GRIDSYSTEMS.

Simplify Complexity

Delivering Grid in commercial environments: The GridSystems' experience

Dr. Marco Laucelli

International School of Grid Computing,

30 July 2004

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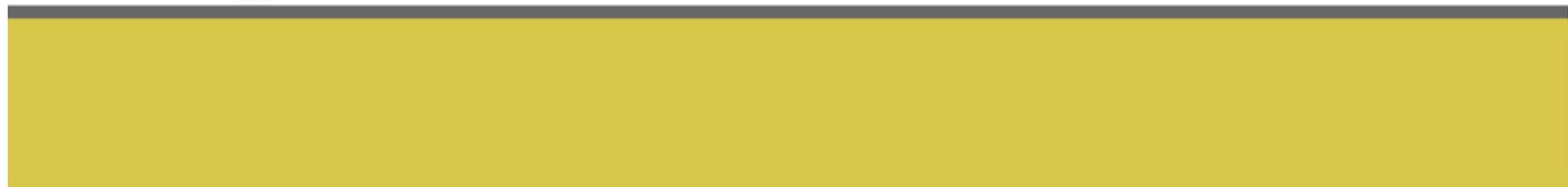
Grid?
Which Grid?

Academic view/e-science

- **GGF**: "flexible, secure, coordinated resource-sharing among dynamic collections of individuals, institutions, and resources".
- **EU Expert Group**: "A grid provides an abstraction for resource sharing and collaboration across multiple administrative domains".

The understanding of a CIO

- ァレンス・モデル： エンタープライズ・グリッド・コンピューティングに関する共通の理解を促進する。利用ケースをドキュメント化し、エ**Save money?**ンタープライズ・グリッド・コンピューティングの用語集および分類項目**More Money?**集を公開する。コンポーネント・プロビジョ

- ニン： アプリケーションに対するリソースのプロビジョニングをオープン化し、標準化する。データセンターのコンポーネントをエンタープライズ・アプ**Which applications?**リケーションにプロビジョニングする標準的な方法を策定する。 データ・プロビジョニング
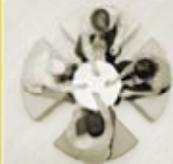
The commercial view

- **EGA** scope… "grid activities within enterprise data centers, but **not desktop grids** within and between trusted and secure enterprises, **but not involving dynamically defined virtual organizations,** and for use with enterprise commercial and technical applications, **but not scientific computing or academic research grids**"

- **British Telecom**: A set of **Distributed, Networked, Middleware-enabled computing and storage resources** with inter/intra organisational management structures, supported by coordinated real-time controls with standard protocols.

The reaction from the academic community

- شرعت قوات الأمن العراقية أمس في تنفيذ حملة واسعة النطاق لتنظيف بغداد من المطلوبين بجرائم قتل واختطاف وسرقة. في **"This is not** وقت قامت القوات الأمي **Grid!!"** ركية والكردية بحملة في كركوك وسامراء وبعقوبة (شمالا) أسفرت عن اعتقال عنصرا من "أنصار

- مراسم عقد قران وزواج ابنة رئيس الوزراء التركي رجب طيب اردوغان التي تقام في **"This is not** اسطنبول امس **Grid!!"** واقتصرت زيارة الملك " الاحد". عبد الله الثاني الى تركيا على "بضع ساعات" لحضور حفل الزفاف الى جانب عدد من الزعماء والشخصيات السياسية، بحسب
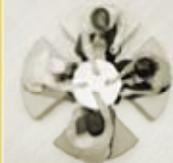
Key features for academic/commercial Grids

Feature	Implications	Academic	Commercial
Sharing	Large effort in security	**Critical**	Not an issue
Reduce Large **dedicated resources**	Big datacenters	**Important**	**Critical**
SLAs	QoS tools	**Important**	**Critical**
R3	Robust design	Not critical	**Critical**
Easy of use (administration, development and use)	High level functionalities, Admin tools, Monitoring tools, SDK	Not important (solving problems is not an issue)	**Critical**
Rapid deployment and Application integration	High-level development tools	Not critical	**Critical (Time to market is crucial)**
Optimisation of existing resources (Scavenging)	Intelligent resource brokering, etc…	Not important	**Very Important**
Standards		**Grid** Standards	**WS**-standards
Focus		**Technology**	**Business**
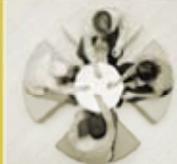
Commercial Grid technology is... (our vision)

