eGee

MARATRA:
A Production Fusion Physics System

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- **Why Fusion?**
- **Fusion Plasma Heating: A bridge not too far but…**
- **Grid comes to the rescue!**
- **Implementation**
  - Infrastructures
  - Framework
- **One step beyond: Chunks**
- **Results**
- **Conclusions**

Enabling Grids for E-sciencE

- **Clean**
- **Alternative method for large scale energy production**
- **No CO_2 – No Global Warming**
- **No long lived radioactive waste**
- **Fuels required are found in abundance**
- **No chain reactions – No "meltdown" - Inherently safe**

x N
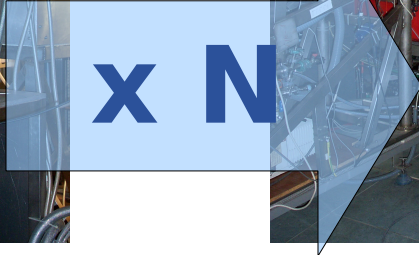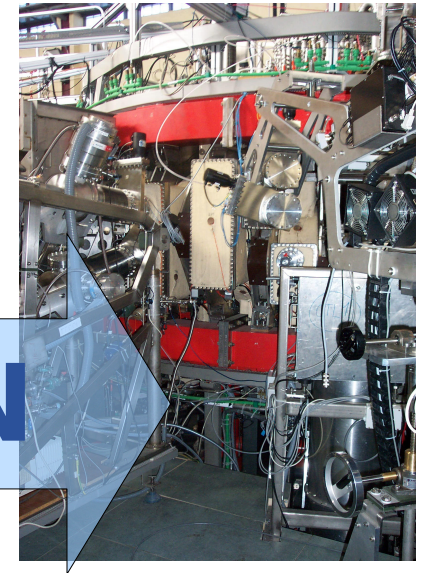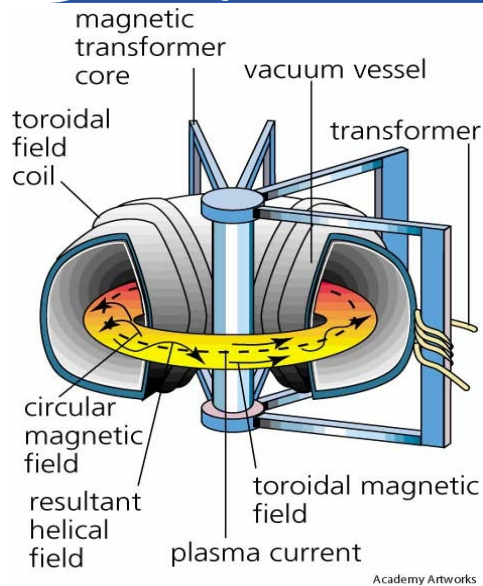
- **Executable: *Truba* (traces 1 ray of the microwave bunch)**
  - 1.8 MB – 9' (Pentium 4 3.20 Ghz)
- **Input files =~ 70 KB**
- **Output files =~ 549 KB**

Grid comes to the rescue!

- **MARATRA:**
  - MAssive RAy TRAcing in Fusion Plasmas
  - Parameter Sweep Application
- **Cluster Environment: 10^2 rays factor**
- **1st Grid Prototype: 50 rays**
  - Results presented in 1st EGEE User Forum (CERN, March 2006)
- **Objective: 10^3 - 10^4 rays**

Enabling Grids for E-sciencE
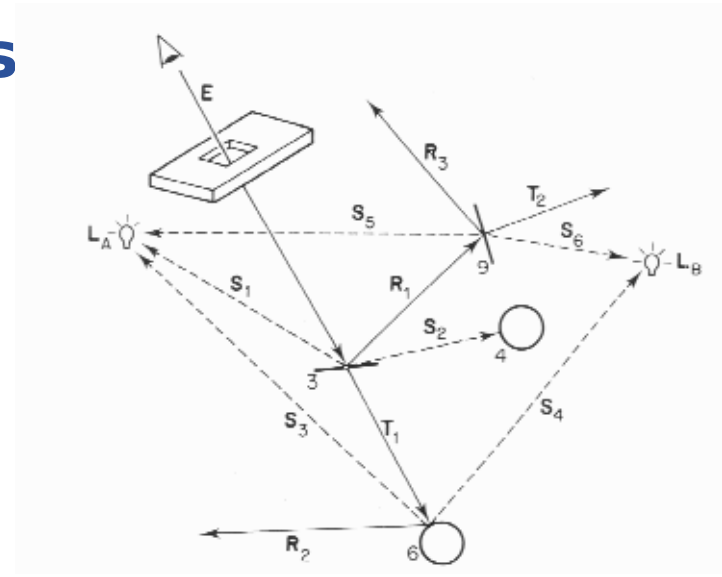
- **Infrastructure: 3 different Grids available**

