Gaia data access scenarios summary

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Abstract

This document provides an overview of the Gaia data access scenarios collected from the astronomical community. The scenarios have been prioritized and a very preliminary analysis of the scenarios in terms of requirements on the data access tools is provided through comments. The astronomical community is invited to read this document and provide feedback through the following wiki page: `http://great.ast.cam.ac.uk/Greatwiki/GaiaDataAccess/GdaScenariosFeedback`.

Document History

Issue	Revision	Date	Author	Comment
1	0	21-Jun-2012	AB	Feedback link added. Document issued.
D	7	15-Jun-2012	NAW	Minor revisions: intro, useCaseSummary
D	6	13-Jun-2012	NCH	Even more minor touch ups
D	5	08-Jun-2012	WOM	Minor touch up .
D	4	06-Jun-2012	AB	Introduction added, ‘use cases’ replaced by ‘scenarios’, acronym table fixed.
D	3	27-Apr-2012	JCM, AB	Use case summary added and ordering of scenarios improved.
D	2	26-Apr-2012	FA, JCM, AB	Typos and math mode. Ordering by cases, comments bug fixed.
D	1	25-Apr-2012	AB, JCM	Use case templates filled in and document name and code changed.
D	0	12-Mar-2012	AB	Document created.

Acronyms

The following table has been generated from the on-line Gaia acronym list:

Acronym	Description
2MASS	Two-Micron All Sky Survey
ABS	Astrometric Binary Star
ADQL	Astronomical Data Query Language
AGIS	Astrometric Global Iterative Solution
AP	Astrophysical Parameter
CANFAR	Canadian Advanced Network For Astronomical Research
CCD	Charge-Coupled Device
CPU	Central Processing Unit
CU	Coordination Unit (in DPAC)
DPAC	Data Processing and Analysis Consortium
EROS	Expérience pour la Recherche d'Objets Sombres
ESAC	European Space Astronomy Centre (VilSpa)
FFT	Fast Fourier Transform
FITS	Flexible Image Transport System
FoM	Figure of Merit
FoV	Field of View (also denoted FOV)
GAP	Gaia Archive Preparations (DPAC WG)
GREAT	Gaia Research for European Astronomy Training
HR	Hertzsprung-Russell (diagram)
ID	Identifier (Identification)
IDL	Interactive Data Language
LIGO	Laser Interferometer Gravitational wave Observatory
MACHO	MAssive Compact Halo Object
MC	Monte-Carlo (simulation/process)
MCMC	Markov Chain Monte-Carlo
MW	Milky Way
NSS	Non-Single Star
OGLE	Optical Gravitational Lensing Experiment
PC	Personal Computer
PDF	Probability Density Function
PanSTARRS	Panoramic Survey Telescope And Rapid Response System
QSO	Quasi-Stellar Object
RAVE	RAdial Velocity Experiment
RV	Radial Velocity
RVS	Radial Velocity Spectrometer

SA	Science Alert(s)
SAMP	Simple Application Messaging Protocol
SDSS	Sloan Digital Sky Survey
SM	Sky Mapper
SOC	Science Operations Centre
SQL	Structured Query Language
SSAP	Simple Spectral Access Protocol
SSO	Solar-System Object
UDF	User Defined Function
UI	User Interface
UVES	UV-Visual Echelle Spectrograph (VLT)
VISTA	Visible and Infrared Survey Telescope for Astronomy
VO	Virtual Observatory
WISE	Wide-field Survey Explorer
XM	Cross-Matching

Contents

1 Introduction

In 2011 a process was initiated by the Gaia Archive Preparation group (GAP) to collect ideas from the astronomical community on how they might wish to access the Gaia science data products (catalogue and/or archive).

The request to the community was to formulate so-called 'Gaia data access scenarios' and enter them on the Gaia Data Access wiki pages: `http://camd08.ast.cam.ac.uk/Greatwiki/GaiaDataAccess`. This task has been initiated within GAP (Gaia Archive Preparation group) but will be taken over by the DPAC Coordination Unit 9 (CU9) once it has been formed. Collection of the scenarios began via an announcement at the 2011 GREAT Plenary (21-23 June 2011) meeting in Brussels. All scenarios received till 5 March 2012 were considered and are contained within this document.

The data access scenarios encapsulate Gaia science data, catalogue or archive usage examples as well as ideas for the kinds of data that should be made available. The scenarios provided by the users are focused on what is needed rather than how their wishes might be implemented technically. The purpose of this exercise is to ensure that the CU9 efforts are strongly focused on the needs expressed by the astronomical community. Thus, the development activities are end-user driven.

The collection of data access scenarios is an ongoing process (feel free to add to the above wiki pages!)

The initial assessment of the community provided science usage scenarios was carried out during a dedicated meeting (attended by the authors of this document) on 29 November 2011. The aim of that meeting was to make a first broad ranking of the data access scenarios, with each scenario being analysed and quantified, assessed across a range of key attributes.

Thus, the following attributes were scored for each scenario:

Urgency Is the scenario described a 'must have' and/or should the corresponding archive capabilities be available for early data releases?

General/specific Is the scenario described useful in general (i.e. can it be generalized to other Gaia data products or user communities) or is it specific to a certain science question or user community?

Science rank This is an assessment, by the authors of this document, of how important the suggested data access scenario is in order to maximize the science exploitation of the Gaia mission results. It should thus not be read as an assessment of how interesting a given science topic is.

Scale Is the scenario expected to involve a large volume of data?

Frequency How often is the scenario likely to occur?

Based on these scores each data access scenario was given an overall rating. The purpose of the rating is to identify development priorities for CU9 and will also aid in the scoping of resources (staff effort) required.

1.1 Data access scenario labelling and attribute definitions

The data access scenarios listed in this document follow the labelling scheme:

GDAS-*topic*-*xxx*,

where *topic* refers to the data access category and can be `BR` (for **Br**owsing and qualitative exploration), `SA` (for **S**cience **A**lerts), `ED` (for **E**arly **D**ata access), or `EG` (for **E**xtra **G**alactic science), `GA` (for **Ga**lactic science), `ST` (for **St**ars and Stellar Physics science), `SO` (for **So**lar System science), `FP` (for **F**undamental **P**hysics science), `PO` (for **P**ublic **O**utreach, `OA` (for **O**ther and **A**dvanced usage scenarios). *xxx* is a monotonically increasing counter for every unique combination of GDAS-*topic*.

The above breakdown of themes breaks the scenarios into main Gaia science areas, with in addition functional themes for cases such as general outreach. In sections 2 and 3 each Gaia data access scenario is presented with its unique label and a number of associated attributes:

GDAS-*topic-xxx*	The unique identifier of the data access scenario (see above).
Scenario	General description of the data access scenario.
Specific Example	Specific example of the scenario. Possible implementation. Worked out query for comparison on various systems.
Urgency	Urgency, 4=high.
General/Specific	General/specific, 1=specific 4=general.
Science rank	Science rank, 4=high
Scale	Scale, 4=large data volume.
Frequency	Frequency, 4=often.
Rating	Overall rating $= \text{ScienceRank} \times (\text{Urgency} + \text{GeneralSpecific} + \text{Frequency})$.
Related to	Codes of related scenarios.
Inputs	Inputs needed for the query related to the scenario.
Tasks	What tasks need to be executed to realise the data access scenario.
Roles	The typical user (astronomer, new user, general public, etc).
Information required for the roles	Information needed by the roles.
Comments	Comments on the data access scenario.

The data access scenarios are summarized in section 2 (ordered by overall rating) for easy reference, and the complete scenarios are listed in section 3 (grouped by topic, ordered by identifier). Note that the text in the scenario tables was automatically generated from a spreadsheet so the formatting is not always optimal.

1.2 Feedback on this document

This document has been circulated amongst the astronomical community in general and feedback is invited. Did we correctly understand your scenario? Are important scenarios missing? Do you have suggestions on the inputs needed or the tasks required? Are there scenarios which should be rated higher/lower?

You can leave your comments on this wiki page: `http://great.ast.cam.ac.uk/Greatwiki/GaiaDataAccess/GdaScenariosFeedback`.

1.3 A note on distances and distance dependent quantities

In the comments to some of the scenarios there are remarks or disclaimers about providing distance information or information on quantities that depend on the distance, such as transverse velocity, angular momentum, etc. We want to point out at this stage, that as a rule the Gaia catalogue *will not contain a 'distance column'* (or for that matter, transverse velocity, angular momentum, etc). The reason is that Gaia does not measure distances but parallaxes. Distances to sources are derived from an interpretation of the parallax (and other information). Only for very precise parallaxes can one simply state $d = 1/\varpi$, in all other cases the distance that one determines for a source (from the astrometry, photometry, and spectroscopy) or groups of sources becomes a matter of scientific research.

Hence, selections on quantities such as distance or transverse motion should in principle never be carried out directly. One should translate the selection criteria to the observables and then do the selection in the catalogue. However, there will be many use cases (e.g., for the volume near the Sun) where a simple selection involving the distance to sources is desirable, and thus standard transformation functions from the astrometric data to the desired quantities will be provided. However, it will be up to the user to take responsibility for using such functions within the limits where they apply.