- Commercial Grid technology **must**
  - Be able to integrate **heterogeneous resources** in to a unique processing environment
  - Manage **optimally dedicated** resources and **profit from underused** resources
  - **Virtualize** the access to the underlying resources from applications (connectors)
  - Be based **on standard** protocols (WS)
  - Be **transparently robust**, **fault-tolerant** and **resilient** for users, administrators and developers
  - Be **easy**
- For Commercial Grid technology **is a plus**
  - Being able to link **different administrative** domains (Metacomputing was already there)
  - Being able to schedule jobs and processes under **defined policies** (act as a scheduler)
  - Being easy to integrate big-datacenters and datacenters commercial software (TIVOLI, OPEN/NETView…)
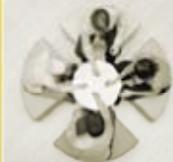
Value proposition from Commercial Grids

The production unit
- Drastic reduction of TCO
- Maximum ROI of resources
- Flexible scalability to meet business needs

The development unit:
- Easy achievement of business needs
- Software development automation
- Reduction of development time and costs

The business unit:
- Gain flexibility
- Shorten time and costs
- Reduce investment risks
- Enlarge business possibilities
- Do more with less

Requirements:
- R3
- Heterogeneous
- Easy administration, centralized access

Requirements:
- Standards
- High-level services deployed
- High-level SDK

Requirements:
- Rapid deployment
- Scalability
- Independence from technology (open source, open standards…)
- Efficient cost model
- Support
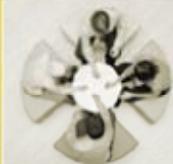
GridSystems' basics

Grid Systems, S.A: from academia to business

- Founded by Prof. Joan Massó in **2000**
- 100% management and 80% of developers/consultants **coming from academia** (Physics PhD, Maths…)
- **Hard work to change our focus** from technology to business

Grid Systems community: customers and partners
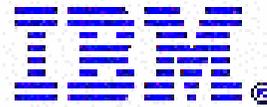
Nitya Extended Suite

NITYA EXTENDED SUITE
by GRIDSYSTEMS

Nitya extended suite is a comprehensive software platform for enterprise grids based on fully standard compliant web services. InnerGrid allows creating grids within the intranet of a corporation, while Outergrid focuses on securely federating grids across business units and/or organizations. A set of complementary GridApps allow IT administrators to monitor, test, view and analyze their grid resources, while giving developers tools to easy and rapidly grid-enable applications. Users can concentrate on their business processes and transparently use grids the easy way.

INNERGRID NITYA   OUTERGRID NITYA

GridDesktop   GridAdmin   GridView   GridTest   GridTask   GridShell   GridStudio

INNERGRID
NITYA

Everything is Grid

InnerGrid Nitya

Those computers that are busy doing tasks for their user don't accept other work from the central computer.

The system uses all the connected computers' power.

When their user is not taking advantage of them, they receive tasks from the central computer.

One or more computers distribute a program among the connected resources. Once the tasks have been done it gathers the results.

The system uses all the available resources in the company. It can combine perfectly different architectures and Operating Systems.

When the PC's user is only taking advantage of a percentage of the power of his PC, the rest is useful for the Grid.

Main features

- Easy
- Robust, Reliable and Resilient
- Scalable
- Multiplatform
- Secure
- Fully Open WS Standards compliant middleware

Comprehensive

- Scheduler & Batch system
- Secure user and file system
- High level grid services: sweeps, data services, etc...
- Full open interoperable API & SDK
- Full suite of System management, development and user tools
- Connectors and solutions

InnerGrid Nitya Architecture

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Connectors

GridPortal

Java C++ VB Perl

SDK

GlobalCenter	**GridCenter**	GlobalScheduler
GridView	**GridView**	GridBilling

Parametric Sweep MetaSystem

GridStudio   **GridTask**

Agent System	Batch	Advanced Scheduling
LocalProcess	Messaging	Audit	QoS & SLA broker

| IXOS FS | | | Cached and Distributed FS |

GridAdmin   **GridTest**

WSDL
(SOAP/XML)