Enabling Grids for E-sciencE
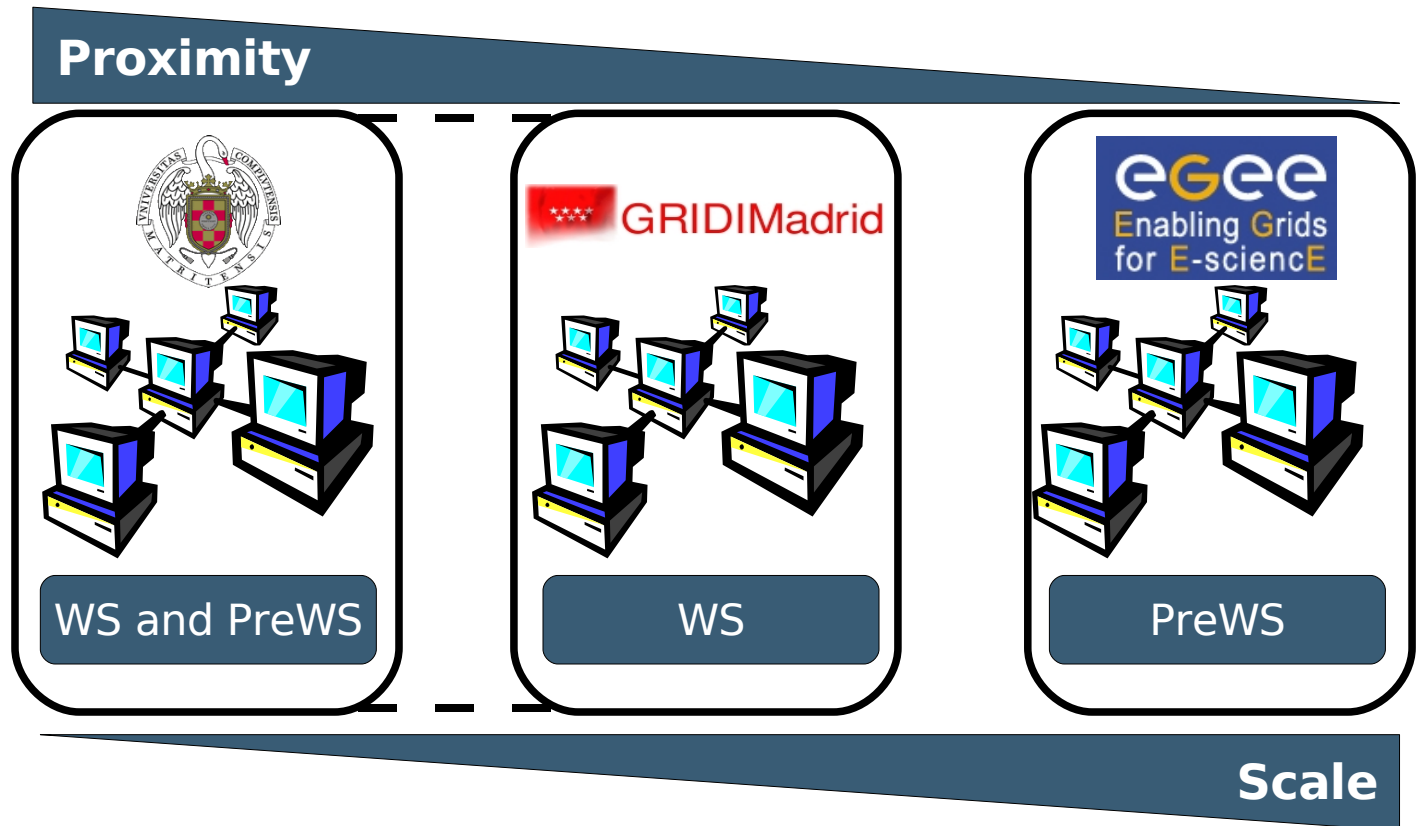
- **Framework used: GridWay Metascheduler (GridWay.org)**
- **Stands on Globus Services**
- **Handles DAG based workflows**
- **Implements the Distributed Resource Management Application API (DRMAA) which is an OGF Standard**
- **Considers static and dynamic resource information**
- **Offers automatic staging mechanisms**
