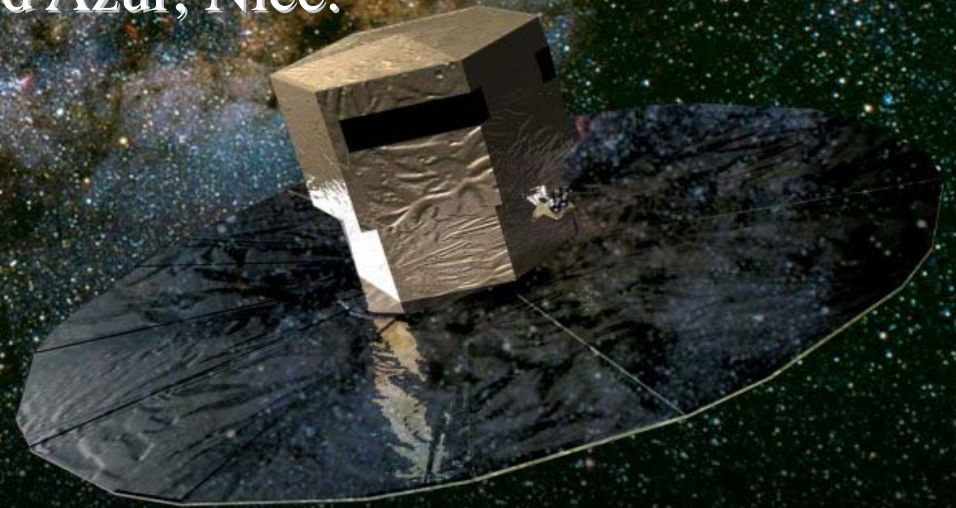


Gaia

How to improve the science return

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- To explain what DPAC is doing and what DPAC is not doing
- How to bridge the gap between Gaia products and science exploitation
- Role of CU9 in the context of science exploitation
- Interface between Gaia community and scientific community
 - ◆ GREAT as one of the vehicles

- DPAC is primarily composed of scientists
 - ◆ Astronomers and alike
- They are in the DPAC because of their interest for the Gaia science
 - ◆ This was expressed in the responses to the Letter of Intent
- But the ESA-AO deals only with Data Processing
 - ◆ The DPAC shall develop all algorithms and processing systems for the scientific processing of Gaia data and the production of all Gaia products
 - ◆ The DPAC shall operate the processing system until the final Gaia products are produced and validated
- DPAC members have not particular right on the Gaia data for the science exploitation.
- This is confirmed in the Science Management Plan approved by SPC

- Data processing of the *Gaia* mission
 - ◆ creation the ultimate scientific product of the mission
- Supporting ESA for the P/L optimisation
- Preparation of the simulated data
- Data analysis algorithms
- Design and implementation of the processing
- Design and operation of necessary ground-based observations
- **Development and operation of the *Gaia* final data base**
 - ◆ **it will contain intermediate and final mission products**
- SOC to host the final catalogue, archive and arrange user access
- GST to oversee the creation and delivery of the final data products

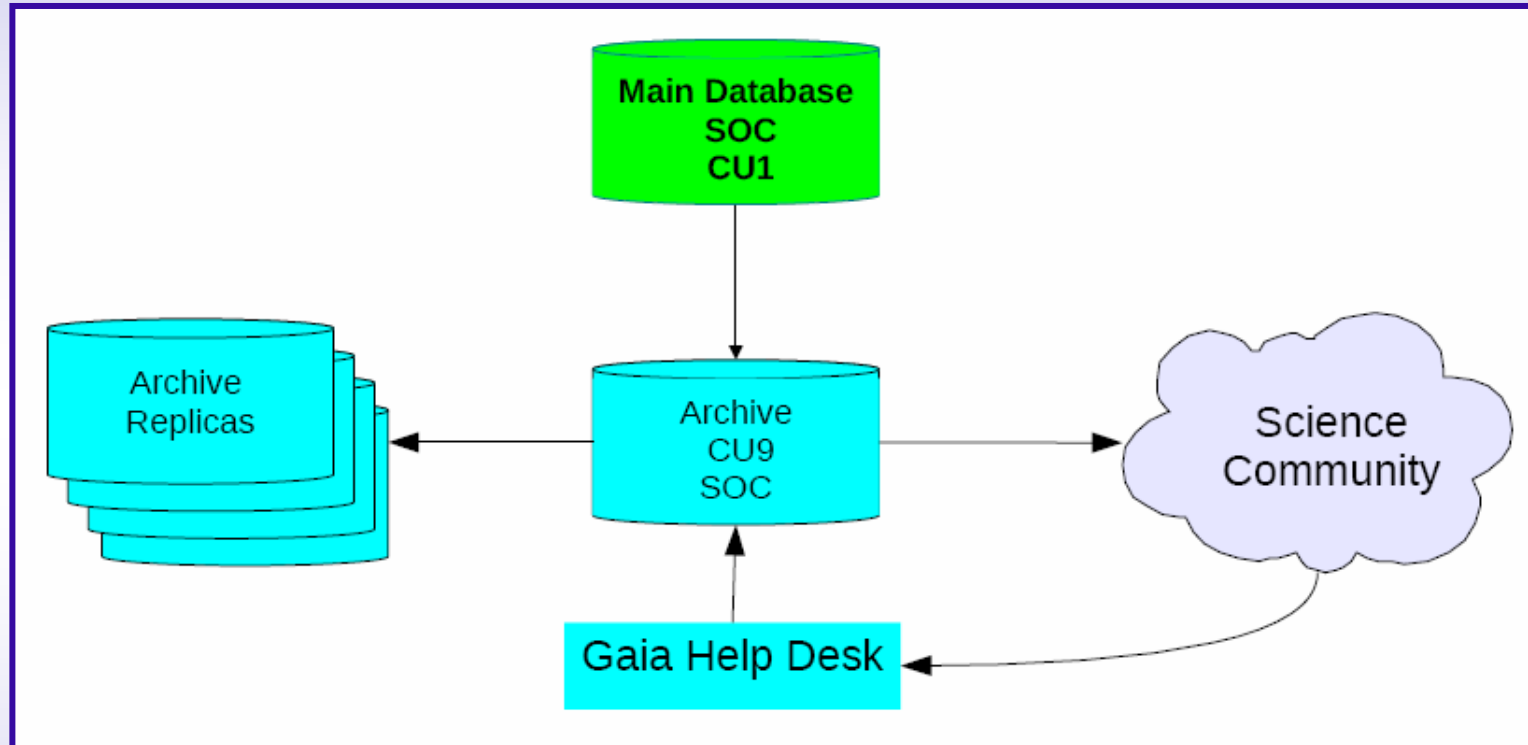
- Defined also in the *Gaia SMP* and *AO*
 - ◆ *Astrometric results*
 - ◆ *Radial velocities and individual calibrated spectra*
 - ◆ *Photometric results for all astrometrically treated objects*
 - ◆ *Several classification of the sources*
 - ◆ *General and statistical information on the Catalogue content*