WS-Security

Nitya Kernel   **(Open Grid Architecture)**

INNERGRID
N I T Y A

Everything is Grid

Extended Nitya Suite
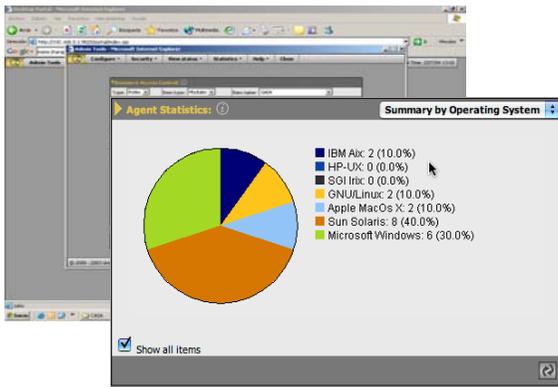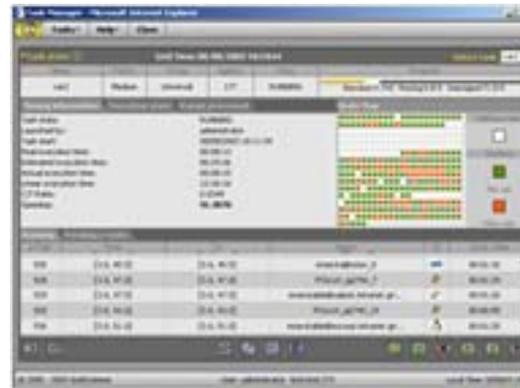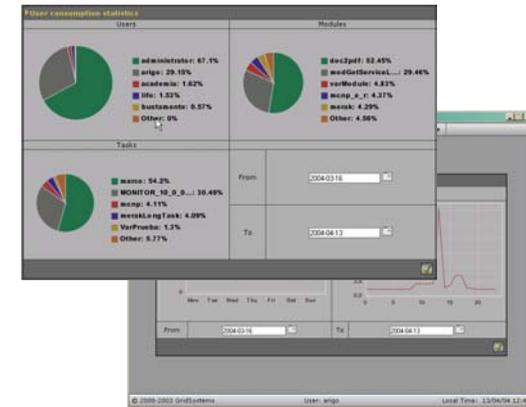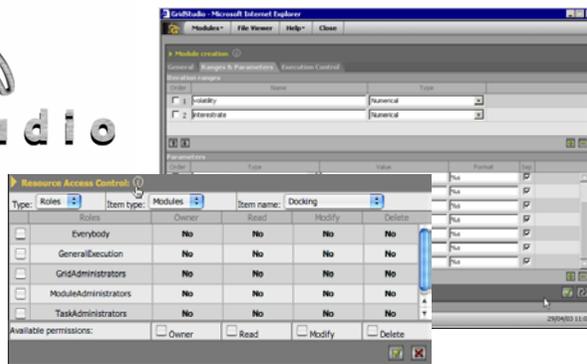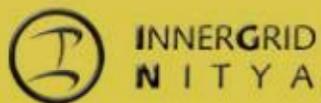
OuterGrid

- The power of **more than a grid**.
  - Unite and federate interoperable grids across dynamic organizations.
  - tailored to the needs and security requirements of several collaborating business units or different organizations.

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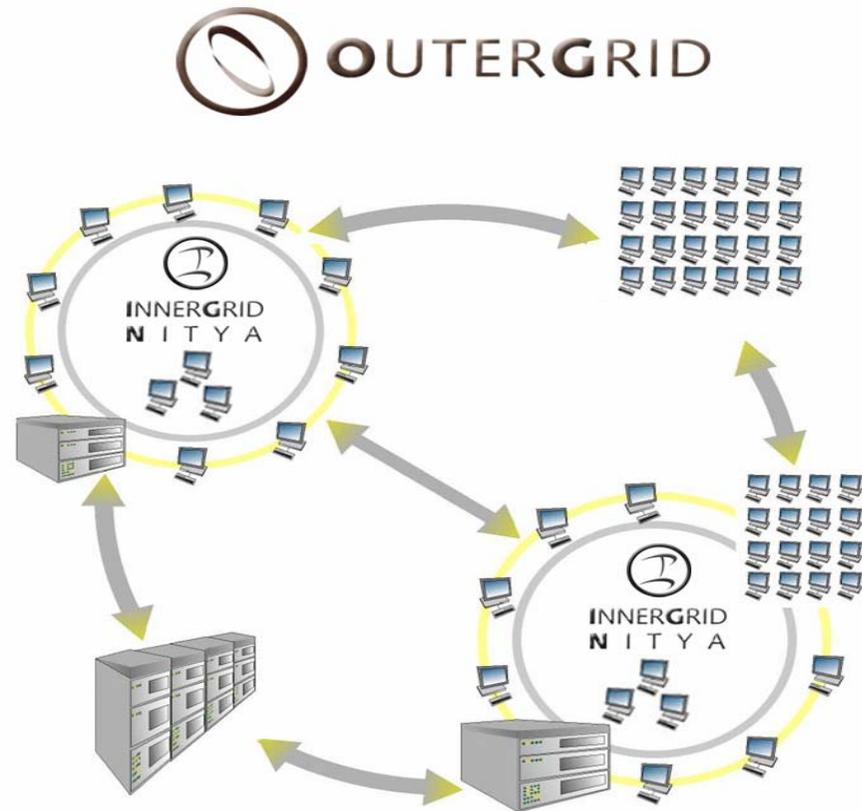
Grid ROI in financial markets

