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EUROPEAN SPACE AGENCY

SCIENCE PROGRAMME COMMITTEE

Revised Gaia Science Management Plan

Summary;

The SPC Delegations will find attached the Science Management Plan for the Gaia mission. The document has been presented to the AWG at its 126th meeting held at the Observatoire de Paris on 28-29 September 2006 and has been submitted to the SSAC at its 117th meeting of 18-19 October 2006. The Gaia Science Management Plan had originally been presented for approval at the 115th meeting of the SPC on May 15/16 2006, following its recommendation by the AWG at its 125th meeting and endorsement by SSAC at its 116th meeting. The SPC delegations from Belgium, France, Germany, Italy, Spain and Switzerland requested that some changes be done to the document prior to its approval. These concerned the appointment procedure and composition of the Gaia Science Team, the availability of early scientific data prior to the release of the final Gaia Catalogue, the definition of the role of the national funding agencies in the Gaia Data Analysis and Processing Consortium (DPAC) and the relative responsibilities of the DPAC and ESA. While at the 115th meeting the possibility of having the revised version of the Gaia Science Management Plan approved via a written procedure was discussed, it was felt that the changes introduced requested an iteration through the Advisory Structure, which has been positively concluded.

Decision :

The SPC is invited to approve the attached Gaia Science Management Plan.

Voting rights and majority required

Simple majority of Member States.

Legal basis
SPC Terms of Reference, Section (b)

Revised Gaia Science Management Plan

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1. Introduction

The Gaia Science Management Plan presents the top-level scientific management of the Gaia mission. It is submitted (through the scientific advisory committees) to the ESA Science Programme Committee for consideration and approval. It proposes the basic principles on which the scientific aspects will be conducted throughout the mission.

In January 2005, ESA issued a call for Letters of Intent (LoI) to gauge the potential participation of the community to the Gaia data processing effort. By the deadline of 20 March 2005, a total of 177 Letters had been received, a synopsis of which was presented to the AWG at its 21-22 April 2005 meeting. The Gaia Science Team nominated a 'Data Analysis Coordination Committee' to further analyse the LoIs, propose a preliminary structure for the Data Processing framework, including a first assessment of the role of ESA, and catalyse the preparation of the response to the planned ESA Announcement of Opportunity.

This Science Management Plan is based upon preliminary community commitments established by the Data Analysis Coordination Committee. The data processing activities are planned to be structured around (currently) nine scientific 'coordination units' and (currently) five high performance data processing centres, including the ESA Science Operation Centre (SOC), located at ESAC.

Contingent upon SPC approval of the Science Management Plan, ESA will issue an Announcement of Opportunity for the Gaia data processing, provisionally scheduled for release on 9 November 2006. The response from the community will formalise the organisational and funding aspects of the Gaia 'Data Processing and Analysis Consortium' (DPAC), referred to in this document. Following the DPAC selection approval by the SPC an AO for GST membership will be issued.

2. Mission Overview

Scientific Objectives: Gaia is a space astrometry mission, a broad survey project following the measurement and operational principles of Hipparcos. It will help solving one of the most difficult yet deeply fundamental challenges in modern astronomy: to create an extraordinarily precise three-dimensional map of about one billion stars throughout our Galaxy and beyond. In the process, it will map their three-dimensional motions, which encode the origin and subsequent evolution of the Galaxy. Through comprehensive photometric and spectroscopic classification, it will provide the detailed physical properties of each star observed: characterising their luminosity, temperature, gravity, and elemental composition. This massive stellar census will provide the basic observational data to tackle an enormous range of important problems related to the origin, structure, and evolutionary history of our Galaxy.

Using on-board object detection, Gaia will survey more than one billion stars at the microarcsec level, complete to 20^{th} magnitude, with extensive multi-colour multi-epoch

photometry and spectroscopic measurements. The formal scientific requirements are included in the Mission Requirements Document [GAIA-EST-RD-00553].