2 Summary of data access scenarios

Scenario label	Scenario	Rating
GDAS-BR-01	I'm completely new to Gaia. Tell me all about what is contained in the Gaia Archive, and give me some clear examples illustrating how it might be useful to my science.	**48**
GDAS-BR-10	I would like to be able to select objects based on any set of the variables provided in the Gaia catalogue position, parallax, astrophysical parameters, proper motion uncertainties etc. These selections should not be limited to simple "axis-parallel" cuts or cone cuts, but permit a broader array of functions/functional dependencies. An example is selection on fractional parallax error and some relation between G magnitude and extinction. Another is selection on space velocities, which requires a combination of position, parallax and proper motion.	**48**
GDAS-BR-07	I want data of all objects contained in a rectangular/circular region centered on a given sky position.	**48**
GDAS-EG-04	I want the RVS spectra of my favourite source(s)	**48**
GDAS-EG-09	I want astrometric and/or photometric and or/spectroscopic measurements of a specific type of source (GDAS-EG-2), but possibly for each and every epoch of observation.	**48**
GDAS-EG-10	Information about flux variation and position among objects with multi-epoch photometry	**48**
GDAS-GA-01	I have a list of N members and member candidates in a young open cluster further than 300 pc, where the Hipparcos parallaxes were not reliable. I want to obtain the parallaxes, proper motions, broad-band photometry and accurate coordinates of all of them in the Gaia dataset.	**48**
GDAS-GA-16	I would like to retrieve the astrometric and photometric data concerning any star in distant star forming region.	**48**
GDAS-GA-02	I would like to query the Gaia catalogue in some peculiar Galactic directions and retrieve the (U,V,W) velocities of the stars relative to the Sun when possible, together with their distance, metallicity and error bars.	**48**

GDAS-GA-21	Given a list of RA,Dec or (l,b) positions, find all objects in the Gaia catalogue within some user-specified physical distance of each. Optionally apply logical queries to the objects selected (e.g. only take objects with Teff in some range or with a class probability above some value).	**48**
GDAS-GA-06	I want all objects whose radial velocities from the RVS are between v_1 and v_2 km/s.	**48**
GDAS-GA-07	I want any measurements of my favourite source(s).	**48**
GDAS-ST-25	Display the information for a given source (for variability analysis): • Source Attributes. E.g. mean magnitude, mean colour, period, amplitude, etc • Light curve • Folded light curve • Frequency gramme	**48**
GDAS-ST-06	Proximity Queries: Select targets in rectangle, polygon, ellipse; Select objects in this circular part of the sky that are closer to target X than to target Y; Coordinate systems: equatorial, ecliptic, galactic	**48**
GDAS-EG-02	I want astrometric and/or photometric and or/spectroscopic measurements of a specific type of source.	**44**
GDAS-EG-08	I want all quasars observed so far with Gaia to be plotted on the celestial sphere.	**44**
GDAS-GA-15	I would like to retrieve the astrometric and photometric data concerning any star hosting planets. I would need positions, proper motions, parallaxes and radial velocities (if available) and the associated covariance matrices.	**44**
GDAS-GA-08	I want the RVS spectra of my favourite source(s).	**44**
GDAS-OA-19	Any query I run on 'Release-N' I'd like to be able to run on any earlier release. This to confirm earlier results, look for systematics due to improving accumulation of data etc.	**44**

GDAS-ST-20	Object selection for observational programmes: Return a list of positions and other selected measurements for all binaries (with a probability >x), with certain constraints for the components, e.g. a G dwarf and an M dwarf (could be specified via $T_{\rm eff}$, $\log g$) with minimum separation y arcsec, brighter than z magnitudes, at Declinations north of 30 degrees.	**44**
GDAS-BR-16	Interactive plots (2D/3D zooming and rotation). The user will have the possibility to select any attribute for any axis and customize the plot in that way. • E.g. selecting mean values for colour and magnitudes, the user can produce the HR diagram. • It should be possible to make a selection of points and store the set of sources for other plots or analysis. • Aggregated plots (Anthony Unwin, 2006). When the number of objects is huge, the data has to be aggregated for better visualization. Some kind of aggregation plots includes: – IQR plot – Histogram – Mosaic plots – Bubble plots – Density plots These aggregated plots are meant to analyze large sets of data without plotting detailed information for all sources.	**40**
GDAS-BR-02	Show me the area of sky which Gaia will be observing on any particular date.	**40**
GDAS-EG-06	I want the list of quasars whose optical magnitude with Gaia is brighter (or the opposite) than a given number. I want the list of quasars whose redshift is smaller (or the opposite) than a given number. I want the list of quasars whose positional accuracy in the Gaia catalogue is better (or worse) than a given number.	**40**

GDAS-GA-22	I would like to have Gaia distances and proper motions for stars that were observed by RAVE. I'd like to obtain in the same query the radial velocities and physical parameters derived from RAVE. Are you planing such a detailed cross-match between catalogues?	**40**
GDAS-GA-04	I want whatever measurements of MW G2 stars only in a given sky region.	**40**
GDAS-GA-05	I want any measurements of all stars except Cepheids.	**40**
GDAS-GA-09	I want the BP/RP magnitudes (or radial velocities) of my favourite source(s) at all dates of observations.	**40**
GDAS-PR-02	Explain what is the Milky Way.	**40**
GDAS-PR-03	Almost similar to GDAS-PR-1: Make a movie of a flight through the Milky Way disc, respecting the distances and apparent luminosity of objects.	**40**
GDAS-PR-04	Hi, I am a ten year old child. I'd like to know which basic science can be done with the data from the satellite	**40**
GDAS-PR-05	Explain and illustrate the progress of our knowledge on the Milky Way science from Hipparcos to Gaia.	**40**
GDAS-PR-06	Explain how Gaia will help to constrain the mass distribution of the Milky Way.	**40**
GDAS-PR-07	Make the Gaia Catalogue available in the data format used by Planetariums for the all-sky projection and by PC planetarium programs	**40**
GDAS-PR-08	Produce user friendly interfaces to the Gaia data base which can even by used by students at school or citizen scientists	**40**
GDAS-ST-22	I would like to retrieve the RVS spectra (combined, normalized, in rest-frame) having S/N $>$ some value and ($T_{\rm eff}$, $\log g$, [Fe/H]) within a specified range.	**40**
GDAS-ST-04	I want to find stars with exceptional properties, i.e. those stars that are outside a certain statistical range. E.g. extreme proper motion, extreme variability, ...	**40**
GDAS-ST-05	Standard Queries Filter operations: ==, ! =, <, >, <=, >= Combination logic: and, or, not, xor Rather often a group of targets to be queried is not aligned along the axes of the parameter space provided by the Archive. Therefore also linear combinations of quantities should be queriable. E.g.: 3 <= a*X + b*Y + c*Z <= 4 with a,b,c provided by the user and X,Y,Z three quantities archived for every star.	**40**

GDAS-BR-03	I have a list of targets of interest from SDSS/UKIDSS/VISTA/PanSTARRS/whatever. For each one, give me the astrometric parameters (position at my specified equinox and epoch, proper motion, parallax and errors/quality statistics indicating the accuracy and significance of the data).	**36**
GDAS-EG-05	Provide a list of point-like sources which have absolute proper motions and parallaxes consistent with zero	**36**
GDAS-EG-07	I want the list of quasars which optical magnitude/astrometric position determined with Gaia is variable.	**36**
GDAS-GA-03	I want whatever measurements of Milky Way objects only in a given sky region.	**36**
GDAS-ST-23	I would like to use G mag, BP/RP, RVS data for Be stars to cross match them with existing surveys like OGLE, MACHO, EROS ...	**36**
GDAS-BR-15	I would like to be able to do on-the-fly smoothing/ averaging of the data such that queries can be composed giving properties per spatial bin - for instance - binned in 1 arcmin elements.	**33**
GDAS-OA-10	I want the FULL catalog of Gaia data, i.e. all objects, from all directions, containing all Gaia measurements (except RVS spectra) with associated uncertainties.	**32**
GDAS-SA-01	Can I get all microlensing events detected in real-time by Gaia and see their photometric light curves and astrometric curves?	**32**
GDAS-SO-01	I want to know if a given asteroid was observed and retrieve a list of epochs corresponding to the object transits.	**32**
GDAS-SO-02	Get a catalogue of Gaia-determined orbits as a function of different parameters (a range of semi-major axis, and/or inclinations, and/or eccentricity, etc)	**32**
GDAS-ST-01	I am studying stars in a cluster. I want to know the probability that these stars are binary/multiple systems. It is important that I can set the cut-off on this probability, it should not have been set in the catalogue itself.	**32**
GDAS-BR-14	I would like to be able to visualise the Gaia catalogue - in multi-dimensional space - preferably utilising a visualisation engine such as Google Sky or World Wide Telescope - such that I can incorporate data from other surveys in to the same tool.	**30**