The business challenge

- The market for financial products **has grown enormously** in the last decade (e.g. Spanish bank launching new exotics products increased from 100 to 28000 portfolio in few months.)
- Banks have been growing its activity in this area during this time and **expects an accelerated growth in the next year**
- They will address
  - An increase of the share of the market of exotic products
  - Increase the range of new, high value products

The operational consequences

- The volume of complex trades **will be 100 fold** of the current volume
- The **number of traders and analysts** is expected to grow accordingly
- The trend to grow the complex trades **will further continue**

Grid in new financial markets
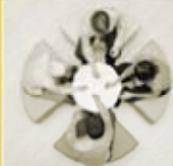
The new requirements

In order to affront the new business problems the underlying IT-Infrastructure must:

- Be **scaled** up to match the new business needs
- The migration to the new platform should be **easy and rapid**
- Continuous **availability** of the platform should be warranted
- The new platform should establish a standardized **development paradigm**
- The new distributed platform should be able to **optimize** the hardware resources (news and already available)
- **Easy** Support and administration of the platform

The unique suitable solution is **GRID**

Nitya Applications:

Client/User

Trading Environment Central Hub

Grid Connector

INNERGRID SERVERS

Trading Database

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Traditional solution:

- Sequential execution on the trading environment

- **Performance and scalability problems as**
  - **The complexity of the structured products increase**
  - **The number of trades and users growths**

- **Big investments, increased TCO and reduced ROI**

Basic Data Structure

Creation of complete data structure

Pricing/Trading requests

Invocation of computational libraries

Trading system APIs (MUREX, in-house…)
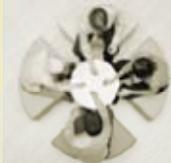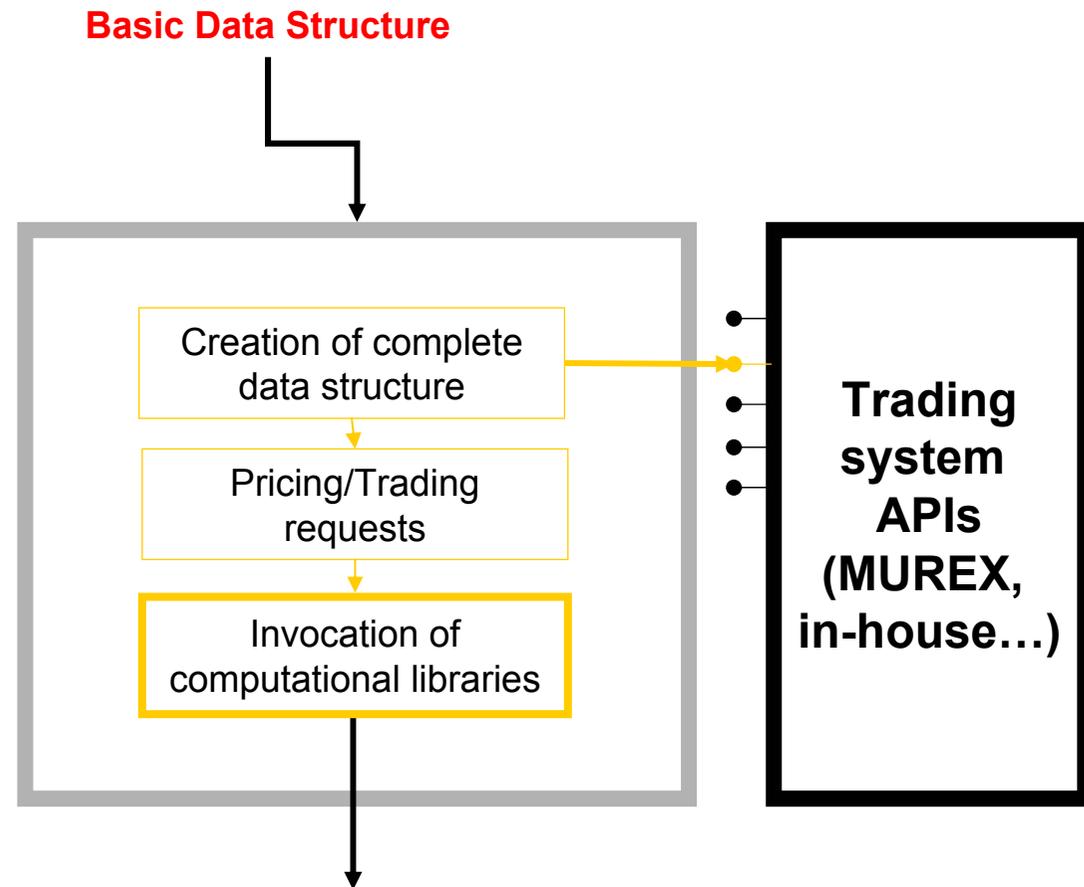
Executing pricing/trading requests through the **GridConnector:**