- **Provides fault tolerance mechanisms (network outage, remote and local machine crash):**
  - Tries task execution/file transfer on the same resource
  - Submits failed task to an alternate resource
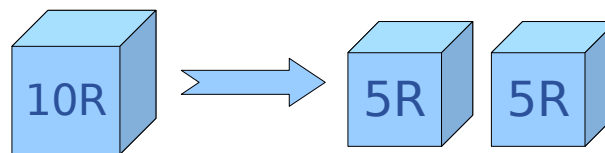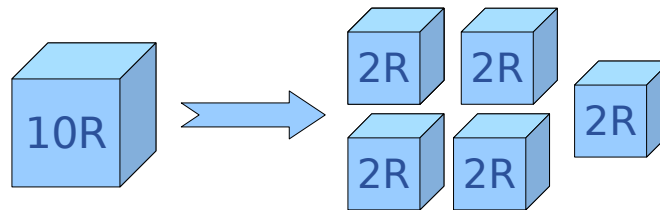 - Failed tasks are moved transparently to other resources
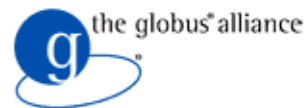
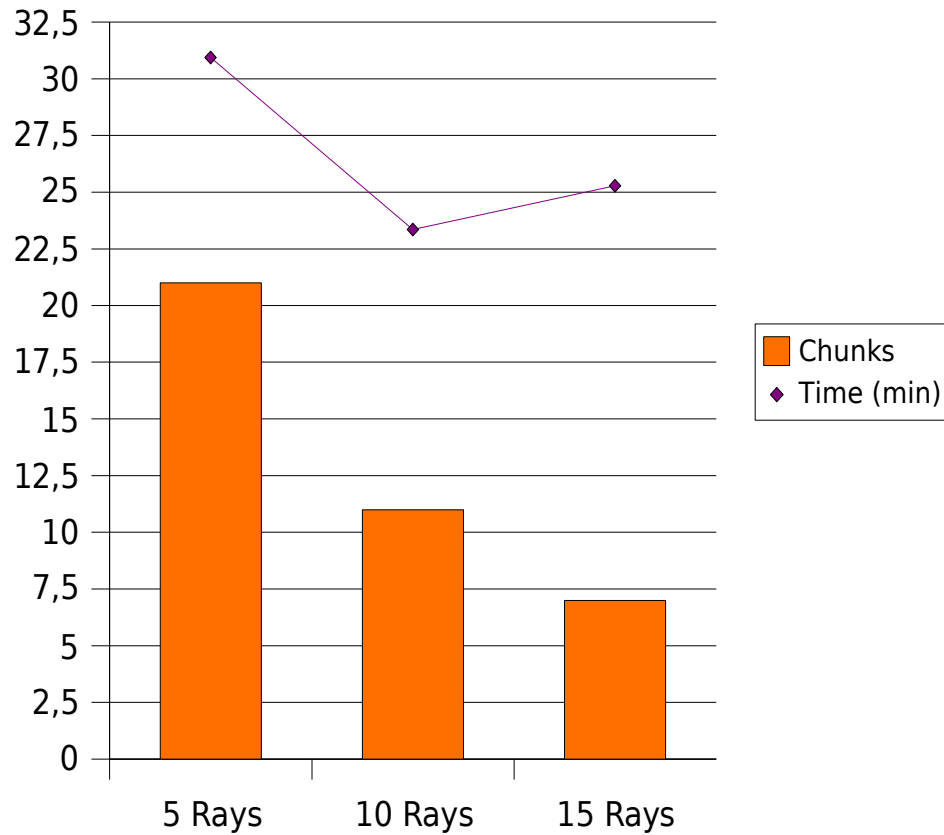- **The resulting infrastructure (1 + 1 + 1 > 3)**

