Grid Computing

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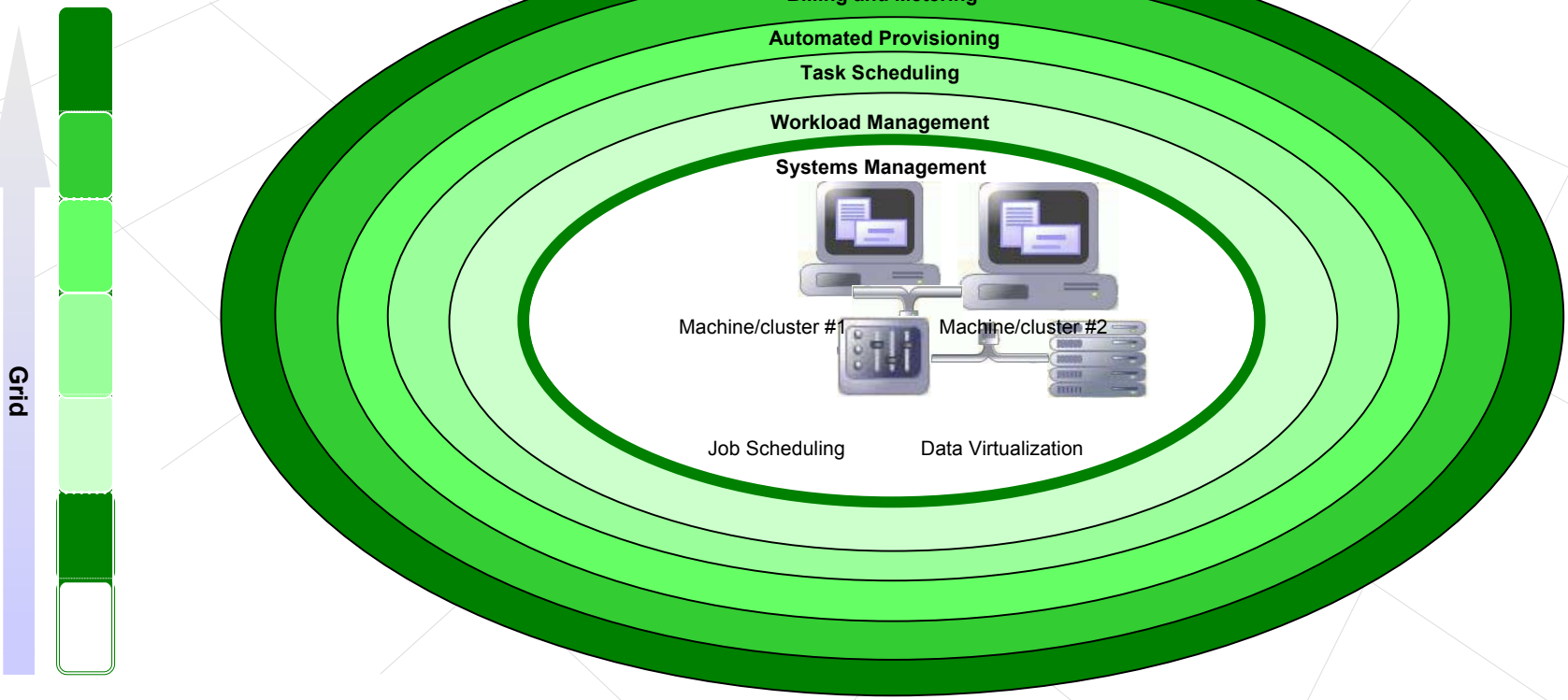
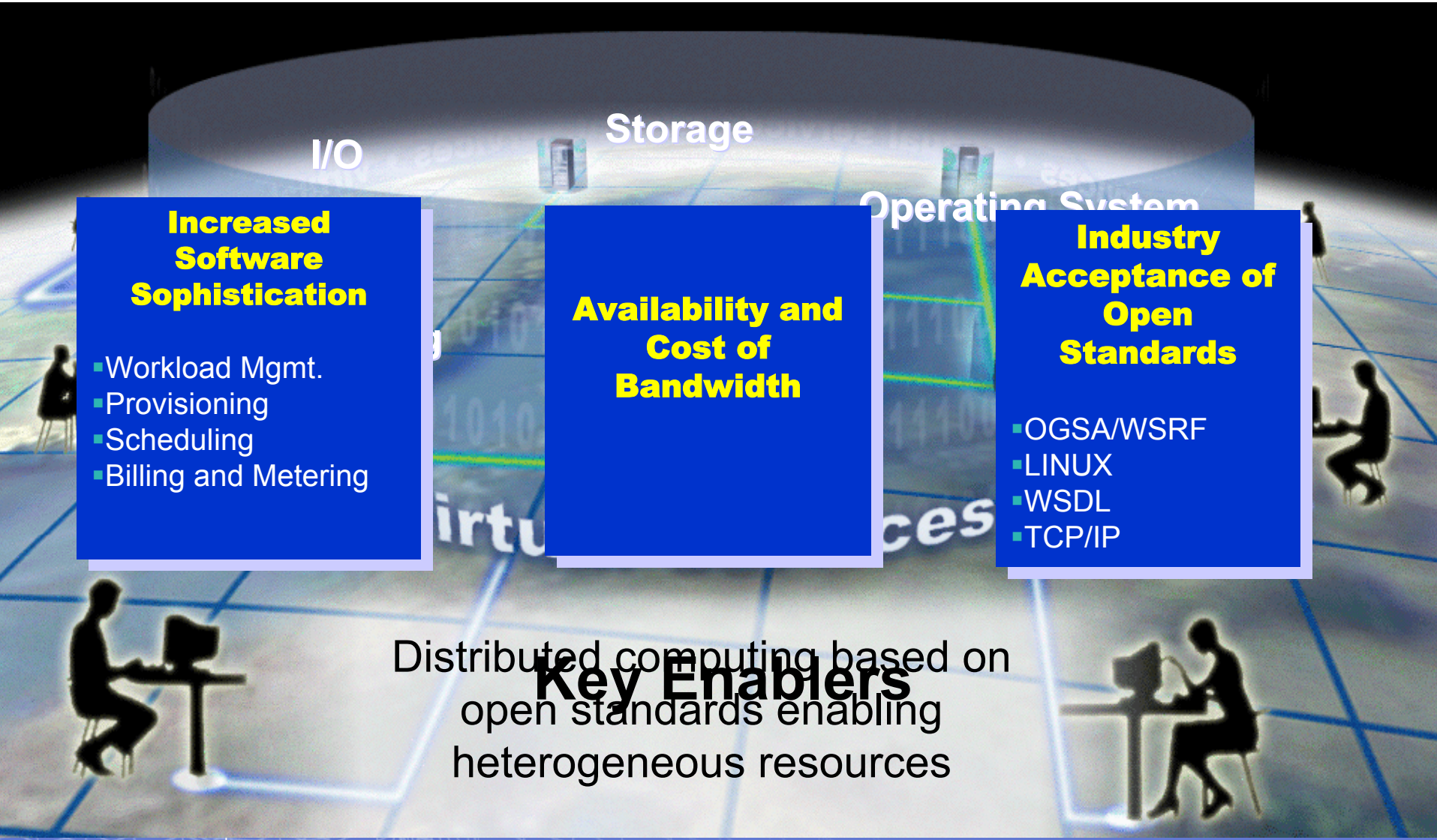
What Makes Up a Grid

