

# INAF – Astrophysical Observatory of Catania



## *A Grid-enabled Theoretical Data Archive in the VO framework*

Kickoff meeting

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# TVO @ OACT

Italian Ministry of Research has funded projects (since 1999) for HPC activity in our Institute: Cosmological Research and development of N-Body tree codes

➤ **Hardware** (IBM SP)

➤ **Development of parallel codes and tools:**

➤ FLY: is a parallel tree-code for LSS cosmological simulations; it runs on SGI – ORIGIN, IBM SP and MPI-2 systems

➤ MARA: for light curves of single and binary stars with surface brightness inhomogeneities

➤ Astrocomp: a portal for job submission on a grid of MPP systems

➤ .....

➔ **Data from cosmological simulations that can be made available to the community**

# TVO @ CINECA

## (INAF-CINECA Agreement)

More than 300,000 CPU hours/year, two different computing platforms: the 512 processors **IBM SP4** architecture and the 512 processors **Intel-Linux Cluster**.

In the last two years more than 100 regular projects have been approved. Several hundreds of simulations have been produced

**Key Projects**: Projects of particular scientific relevance, requiring huge computational and data storage resources. The projects focus on different astrophysical application fields, from star evolution to cosmology

→ Data **MUST** be made available to the community

# TVO @ OATS

TVO is planned to allow access to simulated "observations" as well.

The concept of allowing VO users to generate microwave skies, which is particularly relevant to CMB scientists, has been proved by the MPA-Garching group in the framework of the German AVO.

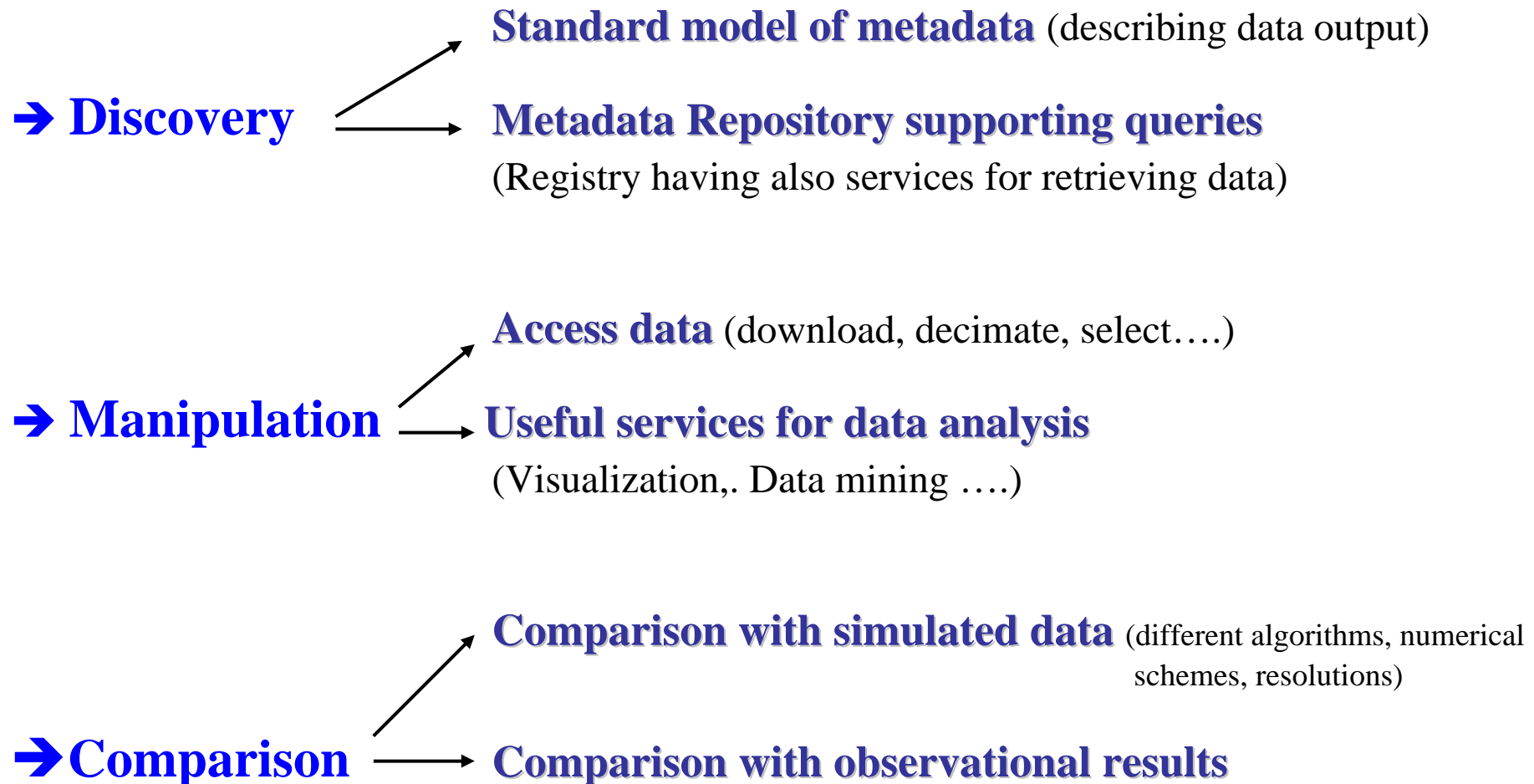
Guaranteeing access to the archive of simulated Planck/LFI data (INAF-OATs is in charge of such effort - see also F.Pasian's presentation) is certainly more demanding in terms of resources.