GDAS-OA-09	Any query with constraints on Gaia measurements: Let the user provide the constraints in any commonly used unit, and give several options for the output units, if applicable. Example: Return the radial velocity in m/s for all objects within a certain volume of space, where the limits are specified in decimal degrees for galactic longitude and latitude and in kpc for the distance from the Sun.	**30**
GDAS-ST-14	Return all epoch radial velocities (with date of observation) of all stars classified as Cepheids (based on Gaia data) with an error in metallicity (based on Gaia data) below x-dex, when there are at least N epoch RV with an error below y km/s.	**30**
GDAS-BR-06	I liked the statistical plots presented in Section 3 of Volume 1 of the Hipparcos and Tycho Catalogues. Show me the same for Gaia and allow me to specify the statistic to explore.	**28**
GDAS-BR-09	I want to manipulate a 3D cube of the Milky-Way.	**28**
GDAS-BR-04	I would like to have all the available Gaia measurements for all red giants (or whater type of physical object, such as galaxies, QSO, SSO and so on)	**27**
GDAS-GA-10	I want the measurements of all Galactic objects located at a given distance z to the median Galactic plane ($z = 0$).	**27**
GDAS-GA-14	I like to analyse the 5-D, 6-D phase space structure of stellar populations selected by magnitude, colour, abundances in a galactocentric (cylindrical) coordinate system.	**27**
GDAS-GA-23	I would like to have velocities and associated uncertainties in the reference system as explained in GDAS-GA-14 but only for stars in a spherical volume of certain radius in pc centered in a given position of the disc that I could indicate in cylindrical coordinates (R, ϕ, z).	**27**
GDAS-OA-03	I want to average astrometric measurements over groups of sources and account correctly for the star-to-star correlations.	**24**
GDAS-PR-01	For my named constellation, fly me along the line-of-sight giving me information of interest on each star as I pass it.	**24**

GDAS-SO-03	I'd like to have access to observed barycentric longitudes and latitudes of asteroids and masses of asteroids deduced from Gaia observations of asteroids	**24**
GDAS-ST-24	Find binary stars with specific colours - where the colours of one or both of the binaries can be specified	**24**
GDAS-ST-07	Fuzzy Queries Most quantities in Gaia archive will have errorbars. This is relevant for queries. E.g. asking for all stars with $T_{\rm eff}$ <= 4000 K, would not include a star with $T_{\rm eff} = 4050 \pm 250$ K. Fuzzy querying should allow this. This requires for each quantity: the value, a standard deviation (errorbar), and a probability distribution for this quantity. Most often this will be a gaussian distribution, but this may not always be the case, particularly if a quantity was computed by dividing two gaussian quantities. A fuzzy query could add a qualifier to the request: almost certain (P $>$ 90%) likely (70% <= P <= 90%) perhaps (30% <= P $<$ 70%) unlikely (10% <= P $<$ 30%) almost certaintly not (P $<$ 10%) The probabilities are computed using the density; the exact definition of the qualifiers could be configured by the user.	**24**
GDAS-GA-17	I like to compare the spatial distribution and dynamics of open star clusters with numerical simulations.	**21**
GDAS-OA-14	The posterior distribution function (PDF) over APs of objects in the Gaia catalogue (provided by CU8, but perhaps also by CU4 and CU7) are, in some cases produced by Bayesian algorithms using a specific prior. For the set of APs of a given object, I would like to be able to obtain (a) the full multiparameter posterior PDF and not just the estimate plus error bar, and (b) the prior PDF, (c) the likelihood function, so that I can apply my own prior and evaluate a new posterior PDF. I would also like to be able to do the same for object classes (where we have scalar class probabilities for each class rather than a PDF).	**21**
GDAS-OA-18	Use standard analysis and visualisation tools Aladin, Topcat, IDL, Python and compare Gaia data with data available in VO standard.	**21**

GDAS-OA-05	If probabilistic (Bayesian) methods were used to arrive at a particular parameter value please provide the full probability density function and not just value+error.	**21**
GDAS-EG-01	I want all informations and measurements of any type of objects whose radial velocities from the RVS are between v_1 and v_2 km/s	**20**
GDAS-ED-01	For my list of stars based on some ground-based observations or catalogue, give me SM CCD image thumbnails.	**20**
GDAS-OA-02	I want to look for candidate planetary systems in the Gaia catalogue. Let me experiment with my selection criteria to get what I consider to be a usefully clean and complete set, along with all their astrometric, photometric and spectroscopic data.	**20**
GDAS-SA-03	Fermi has detected a flaring blazar. It has a certain error ellipse, say a few arc-minutes. An optical counterpart is not known. How can one get lightcurves for all objects in the error-ellipse to look for variability and thus possible counterparts to the blazar?	**20**
GDAS-GA-19	I would like to be able to select objects based on any set of the variables provided in the Gaia catalogue position, parallax, astrophysical parameters, proper motion uncertainties etc. These selections should not be limited to simple ”axis-parallel” cuts or cone cuts, but permit a broader array of functions/functional dependencies. An example is selection on fractional parallax error and some relation between G magnitude and extinction. Another is selection on space velocities, which requires a combination of position, parallax and proper motion.	**18**
GDAS-OA-16	An object in the Gaia catalogue turns out to be misclassified, is of special interest, or needs to be discussed.	**18**
GDAS-ED-02	I would like to be able to access the individual Gaia astrometric measurements, as opposed to only the astrometric parameters (positions, parallax, proper motions) resulting from modelling; similar to the Hipparcos Intermediate Astrometric Data.	**16**
GDAS-GA-12	I want a face-on view of the velocity field(s) of any Galactic objects.	**16**

GDAS-OA-01	I have a sophisticated simulation code that produces full phase-space realisations of the stellar content of some fraction of the Milky Way. I want to vary certain inputs to my model that are of astrophysical interest and compare against the full Gaia catalogue. Provide me with the means to do this.	**16**
GDAS-OA-15	I want to do rare object detection on the entire Gaia catalogue. Two possibilities: (1) I wish to find the (say) 0.01% of all objects (=>10^5 objects, call this number X) which have the highest/lowest value of some metric defined on the Gaia data. For example, this might be the X coolest stars, the X nearest/fastest relative to the Sun, or the X stars nearest to the Galactic centre (say) with extinctions less than (say) 1 magnitude where the extinction errors are also less than 0.1 mag. (2) like (1), but not fixing X but rather finding all objects which have a value of the metric above (or below) some threshold	**16**
GDAS-SO-04	Find me all objects with colours of asteroids, located within our solar system, not classified as asteroids	**16**
GDAS-ST-19	I want to analyze the per CCD photometry for stars where I expect variability on very short time scales. This represents a 10-fold increase in the stored G-band photometry but would be very much appreciated.	**16**
GDAS-BR-12	I would like to be able to select those objects which show significant spectral features (emission lines or absorption lines) in the BP/RP.	**15**
GDAS-GA-20	I would like to make selections of Gaia objects based not only on Gaia data, but also based on other major catalogues available at that time, such as Pan-STARRS and SDSS.	**15**
GDAS-GA-24	Tell me the number of stars that Gaia has observed with $\|z\|$ <500 pc (kind of disc selection). Now give me positions, velocities and associated uncertainties of all these stars. Will I be able to handle this file?	**15**
GDAS-GA-25	I need all information available for stars located at distances d<1 kpc and with certain heliocentric velocities $U \pm dU$ and $V \pm dV$ corresponding to a given moving group.	**15**

GDAS-OA-04	I know that CU8 uses multiple methods for the classification and parametrization of stars and other sources. The same will hold for CU4 and CU7. Please give me the output of all methods used so that I can decide for myself which one to trust/use.	**15**
GDAS-BR-05	I want a pretty colour picture for my powerpoint presentation, created using Gaia data. For example (first that comes in mind): I would like to select all stars belonging to the halo of the Milky Way and colour them according to their 6D phase space information, assigning to each group its own colour. Then I want to project this on the sky either in ecliptic coordinates or whatever I choose, so that I can illustrate how the halo is structured and where the streams are, to make a picture like the one from the SDSS one, but with Gaia data (`http://www.ast.cam.ac.uk/~vasily/sdss/field_of_streams/dr6/fos_dr6.jpg`). I would also like to be able to put labels with the stream names and then save that picture in one of the most common formats, without having to actually download the data on my computer.	**14**
GDAS-BR-08	I want data of all objects contained in a rectangular/circular region within (or at a) a given distance R from the Sun, or from any other star, and at a given distance z from the equatorial plane (z=0).	**14**
GDAS-SA-05	Based on selection criteria, flux alerts meeting those criteria should trigger observations on robotic observational facilities - e.g. the Liverpool Telescope	**14**
GDAS-ST-03	I want to find clusters of stars in the following way: I select a core set of the stars in the catalogue. The archive then finds me stars that are “similar” in distance, proper motion, radial velocity, ... On all these parameters I can set cut-off values that define what “similar” means.	**14**

GDAS-OA-13	CU8 provides classes on all and APs on most objects using different algorithms and based on different combinations of input data (BP/RP only, BP/RP with parallax and magnitude, RVS only, etc.). For a given class/AP for a given object I would like to repeat the CU8 work using my own algorithms, but using the same input data. I therefore want to be able to access exactly these data as was used for a specified set of objects (specified via Gaia ID). (I actually would want to specify via the APs themselves, e.g. I want to reparametrize all hot stars, or everything classified by CU8 as a white dwarf. But I am assuming this could be achieved via a separate query I have requested elsewhere).	**12**
GDAS-OA-08	My target has been observed as part of a large spectroscopic survey (e.g. from 4MOST and/or WEAVE) - and I would like to be able to interface (in a seamless manner) that external spectroscopic data and the Gaia data	**12**
GDAS-BR-11	I would like to make selections of Gaia objects based not only on Gaia data, but also based on other major catalogues available at that time, such as Pan-STARRS and SDSS.	**10**
GDAS-ED-03	Give me the positions of all objects observed by Gaia in the Gaia 'initialisation' phase.	**10**
GDAS-GA-13	Same as GDAS-BR-10 but for the RVS radial velocities.	**10**
GDAS-SA-02	I would like check if there were any supernovae detected in real-time by Gaia in a given region of sky, e.g. in a galaxy cluster. Also it would be good to check what kind of follow-up data is available for these supernovae which was taken after the Gaia trigger.	**10**
GDAS-OA-12	I would like to access the individual astrometric measurements or their residuals with respect to the standard astrometric model; similar information to what the Hipparcos Intermediate Data provide.	**9**
GDAS-OA-07	What is the detailed detection/selection function of Gaia at both ends of its magnitude range? This should be known from the knowledge of the on-board detection and resource allocation algorithms and from the subsequent data processing.	**9**
GDAS-OA-17	Examine the properties of Gaia data in detail without querying the whole Gaia database.	**8**

