Serbian Virtual Observatory SerVO

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Outline

- VO concept
- SerVO
- VAMDC and SerVO involment
- DSED
- Other projects

VO concept

Astronomy is well-positioned to exploit the IT revolution because of its early commitment to formatting standards (FITS), the now universal use of digital detectors, and an ever-broadening commitment to data preservation and data re-use.

VO concept

- Fairly new concept in astronomy
- origin traced to the NASA's centers for mission oriented datasets in early 1990's
- also large all-sky surveys 2MASS, SDSS; individual observatory archives
- originally – aim to find, retrieve, and analyze astronomical data from ground- and space-based telescopes worldwide

VO concept

Convergence of research interests in astronomy and information technology

- multiwavelength astrophysics
- archival research
- survey astronomy
- temporal astronomy
- theory and simulations
  - comparisons with observations

- Moore's law
- the Internet
- digital detectors
- data representation standards

Virtual Observatory

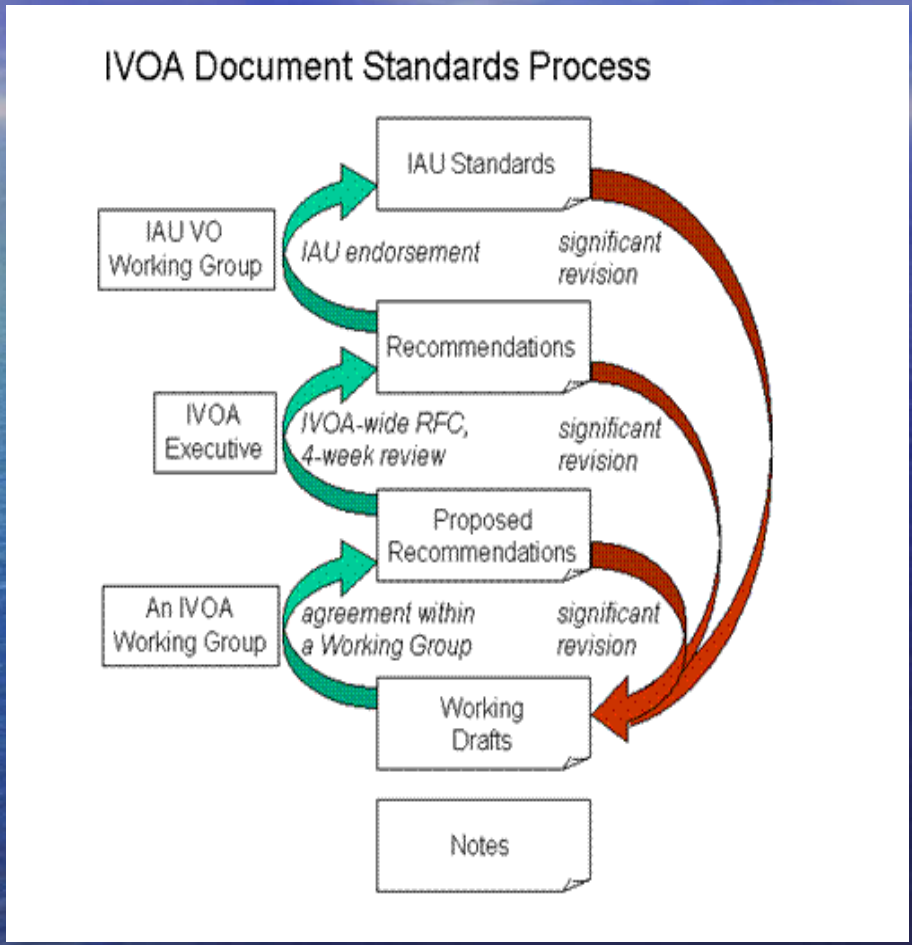
international astronomical community-based initiative - global electronic access to

- astronomical data archives of space and ground-based observatories
- sky survey databases
- data analysis techniques
  - common standards, wide-network bandwidth and state-of-the-art analysis tools

IVOA

- formed in June 2002
- mission to facilitate the international coordination and collaboration necessary for the development and deployment of the tools, systems and organizational structures necessary to enable the international utilization of astronomical archives as an integrated and interoperating virtual observatory.
- The work of the IVOA focuses on the development of standards.