Enabling Grids for E-sciencE
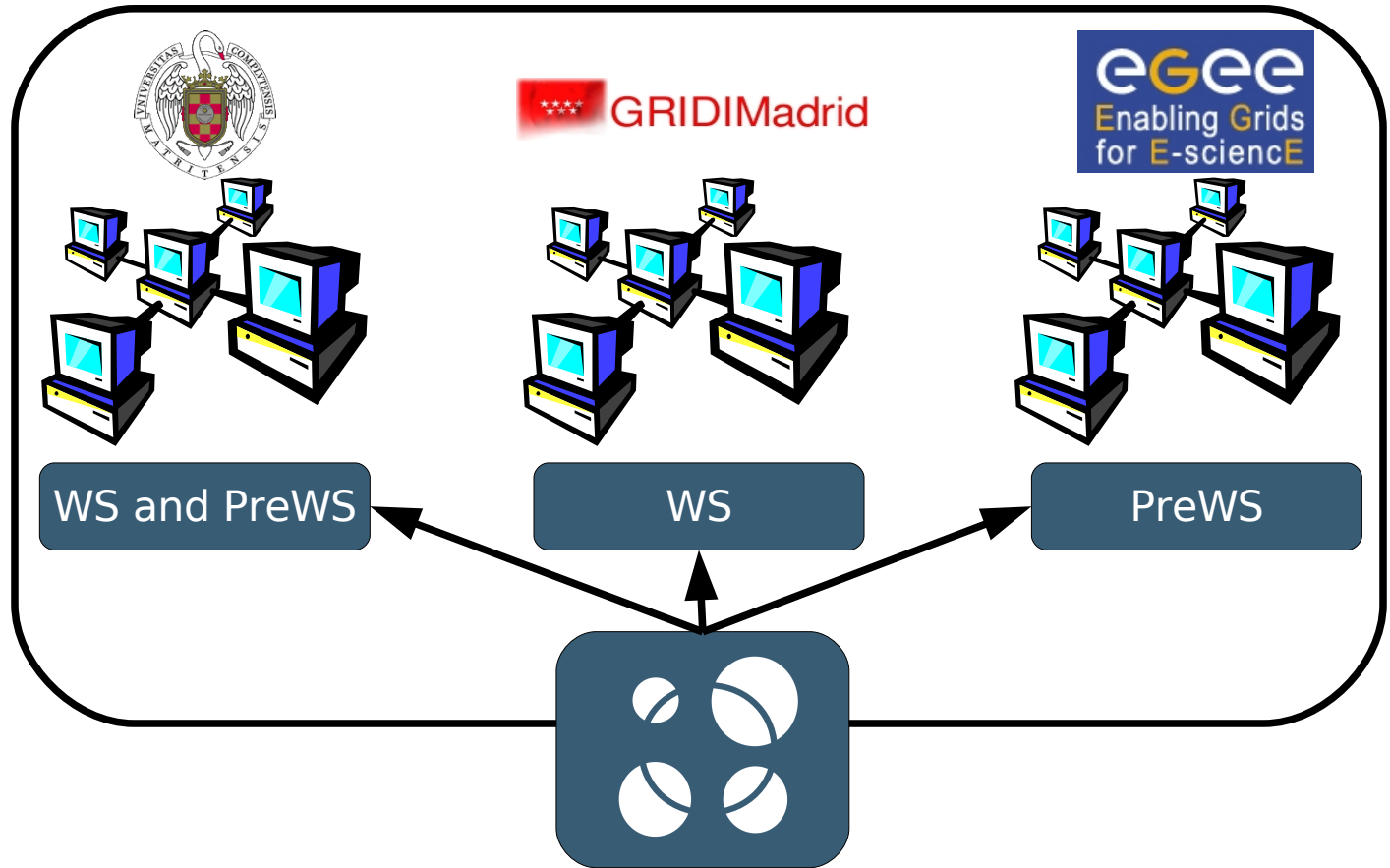
- **If "fixed" overheads due to queues...**
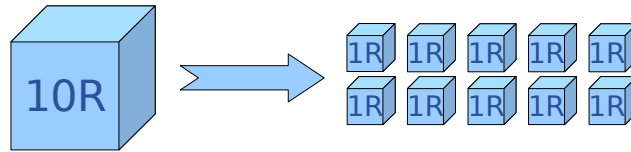
... why don't combine rays in chunks?