GDAS-BR-13	Case opposite to GDAS-BR-2; given an object (or a list of objects; or a specific area on the sky), tell me when it will be observed by Gaia.	**7**
GDAS-GA-11	I want a tool that provides a face-on view of the Milky Way, as inferred from Gaia data.	**7**
GDAS-EG-03	I want the reconstructed image of my favourite source(s)	**6**
GDAS-FP-01	Multiply imaged quasars consist of multiple (typically 2, 3, 4 or even more) point-like images of a same quasar lensed by a foreground intervening galaxy. The typical angular separations between the multiple point-like images range between 0.1” and 3”-5”. It might also be that between these multiple lensed images lies the direct image of the lensing galaxy responsible for the cosmic mirage. This galaxy could be somewhat extended. In our opinion, at least two distinct cases might happen for Gaia. All point- like images will either be detected by Gaia and show a same quasar spectrum (at the same redshift). In that case, we could just query the database to show all those systems consisting of multiple quasar images at a same redshift with an angular separation less than 5”. A second case could be such that the individual lensed images have not all been resolved by Gaia and that the resulting object has been classified as an extended one (possibly consisting of several nearby point-like or barely resolved components showing an overall quasar spectrum). How to identify such systems in the Gaia database? We could perhaps just select these as being extended objects and showing a quasar spectrum.	**6**
GDAS-OA-06	Where Markov Chain Monte Carlo methods are employed please store the actual Markov chain. I would like to run my own MCMC optimization using the Gaia Markov chain as a starting point.	**6**
GDAS-SA-06	Provide an alert if an object if now at a level below the standard flux alert threshold BUT was previously also just below an flux alert threshold.	**6**
GDAS-ST-08	Pattern Queries Example: ”Return stars like this set of stars, but avoid stars like that set of stars”, where the two sets are defined by the user. Rather challenging to implement, but incredibly useful.	**6**

GDAS-SA-04	Advanced LIGO will start to generate a stream of Gravitational Wave alerts from 2014 or so. A rapid correlation of AdvLIGO 'gravitational' and Gaia 'electromagnetic' alerts will be required. The positional error box on advLIGO sources will be large, 2deg with advLIGO for high S/N events, and perhaps 10's of degrees for more common low S/N events. Thus the ability to provide effective cross matches will be important.	**4**
GDAS-ST-21	Radial velocities of bright stars observed with Gaia and in particular with the RVS will be measured for the majority of bright single stars and average spectra will be computed and included in the catalog. The pipe-line processing will usually have two weaknesses. The first weakness is that the catalog pipe-line will be limited in processing time and thus a few computations of interest will be missing. The second is that the processing should be blind and robust which is very difficult to afford. Therefore some sophisticated techniques do not have their place in the pipe-line processing. We can consider that the exploitation of the catalog should include the possibility to perform further (re)processing of a limited number of objects... and thus the related possibility.	**4**
GDAS-EG-11	List all objects given as superimposed stars and galaxies. Provide the unblended (estimated) properties of the non-stellar component.	**3**
GDAS-OA-11	I want to retrieve ALL existing RVS spectra.	**3**
GDAS-ST-10	Random Queries Return an unbiased random subset of size N of the Gaia Archive, according to a user-specified multivariate distribution for quantities X, Y, and Z. Computing a reliable histogram, for example, can be done without using the entire archive, as long as you have a unbiased subset of the archive.	**3**
GDAS-ST-11	Whole-database queries Sequentially According a space-filling curve	**3**
GDAS-ST-12	Queries in the frequency domain E.g.: return stars with an excess in the Fourier spectrum in the frequency range [x,y] E.g.: return stars with a 1/f noise profile in the Fourier domain	**3**

GDAS-ST-13	Queries in the time domain E.g.: return stars with at least N points that are 5 sigma below the median of the light curve.	**3**
GDAS-ST-15	One wish would be to have more than only cross-matches to external catalogs but also the data values, so I assume there is a link to e.g. WISE or VISTA Hemisphere survey, say a K-band magnitude. Query: return the epoch radial velocities of all stars with ABS(a Log P + b - K-mag) $<$ sigma, where a,b,sigma are user-supplied, K-mag would come from the cross-matched external catalog and P is the Gaia-derived period.	**3**
GDAS-ST-16	I would like to select all Gaia measurements of all objects of a certain kind that also have certain data in a certain public archive. Example: I need Gaia astrophysical parameters for all red giants ($\log g$ $<$3, 4000$<$T$<$5000, for example) that also have high resolution spectra present in the UVES archive (or in any other VO archive). Commentary: This means interfacing effectively with the VO.	**3**
GDAS-ST-17	I have my own private catalogue (of magnitudes, or positions, or chemical abundances or other properties) of a globular cluster. I would like to upload it or anyway match it with the Gaia catalogue and visualize any of the chosen properties of common objects in a graph, maybe even in 3D form. I also want to do some statistical tests. Maybe in the first exploratory phases I do not want my private catalogue to become public, but I still would like to avoid downloading locally a large chunk of data because I want an instant check of some idea that came when analyzing my data. An example: I want a 3D plot of all the stars spatial positions (from Gaia), and I want the stars coloured differently according to their carbon abundance (that I measured). Then I want to project this in different ways and planes, and perform some Kolmogorov-Smirnov statistics, for example. Commentary: This would be immensely useful to understand the physical object you are studying!	**3**

GDAS-ST-18	I have my own radial velocity measurements in the core of a globular cluster, and some literature proper motions that I collected, with some overlaps for some of the stars. Gaia measurements, due to crowding from the other line of sight are for many less stars than my catalogue, but they are much more precise and accurate. I want to cross-match the various catalogues with Gaia data on the fly, online, and check zero-points, trends with magnitude and colour, eventually correct my data and homogenize all the measurements (mine, Gaia, and literature) with meaningful errors through robust statistics (medians, whatever) and have that resulting catalogue on my laptop for further science exploration of that cluster. Commentary: This would be immensely useful to understand the physical object you are studying!	**3**
GDAS-ST-02	I want to fit a synthetic spectrum to the observed fluxes (BP/RP and/or RVS), as well as additional fluxes from other catalogues (e.g. 2MASS). I would like those data to be directly available in the Gaia catalogue, I don't want to copy/paste from the 2MASS catalogue. I need to be able to degrade the synthetic spectrum with all the Gaia instrumental effects for a useful comparison between observation and theory.	**3**
GDAS-ST-09	Group Queries Rather than constraining the properties of targets, it is sometimes needed to constrain the relation between two or more targets. E.g.: return all stars with an apparent distance on the sky <= alpha E.g.: return all stars within this circle on the sky that have the same apex with a tolerance of alpha.	**3**
GDAS-GA-18	I like to measure the properties of spiral arms in the extended solar neighbourhood.	**2**

3 Data access scenarios

Gaia Data Access scenario: GDAS-BR-01		
Scenario: I'm completely new to Gaia. Tell me all about what is contained in the Gaia Archive, and give me some clear examples illustrating how it might be useful to my science.		
Specific example: all the rest		
Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale:	**Frequency**: 4	**Rating**: 48
Related to:		
Inputs: query help / archive info		
Tasks: help system		
Roles: new user		
Information required for the roles: list of tables		
Comments:		

Gaia Data Access scenario: GDAS-BR-02		
Scenario: Show me the area of sky which Gaia will be observing on any particular date.		
Specific example: for DATE = ? RETURN RA,DEC bounding box - indicate direction of scan		
Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale:	**Frequency**: 2	**Rating**: 40
Related to: GDAS-BR-13		
Inputs: date range		
Tasks: positional coverage		
Roles: general user		
Information required for the roles: Gaia FoV over given date range		
Comments: Requirements doc underway in SOC WOM-067 or WOM-068		

Gaia Data Access scenario: GDAS-BR-03

Scenario:
I have a list of targets of interest from SDSS/UKIDSS/VISTA/PanSTARRS/whatever. For each one, give me the astrometric parameters (position at my specified equinox and epoch, proper motion, parallax and errors/quality statistics indicating the accuracy and significance of the data).

Specific example:
select posAtEquinox(c.ra,c.dec,c.pmc.varpi, 1950) from completesource c where c.sourid in (select id from mylist)

Urgency: 2	**General/Specific**: 4	**Science rank**: 4
Scale: 4	**Frequency**: 3	**Rating**: 36

Related to:
GDAS-EG-04

Inputs:
target list (ID or positions), epoch

Tasks:
nameresolver, xmatch, epoch transform

Roles:
astronomer, general user

Information required for the roles:
astrometry

Comments:
Epochs later - xmatch initially in Aladin or other VO tools

Gaia Data Access scenario: GDAS-BR-04

Scenario:
I would like to have all the available Gaia measurements for all red giants (or whater type of physical object, such as galaxies, Qso, SSO and so on)

Specific example:

Urgency: 2	**General/Specific**: 4	**Science rank**: 3
Scale: 4	**Frequency**: 3	**Rating**: 27

Related to:

Inputs:
Classification of physical parameters.