IVOA



http://www.ivoa.net/Documents/

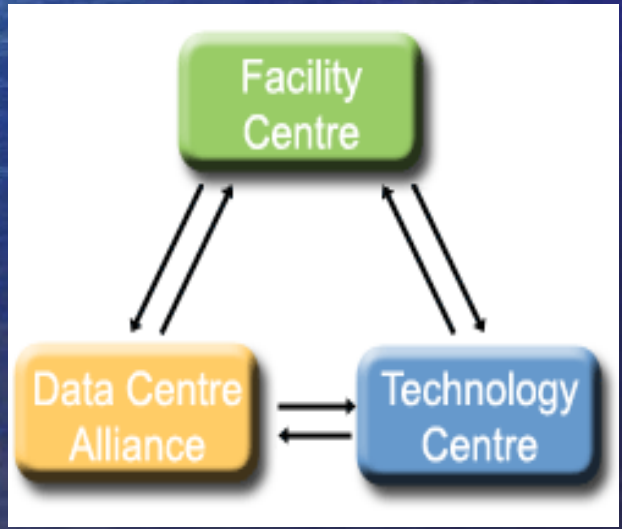
EuroVO

- aims at deploying VO in Europe
- objectives:
  - technology take-up
  - VO compliant resource provision
  - building the technical infrastructure
  - support its utilization by the scientific community

EuroVO

VOFC - an organisation that provides the EURO-VO with a centralised registry for resources, standards and certification mechanisms as well as community support for VO technology take-up and dissemination and scientific program support using VO technologies and resources

DCA - an alliance of European data centres who will populate the EURO-VO with data, provide the physical storage and computational fabric and who will publish data, metadata and services to the EURO-VO using VO technologies



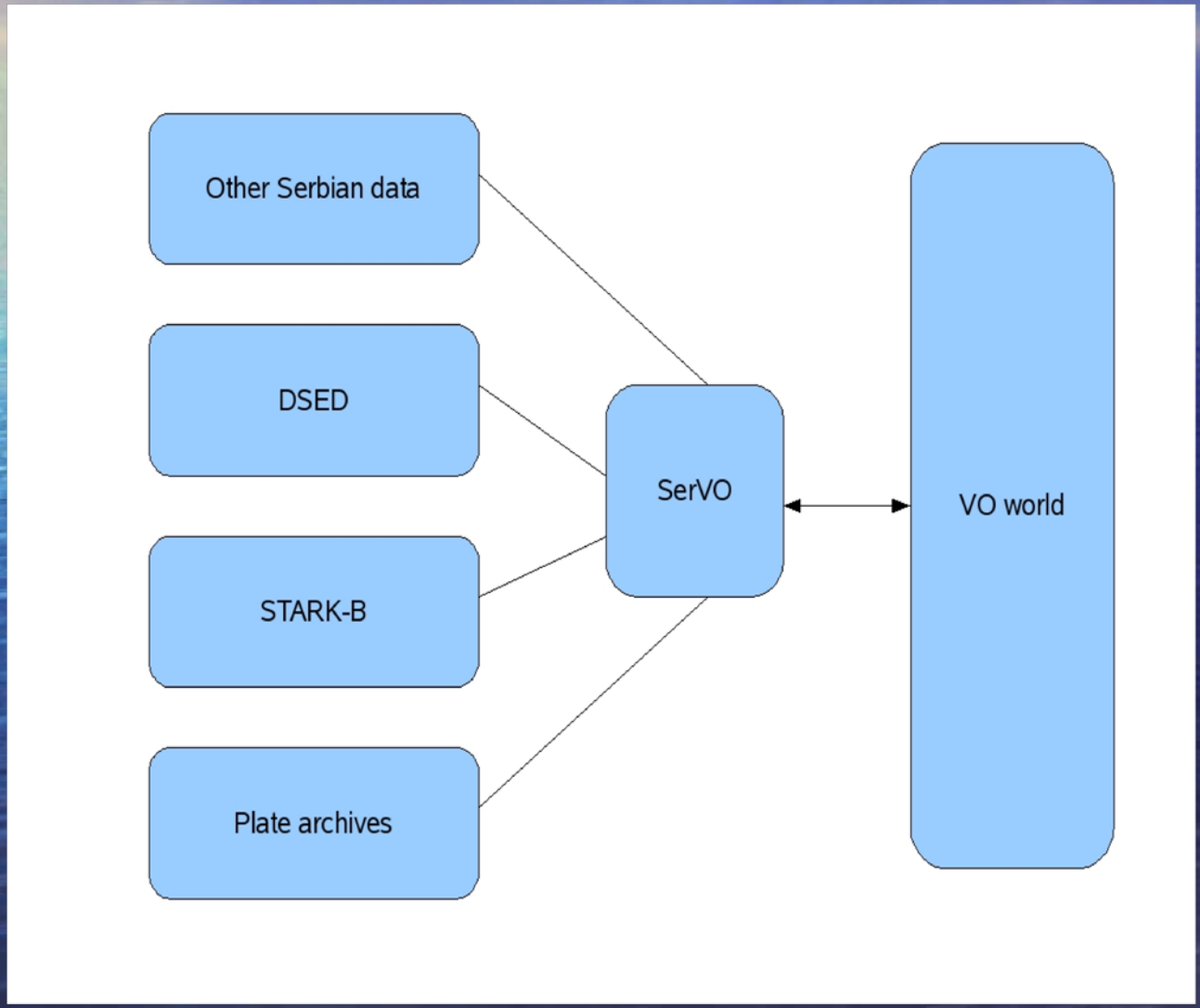
VOTC - a distributed organisation that coordinates a set of research and development projects on the advancement of VO technology, systems and tools in response to scientific and community requirements.