Transaction Management:

- **Manage the execution of e-business transactions across distributed resources**
- **Enable dynamic allocation of resources for transactional and parallel application models**

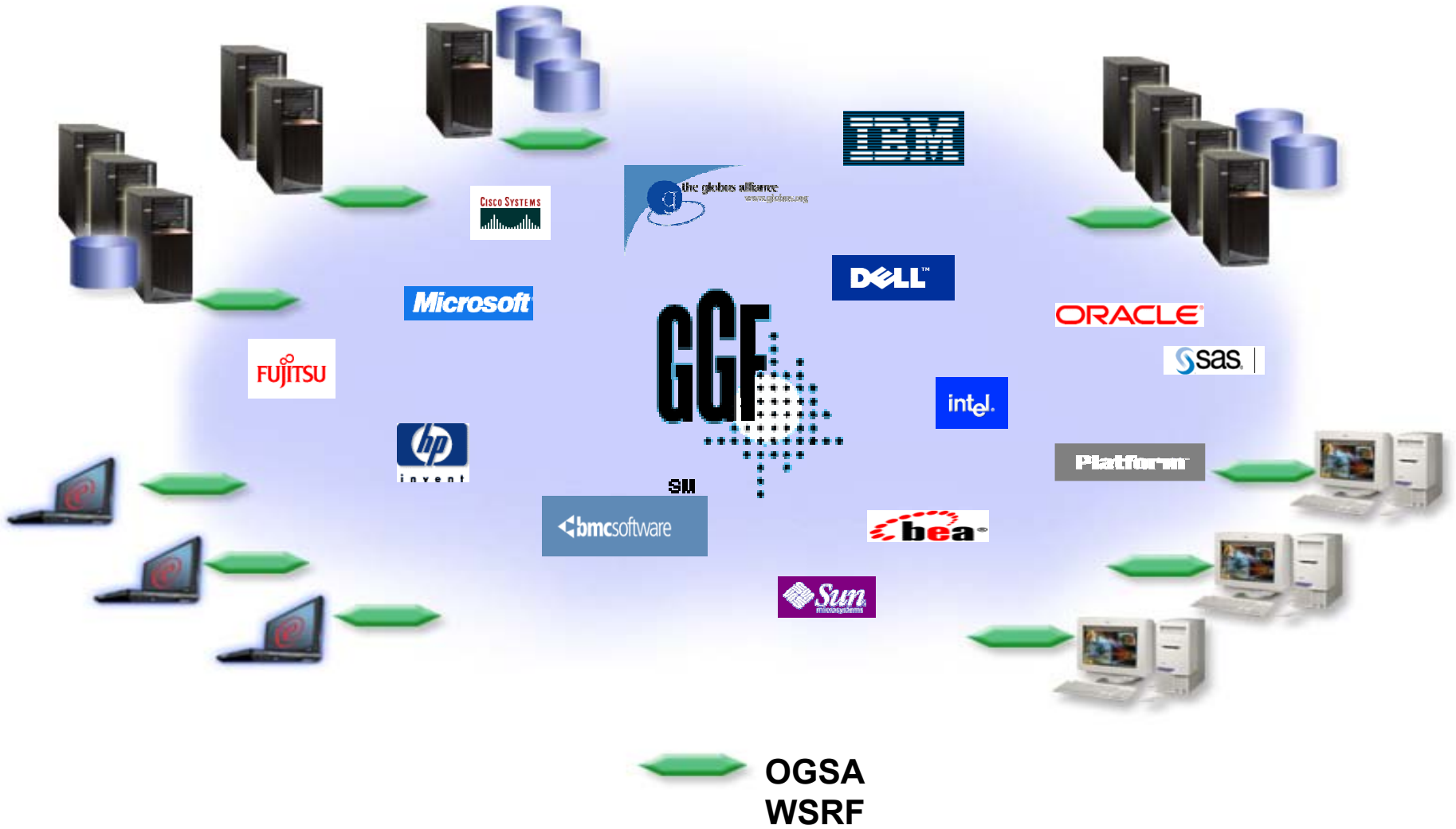


Grid Computing…The Ultimate Objective

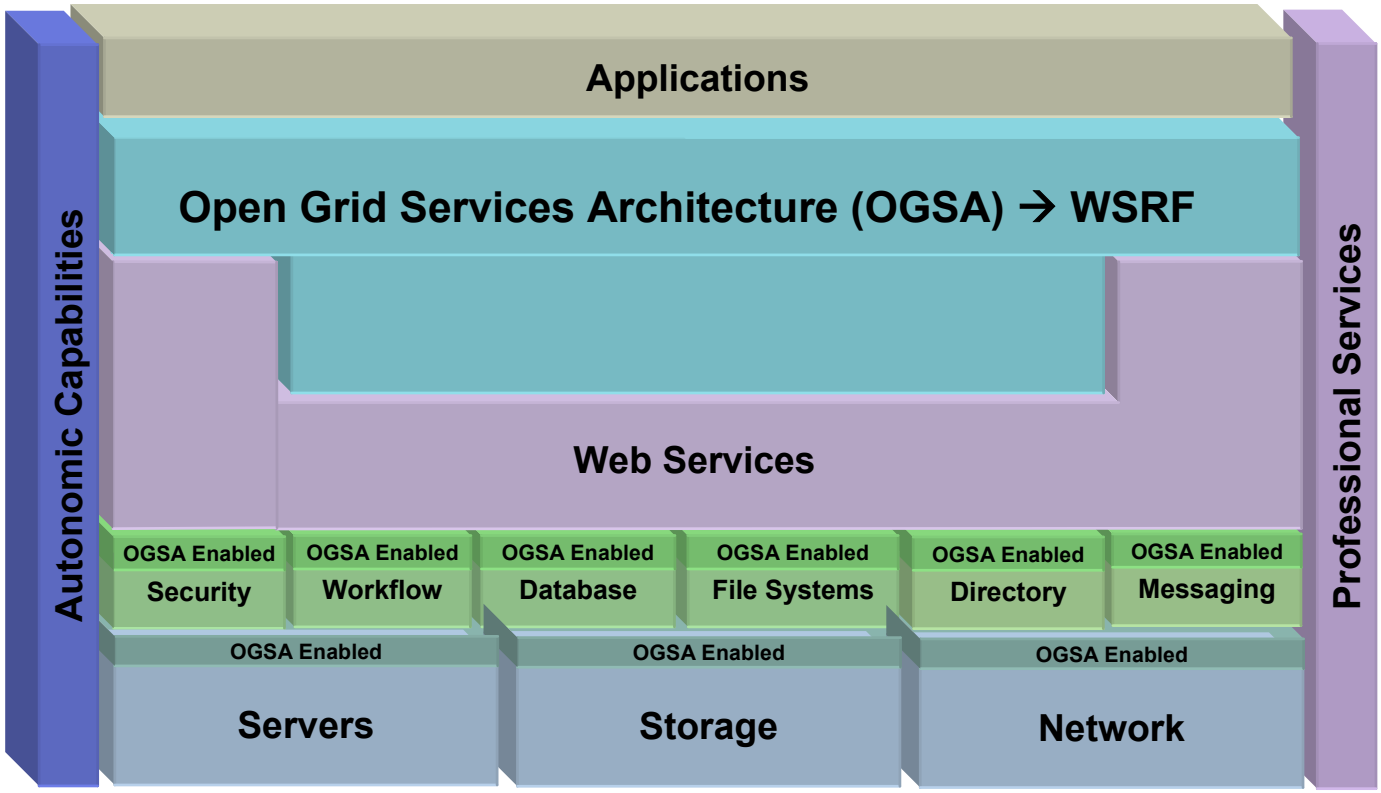


The Global Grid Forum: Open Grid Services Architecture (OGSA)