The expected products of Gaia have been presented in the Concept and Technology Study Report [ESA-SCI(2000)4], and broadly cover:

- 10^9 stars;
- 10^6–10^7 resolved galaxies;
- 10^5 extragalactic supernovae;
- 500000 quasars;
- 10^5–10^6 solar system objects;
- 50000 brown dwarfs;
- 30000 extra-solar planets;
- 200 micro-lensing events;
- 10^7 resolved binaries within 250 pc;
- 2×10^7 variable stars;
- Accurate PPN (Parameterised Post-Newtonian) parameters;
- etc…

Mission and Satellite: The space segment is characterised by:

- a 3-axis stabilized satellite, operated at the Lagrange point L2;
- systematic scanning of the sky at a constant angular velocity according to a well-defined scanning law;
- a high-stability payload which systematically and repeatedly measures the astrometric, photometric and spectroscopic properties for some 1 billion celestial objects;
- on-board detection of each object brighter than a given signal-to-noise ratio at the observation epoch;
- a telemetry rate of some 1–5 Mbps.

Mission Operations Ground Segment: The mission operations ground segment is composed of the Mission Operations Centre (MOC) located at ESOC, and the associated ground stations and communication links. The Mission Operations Centre is responsible for all spacecraft mission operations, including: spacecraft status monitoring; payload health monitoring; spacecraft control; mission planning of spacecraft and payload activities; orbit determination and control; attitude determination and control; on-board software maintenance; and transmission of the raw satellite data to the data processing ground segment.

Data Processing Ground Segment: The data processing ground segment comprises a single processing pipeline leading directly to the intermediate and final mission products. The underlying principles of the data processing have been developed by the Gaia scientific community over several years. The task will be undertaken by the Gaia Data Processing and Analysis Consortium (DPAC), a collaboration between the ESA Gaia Science Operations Centre (SOC) and a substantial and broad scientific community. The responsibilities are described in further detail in this document.

Mission Phases and Milestones: The Gaia project phases and milestones are given in Table 1. The assumed overall timeline of the Data Processing and Analysis Consortium (DPAC) is specified in Table 2 based on the ESA project mission phases, and the detailed schedule of the DPAC AO process is described in section 6.3 and Table 4.

***Table 1**: Gaia project phases and milestones*

Definition phase B2	
Start of Phase B2	February 2006
System Requirements Review	Q2 2006
Preliminary Design Review	March 2007
Development phase C-D	
Start of Phase C-D	March 2007
Ground Segment Requirements Review	Launch–4 year
Critical Design Review	Q1 2009
System validation test 0	Launch -18 month
System validation test 1	Launch -12 months
System validation test 2	Launch -6 months
Flight Acceptance Review	Q1 2011
Operational phase E	
Launch	1st December 2011
Transfer phase to L2	Up to 6 months
Commissioning phase	30 days (starts during transfer)
Routine operational phase	5 years
Extended operational phase	1 year (nominally)
Post-Operational phase F	
Final reduction of the data products	3 years after end of operations

***Table 2**: Data Processing and Analysis Consortium phases*

Phase	Timeframe	Title
AO	2005-07	AO process (see Table 4)
B	2006–07	Definition (System Requirements & Preliminary Design Review)
C	2008–09	Development & production (Detailed & Critical Design Reviews)
D1	2010–11	Verification (Qualification & Acceptance Reviews)
D2	2012	Commissioning
E1	2012–17	Routine operational phase
E2	2017-18	Extended operational phase
F	2018-2020	Post mission

3. Overall Responsibilities

3.1 ESA Responsibilities

Gaia is a purely ESA programme. ESA assumes full responsibility for the overall Gaia project; it is responsible for overall mission design, procurement of the satellite including all scientific instruments; testing and validation, launch, and all interactions with the satellite during orbital operations. The mission cost-at-completion presented to the SPC in February 2006 includes the complete satellite (including payload) design, development, launch, and operations, as well as the substantial contribution made by the ESA Science Operations Centre (SOC) to the overall data processing effort.

The ultimate responsibility for all scientific aspects of Gaia rests with the ESA Research and Scientific Support Department which, for this purpose, delegates this responsibility to the Gaia Project Scientist.

The scientific responsibility for the data processing and analysis as undertaken by the DPAC will be delegated to the DPAC executive, where ESA's project scientist is present as an observer. The DPAC forms an integral part of the Gaia mission and will require very significant national contributions.

It is anticipated that coordination between the ESA project scientist, the Gaia Science Team and the DPAC executive will resolve possible conflicts relating to the scientific output of Gaia as defined by the processing undertaken by the DPAC and its constituting elements.