 - ◆ *Detailed documentation*
 - ◆ *Catalogue interrogation tool tailored to Gaia data*
 - ◆ *Appropriate VO interfaces to access Gaia data*

- The real science return for the DPAC scientists sounds more like
 - ◆ Mapping of the Milky-way
 - ◆ Stellar physics (classification, M , L , $\ln g$, T_{eff} , $[\text{Fe}/\text{H}]$, variability)
 - ◆ Galactic kinematics and dynamics
 - ◆ Distance scale (geometric to 10 kpc, HR diagram, cepheids, RR Lyr)
 - ◆ Age of the Universe (cluster diagrams, distances, luminosity)
 - ◆ Dark matter (potential tracers)
 - ◆ Reference frame (Quasars, astrometry)
 - ◆ Planet detection ($\sim M_{\text{J}}$, astrometry and photometric transits)
 - ◆ Fundamental physics (Relativity experiments, $\gamma \sim 5 \times 10^{-7}$, $\beta \sim 5 \times 10^{-4}$)
 - ◆ Solar Physics ($J2_{\text{sun}} \sim 5 \times 10^{-7}$)
 - ◆ Solar system science (Taxonomy, Masses, Orbits, 5×10^5 bodies)

- DPAC mandate is not meant for this extra-activity
 - ◆ this is not our current first priority
 - ◆ but every DPAC member wants to take his/her share
- CU9 in DPAC will come closer to scientific product
 - ◆ But this is not yet the science exploitation of Gaia results
 - It will contain rearranged data product and data interrogation
 - In principle no other data than those produced by Gaia
- Science exploitation will be done by a much larger group than DPAC
 - ◆ It must be organised differently
 - ◆ It will combine Gaia data to many others observations
- GREAT is a good starting structure to raise the community awareness
- The Science exploitation must also be prepared in each country
 - ◆ Take advantage of the national astronomical organisations and funding

Difference between MDB and Science Archive



- The content will be a rearranged subset of the Main Data base
 - ◆ This must be clearly documented
 - ◆ MDB Dictionary is a start
 - ◆ GST/DPAC to decide on content - approved by AWG (SMP 4.1)
 - ◆ also intermediate release (content .. how many)
- General properties of the data should be included
 - ◆ descriptive statistical analysis with tables and/or histograms
 - ◆ many graphical output to summarize spatial or other distributions
 - ◆ basic 2D plots or 3D visualisation/animation
 - ◆ several key-diagrams of great scientific value (eg HR, ..)

- Additional Documentation will form a large part of the catalogue e.g.
 - ◆ Algorithms used to get values
 - Requires DPAC input
 - Like Hipparcos books (ref frame, accuracies etc ..)
 - ◆ Reference parameters and constants
 - ◆ Main assumptions in the DP
 - ◆ Project History (PS must be involved)

- This is the next step and the object of this meeting
- Areas to be covered
 - ◆ Stellar physics and stellar populations
 - ages, chemical composition, planetary systems
 - ◆ Galactic archeology
 - kinematical vs. physical properties, galactic components, dark matter
 - ◆ Globular clusters : inner regions
 - ◆ Solar system astrometry
 - reanalysis of old plates, stellar occultations, dynamical families
 - ◆ Reference frame
 - maintenance over long term, QSOs maps
- Methodology: tools to exploit survey data
- Complementary observations