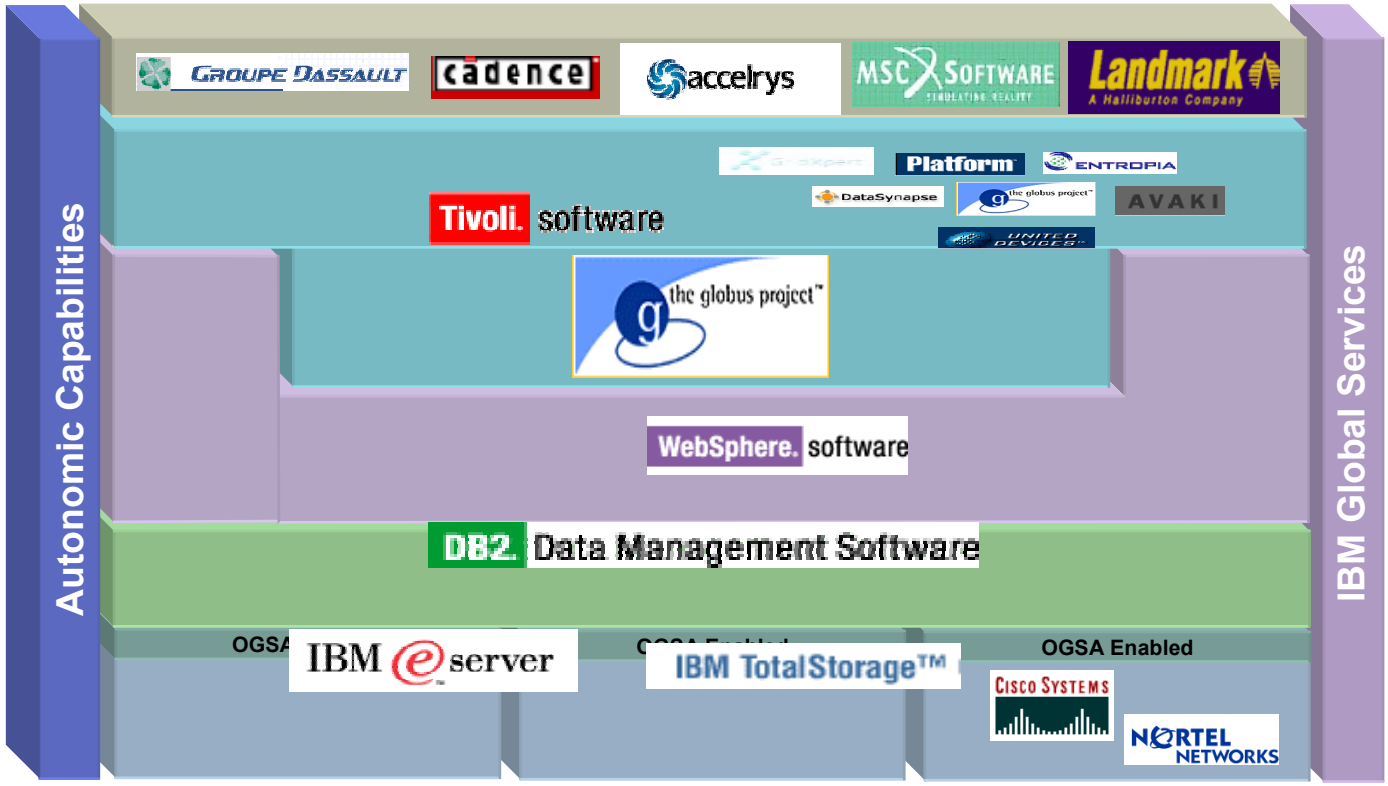
"OGSA…. the TCP/IP of Grid Computing"



Architecture Framework



Architecture Framework



Grid Adoption Today

Transaction Management — WebSphere.

Billing and Metering — Tivoli. GridXpert

Workload Management — @server Tivoli.

Automated Provisioning — @server Tivoli.

Resource & Information Virtualization — @server TotalStorage™ DB2.

Scheduling — WebSphere. Tivoli.

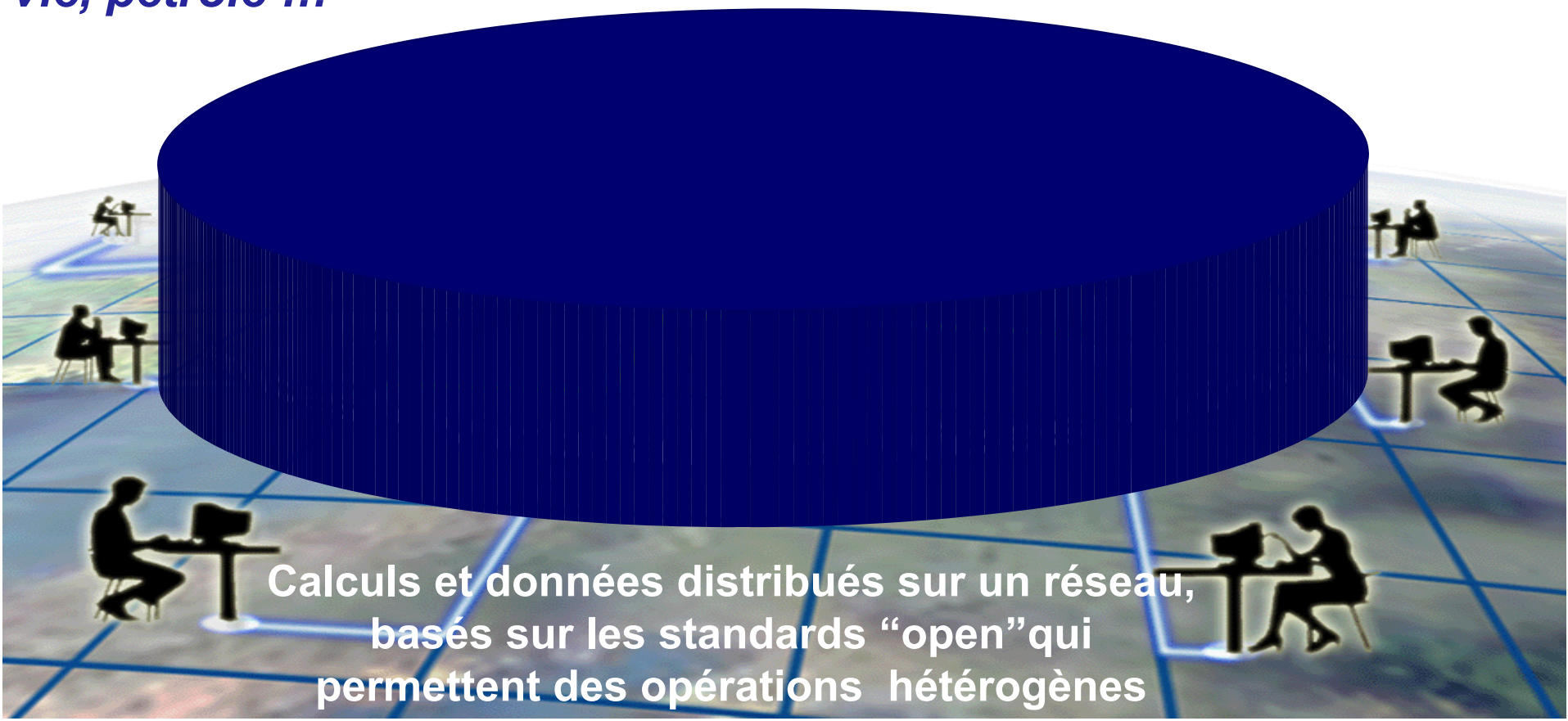
Web Services, Grid Services (OGSA) — @server WebSphere.