Serbian Virtual Observatory SerVO

- new project – since April 2008
funded by grant no. 13022 from Ministry of Science

- main goals in the first three years:
  - digitization and publishing in VO photo-plates from the archive of AOB
  - BelData (Stark effect data) – Become STARK B
  - DSED (stellar evolution database)
  - servo.aob.rs/~darko

Serbian Virtual Observatory
SerVO



Serbian Virtual Observatory SerVO

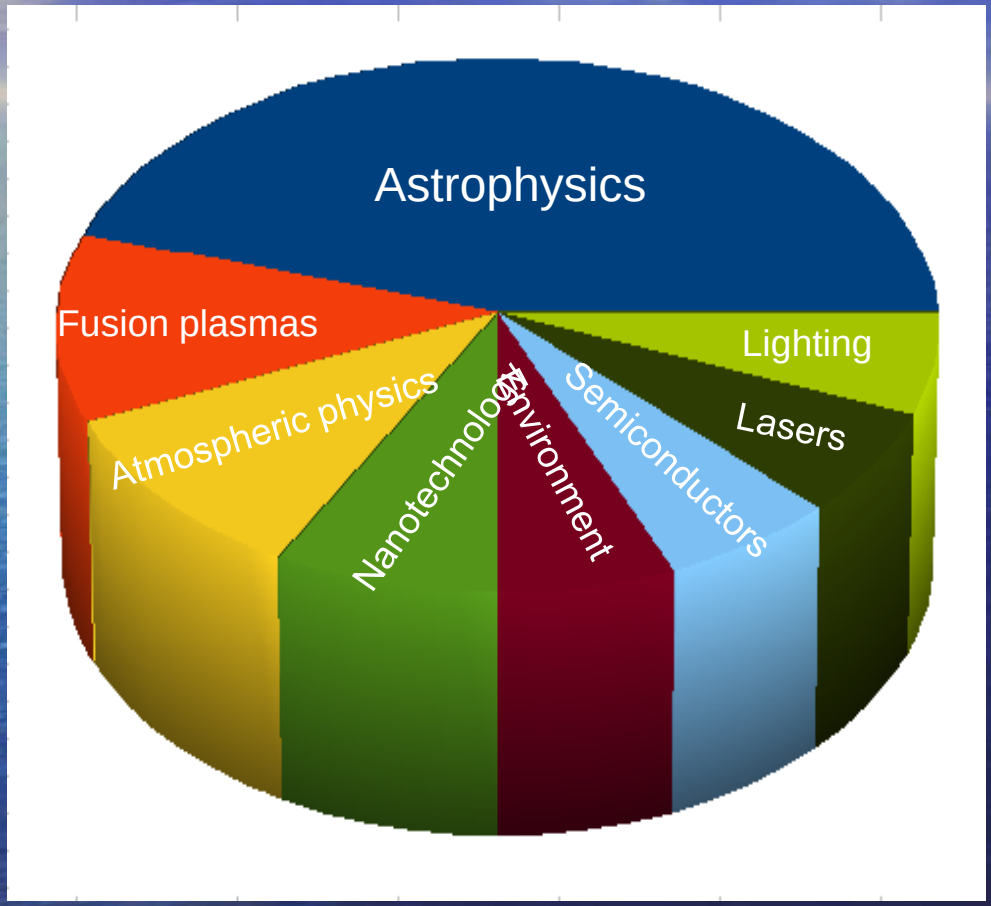
- ~ 15000 photo-plates acquired from 1936 to 1996
- different astronomical phenomena (from Sun, solar system objects, stars etc.)
- different instruments
- in the first phase we intended to process around three thousand plates from Zeiss astrograph