- **Distribute** executions among heterogeneous resources
- **Automatically** deploy new pricing/trading models using the **GridConnector**
- Increase the **scalability**, **fault-tolerance** and **optimization** of the underlying infrastructure

In collaboration with **excelian** software solutions

Basic Data Structure

Nitya

Grid Connector
Automatically deploys computational services

Creation of complete data structure

Pricing/Trading requests

Trading system APIs (MUREX, in-house…)

The performance of the solution

- Pricing example of a Grid Enabled computational service for Monte Carlo-based valuation of a Vanilla product
- Small Grid environment with 16 computers compared to a single workstation
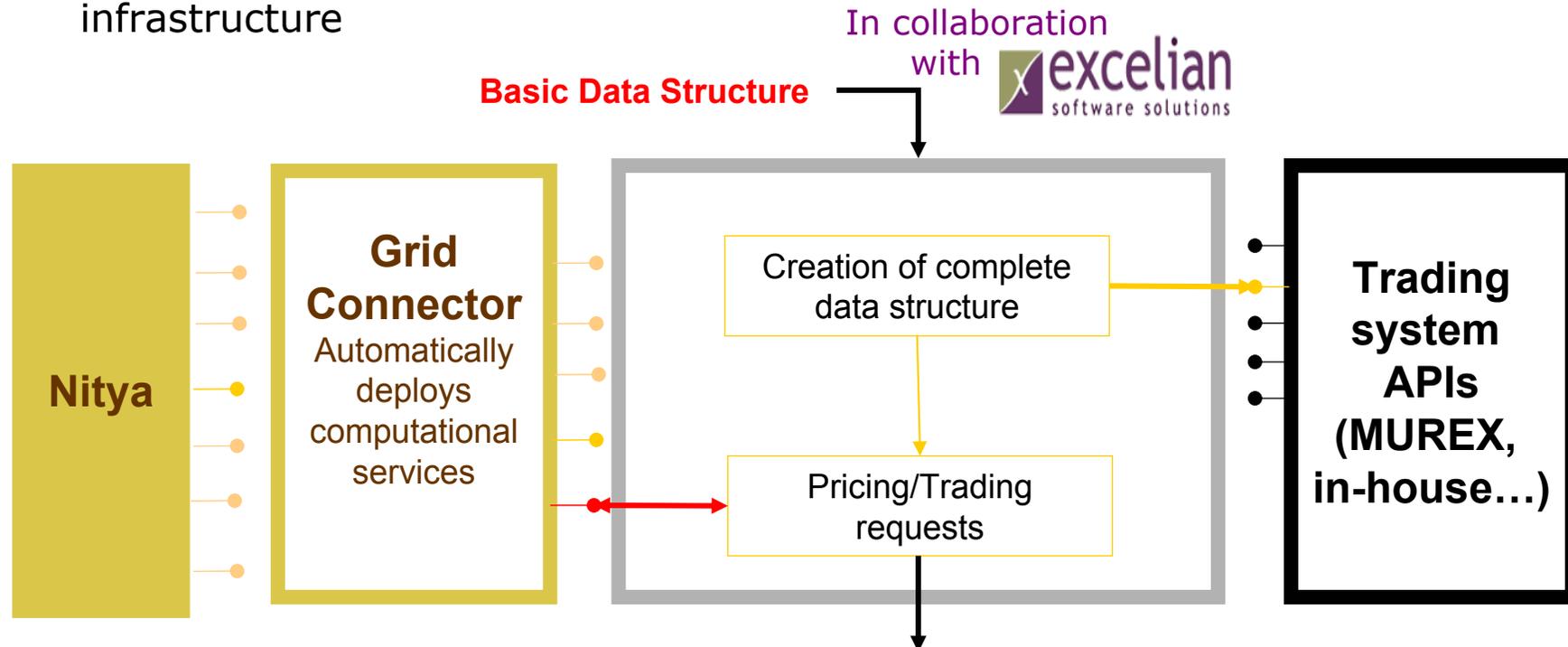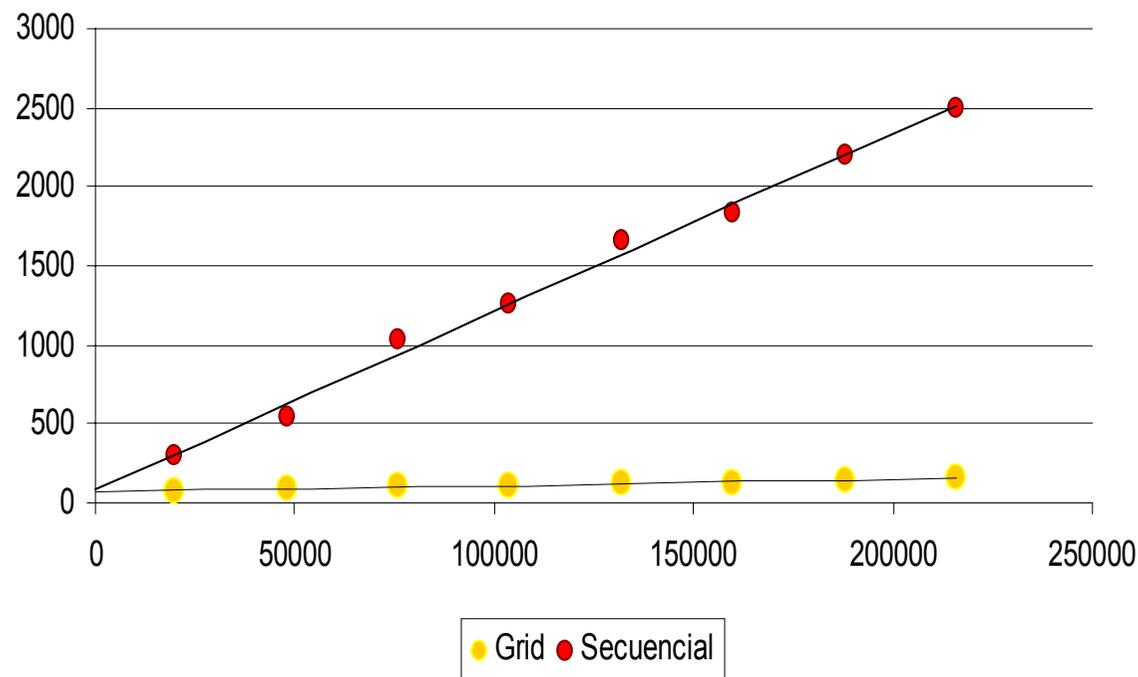
Results (Time (s) Vs Simulations)