Grid Computing

Flexible, secure, coordinated resource sharing among dynamic collections of individuals, institutions and resources called *Virtual Organizations*

Foster & Kesselmann
The Anatomy of the Grid

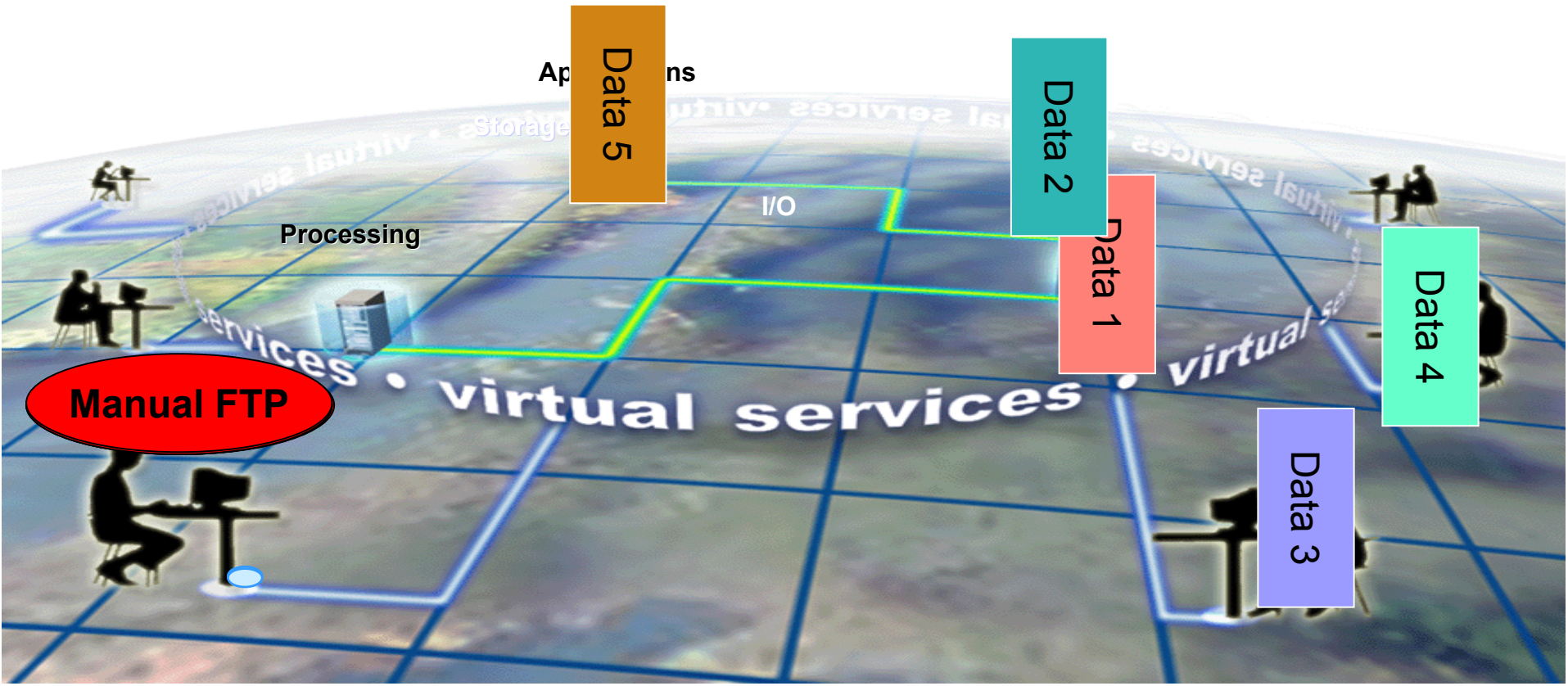
Recherche, industrie, marchés financiers, sciences de la vie, pétrole …



Calculs et données distribués sur un réseau, basés sur les standards “open”qui permettent des opérations hétérogènes

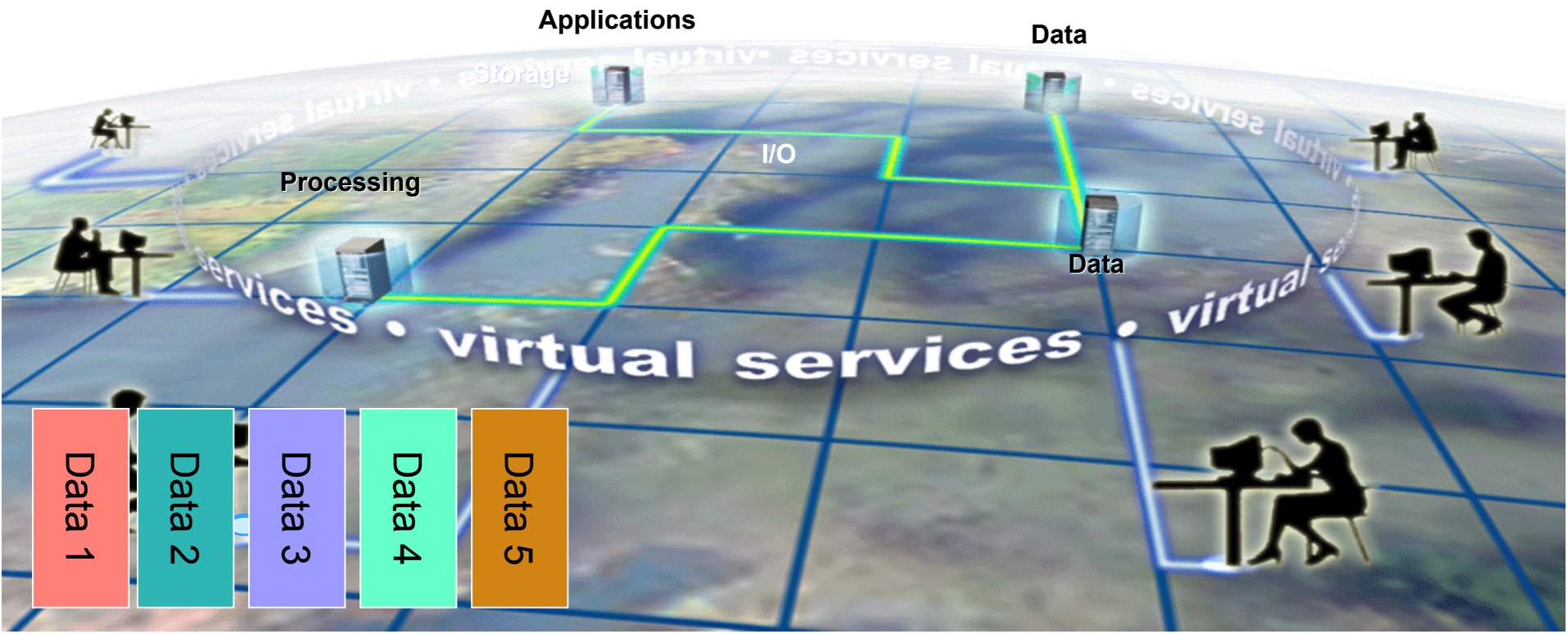
Sciences de la vie - Accéleration des calculs & Accès aux informations