Coordination between the Planck/LFI simulations archive and the TVO has been planned.

# Pilot Project: Theoretical Archive

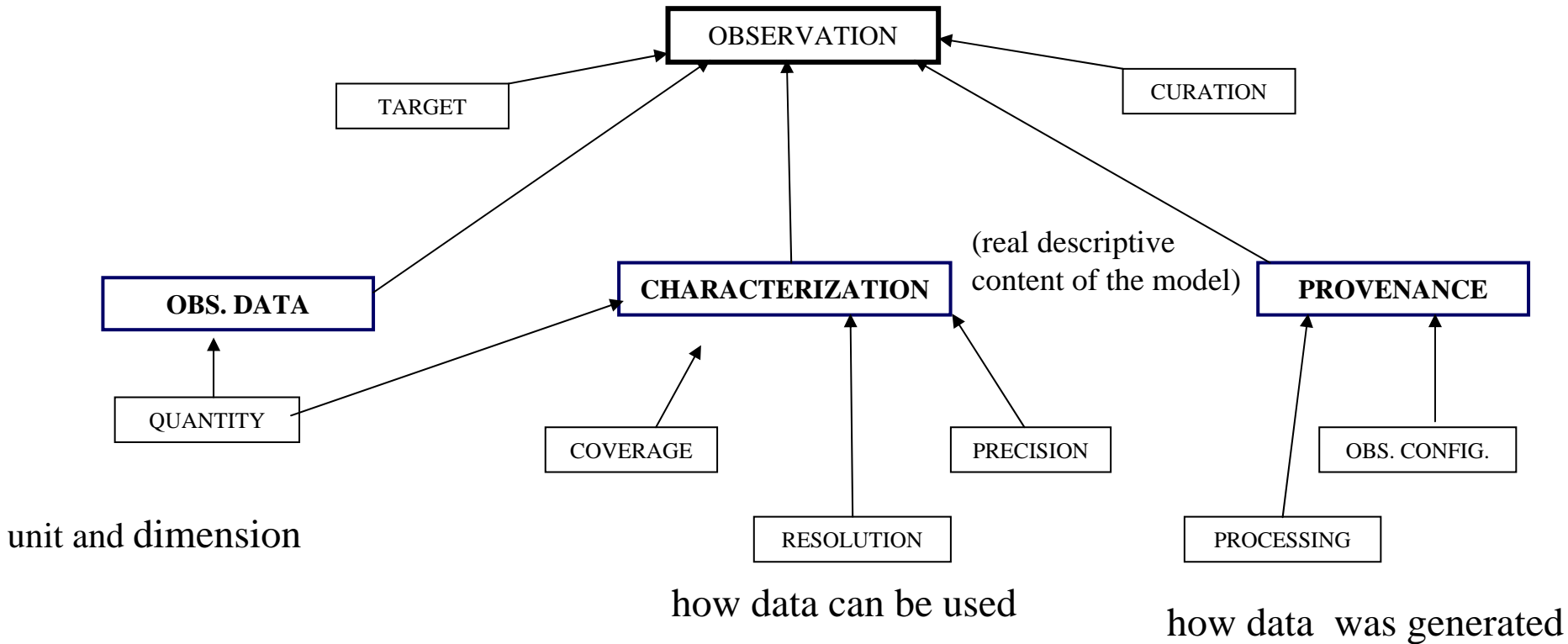
In Jan. 2004 the IVOA Theory Interest Group was formed with the goal of taking into account theoretical data and services in the IVOA standard process