Grid ● Secuencial

The economical efficiency of the solution:

- Traditional solutions (scalability based on hardware):
  - Big investments
  - Exponentially growth of TCO
- Grid solution:
  - Small investments
  - Very low costs growth
  - Increase the ROI as the business growths
- Small growth of the process (80% anual)

Compared Cost analysis

Legend: "Process needs" — Traditional solution costs — GridSolutions costs

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Grid ROI in Telcos

```
912345678;00790555;10/0
6/0
914  912345678;00790555;10/0
6/0  6/0
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...
```

EDRs

Telefonica was interested in explore the suitability of Grid Technology in several processes:

- **Network Planning & Management**
  - Simulated annealing
  - Critical processes guaranteed
- **Datamining and Datawarehousing**
  - CDR & EDR Analysis
  - Fraud Detection
  - Billing processes
  - QoS

The selected project was EDR – within their ETL platform- processing because

- EDRs represent an **important active of the company**, if they can be properly analyzed.
- This is a **critical and high demanding** process in telcos
- It has a **complex workflow** and required **high flexibility** and **usability** (as developers)

Grid ROI in Telcos: CDRs processing system

- Massive data processing system
- Transform the monolithic process into a Grid process (connector developed by Telefonica & GridSystems)

NASMA-Traditional

NASMA-Grid

Rule Files | Rule Files

Evaluation | Validation

CDRs Files | Evaluation | Validation | Record Files

Evaluation — Grid Processing | Validation — Grid Processing

CDRs Files | Record Files | BBDD | BBDD

INNERGRID SERVER

Telefonica

COMPANY

Passionate about Grid
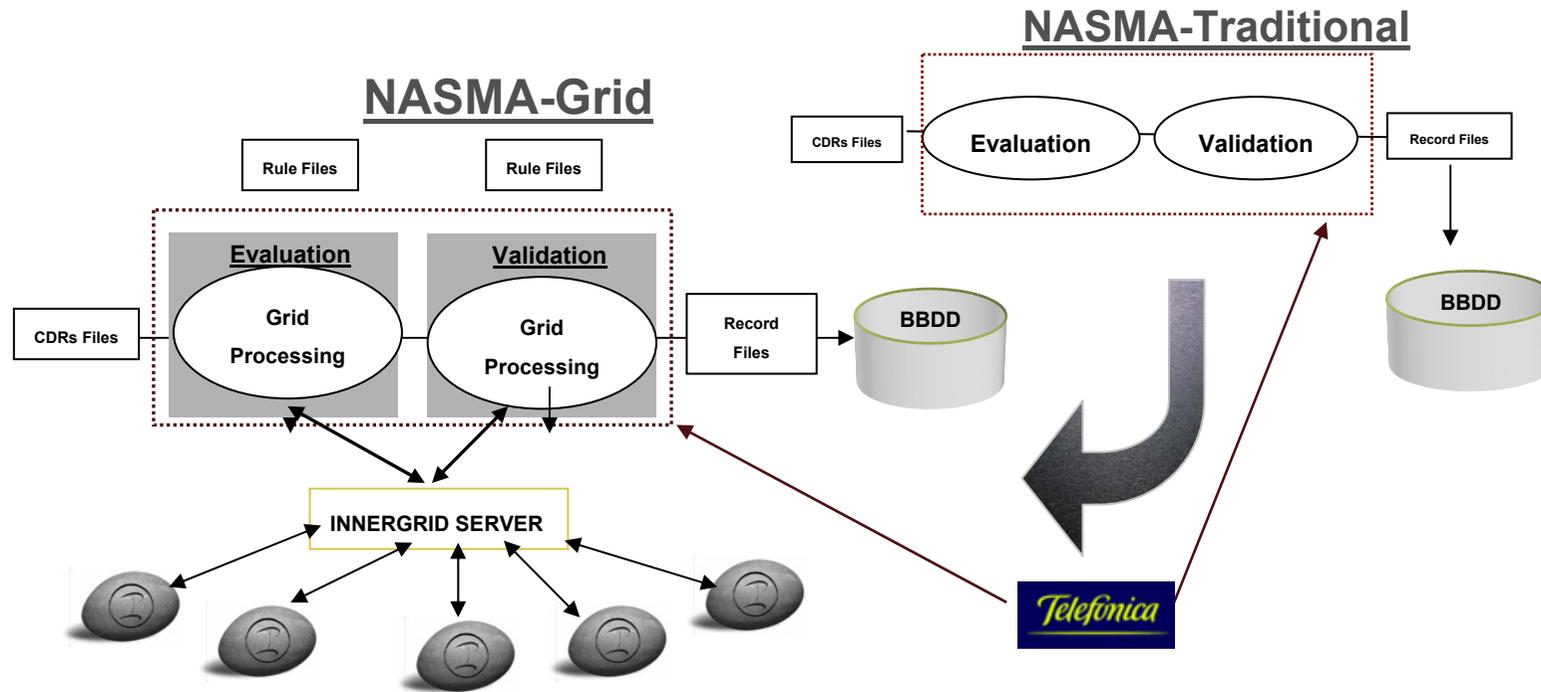
The ROI of the project: drastic cost reductions

Cost reduction in ETL processes

Millions of Euro

Legend:
- ■ 60 €-65 €
- ■ 55 €-60 €
- ■ 50 €-55 €
- ■ 45 €-50 €
- ■ 40 €-45 €
- ■ 35 €-40 €
- ■ 30 €-35 €
- ■ 25 €-30 €
- ■ 20 €-25 €
- ■ 15 €-20 €
- ■ 10 €-15 €
- ■ 5 €-10 €
- ■ 0 €-5 €
- ■ -5 €-0 €

Growth Rate (3% to 45%)

3G mobile network

Mobile network

Wireline National network

Wireline international network

X-axis values: 5,00E+06, 6,67E+07, 1,29E+08, 1,92E+08, 2,54E+08, 3,17E+08, 3,79E+08, 4,42E+08, 5,04E+08, 5,67E+08, 6,29E+08, 6,92E+08, 7,54E+08, 8,17E+08, 8,79E+08, 9,42E+08, 1,00E+09

Daily throughput of EDRs (5.000.000 to 1.000.000.000)