Aujourd'hui…la collecte des données



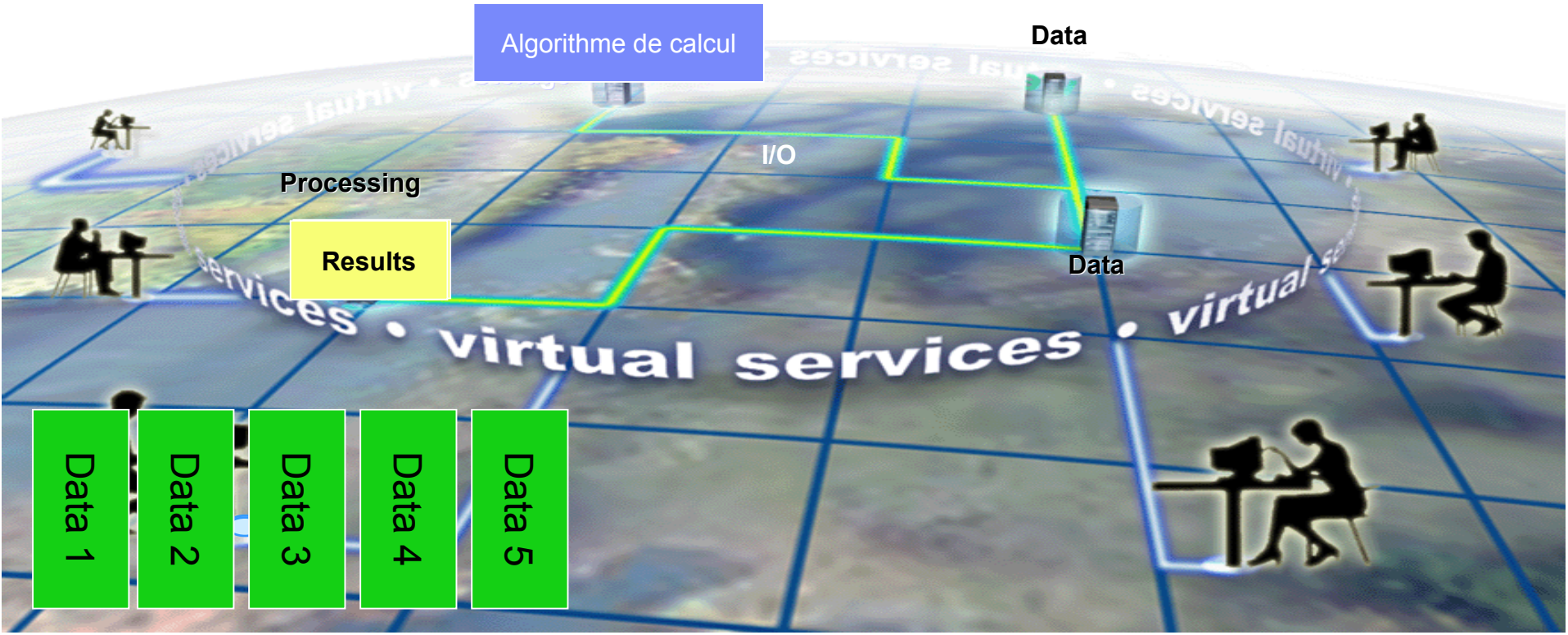
Sciences de la vie - Accéleration des calculs & Accès aux informations

Aujourd'hui…le "nettoyage" des données



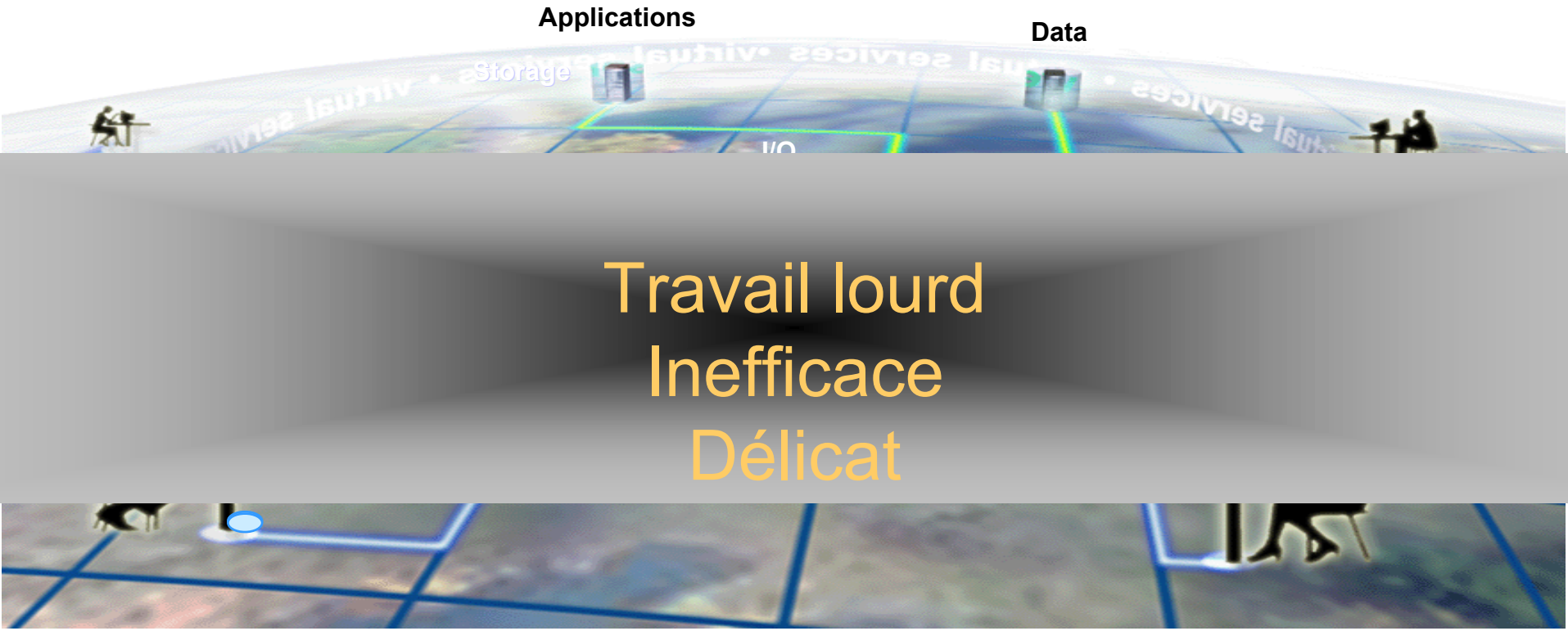
Sciences de la vie - Accéleration des calculs & Accès aux informations