Tasks:
query. phenomenological.

Roles:
astronomer. public.

Information required for the roles:
Any parameters from Gaia catalogue.

Comments:

Gaia Data Access scenario: GDAS-BR-05

Scenario:
I want a pretty color picture for my powerpoint presentation, created using Gaia data. For example (first that comes in mind): I would like to select all stars belonging to the halo of the Milky Way and color them according to their 6D phase space information, assigning to each group its own colour. Then I want to project this on the sky either in ecliptic coordinates or whatever I choose, so that I can illustrate how the halo is structured and where the streams are, to make a picture like the one from the SDSS one, but with Gaia data (`http://www.ast.cam.ac.uk/~vasily/sdss/field_of_streams/dr6/fos_dr6.jpg`). I would also like to be able to put labels with the stream names and then save that picture in one of the most common formats, without having to actually download the data on my computer.

Specific example:

Urgency: 1	**General/Specific**: 4	**Science rank**: 2
Scale: 4	**Frequency**: 2	**Rating**: 14

Related to:

Inputs:
Complex workflow. Selection algorithm.

Tasks:
selection. analysis. visualization.

Roles:
general. astronomer. public.

Information required for the roles:
1

Comments:
selection criteria has to be provided by the user. Connect through SAMP to other visualization tools (provided by VO).

Gaia Data Access scenario: GDAS-BR-06

Scenario:
I liked the statistical plots presented in Section 3 of Volume 1 of the Hipparcos and Tycho Catalogues. Show me the same for Gaia and allow me to specify the statistic to explore.

Specific example:

Urgency: 3	**General/Specific**: 4	**Science rank**: 4
Scale:	**Frequency**:	**Rating**: 28

Related to:

Inputs:
list of parameters.

Tasks:

Roles:
astronomer. public user.

Information required for the roles:
Any kind of parameter the user wants statistics from.

Comments:
plots provided in every release. Possibility of plugging interactive (user specified) plots through a program.

Gaia Data Access scenario: GDAS-BR-07

Scenario:
I want data of all objects contained in a rectangular/circular region centered on a given sky position.

Specific example:
ADQL (geometry) Query. SELECT Star in CompleteSources WHERE RECTANGLE()

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 2	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
position, radius

Tasks:
positional query

Roles:
astronomer, public

Information required for the roles:
any params from catalogue

Comments:

Gaia Data Access scenario: GDAS-BR-08

Scenario:
I want data of all objects contained in a rectangular/circular region within (or at a) a given distance R from the Sun, or from any other star, and at a given distance z from the equatorial plane (z=0).

Specific example:

Urgency: 2	**General/Specific**: 2	**Science rank**: 2
Scale: 2	**Frequency**: 3	**Rating**: 14

Related to:
GDAS-BR-07

Inputs:
position, name, distance.

Tasks:
positional query

Roles:
astromomer

Information required for the roles:
any params from catalogue

Comments:
possible to limit to half a kpc. Distances provided for public outreach only (not for professional usage).

Gaia Data Access scenario: GDAS-BR-09		
Scenario: ???I want to manipulate a 3D cube of the Milky-Way.		
Specific example: Related to GDAS-PR-03		
Urgency: 1	**General/Specific**: 4	**Science rank**: 4
Scale: 3	**Frequency**: 2	**Rating**: 28
Related to:		
Inputs:		
Tasks:		
Roles: public		
Information required for the roles:		
Comments: public outreach.		

Gaia Data Access scenario: GDAS-BR-10

Scenario:
I would like to be able to select objects based on any set of the variables provided in the Gaia catalogue position, parallax, astrophysical parameters, proper motion uncertainties etc. These selections should not be limited to simple ”axis-parallel” cuts or cone cuts, but permit a broader array of functions/functional dependencies. An example is selection on fractional parallax error and some relation between G magnitude and extinction. Another is selection on space velocities, which requires a combination of position, parallax and proper motion.

Specific example:
Select all stars within 2.5 kpc from the Sun and within a certain range of angular momentum, energy, and metallicity and return the CompleteSource data. This can be implemented for example as a filter coded within the Hadoop framework used at the recent GREAT workshops. This requires a facility that allows users to specify the Galactic potential to use.

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 4	**Frequency**: 4	**Rating**: 48

Related to:
GDAS-BR-07

Inputs:
Query (ADQL type).

Tasks:

Roles:
Any role. Most probably the astronomer.

Information required for the roles:
Any parameter.

Comments:
It has to allow a two stage query (for drilling down to the epoch data). First to get the epoch data through a query, then allow users to run their algorithms against the epoch data.

Gaia Data Access scenario: GDAS-BR-11

Scenario:
I would like to make selections of Gaia objects based not only on Gaia data, but also based on other major catalogues available at that time, such as Pan-STARRS and SDSS.

Specific example:

Urgency: 1	**General/Specific**: 2	**Science rank**: 2
Scale: 4	**Frequency**: 2	**Rating**: 10

Related to:

Inputs:
selection criteria per catalogue.

Tasks:
openskyquery or equivalent ..

Roles:

Information required for the roles:
Any parameter.

Comments:
Query involving a xmatch and a selection of external data. In the beginning it is not needed as the user can query the external catalogues and later on do the xmatch against Gaia data.

Gaia Data Access scenario: GDAS-BR-12

Scenario:
I would like to be able to select those objects which show significant spectral features (emission lines or absorption lines) in the BP/RP.

Specific example:

Urgency: 2	**General/Specific**: 1	**Science rank**: 3
Scale: 4	**Frequency**: 2	**Rating**: 15

Related to:

Inputs:
user-provided program.

Tasks:
Apply program to all selected spectra.

Roles:
professional astronomer.

Information required for the roles:
object ids

Comments:
Some kind of classification solutions specified by CU8 that could be used.

Gaia Data Access scenario: GDAS-BR-13

Scenario:
Case opposite to GDAS-BR-2; given an object (or a list of objects; or a specific area on the sky), tell me when it will be observed by Gaia.

Specific example:

Urgency: 4	**General/Specific**: 3	**Science rank**: 1
Scale: 2	**Frequency**:	**Rating**: 7

Related to:
GDAS-BR-02

Inputs:

Tasks:
reverse scan law

Roles:
any role. Most probably the astronomer.

Information required for the roles:

Comments:
Covered by GDAS-BR-2. Observing schedule tool.

Gaia Data Access scenario: GDAS-BR-14

Scenario:
I would like to be able to visualise the Gaia catalogue - in multi-dimensional space - preferably utilising a visualisation engine such as Google Sky or World Wide Telescope - such that I can incorporate data from other surveys in to the same tool.

Specific example:

Urgency: 4	**General/Specific**: 4	**Science rank**: 3
Scale: 2	**Frequency**: 2	**Rating**: 30

Related to:
GDAS-PR-07

Inputs:

Tasks:
provision of basic catalogue for download

Roles:
Anyone.

Information required for the roles:
basic astro, photo, radial velocities

Comments:

Gaia Data Access scenario: GDAS-BR-15

Scenario:
I would like to be able to do on-the-fly smoothing/ averaging of the data such that queries can be composed giving properties per spatial bin - for instance - binned in 1 arcmin elements.

Specific example:
this is probably best done in a offline manner such as the hadoop system

Urgency: 3	**General/Specific**: 4	**Science rank**: 3
Scale: 4	**Frequency**: 4	**Rating**: 33

Related to:
GDAS-BR-16

Inputs:
parameters and/or categories. Bin size.

Tasks:
Calculate histogram.

Roles:
Astronomers.

Information required for the roles:
Counts and bins. Output format (VOTable, FITS, etc).

Comments:
Special case of GDAS-BR-16

Gaia Data Access scenario: GDAS-BR-16

Scenario:
Interactive plots (2D/3D zooming and rotation). The user will have the possibility to select any attribute for any axis and customize the plot in that way.

- E.g. selecting mean values for color and magnitudes, the user can produce the HR diagram.
- It should be possible to make a selection of points and store the set of sources for other plots or analysis.
- Aggregated plots (Anthony Unwin, 2006). When the number of objects is huge, the data has to be aggregated for better visualization. Some kind of aggregation plots includes:
  - IQR plot
  - Histogram
  - Mosaic plots
  - Bubble plots
  - Density plots

These aggregated plots are meant to analyze large sets of data without plotting detailed information for all sources.

Specific example:

Urgency: 2	**General/Specific**: 4	**Science rank**: 4
Scale: 4	**Frequency**: 4	**Rating**: 40

Related to:
GDAS-BR-14

Inputs:
bin specs and attributes

Tasks:
Calculate histogram.

Roles:
astronomers.

Information required for the roles: Counts and bins. Output format (VOTable, FITS, etc).
Comments: Needs to be demonstrated to be possible with 3rd-party VO tools etc.

Gaia Data Access scenario: GDAS-ED-01

Scenario:
For my list of stars based on some ground-based observations or catalogue, give me SM CCD image thumbnails.