The main ESA contacts with respect to the science organisation and data processing are:

Project Manager: Up to the end of the commissioning phase, the Project Manager (PM) has overall responsibility for all aspects of the Gaia mission. The PM ensures that the mission is developed and launched successfully from the schedule, budget, operational and spacecraft performance aspects, and fulfils the scientific requirements. The PM monitors and controls the work of the Gaia spacecraft industrial contractor(s). The PM ensures that the necessary resources for the mission are available in time within the programme level constraints. These include: support to the PS, fulfilment of any international agreement, science operations, mission operations, archiving, spacecraft health and maintenance and lessons learnt.

Project Scientist: The ESA Gaia Project Scientist (PS) will be ESA's main interface to the scientific community. Within ESA, the PS will liaise with the Gaia Project Manager until completion of the satellite in-orbit commissioning, and thereafter with the Mission Manager. During all phases of the project, the PS will coordinate all scientific issues with the Project and/or Mission Manager. In particular, the PS will advise the ESA Payload Manager on technical matters when they affect scientific performance. The PS main task is to maximize the scientific return from the mission within its approved schedule and budgetary constraints. The PS monitors all phases of the project, is responsible for scientific decisions within the mission, oversees that all data are fully accessible to the community at large, and makes scientific results visible to the public.

SOC Development Manager: The SOC Development Manager is responsible for the implementation of the SOC according to requirements as laid down by the Gaia Project Scientist (PS). He is also responsible for meeting the ESA commitments to the DPAC as laid down in section 6.4.

Mission Manager: After the commissioning phase, the Mission Manager (MM) takes over the responsibilities of the Project Manager, and therefore becomes responsible for all aspects of the mission. The MM ensures that the mission is operated successfully from the schedule, budget, operational and spacecraft performance aspects, and fulfils its scientific requirements. The MM ensures the necessary resources for the mission are available in time within the programme level constraints. These include: support to the PS, fulfilment of any international agreement, science operations, mission operations, archiving, spacecraft health and maintenance, lessons learnt...

3.2 Scientific Community Responsibilities

The very challenging task of data processing for the Gaia mission (effectively creating the ultimate scientific product of the mission) will to a very large extent be carried out by the scientific community, in this case represented by the Data Processing and Analysis Consortium (DPAC); a group predominantly funded by contributions from the national agencies in the relevant member states.

In addition, the scientific community is supporting ESA in the scientific optimisation of the mission (through the Gaia Science Team, and its interaction with the ESA Project Team). In summary, the top-level responsibilities of the Gaia scientific community will include:

- supporting ESA in the optimisation of the payload instruments, including those with a direct bearing on the final scientific accuracies, and supporting ESA in the predictions of the final mission accuracies for all instruments;
- preparation of simulated data for all payload instruments, to support accuracy and performance analysis, optimisation studies, and the design and development of the entire data analysis environment;
- preparation of the data analysis algorithms, including the adopted astrometric reduction framework, and all algorithms required to reduce the astrometric, photometric, and spectroscopic data;
- the design, development, procurement, and operation of all aspects of the hardware and software processing environment necessary to fulfil their responsibilities in the reduction of the mission data throughout the simulation, mission operations and final catalogue production phases;
- the design and operation of any additional ground-based astronomical observations that may prove necessary for the mission data processing.

In addition, the Gaia scientific community will contribute, in close cooperation with the SOC, to the design, development and operation of the final Gaia data base, which will contain the intermediate and final mission products.

In line with the ESA Science Programme Committee policy adopted for Gaia at the time of the mission's acceptance in 2000, funding of all scientific related activities, including scientific studies, ground-based observing programmes, travel costs for general meetings,

development of the data processing algorithms and pipeline, and hardware for the on-ground data processing, will not be supported by ESA, other than for those activities identified in the ESAC SOC contribution to the data processing, and already included within the mission cost-at-completion.

3.3 The Gaia Science Team

The Gaia Science Team advises ESA, through the Project Scientist, on all top-level science performance, science policy and science organization aspects of the mission, including the activities of the Data Processing and Analysis Consortium. External reviews of the scientific development of Gaia will follow the standard ESA review procedures, and will involve, as needed, the AWG.

The Gaia Science Team will be involved, through the Project Scientist and Project Team as appropriate, in:

- acting as a focus for the interest of the broader scientific community in Gaia;
- maximising the scientific return within its boundary conditions;
- advising on the satellite, payload, calibration, and ground segment developments;
- defining data rights and publication policy;
- overseeing the timely development of the on-ground data processing;
- overseeing the creation and delivery of the final data products to the broader scientific community;
- promoting public awareness, education, and public relations aspects.