Aujourd'hui…le calcul



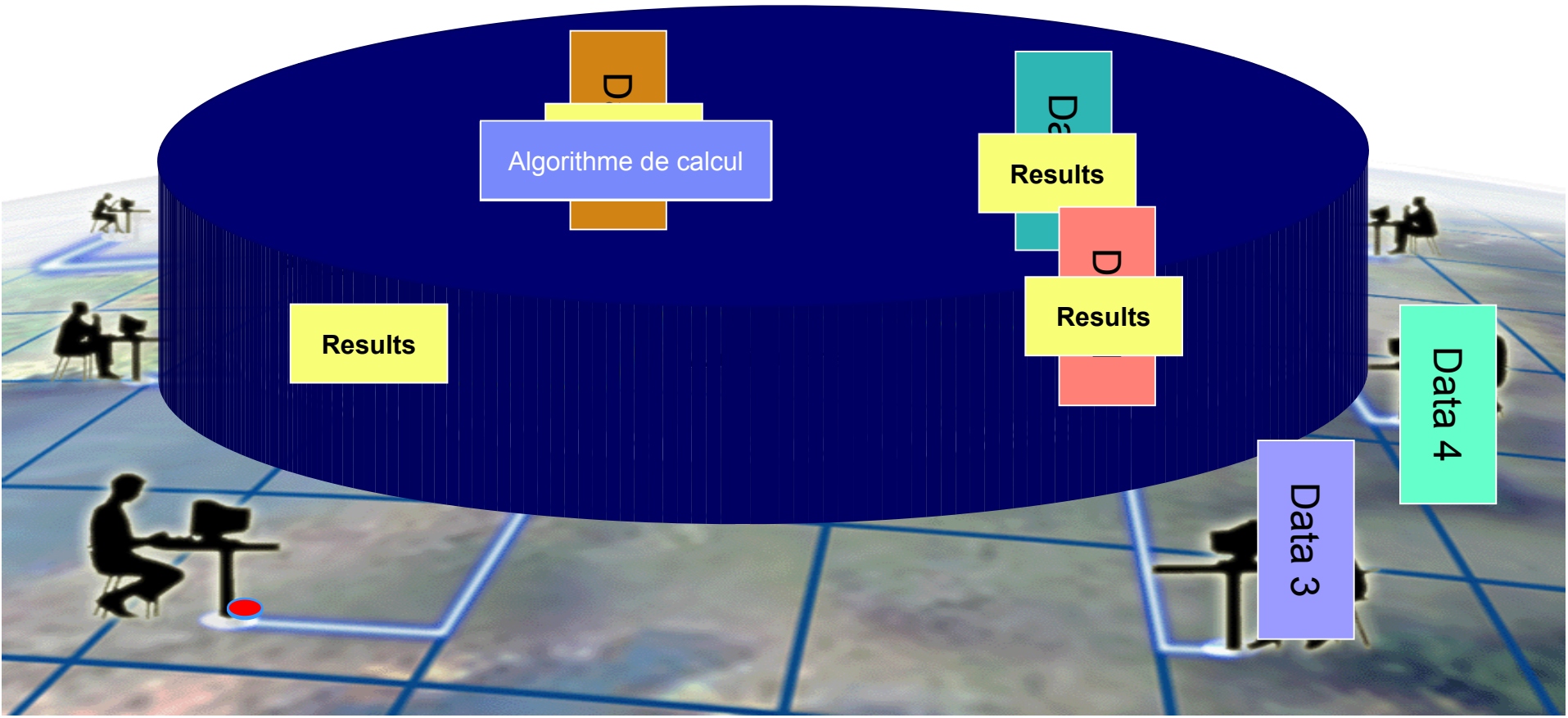
Sciences de la vie - Accéleration des calculs & Accès aux informations

Aujourd'hui…collecte des données et calcul

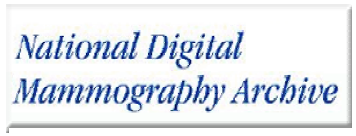


Sciences de la vie - Accéleration des calculs & Accès aux informations

Utilisation du Grid…



Grid Computing Marketplace Momentum



UK eDiaMoND Programme

Numérique

2,000,000 – Mammogramme par an
120,000 – Rappel pour vérification
10,000 - Cancers
1,250 – Vies Sauvées

230 - Radiologues (Double lecture)
50% - d'augmentation de la charge de travail

MIRADA SOLUTIONS

St George's Healthcare NHS Trust

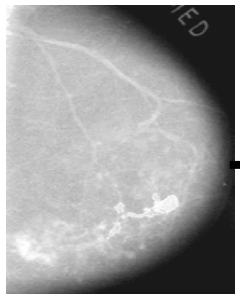
Guy's and St. Thomas' Hospital NHS Trust

UCL

Oxford Radcliffe Hospitals NHS Trust

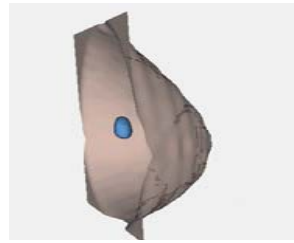
KING'S College LONDON

UK eDiaMoND Scope



Standard Mamo format

Computer Aided Detection



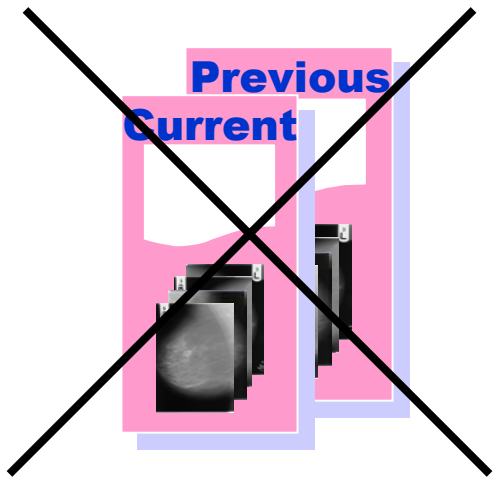
3D view

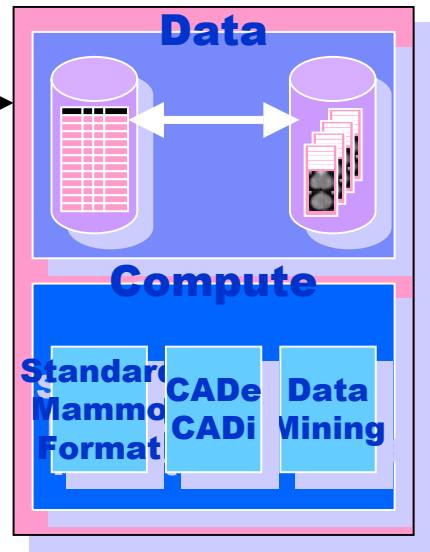
Stations

32 MB / Image

256 TB / Year

4 Breast Screening Programmes





Grid

CADe=computer aided detection

CADi= computer aided diagnosis

Décrypthon II

Research & Development

Challenge:

The Décrypthon II program, set up to rapidly accelerate progress in researching genetic diseases and their cures, required an ambitious IT infrastructure to support its mission.