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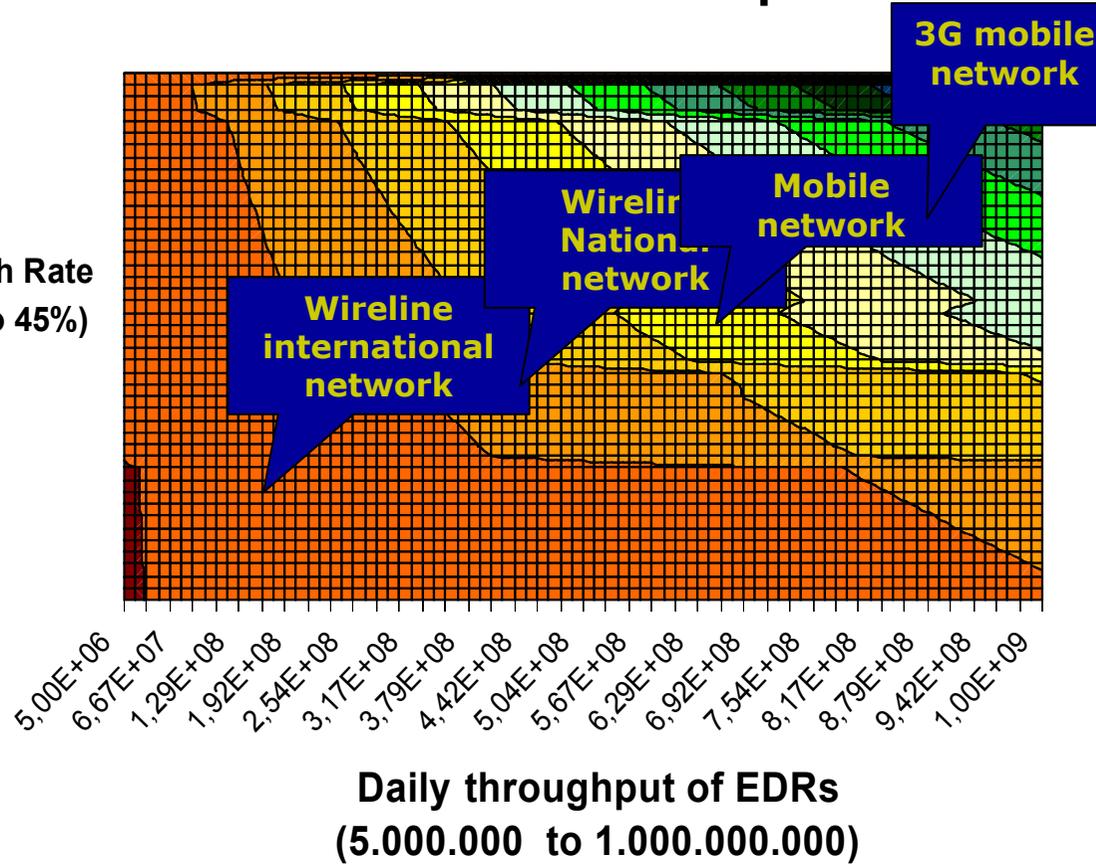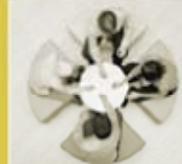
Conclusions

- Grid provides better performance and robustness with **savings of 80%** compared to the traditional solution costs

- Grid solutions **are much more efficient and profitable for** volume-growing processes

- EDR processing platform are **the simplest case** in which this analysis would apply

- The ROI of a Grid deployment is much higher than the ROI for a traditional solution

- Similar **InnerGrid Nitya** deployment projects are **in progress** for

TELECOM ITALIA

BT

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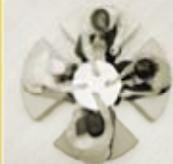
Telcos as Grid Service providers

- All IT **service providers need to have a GRID story** to be credible
  - IT vendors winning market share by **deploying bespoke GRID-like solutions**
- Suppliers **without a GRID story will find ICT sales much harder**
  - The GRID-only market will be worth £860m (2008)
  - However GRID capability will be a major factor for ICT sales
  - Telcos are forecast to take **25% market share in IT services by 2008**

by BT

- The **VALUE** will be not the Middleware but the GridApplications needed **to deploy the Telco business model** (Billing, Brokering, Application deployment…)
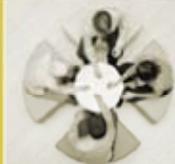
- Commercial Grid Technology **is already delivering** (crossing the chasm)
  - Focusing on the **business solutions, the value proposition and ROI**
  - **Financial** markets, **Telcos** and other traditional areas (engineering) are the early adopters
  - **Robustness** and **simplicity** is a key factor for Commercial Grid
- Commercial Grid Players and Research Grid Community **seem to be a little far from each other**
  - Big science Vs business solutions have different needs
- Surely in the future **must converge**
  - **Grid Service** market (Telcos, Big Iron providers) might be the key convergence opportunity
    - Previous credible stories are mandatory
    - Technology there is the piece to enable **Business models**
  - Shift focus away from technology! Users are much more important!!!!!
    - Clarify the different needs, and the different approaches
  - Standards will then arise spontaneously!!!
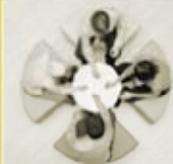
Thanks!

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