The Gaia Science Team has been in place since acceptance of the mission by ESA in 2000 (replacing the Science Advisory Group for the preceding study phase). The Gaia Science Team, chaired by the Project Scientist, currently comprises 12 members of the European scientific community, selected with respect to their specific expertise in the key scientific, technical, and data analysis aspects of the mission (astrometry, photometry, and spectroscopy). The ESA Project Manager, Payload manager and SOC development manager have standing invitations to attend all meetings and participate in all activities of the Gaia Science Team.
In consultation with the AWG, the composition of the Science Team will be revised around the end of Phase B2 (early 2007), following the selection by the SPC of the Gaia Data Processing and Analysis Consortium in response to the ESA Announcement of Opportunity, and it will include the following members.

- ESA Project Scientist (chair, permanent)
- Two “astrometry scientists” (three years renewable)
- Two “photometry scientists” (three years renewable)
- Two “radial velocity spectrometer scientists” (three years renewable)
- One “data analysis scientist” (three years renewable)
- The chairperson of the DPAC executive (permanent)

The managers of the relevant sub-units of the DPAC will have standing invitations to the Gaia Science Team meetings as experts with the status of observer and participate in all activities of the Gaia Science Team. The ESA Project Manager, Payload manager and the SOC development manager will continue in their GST role as before.

This will ensure continued representation of the scientific community with expertise in the various key science aspects of the mission, as well as of key representatives of the Data Processing and Analysis Consortium.

The "scientist" members of the Gaia Science Team will be selected through an AO (see table 3) on their expertise and the excellence of their proposals, but also ensuring that they are to a reasonable degree independent from DPAC management activities.

***Table 3**: Timeline for the AO for the GST membership selection.*

Time frame	Title
1 Mar 2007	AO Release for GST membership
May 2007	Selection of GST members (AWG/Project Scientist)

4. Data Products and Data Rights

4.1 Intermediate and Final Data Products

The final mission catalogue products, to be made available to the community, will not be available until the end of the post-operational phase, in around 2020. However, it is important that the astronomical community will have access to the Gaia data, through intermediate catalogues, as soon as a reasonable preliminary calibration is established, while the final mission products with the final instrument calibrations will follow in 2020.

The overall Gaia data products shall include as a minimum:

- astrometric results: stellar positions, parallax and proper motions. Parallax accuracies of <7 microarcsec for V<10, < 25 microarcsec for V<=15 and <300 microarcsecs for V<=20;
- radial velocities and individual calibrated spectra of intermediate resolution within the wavelength range 847-874 nm;
- photometric results for all astrometrically treated objects in TBD colour bands and individual calibrated spectra of low resolution covering the wavelength intervals 330-660 and 650-1000 nm;
- several classifications of the sources shall be given e.g. planets, solar system objects, multiple systems, near earth objects etc;
- general and statistical information e.g. HR-Diagram, coverage plots, etc.;
- detailed documentation of all catalogue fields and interrelationships;
- browsing and catalogue interrogation software tailored to the Gaia data set in manner similar to the Sloan Digital Sky Survey (SDSS) server;
- appropriate Virtual Observatory interfaces will be implemented allowing access to Gaia data through the usual VO tools.

It is important for the productivity of the mission as a whole that some intermediate results be communicated to the scientific community and/or published while the mission is ongoing and before the availability of the final catalogue. This will ensure that results can or should be followed up with other space borne or ground based tools. It will also ensure that Gaia

results, and their impact, be made known in a timely fashion. Possible intermediate results might include:

- astrometric results: an interim release, with bright star accuracies of order 100 microarcsec, targeted within 3 years of the start of routine operations;
- spectroscopic and photometric results: one or two intermediate catalogues to be released between 2015–18;
- science alerts data (e.g. supernova or micro-lensing event): as soon as possible from the processing (within hours or days);
- intermediate products that result from the work of individual coordination units, as defined in the context of the Data Processing and Analysis Consortium (defined in section 6.2)

These intermediate results and final data catalogues will only be released for wider community exploitation once validated and documented. The precise content and schedule of such early releases will be defined at a later date by the Gaia Science Team, in consultation with the Data Processing and Analysis Consortium executive committee - defined in section 6.2 - and the AWG.