Solution:

IBM, AFM, CNRS and several major French universities joined the Décrypthon II program to provide a collaborative compute grid including:

- building of a nation-wide "University Centers" grid leveraging existing HPC infrastructure involving IBM pSeries, and jointly a second "end user" grid to link in the compute resource of the general public
- implementing specific grid services that are mission-critical for this type of project (such as confidentiality, single-sign-on security and multi-job workload balancing) on top of existing Globus specifications

Benefits:

- huge calculation resources now available for research on genetic diseases and protein modeling
- ability to leverage both the unutilised compute power of the universities' IT infrastructure and also individually-owned PCs connected to the grid
- improved and faster results on genetic disease research meaning that 2 years worth of calculations can now be completed in just 1

" Following the success of Decrypthon I, we decided to go on and take advantage of IBM technologies and scientifics competencies. Working with IBM on the implementation of the grid solution for this Decrypthon II program will help us optimise the use of the university compute centers and share the compute resources of thousand of end users to get faster results on genetic diseases as part of this ambitious research program"
said Stéphane Roques, Secrétaire Général , AFM

Royal Dutch Shell

Business Analytics

Challenge

- Create a robust self-managing infrastructure that adapts to the varying demands for petroleum upstream seismic data analysis

Solution

- IBM ^
- Linux
- Globus Toolkit

"Autonomic computing is important to Shell because it is a way to manage complexity of high performance computing in a cost-effective way." Jack Buur, Principal Research Physicist, Shell International Exploration and Production B.V.

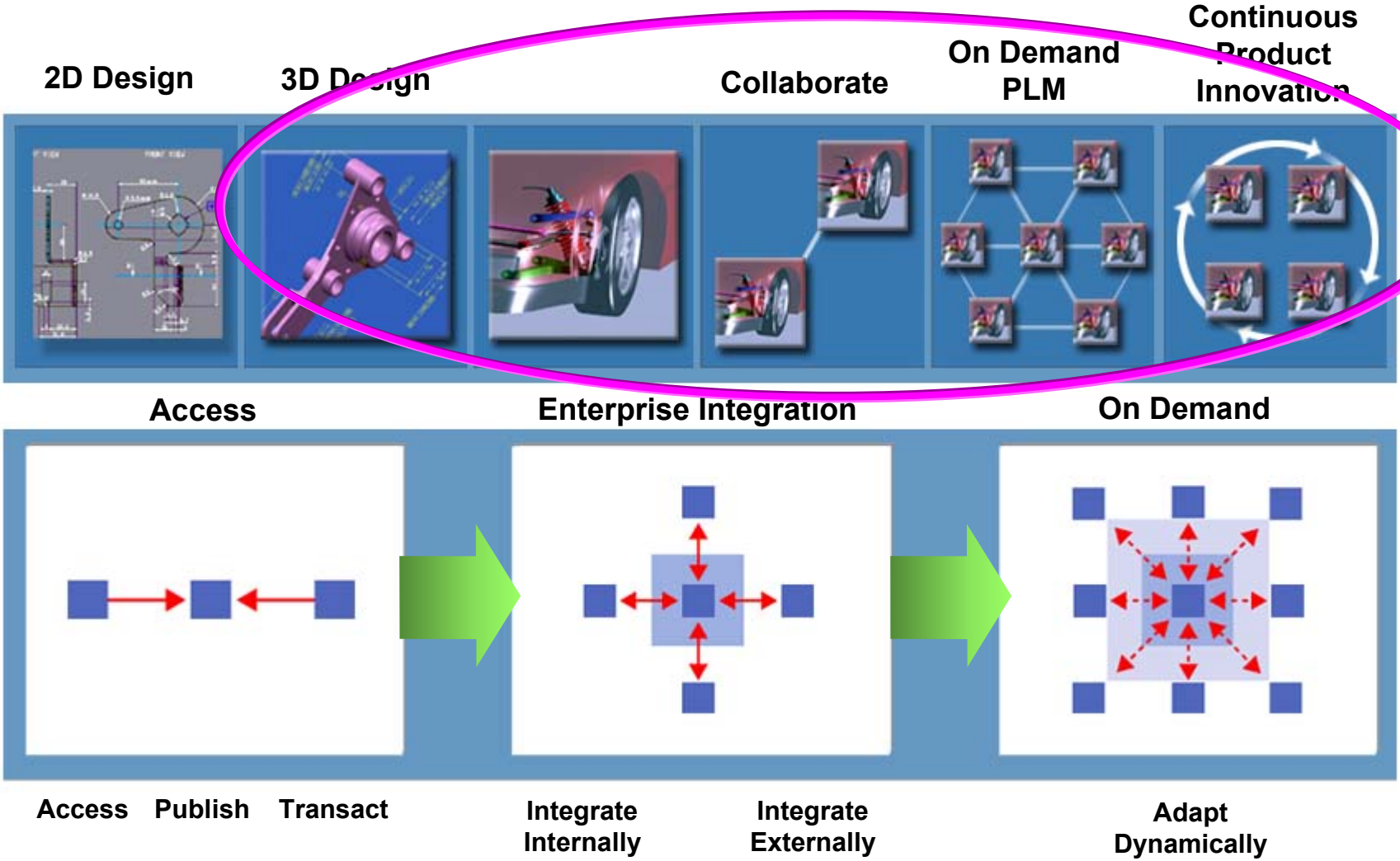
Technology Benefits:

- More robust, scalable IT infrastructure that adjusts autonomically as volumes fluctuate
- Open standards permit easy integration of existing software
- Compliance with IBM's MAPE-loop autonomic blueprint.