Specific example:

Urgency: 1	**General/Specific**: 2	**Science rank**: 4
Scale: 1	**Frequency**: 2	**Rating**: 20

Related to:

Inputs:
Source IDs or locations.

Tasks:
Query and data retrieval.

Roles:
Astronomers

Information required for the roles:
Target list or source list.

Comments:

Gaia Data Access scenario: GDAS-ED-02

Scenario:
I would like to be able to access the individual Gaia astrometric measurements, as opposed to only the astrometric parameters (positions, parallax, proper motions) resulting from modelling; similar to the Hipparcos Intermediate Astrometric Data.

Specific example:

Urgency: 1	**General/Specific**: 2	**Science rank**: 4
Scale: 3	**Frequency**: 1	**Rating**: 16

Related to:

Inputs:
Source IDs or locations.

Tasks:
Query and data retrieval.

Roles:
Power user.

Information required for the roles:
Area or source list.

Comments:
This refers to access to the residuals from astrometric solutions and is not for early data releases.

Gaia Data Access scenario: GDAS-ED-03		
Scenario: Give me the positions of all objects observed by Gaia in the Gaia 'initialisation' phase.		
Specific example:		
Urgency: 2	**General/Specific**: 2	**Science rank**: 2
Scale: 2	**Frequency**: 1	**Rating**: 10
Related to:		
Inputs:		
Tasks: Query for filtering, results compilation and associated data retrieval.		
Roles: Astronomers		
Information required for the roles:		
Comments:		

Gaia Data Access scenario: GDAS-EG-01

Scenario:
I want all informations and measurements of any type of objects whose radial velocities from the RVS are between v1 and v2 km/s

Specific example:
see GA-06 - will not have spectra for Extra galactic sources

Urgency: 2	**General/Specific**: 4	**Science rank**: 2
Scale: 3	**Frequency**: 4	**Rating**: 20

Related to:
GDAS-GA-06

Inputs:
Radial velocity range

Tasks:
Query and data retrieval.

Roles:
Anyone.

Information required for the roles:
any params from catalogue

Comments:
This is a basic query, nothing very specific here. Also, since it is related to EG objects, should take into account that there will not be many of them in the RVS range $G_{\mathrm{RVS}} < 17$.

Gaia Data Access scenario: GDAS-EG-02

Scenario:
I want astrometric and/or photometric and or/spectroscopic measurements of a specific type of source.

Specific example:
select id from RVS where CompleteSource.type = Quasar and CompleteSource.id = rvs.id into MyRVSlist — then download all of those spectra as zip etc

Urgency: 3	**General/Specific**: 4	**Science rank**: 4
Scale: 3	**Frequency**: 4	**Rating**: 44

Related to:

Inputs:
Source type

Tasks:
Query and data retrieval.

Roles:
Anyone.

Information required for the roles:
final astrometry & photometry

Comments:
This is a basic query, nothing very specific here.

Gaia Data Access scenario: GDAS-EG-03

Scenario:
I want the reconstructed image of my favourite source(s)

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 2
Scale: 4	**Frequency**: 1	**Rating**: 6

Related to:

Inputs:
Source ID

Tasks:
Query and data retrieval + image reconstruction

Roles:
Astronomers

Information required for the roles:
CCD level data

Comments:
Could be simplified to retrieval of SM images instead of reconstruction. Otherwise, if someone does the image stacking they could also be stored instead of calculated on the fly.

Gaia Data Access scenario: GDAS-EG-04

Scenario:
I want the RVS spectra of my favourite source(s)

Specific example:
Get object by object ID. Select only RVS data. Upload list of sourceids and so select in list . Upload list of names use nameresolver to get positions. Upload list of positions and xmatch to RVS. Then prepare download (zip, tar ..)

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
Source ID list

Tasks:
Query and data retrieval.

Roles:
Astronomers

Information required for the roles:
RVS spectra

Comments:
This is a general query to retrieve spectra.

Gaia Data Access scenario: GDAS-EG-05

Scenario:
Provide a list of point-like sources which have absolute proper motions and parallaxes consistent with zero

Specific example:
select * from completeSource where mualpha/sigmualpha $<$ 0.01 and mudelta/sigmamudelta $<$ 0.01 and varpi/muvarpi $<$ 0.01

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 2 to 4 (depending if it is limited to QSO or not)	**Frequency**: 1	**Rating**: 36

Related to:
GDAS-EG-08

Inputs:
Parallax and proper motion range

Tasks:
Query and data retrieval.

Roles:
Astronomers

Information required for the roles:
astrometry

Comments:
This is likely for reference frame work. Probably the query can be limited to objects marked as QSOs (or suspected as such) in most cases, which will greatly simplify it.

Gaia Data Access scenario: GDAS-EG-06

Scenario:
I want the list of quasars which optical magnitude with Gaia is brighter (or the opposite) than a given number. I want the list of quasars which redshift is smaller (or the opposite) than a given number. I want the list of quasars which position accuracy in the Gaia catalogue is better (or worse) than a given number.

Specific example:
Redshift not guaranted to be computed. SELECT * where type.quasar.probability>.95,x<magnitude<y SELECT * where ra.error,dec.error < limit

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 2	**Frequency**: 2	**Rating**: 40

Related to:

Inputs:
Parameter limits

Tasks:
Query and data retrieval.

Roles:
Astronomers

Information required for the roles:
ID list

Comments:
This is a general query to retrieve a list of objects.

Gaia Data Access scenario: GDAS-EG-07

Scenario:
I want the list of quasars which optical magnitude/astrometric position determined with Gaia is variable.

Specific example:
select * from completeSource where c.variable=true and c.type = quasar and c.typeprobability>.95

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 3	**Frequency**: 1	**Rating**: 36

Related to:
GDAS-EG-05

Inputs:

Tasks:
Query and data retrieval.

Roles:
Astronomers

Information required for the roles:
ID list

Comments:
This is a general query to retrieve a list of objects, but the search criteria is fuzzy unless there is a flag for the astrometric and /or photometric solution indicating variability

Gaia Data Access scenario: GDAS-EG-08

Scenario:
I want all quasars observed so far with Gaia to be plotted on the celestial sphere.

Specific example:
select ra,dec from complete source where type=quasar - send to aladin (or a SAMP enabled tool)

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 3	**Frequency**: 3	**Rating**: 44

Related to:
GDAS-EG-05

Inputs:

Tasks:
Query and data retrieval + plot

Roles:
Anyone.

Information required for the roles:
Plot

Comments:

Gaia Data Access scenario: GDAS-EG-09

Scenario:
Same as GDAS-EG-2, but possibly for each and every epochs of observation.

Specific example:
Given a list of ids (in a table for example) go and etech all epoch data (spectro, photo, and astro - all or one or two) then give link to zip,tar (order probably by Healpix directory ..)

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 3	**Frequency**: 4	**Rating**: 48

Related to:
GDAS-EG-02

Inputs:
Source type

Tasks:
Query and data retrieval.

Roles:
Anyone.

Information required for the roles:
epoch astrometry & photometry

Comments:
This is a basic query, nothing very specific here.

Gaia Data Access scenario: GDAS-EG-10

Scenario:
information about flux variation and position among objects with multi-epoch photometry

Specific example:
all objects have multi eopch photometry.. this a search in CU7 variability categorisation. Select c.id , v.period from variability v, completeSource c where c.id = v.id nd c.type=extragalactic and v.type = astrometricvariable into mags – then download or whatever.

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1 to 4 depending on query criteria	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
Unspecified. Should be fitted into the general query frame to be meaningful.

Tasks:
Query and data retrieval.

Roles:
Anyone.

Information required for the roles:
AGIS and variability flags

Comments:
All objects have epoch data; this specification is meaningless

Gaia Data Access scenario: GDAS-EG-11

Scenario:
List all objects given as superimposed stars and galaxies. Provide the unblended (estimated) properties of the non-stellar component.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 1 to 4 depending on query criteria	**Frequency**: 1	**Rating**: 3

Related to:
GDAS-EG-03

Inputs:
Query unclear, unless based on reduction flags indicating blended objects (if these exist)

Tasks:
Query and data retrieval.

Roles:
Astronomers

Information required for the roles:
ID list + general information about blended objects (unclear if this will be available)

Comments:

Gaia Data Access scenario: GDAS-FP-01

Scenario:
Multiply imaged quasars consist of multiple (typically 2, 3, 4 or even more) point-like images of a same quasar lensed by a foreground intervening galaxy. The typical angular separations between the multiple point-like images range between 0.1" and 3"-5". It might also be that between these multiple lensed images lies the direct image of the lensing galaxy responsible for the cosmic mirage. This galaxy could be somewhat extended. In our opinion, at least two distinct cases might happen for Gaia. All point-like images will either be detected by Gaia and show a same quasar spectrum (at the same redshift). In that case, we could just query the database to show all those systems consisting of multiple quasar images at a same redshift with an angular separation less than 5". A second case could be such that the individual lensed images have not all been resolved by Gaia and that the resulting object has been classified as an extended one (possibly consisting of several nearby point-like or barely resolved components showing an overall quasar spectrum). How to identify such systems in the Gaia database? We could perhaps just select these as being extended objects and showing a quasar spectrum.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 2
Scale: 3	**Frequency**: 1	**Rating**: 6

Related to:
GDAS-EG-03

Inputs:
selection criteria for lens candidates

Tasks:
execute query and retrieve raw data and compute images.