SerVO photo plates

VAMDC idea

- Atomic and molecular (A&M) data
  - many research fields (astrophysics, fusion plasmas, atmospheric physics, chemistry and quantum optics)
  - Technological applications (lighting, semiconductor manufacturing, environmental sciences, molecular biology, nanotechnology
- Data obtained from laboratory measurments and computations

VAMDC idea


Astrophysics
Fusion plasmas
Lighting
Atmospheric physics
Lasers
Nanotechnology
Environment
Semiconductors

VAMDC idea

- Development of A&M databases keeps up with computer evolution and advent of Internet and WWW
- New way of doing science – use of huge distributed data resevoirs in number of scientific fields – e-science
- E-science as research enterprise driven by global and dynamic collaborations on a second generation Internet

VAMDC idea

- Two years group of European physicist and astrophysicist applied for a grant from FP7 to develop "virtual atomic and molecular data center" to upscale and integrate A&M data activities and services to a new paradigm
- Very higly graded – negotiation of the grant has been successifuly fnished and contracts with EU commision signed
- formal start July1 2009 for 30 months ~4M Euro
- Kick-off meeting held in Paris last October

Participating Institutions

UCL
U Cambridge
Open U

U Uppsala

U Cologne

RAS
RFNC

NIST

Queen's U

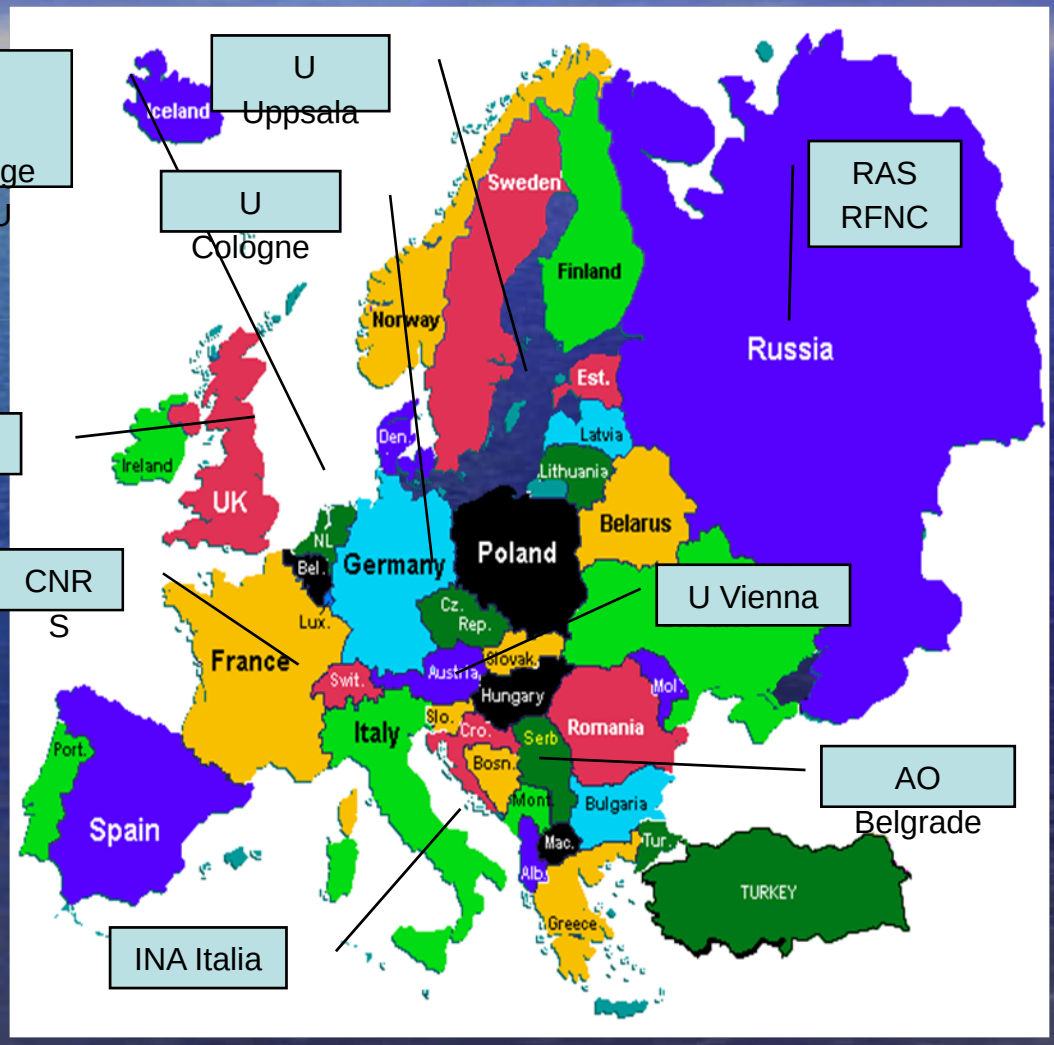
CNRS

U Vienna

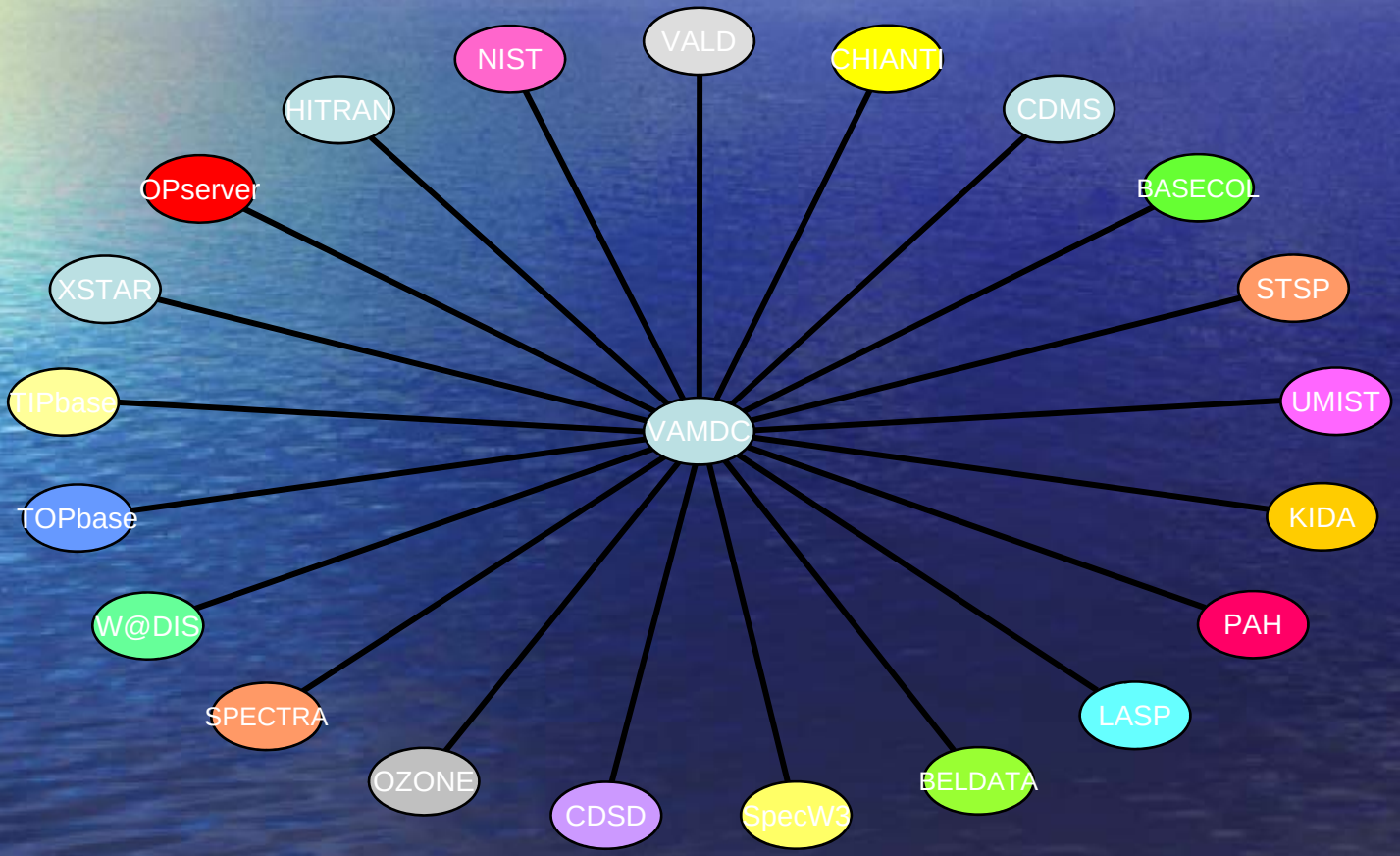
IVIC
CeCalCULA

AO
Belgrade

INA Italia



VAMDC databases involved



Problems in A&M data activities