Business Benefits:

- Cut processing time of seismic data, while improving the quality of the output
- Focus employees on key scientific, not IT problems

Grid enables the PLM process



Magna Steyr Overview

- International automotive engineering supplier
- Complete vehicle production
  - BMW X3
  - Saab 9-3 Cabriolet
  - Mercedes E-Class
  - Chrysler Voyager
  - Mercedes G-Class
  - Jeep Grand Cherokee
- 9.400 employees

MAGNA STEYR

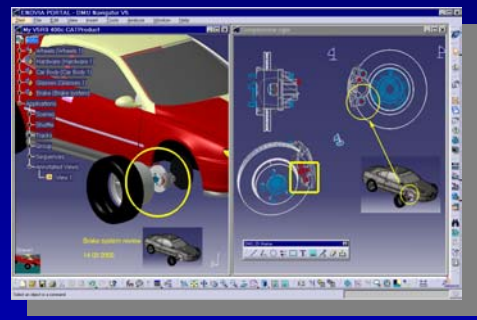
Engineering and Design

Challenge:

- Too much time required to effectively run clash tests between complex sub-assemblies which impacts quality of the end product and getting the product to market on time.
- Too much administrative time required from design engineers

Solution:

- Grid enabled clash environment running Platform Computing as Grid Middleware provider w/ Dassault Systemes CATIA & ENOVIA DMU applications providing clash detection analysis

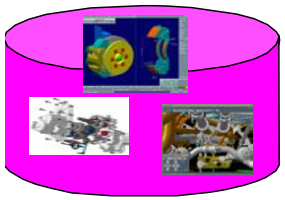


Benefits:

- Significant performance improvement (72 – 4 hrs)
- Risk and Error Reduction
- Cost Reduction
  - Increased accuracy of data improves quality and reduces late changes)
- Improved Time to Market
  - Faster evaluation of design alternatives
  - timely product

"Grid technology from IBM and Platform Computing reduced the time required for our clash testing from 72 – 4 hours and contributed significantly to enhancing our design quality," said Dr. Heinz Mayer, MAGNA STEYR.

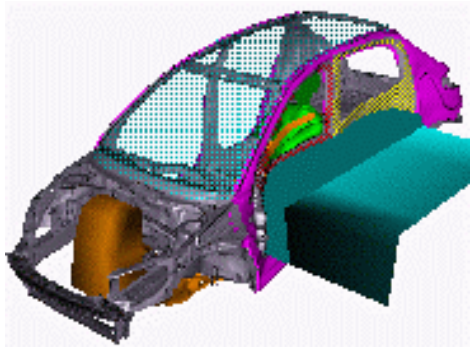
Computing chain : Simulation process in design office



CAD systems

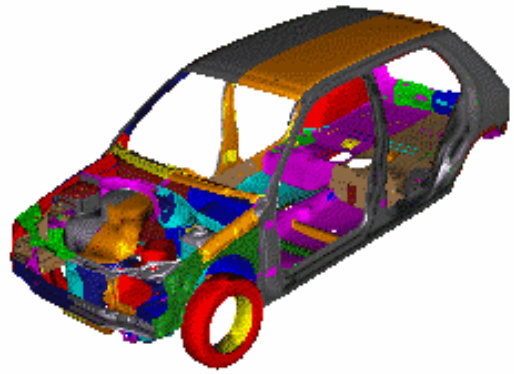
Pre-processing

- Retrieve geometry from CAD systems
- Mesh
- Set parameters



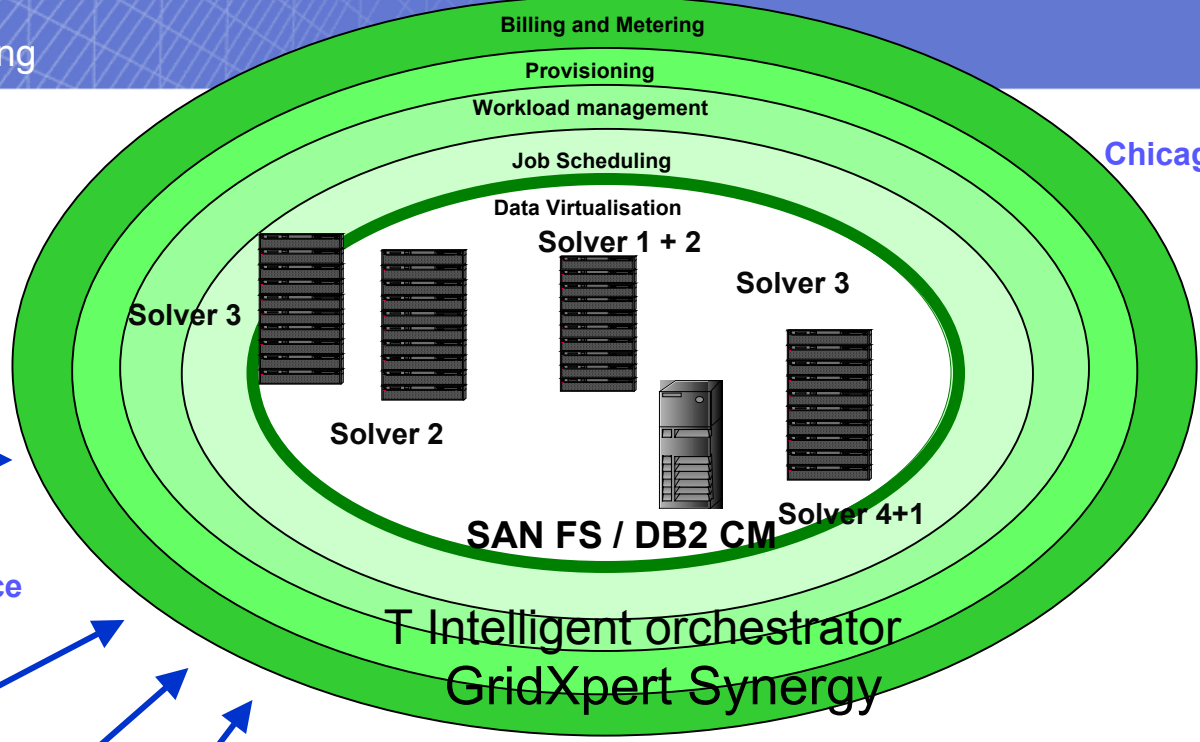
Solver

- Simulation algorithms
  - "interactive" simulation for sm model on workstation or small dedicated servers
  - Batch simulation for large moc



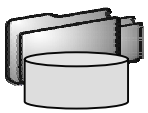
Post-processing

- Results visualization



Customer's design office

Customer Project2



Local customer data

Customer Project1

Partner/Subcontractor

- **Enable seamless access to applications & computing resources across the organization**
  - Application & computing scalability
- **Support large multi-disciplinary collaborations**
  - Link Business Processes
  - Federation of Data

OME Project (Outils Métiers pour l'Emboutissage)

Engineering and Design

Challenge:

Cetim (the French technical center for mechanical industry), has joined up with GIMEF, 16 manufacturers and the French Ministry of Finance and Industry in order to collaborate in the **OME** project which has been set up to develop a software web workshop for metal drawing tools. Cetim, needed to provide it's clients with an innovative on demand infrastructure so that they could execute their stamping simulations as they required.

The infrastructure had to provide flexible levels of service which could be billed for as it was used.

Solution:

The IBM Grid solution includes:

- IBM eServer® x325 server running Linux
- GridXpert Synergy
- ESI PAM-STAMP

Expected Technology Benefits:

- OME's clients will get access to an integrated technological environment :
  - Enabling "on demand" application
  - Via a fully secured web interface.

Expected Business Benefits :

- Reduced development costs and lead times for OME clients
- A project closely coupled with Cetim's core mission of companies innovation support

*"*Working with IBM in implementing a grid means that we'll be able to offer our clients a flexible, on demand, environment for running simulations so that they can make use of the infrastructure when they need it and only get billed for what they use*"*

-- *Claude Bouhêlier*, OME project coordinator, Cetim

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www.ibm.com/grid