Roles:
power user

Information required for the roles:
Reconstructed images

Comments:
User may have to provide programme for lens selection and also for image reconstruction.

Gaia Data Access scenario: GDAS-GA-01

Scenario:
I have a list of N members and member candidates in a young open cluster further than 300 pc, where the Hipparcos parallaxes were not reliable. I want to obtain the parallaxes, proper motions, broad-band photometry and accurate coordinates of all of them in the Gaia dataset.

Specific example:
Upload list of IDs (positions ?) then match to complete source to get gaia information. Put the match ids in a myids table then .. Select c.id,c.varpi,c.ra,c.dec from complete-source where id in (select id from mylist)

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
List of sources (names, positions, ids, etc).

Tasks:
Name resolving and query.

Roles:
Astronomer in general

Information required for the roles:
Catalog data.

Comments:

Gaia Data Access scenario: GDAS-GA-02

Scenario:
I would like to query the Gaia catalogue in some peculiar Galactic directions et retrieve the UVW velocities of the stars relative to the Sun when possible, together with their distance, metallicity and error bars.

Specific example:
Beware: UVW, distance are derived parameters, to some extent model dependent. Only parallax and proper motion queries should be accepted.

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 2	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
Sky area.

Tasks:
Query with relevant UDF (User Defined Function) or archive (standard) provided UDF.

Roles:
Astronomer in general

Information required for the roles:
The parameters requested and the computed ones.

Comments:
Query and further processing made by the user. The archive could provide the standard algorithms with the corresponding documentation and disclaimer of scientific use.

Gaia Data Access scenario: GDAS-GA-03		
Scenario: I want whatever measurements of Milky Way objects only in a given sky region.		
Specific example: Cone search. See GDAS-BR-07		
Urgency: 4	**General/Specific**: 2	**Science rank**: 4
Scale: 2	**Frequency**: 3	**Rating**: 36
Related to:		
Inputs: Query criteria.		
Tasks: Query with where clauses.		
Roles: Astronomer and for public outreach.		
Information required for the roles: parameters requested.		
Comments:		

Gaia Data Access scenario: GDAS-GA-04

Scenario:
I want whatever measurements of MW G2 stars only in a given sky region.

Specific example:

Urgency: 4	**General/Specific**: 2	**Science rank**: 4
Scale: 2	**Frequency**: 4	**Rating**: 40

Related to:
GDAS-GA-03

Inputs:
Query criteria.

Tasks:
Query with where clauses.

Roles:
Astronomers.

Information required for the roles:
parameters requested.

Comments:

Gaia Data Access scenario: GDAS-GA-05

Scenario: I want any measurements of all stars except Cepheids.		
Specific example: Unrealistic! Will return almost the full catalogue! Explain further.		
Urgency: 4	**General/Specific**: 3	**Science rank**: 4
Scale: 2	**Frequency**: 3	**Rating**: 40
Related to: GDAS-GA-03		
Inputs: Query criteria.		
Tasks: Query with where clauses.		
Roles: Astronomers.		
Information required for the roles: parameters requested.		
Comments:		

Gaia Data Access scenario: GDAS-GA-06

Scenario:
I want all objects whose radial velocities from the RVS are between v1 and v2 km/s.

Specific example:
select id from RVS where RVS.velocity between (1, 15) into MyRVSlist — then download all of those spectra (link to tar or zip file)

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 2	**Frequency**: 4	**Rating**: 48

Related to:
GDAS-GA-03

Inputs:
Query criteria.

Tasks:
Query with where clauses.

Roles:
Astronomers.

Information required for the roles:
parameters requested.

Comments:

Gaia Data Access scenario: GDAS-GA-07

Scenario:
I want any measurements of my favourite source(s).

Specific example:
upload list of IDs (positions ?) then match to complete source to get gaia information. Put the match ids in a myids table then .. Select what you want from completesource where id in (select id from mylist)

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 48

Related to:
GDAS-EG-04

Inputs:
Source name.

Tasks:
Name resolving and query.

Roles:
Everybody.

Information required for the roles:
all catalog data of the source.

Comments:

Gaia Data Access scenario: GDAS-GA-08

Scenario: I want the RVS spectra of my favourite source(s).		
Specific example: See GDAS-EG-04		
Urgency: 3	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 44
Related to:		
Inputs: Source names, ids.		
Tasks: Query catalogue and data (spectra) retrieval.		
Roles: Astronomers.		
Information required for the roles: Spectra		
Comments:		

Gaia Data Access scenario: GDAS-GA-09

Scenario:
I want the BP/RP magnitudes (or radial velocities) of my favourite source(s) at all dates of observations.

Specific example:
again upload list match get Ids - request downloadof epoch photmetry

Urgency: 2	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 40

Related to:
GDAS-GA-08

Inputs:
Source names, IDs.

Tasks:
Query and data retrieval.

Roles:
Astronomers.

Information required for the roles:
Photometry and radial velocities.

Comments:

Gaia Data Access scenario: GDAS-GA-10

Scenario:
I want the measurements of all Galactic objects located at a given distance z to the median Galactic plane (z=0).

Specific example:

Urgency: 3	**General/Specific**: 4	**Science rank**: 3
Scale: 3	**Frequency**: 2	**Rating**: 27

Related to:
GDAS-GA-02

Inputs:
distance criteria.

Tasks:
Query with the distance calculation function execution.

Roles:
Astronomers.

Information required for the roles:
parameters requested.

Comments:
Distance from the galactic plane must be calculated through standard archive-provided function (with the corresponding disclaimer) or with the user-provided function.

Gaia Data Access scenario: GDAS-GA-11

Scenario:
I want a tool that provides a face-on view of the Milky Way, as inferred from Gaia data.

Specific example:

Urgency: 1	**General/Specific**: 3	**Science rank**: 1
Scale: 4	**Frequency**: 3	**Rating**: 7

Related to:

Inputs:

Tasks:

Roles:
Astronomers and public outreach.

Information required for the roles:
Galaxy model (for visualization).

Comments:
This task is up to the scientific community to come up with the galaxy model. There might be tools within the archive that might allow this though.

Gaia Data Access scenario: GDAS-GA-12

Scenario:
I want a face-on view of the velocity field(s) of any Galactic objects.

Specific example:

Urgency: 2	**General/Specific**: 3	**Science rank**: 2
Scale: 3	**Frequency**: 3	**Rating**: 16

Related to:
GDAS-GA-02

Inputs:
Criteria for defining which stars to include in the velocity field calculation.

Tasks:
Velocity fields computation and visualization.

Roles:
Astronomers.

Information required for the roles:
Plot with the velocity field.

Comments:

Gaia Data Access scenario: GDAS-GA-13

Scenario:
Same as GDAS-BR-10 but for the RVS radial velocities.

Specific example:

Urgency: 2	**General/Specific**: 3	**Science rank**: 2
Scale:	**Frequency**:	**Rating**: 10

Related to:
GDAS-BR-10

Inputs:

Tasks:

Roles:

Information required for the roles:

Comments:
GDAS-BR-10 covers this already.

Gaia Data Access scenario: GDAS-GA-14

Scenario:
I like to analyse the 5-D, 6-D phase space structure of stellar populations selected by magnitude, colour, abundances in a galactocentric (cylindrical) coordinate system.

Specific example:

Urgency: 1	**General/Specific**: 4	**Science rank**: 3
Scale: 2	**Frequency**: 4	**Rating**: 27

Related to:

Inputs:
Selection criteria to define the sample to work on.

Tasks:
Perform the coordinate transformation including the transformation of the errors and their correlations.

Roles:
Astronomers.

Information required for the roles:
The 6-D phase space coordinates.

Comments:
This is a scientific job. The archive should allow to incorporate the results of the Galactic reference system redefinition into the provided standard transformation routines (living archive).

Gaia Data Access scenario: GDAS-GA-15

Scenario:
I would like to retreive the astrometric and photometric data concerning any star hosting planets. I would need positions, proper motions, parallaxes and radial velocities (if so) and the associated covariance matrices.

Specific example:
Upload you list of planet targets. Match to ComplerteSource get list of myids. Or slects know planetary systems from CU4 clasification. Then request download of astro + phot + formal errors on all — needs more clarification.

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 3	**Rating**: 44

Related to:

Inputs:
Query.

Tasks:
Execute query.

Roles:
Astronomers and public.

Information required for the roles:
Astrometry and photometry data.

Comments:

Gaia Data Access scenario: GDAS-GA-16

Scenario:
I would like to retreive the astrometric and photometric data concerning any star in distant star forming region.

Specific example:
Selection on parallax and coordinates. Retrieve astrometry and photometry. Caveat: parallax is not distance, beware of this type of request - provide barycentricdistance in parsecs funciton in system (1/varpi check for negvarpi deny) . SO we can have Select * from completeSOurce where bcdistanceproxy(varpi) between (100, 1000)

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 2	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
Query.

Tasks:
Execute query.

Roles:
Astronomers.

Information required for the roles:
Astrometry and photometry data.

Comments:
This is covered by normal queries.

Gaia Data Access scenario: GDAS-GA-17

Scenario:
I like to compare the spatial distribution and dynamics of open star clusters with numerical simulations.

Specific example:

Urgency: 2	**General/Specific**: 3	**Science rank**: 3
Scale: 1	**Frequency**: 2	**Rating**: 21

Related to:
GDAS-OA-01

Inputs:
Selection criteria to define the sample to work on and cluster model.

Tasks:
Execute workflow.