4.2 Data Rights

Adopted as a basic principle since the start of the Gaia studies in 1994, and confirmed at the time of the mission's acceptance by the Science Programme Committee in 2000, formal 'data rights' (for example, through a Call for Proposals) will not be assigned to any scientists involved in any aspects of the mission, including those participating in the data processing. Early access to the reduced data could, however, be awarded to individuals and groups participating in the data analysis, its validation, and documentation, according to procedures to be established by the Gaia Science Team, in consultation with the AWG and the executive committee of the Data Processing and Analysis Consortium. Any such procedures should not impede the timely analysis of the global data set, should not permit the published scientific interpretation of incorrectly calibrated or otherwise misleading data, and should not disrupt the dissemination of preliminary or final catalogues to the wider scientific community.

5. Public Relations, Education, and Outreach

Gaia is exceptionally well-suited for educational, awareness and technical training requirements, and will provide opportunities and challenges at all levels, from the evolution of the Galaxy, the search for extra-solar planets and detection of NEO's, through General Relativity, to the technical challenges in accessing large data sets. Every one of these is of direct and topical interest, and produces knowledge of very wide and continuing general applicability. The Gaia Mission will therefore be included in the overall ESA Communication Plan and a detailed Gaia communication Plan will be drafted in due time with inputs from the Project Scientist.

In parallel, the RSSD Gaia web facilities will continue to be the major on-line link between ESA and the Gaia community, offering a general documentation on Gaia.

6. The Gaia Data Processing and Analysis System

6.1 Overall Considerations

The Gaia scientific community is composed of a broad and extensive body of scientists who will eventually make use of the Gaia data products. A subset of this community will be a number of organizations and institutes willing to participate in the data processing and analysis tasks required to produce the Gaia products.

The processing of the Gaia data on ground presents its own formidable challenges for ESA and the associated scientific community:

- the algorithmic complexity is considerable;
- the data volume is vast, of order 1 Petabyte, dwarfing data sets currently treated within the astronomical community;
- it will require a massive numerical data processing effort, estimated of the order of 10^{21} floating point operations (1 second of CPU time devoted to each object would require 30 years);
- observations of each object, or each area of sky, are distributed throughout the mission observations, requiring rapid access in both the spatial and temporal domains;
- many different pieces of mission data will need to be considered together as part of the object model: the photometry, the spectroscopy, and the astrometric data;
- the control of systematic errors will be paramount;
- many different groups, with varied expertise, will be required to provide algorithms to the overall reduction system;
- the solution will be an iterative one;
- the lifetime of the associated software and processing system will be of order 10 years.

With a late-2011 launch, the 5-year operational phase would extend between 2012 and 2016, with an additional year of possible extended lifetime. There is no rigorous estimate of the time required to complete the entire mission data analysis, but a period of 3 years after end of operations is targeted, such that the final Gaia data products will be available as from 2020. Consideration of this time-scale drives consideration of early release(s) of preliminary Gaia data, and of the level of scientific analysis considered to be part of the pipeline data processing. The proposed approach is to form a Gaia Data Processing and Analysis Consortium (DPAC), which will design, develop, and operate the entire data analysis system, including its testing and validation in advance of launch.

6.2 Data Processing and Analysis Consortium

The Gaia Data Processing and Analysis Consortium (DPAC) will be responsible for:

- preparation of the data analysis algorithms to reduce the astrometric, photometric, and spectroscopic data within a coherent and integrated processing framework, including ‘special objects’ such as multiple stars and minor planets;
- generation and supply of simulated data to support the design, development and testing of the entire data processing system;

- the design, development, procurement and operation of all aspects of the hardware and software processing environment necessary to reduce the mission data throughout the simulation, mission operations and final catalogue production phases;
- the design, development and operation of the final Gaia database, which will contain the intermediate and final mission products of interest to the scientific community at large.

As a broad collaboration, a strictly hierarchical management structure cannot be adopted for the DPAC, but the following principles are considered applicable:

- overall distribution of responsibility for the Gaia data processing is as described in section 3;
- the SOC team at ESAC reports hierarchically through the standard ESA Directorate of Science reporting line;
- in addition to a local management of each 'coordination unit', the overall DPAC will be coordinated and managed by an Executive Committee. This committee should be able to oversee all relevant aspects of the DPAC development, yet be efficient in its management of what is anticipated to be a very large consortium. The ESA project scientist will be invited, as an observer, at the meetings of the DPAC executive committee.