- Funding – apart from some high profile lines of research (Bose Einstein condensations, quantum dots, entaglement, spintronics, nanoscience) production of data and dissemination have been overlooked and on very low budget
- Lack of standards and common guidelines – interoperability problem – prevents productive searches and data mining
- Several attempts to implement A&M search engines were not sufficently supported from database developers
- Data exchange informal – e-mails, ASCII files, peer to peer exchanges though standard formats(I.e. FITS in astronomy) have been incorporated

Problems in A&M data activities

- Variety of relational database management systems and diverse data models
- Local developments – can in the long run compromise integrity and regular updating procedures
- XML schemata key not only for data exchange but also for data identification - new generation of search engines that must look "everywhere" in order to map A&M universe
- Most developers are physicist and chemists – need of hiring computer engineers

Problems in A&M data activities

- VAMDC addresses many of mentioned problems.
- Accessible and interoparable e-infrastructure for A&M data, upgrading and integrating extensive portfolio of database services and catering for the needs of variety of data users from academia and industry
- Starting points are infrastructure and capabilities developed by AstroGRID, EURO-VO and EGEE, creation of core consortium and programming of a series of network and service activities to establish self-sustainable computational and data mining services
- Training potential users and regular disemination in the ERA and worldwide

VAMDC work packages

- Eight workpackages
- WP1 : MGT: Project Management
- WP2 : NA1: Science/Technical Coordination of the network
- WP3 : NA2: Dissemination and Training
- WP4 : SA 1: Infrastructure Deployment
- WP5 : SA 2: Support to the Infrastructure
- WP6 : JRA1: Interoperability
- WP7 : JRA2: Publishing Tools
- WP8 : JRA3: New mining and Integration Tools

SerVO involment

- BELDATA/ STARK-B
- Stellar atmospheres from the point of view of user
- Standards involment on definitoin...
- Meeting – regional dissemination...

Serbian involment

- small database developed – recently updated with help from people from Paris Observatory
- hosting of this service will be shared between Paris and Belgrade
- VO VAMDC compatibility
- http://stark-b.obspm.fr/

SerVO DSED

- recently published collection of evolutionary tracks and isochrones
- [Fe/H] -2.5 +0.5 ; [α/Fe] -0.2 +0.8 mf(He) 0.25 0.4
- mass 0.1 - 4 M_o ages from pre-main sequence to either runaway fussion or 100Gy
- need standards to achieve VO compatibility and proper metadata

SerVO

- other projects which can be included in SerVO (most of them need digitization)
- Fundamental catalogs (several published at AOB)
- visual observations (i.e. double stars)
- newer observations (CCD)
- MP database (in collaboration with Pisa)
- future observations from new Observatory
- observations from other observatories done by our astronomers

SerVO

- Virtual Observatories are powerful development in astronomy
- many opportunities for astronomers, IT people etc.
- VO has its PUS outreach potential
- AstroInformatics new scientific paradigm: 'e-science'

Thank you for your attention