Enabling Grids for E-sciencE

101 Rays

1001 Rays

Enabling Grids for E-sciencE
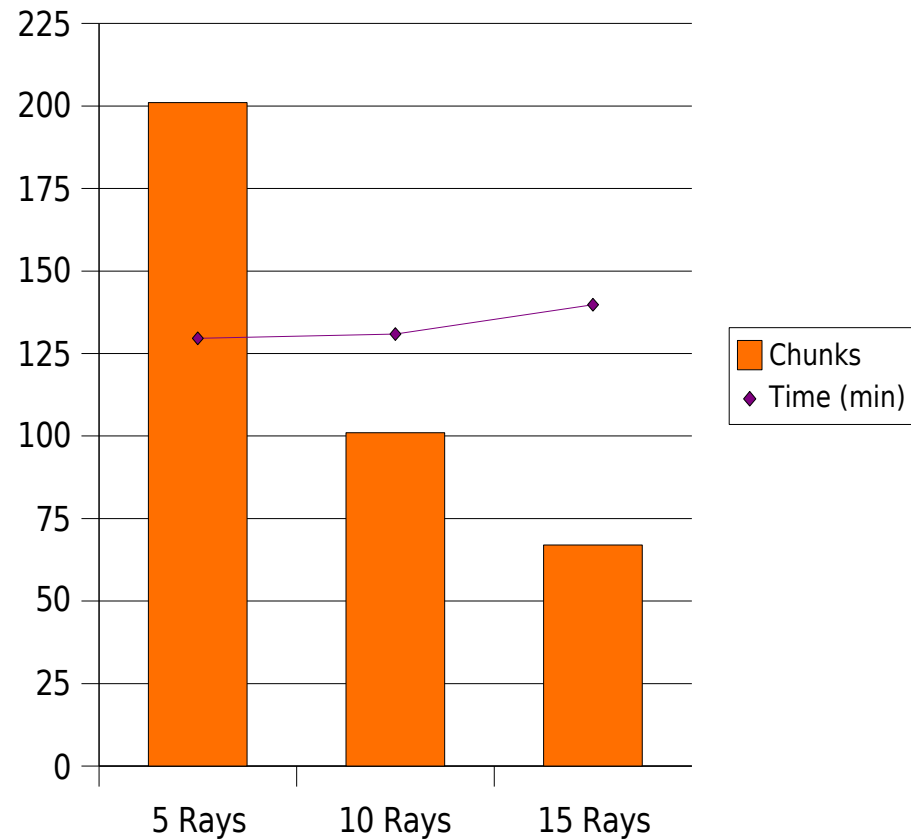
- **Milestone achieved: 10^2 and 10^3 Ray factor processed**
- **Chunk approach started to be considered**
- **Joint infrastructure provided synergy**
- **GridWay's fault tolerance mechanisms were valuable**
  - "Non-scheduled" downtime
  - DN still not mapped
  - ...
- **Next Milestones:**
  - Optimize process with the chunk approach
  - Process 10^4 Ray factor

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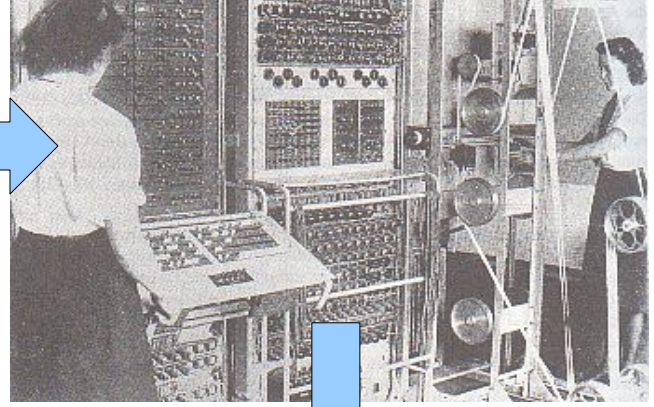
Willing to see MARATRA running on the Grid? Look for the GridWay logo at the Demo Booths!