## MAIN KEYWORDS



→ Propose a Simulation Data model to determine the Metadata describing the data product

## Observational Data Model

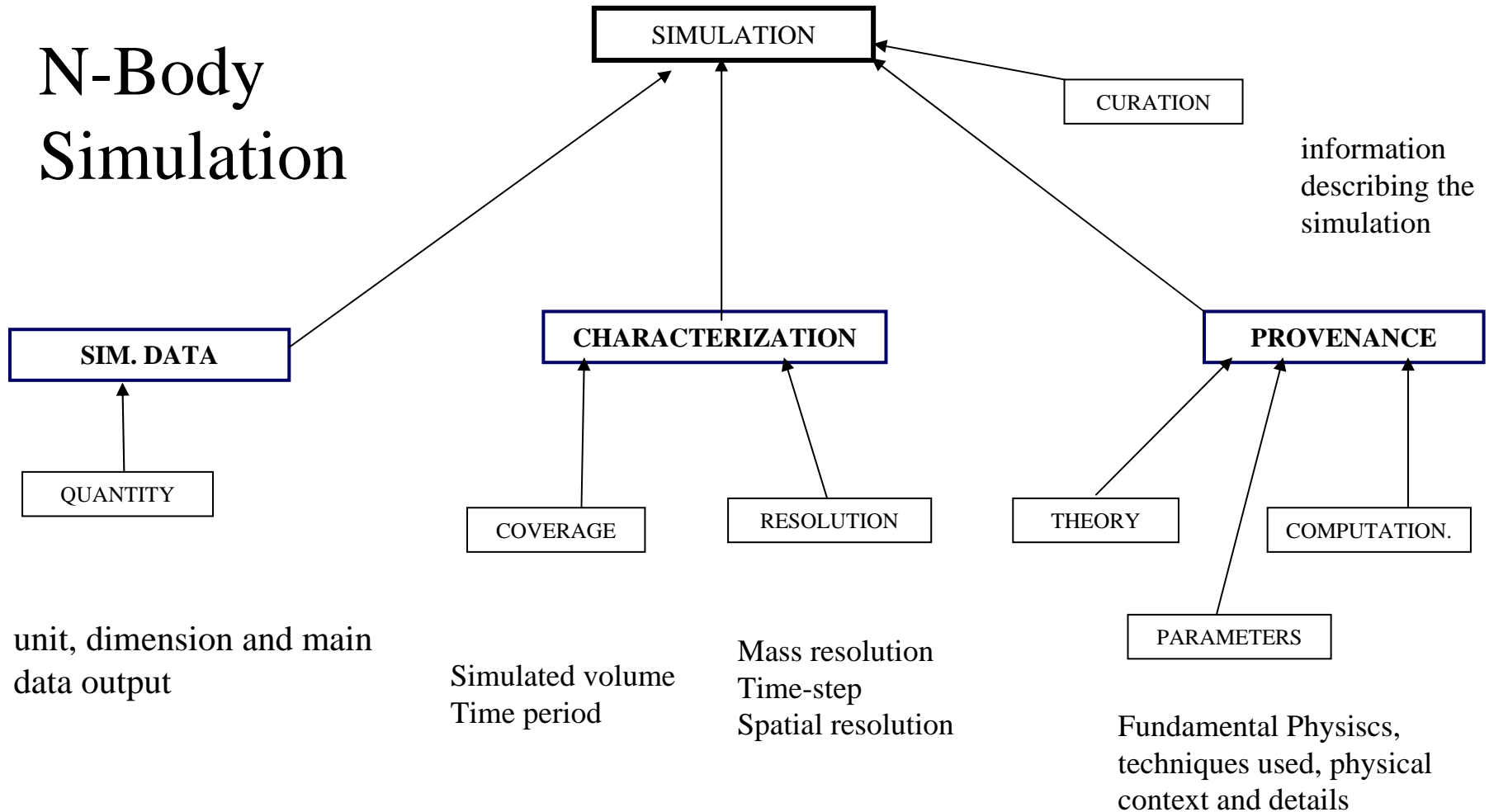


# Simulation Data Model (Shaw, Walton, Ostriker)

→ Maintain the same structure

→ There is a much wider range of quantities to be stored

## N-Body Simulation



# Pilot Project: Theoretical Archive

## ➤ Federation of archives

Comparison between simulated data (different model), observational results

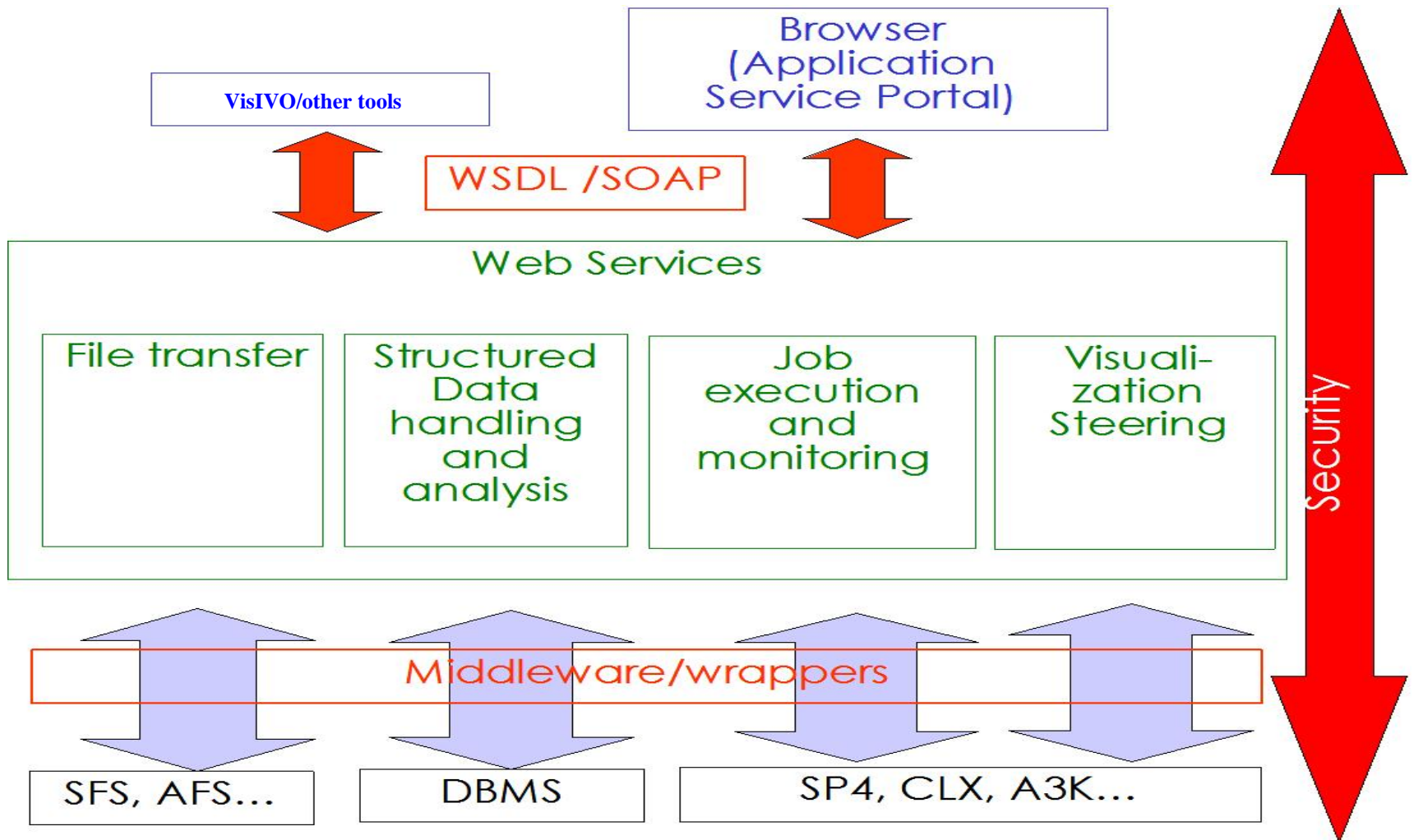
## ➤ Grid-enabled technology ➡

Distributed data archive: data are not in the same system (and location) and are produced using different platforms.

## ➤ Proposal for TVO standardization

# TVO @ INAF OACT , OATS and CINECA

(generic schema of a data center)



**24 Processors**

**Global RAM Memory: 48 Gbytes**

**Languages: C, C++, Fortran 90**

**Parallel Libraries: OpenMP, MPI,  
LAPI**



**IBM SP POWER3**

**Power4**

**8 Processors**

**Global RAM Memory: 16 Gbytes**

**Disk Array: 1 TByte**



**IBM SP P650**