERVICES
- INCREASED SYSTEM AUTONOMY
- ECOLOGICAL AND SOCIOLOGICAL CONSEQUENCES

PANEL DISCUSSION

HUMAN – OWNER OF RESOURCES
(ALSO OF OVERDIMENSIONED OR IDLE RESOURCES)

HOW TO MOTIVATE A HUMAN TO PARTICIPATE IN CLOUD EXTENSION?

"TWO TYPES OF HUMAN IN CLOUDS"

1. OWNER

- commercial ("big") – possess all and dictate market conditions
- "small" does not need service of cloud, but can possess important resources and appropriate PSE

2. OWNER/USER

- uses powerful cloud services,
- usually holds huge resource capacities (institutions, big companies)
- given/taken capacity incorporated in CSCW

↓

QUESTIONABLE OR UNPREDICTABLE **AVAILABILITY**

HUMAN IN CLOUD - WORST CASE SCENARIO

- SELFISH (OR IRRESPONSIBLE) “SMALL” OWNER (inaccessible resources, shutting down the computer)
- FOR “BIG” OWNERS OR SERVICE PROVIDERS NOT IN QUESTION -
- GREEDY USER (usage of unnecessary accessible resources)

SOLUTIONS

- OWNER – WITHOUT COMPENSATION HARD
- “BIG” OWNER AND OWNER/USER – SOLVABLE

CLOUDS ON DEDICATED AND NON-DEDICATED RESOURCES

- **INDIRECT SELECTION OF RESOURCES** VIA THE PROFILE OF THEIR OWNERS/USERS AND THEIR COOPERABILITY IN CLOUD EXTENSION
- **OWNER/USER RESPONSIBLE** FOR HIS ORGANIZATIONAL AND INFRASTRUCTURAL QUALITIES: INVESTMENT IN HW, SW, EDUCATION, TRAINING AND PLACEMENT IN COMPETITIVE POSITION

PANEL DISCUSSION

CLOUD EXTENSION BY NON-DEDICATED RESOURCES: **OK (FINANCIAL, SOCIAL, ECOLOGICAL, RESOURCE MANAGEMENT)**.

PROBLEMS:

- **SELFISH "SMALL" OWNERS, DOMINANT "BIG" OWNERS – SERVICE PROVIDERS** .

POSSIBLE SOLUTIONS PROBABLY ACCEPTABLE, BUT NOT RELIABLE AND FINANCIALLY IMPORTANT.

EXTEND/OPEN CLOUDS:

– CHALLENGES AND PROBLEMS

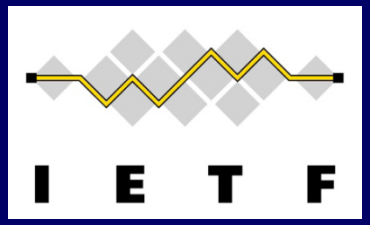
- **POSITIVE CONSEQUENCES (e.g. more appropriate and specific services appropriate for more users,...)**

PANEL DISCUSSION

Cloud and Standardization

Yong Woo LEE
Professor, University of Seoul
President, Ubiquitous City Consortium for Seoul, Korea
Director, Seoul Grid Center
Chair, The Korean National Committee for ISO JTC1/SC22

2010. 11.



Activities in Cloud Computing Standardization: Repository (Version 1.1, May 2010), http://www.itu.int/ITU-T/focusgroups/cloud/

De Facto Standard
vs.
De Jure Standard

” ITU-T vs. ISO/IEC JTC 1”

ITU-T FG Cloud

Terms of References for FG Cloud: Scope

1. To identify potential impacts on standards development and priorities for standards needed to promote and facilitate telecommunication/ICT support for cloud computing.
2. To investigate the need for future study items for fixed and mobile networks in the scope of ITU-T.
3. To analyze which components would benefit most from interoperability and standardization.
4. To familiarize ITU-T and standardization communities with emerging attributes and challenges of telecommunication/ICT support for cloud computing.
5. To analyze the rate of change for cloud computing attributes, functions and features for the purpose of assessing the appropriate timing of standardization of telecommunication/ICT in support of cloud computing.

Source: http://www.itu.int/ITU-T/focusgroups/cloud/tor.html

ITU-T FG Cloud

Terms of References for FG Cloud (con't)

- FG Objective:
  - The objective of the Focus Group is to collect and document information and concepts that would be helpful for developing Recommendations to support cloud computing services/applications from a telecommunication/ICT perspective.
- Specific tasks and deliverables:
  - Benefits of cloud computing from telecommunication/ICT perspectives.
  - Gap analysis of ITU-T standards for telecommunication/ICT to support cloud computing.
  - To collect and summarize vision and value propositions of cloud computing with a focus on telecommunication/ICT aspects.
  - Leverage expertise within the ITU-T in building telecom networks to take advantage of cloud concepts and capabilities.
  - Terminology and taxonomy and to develop new definition when necessary.
  - Analysis of telecommunication/ICT networking requirements functions and capabilities to support cloud computing services/applications (for both fixed and mobile).
  - Use cases of services and reference models for telecommunication/ICT to support cloud computing.
  - Roadmap to guide further developments of relevant ITU-T Recommendations.

Source: http://www.itu.int/ITU-T/focusgroups/cloud/tor.html

ISO/IEC JTC 1 SC38 SGCC

Title: Distributed Application Platforms and Services (DAPS)

Scope: Standardization for interoperable Distributed Application Platform and services including:

- Web Services, Service Oriented Architecture (SOA), and
- Cloud Computing.

As per the JTC 1 Directives, SC 38 establishes its own substructure at its first meeting in Beijing China, May 2010:

- Web Service WG
- Service Oriented Architecture (SOA) WG
- Cloud Computing SG

ISO/IEC JTC 1 SC38 SGCC

- **Terms of References** for SGCC:
  1. To provide a taxonomy, terminology and value proposition for Cloud Computing.
  2. To assess the current state of standardization in Cloud Computing within JTC 1 and in other SDOs and consortia beginning with document JTC 1 N 9687*.
  3. Document standardization market/business/user requirements and the challenges to be addressed.
  4. To liaise and collaborate with relevant SDOs and consortia related to Cloud Computing.
  5. To hold open meetings to gather requirements as needed from a wide range of interested organizations.
  6. To provide a report of activities and recommendations to SC 38.
- **N9687: Report of JTC 1/SWG-Planning on possible future work on Cloud Computing in JTC 1 (2009)*

Source: Resolution of ISO/IEC JTC 1 SC 38 Plenary

Ubiquitous (Smart) City

A good testbed for Cloud computng