The ESA requirements on the management structure, reporting procedures and data processing will be defined in the Announcement of Opportunity (and the embedded Science Implementation Requirements Document). Details will be provided in the community's response to the Announcement of Opportunity, from which later the Science Implementation Plan will be defined, once the DPAC has been selected by the SPC.

6.3 DPAC selection process

After approval of the SMP by the SPC, ESA will issue an Announcement of Opportunity (AO) for the community to formally participate in the processing and analysis of Gaia data. Together with the ESA Science Operation Centre located at ESAC, the groups and institutes that will be selected will collectively constitute the Gaia Data Processing & Analysis Consortium (DPAC). The AO will be open to all scientists from ESA member states. The AO will request the scientific groups and institutes to provide the manpower and facilities necessary for the development, testing and operations of their contribution to the Gaia data processing system. For that purpose, a Letter of Commitment from the relevant national funding authorities will be requested as an essential component of the Proposal.

The Proposals received in response to the AO will be evaluated under the responsibility of the AWG, following the standard ESA procedure involving the SSAC and approval by the SPC. Details of the selection procedure and evaluation criteria will be specified in the AO documentation package.

Upon selection, the exact responsibility of each party in the DPAC will be formalised through a Multilateral Agreement (MLA) between ESA and the relevant national funding authorities. After SPC endorsement, the MLA will have to be approved by the ESA council.

A timeline for the selection of the DPAC is provided in Table 4.

***Table 4**: Timeline for the Data Processing & Analysis Consortium (DPAC) selection*

Time frame	Title
15 Jan 2005	Request Letters of Intent
20 Mar 2005	Receive Letters of Intent
Apr 2005–Sep 2006	Data Analysis Coordination Committee preparatory work
29 Sep 2006	Publication of DPAC selection timeline on WWW
7-8 Nov 2006	SMP Approval by SPC
9 Nov 2006	AO Release for DPAC
11 Dec 2006	AO Proposals DPAC due
Dec 2005–Jan 2007 18-19 Jan 2007 30-31 Jan 2007	Evaluation phase AWG recommendation SSAC endorsement
22–23 Feb 2007	DPAC selection approval by SPC
Jan–Apr 2007	MLA negotiations with national funding agencies
24-25 May 2007	Confirmation of DPAC funding through MLA recommendation by SPC
13-14 June 2007	MLA approval by ESA council

6.4 ESA Commitments to the DPAC

The ESA SOC team for Gaia is committing a substantial contribution to the ground data processing, fully accounted for in the Gaia mission cost-at-completion. The Gaia SOC will be responsible for a number of tasks critical to the timely reduction of the entire Gaia data, specifically:

- the overall processing system architecture;
- the development, integration, testing and operation of the data reception and archiving system;
- hosting, operation and maintenance of the main data base;
- the execution of the astrometric global iterative solution;
- data transfer to and from the external processing centres;
- definition and execution of end-to-end system testing;
- technical support in definition and production of the final catalogue;
- hosting the final catalogue archive and user access;
- the acquisition, maintenance and operation of all the hardware and infrastructure required for the above tasks.

In addition, the SOC will be involved, in collaboration with the community, in the development of the astrometric global iterative solution.

Taking due account of the above defined undertakings, the ESA SOC at ESAC will form part of the Data Processing and Analysis Consortium.

6.5 Community Commitments to the DPAC

Substantial contributions from the scientific community to the DPAC are planned, and fully reflected in the provisional DPAC structure at the individual, institute, and data processing centre level. The community contributions will cover the development, implementation, testing, and operation of the following specific activities:

- contributions to the overall system activities;
- data simulations for all aspects of the ground processing;
- algorithms for the astrometric (core) global iterative solution, including relativistic treatment and reference frame definition and realisation;
- processing for special objects not handled in the core processing (including multiple stars, extra-solar planets, and solar system objects);
- photometric data processing;
- variability data processing;
- spectroscopic data processing;
- astrophysical classification (including derivation of effective temperatures, gravities, and metallicities);
- active participation in defining and updating relevant calibration products;
- contributions to the final catalogue archive and access.

Detailed scientific and technical work package descriptions, software prototypes, an overall data flow concept, an interface control document for the data transfer between the main data base and external processing groups, as well as plans for institutes for the external data processing centres, are well advanced, and will be formalised through the response to the ESA AO.