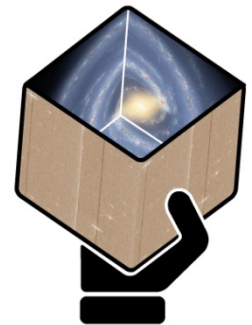# GENIUS 2nd year review

Report for WP2

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Future proofing the Gaia archive

- **Gaia will provide an unprecedented stereoscopic map of our Milky Way and the nearby universe**
  - ▶ **>1 billion stars, 300000 solar system objects, 500000 quasars, 1–10 million galaxies, tens of thousands of exoplanets**
  - ▶ **Catalogue and archive `finished' in ~2022**

- **It will be *the* astronomical archive for decades to come**
  - ▶ **Tremendous discovery potential when combined with other archives**

- **Research and invest effort in:**
  - ▶ **Taking into account user requirements (T2.2)**
  - ▶ **Confronting complex models with a complex catalogue (T2.3)**
    - ▪ **Bring the processing to the data**
  - ▶ **Seamless interoperation with other data archives (T2.4)**
  - ▶ **Facilitate reprocessing (T2.5)**
    - ▪ **Keep raw data, calibration data, and processing software available**
  - ▶ **Make the archive `live' (T2.6)**

GENIUS WP2

- **Leiden: T2.1 (Brown), T2.2/2.6 (Costigan), T2.3/2.5 (Hypki)**
- **UCAM: T2.2 (Lead: Walton)**
- **KU: T2.2 (Lead: Yamada)**
- **FFCUL: T2.2 (Lead: Moitinho)**
- **INAF: T2.4 (Lead: Smart)**

- **Technical coordination done through the regular coordination mechanisms in CU9**
- **Costigan/Hypki interface to astronomical community by participation in conferences/workshops**
  - ▶ **Presentation of GENIUS and its goals**
  - ▶ **Ask Gaia catalogue users about their requirements**

T2.2 Requirements Gathering

- **UL/UCAM contribution**
  - ▶ **Organising the beta-testing of the archive, to start soon**
  - ▶ **Gathering requirements from amateur astronomers**
  - ▶ **Support of GAVIP developments**
  - ▶ **Update of previous requirements gathering exercise**
    - ▪ **To be concluded after summer 2016 in order to accommodate requirements for Gaia DR2 $\Rightarrow$ delay of D2.5**

- **KU contribution**
  - ▶ **Preparations to host Gaia archive mirror on Japan**

- **FFCUL contribution**
  - ▶ **Continuation of the effort to include the visualization requirements into archive visualization services**
    - ▪ **Definition of services needed for Gaia-DR1 in place**

T2.3 Models vs catalogues

- **UL contribution**
  - ▶ **Proposal for API to interact with Gaia in sophisticated ways:**
    - ▪ **Upload simulations/models to user space**
    - ▪ **Upload code to carry out data analysis or model-catalogue comparison**
    - ▪ **Query archive from within code**
    - ▪ **Save and download results**
    - ▪ **Share data and code with other users**
  - ▶ **Implementation could be through thick server thin client approach following REST approach**
  - ▶ **Documented in GAIA-C9-TN-LEI-HYP-001/002**
  - ▶ **Hypki will explore alternative GAVIP approach through concrete example of globular cluster studies**

T2.4 Seamless archive interops

- **INAF contribution**
  - ▶ **M. Frabrizio started work on multi-wavelength cross-match in July 2015**
  - ▶ **Census conducted of radio surveys to be cross-matched with Gaia**
  - ▶ **To be continued for other wavelength domains (IR, X-ray, γ-ray)**
  - ▶ **Two technotes GAIA-C9-TN-ASDC-PM-011 (D2.4) and GAIA-C9-TN-ASDC-MFA-001 on motivations and requirements, and on radio census**
  - ▶ **Implementation to be in form of:**
    - ▶ **Pre-computed matches to large archives**
    - ▶ **X-match algorithms for x-matching of smaller data sets (millions of objects) or user-provided samples**
    - ▶ **Available through Gaia archive web portal from Gaia-DR3**

T2.5 Living archive

- **UL contribution**
  - ▶ **Costigan investigated ideas and requirements for implementing living archive concept**
    - ▪ **Including survey of existing 'living' archives**
  - ▶ **Documented in GAIA-C9-TN-LEI-GCO-003**
  - ▶ **Recommendation to expand archive functionality to allow inclusion of user-provided or derived parameters for sources**
  - ▶ **Discussed at last CU9/GENIUS meeting**

- **Critical areas if this idea is to be pursued for Gaia archive**
  - ▶ **Restricting scope (no duplication of efforts in other archives)**
    - ▪ **Focus specifically on improving over Gaia-only results**
  - ▶ **Quality control of user-provided data**
  - ▶ **Ease of process to add data**

T2.6 Reprocessing

- **UL contribution**
  - ▶ **Not started yet**