Roles:
Astronomers

Information required for the roles:
Likelihood of the model.

Comments:
Covered by GDAS-OA-1.

Gaia Data Access scenario: GDAS-GA-18		
Scenario: I like to measure the properties of spiral arms in the extended solar neighbourhood.		
Specific example:		
Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale:	**Frequency**:	**Rating**: 2
Related to:		
Inputs:		
Tasks:		
Roles:		
Information required for the roles:		
Comments: Scientific work enabled by the archive.		

Gaia Data Access scenario: GDAS-GA-19

Scenario:
I would like to be able to select objects based on any set of the variables provided in the Gaia catalogue position, parallax, astrophysical parameters, proper motion uncertainties etc. These selections should not be limited to simple ”axis-parallel” cuts or cone cuts, but permit a broader array of functions/functional dependencies. An example is selection on fractional parallax error and some relation between G magnitude and extinction. Another is selection on space velocities, which requires a combination of position, parallax and proper motion.

Specific example:

Urgency: 2	**General/Specific**: 4	**Science rank**: 3
Scale:	**Frequency**:	**Rating**: 18

Related to:

Inputs:

Tasks:
full user defined functions

Roles:

Information required for the roles:

Comments:
Duplicated by GDAS-BR-10.

Gaia Data Access scenario: GDAS-GA-20

Scenario:
I would like to make selections of Gaia objects based not only on Gaia data, but also based on other major catalogues available at that time, such as Pan-STARRS and SDSS.

Specific example:

Urgency: 2	**General/Specific**: 3	**Science rank**: 3
Scale:	**Frequency**:	**Rating**: 15

Related to:

Inputs:

Tasks:

Roles:

Information required for the roles:

Comments:
Duplicated by GDAS-BR-11.

Gaia Data Access scenario: GDAS-GA-21

Scenario:
Given a list of RA,Dec or l,b positions, find all objects in the Gaia catalogue with some user-specified physical distance of each. Optionally apply logical queries to the objects selected (e.g. only take objects with Teff in some range or with a class probability above some value).

Specific example:
Beware: distance is a derived parameter. Only parallax queries should be accepted. Users should be allowed to plug their own functions in.

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
Query criteria.

Tasks:
Execute query.

Roles:
Astronomers and public.

Information required for the roles:
Parameters requested.

Comments:

Gaia Data Access scenario: GDAS-GA-22

Scenario:
I would like to have Gaia distances and proper motions for stars that were observed by RAVE. I'd like to obtain in the same query the radial velocities and physical parameters derived from RAVE. Are you planing such a detailed cross-match between catalogues?

Specific example:
VO does this sort of. Minimally you select from RAVE the params you want. Upload to gaia local space - xmatch to complete source and select out gaia params. We hope to have precomputed xmatch for some cats. This should be done by partners such as CDS.

Urgency: 3	**General/Specific**: 4	**Science rank**: 4
Scale: 2	**Frequency**: 3	**Rating**: 40

Related to:
GDAS-BR-03

Inputs:
Query criteria.

Tasks:
Execute xmatch and get requested parameters.

Roles:
Astronomers.

Information required for the roles:
Parameters requested from Gaia catalogue and external catalogues (RAVE).

Comments:
Crossmatching and downloading data from external sources. Inverse use case of GDAS-BR-3.

Gaia Data Access scenario: GDAS-GA-23

Scenario:
I would like to have velocities and associated uncertainties in the reference system as explained in GDAS-GA-14 but only for stars in a spherical volume of certain radius in pc centered in a given position of the disc that I could indicate in cylindrical coordinates (R, phi, z).

Specific example:

Urgency: 2	**General/Specific**: 4	**Science rank**: 3
Scale: 2	**Frequency**: 3	**Rating**: 27

Related to:
GDAS-GA-14

Inputs:
Query criteria.

Tasks:
Execute query.

Roles:
Astronomers

Information required for the roles:
6-D phase space coordinates.

Comments:
Disclaimer about the selecting directly on phase space coordinates. May not work as expected for distant regions

Gaia Data Access scenario: GDAS-GA-24

Scenario:
Tell me the number of stars that Gaia have observed with —z—<500 pc (kind of disc selection). Now give me positions, velocities and associated uncertainties of all these stars. Will I be able to handle this file?

Specific example:

Urgency: 2	**General/Specific**: 3	**Science rank**: 3
Scale:	**Frequency**:	**Rating**: 15

Related to:
GDAS-GA-10

Inputs:

Tasks:

Roles:

Information required for the roles:

Comments:
Covered by GDAS-GA-10.

Gaia Data Access scenario: GDAS-GA-25

Scenario:
I need all information available for stars located at distances d<1 kpc and with certain heliocentric velocities U+-dU and V+-dV corresponding to a given moving group.

Specific example:

Urgency: 2	**General/Specific**: 3	**Science rank**: 3
Scale:	**Frequency**:	**Rating**: 15

Related to:
GDAS-GA-23

Inputs:

Tasks:

Roles:

Information required for the roles:

Comments:
Covered by GDAS-GA-23.

Gaia Data Access scenario: GDAS-OA-01

Scenario:
I have a sophisticated simulation code that produces full phase-space realisations of the stellar content of some fraction of the Milky Way. I want to vary certain inputs to my model that are of astrophysical interest and compare against the full Gaia catalogue. Provide me with the means to do this.

Specific example:

Urgency: 2	**General/Specific**: 1	**Science rank**: 4
Scale: 4	**Frequency**: 1	**Rating**: 16

Related to:

Inputs:
Nbody sims

Tasks:
Generate Gaia observations; calculate statistical set; compute differences Gaia minus model.

Roles:
power astronomer

Information required for the roles:
Liklihood of model using FoM on stats and formal errors

Comments:
Should clarify with experts (e.g. J. Binney) if this is the way to do it. This is a topic for Barcelona modelling workshop (March 2012). Highly specialised so not confined to archive-server-side (user provides CPU!)

Gaia Data Access scenario: GDAS-OA-02

Scenario:
I want to look for candidate planetary systems in the Gaia catalogue. Let me experiment with my selection criteria to get what I consider to be a usefully clean and complete set, along with all their astrometric, photometric and spectroscopic data.

Specific example:

Urgency: 2	**General/Specific**: 1	**Science rank**: 4
Scale: 3	**Frequency**: 2	**Rating**: 20

Related to:

Inputs:
Selection criteria: astrometric, photometric and/or spectroscopic criteria and procedure

Tasks:
Apply to NSS the given criteria and procedure

Roles:
power astronomer

Information required for the roles:
Candidate IDs

Comments:
Programming required (not single SQL) in workflow scenario

Gaia Data Access scenario: GDAS-OA-03

Scenario:
I want to average astrometric measurements over groups of sources and account correctly for the star-to-star correlations.

Specific example:

Urgency: 2	**General/Specific**: 1	**Science rank**: 4
Scale: 3	**Frequency**: 3	**Rating**: 24

Related to:

Inputs:
Group definition; error value(s) of interest; order of correlation

Tasks:
Calculate correctly-weighted aggregate

Roles:
power astronomer

Information required for the roles:
Aggregate value with rigorously calculated error(s)

Comments:
Assumes availability of scalable solution (e.g. B.Holl's)

Gaia Data Access scenario: GDAS-OA-04

Scenario:
I know that CU8 uses multiple methods for the classification and parametrization of stars and other sources. The same will hold for CU4 and CU7. Please give me the output of all methods used so that I can decide for myself which one to trust/use.

Specific example:

Urgency: 1	**General/Specific**: 2	**Science rank**: 3
Scale: 1	**Frequency**: 2	**Rating**: 15

Related to:

Inputs:
Selection criteria

Tasks:

Roles:
power astronomer

Information required for the roles:
PDF(s) for solution(s)

Comments:
Assumes availability of required PDFs etc from CUs 4, 7 and 8

Gaia Data Access scenario: GDAS-OA-05

Scenario:
If probabilistic (Bayesian) methods were used to arrive at a particular parameter value please provide the full probability density function and not just value+error.

Specific example:

Urgency: 3	**General/Specific**: 4	**Science rank**: 3
Scale:	**Frequency**:	**Rating**: 21

Related to:
GDAS-OA-04

Inputs:

Tasks:
Give PDFs - CU8 will do this

Roles:

Information required for the roles:

Comments:
Exactly the same as previous

Gaia Data Access scenario: GDAS-OA-06

Scenario:
Where Markov Chain Monte Carlo methods are employed please store the actual Markov chain. I would like to run my own MCMC optimization using the Gaia Markov chain as a starting point.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 2
Scale: 1	**Frequency**: 1	**Rating**: 6

Related to:
GDAS-OA-05

Inputs:
Selection criteria

Tasks:
Return MC data

Roles:
power astronomer

Information required for the roles:
MC data

Comments:
Ensure Markov Chain is persisted! (e.g. consult CU4)

Gaia Data Access scenario: GDAS-OA-07

Scenario:
What is the detailed detection/selection function of Gaia at both ends of its magnitude range? This should be known from the knowledge of the on-board detection and resource allocation algorithms and from the subsequent data processing.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 3
Scale: 1	**Frequency**: 1	**Rating**: 9

Related to:
GDAS-OA-01

Inputs:

Tasks:
Provide documentation

Roles:
power astronomer

Information required for the roles:
Documentation

Comments:
Implementation also available (see OA-1)

Gaia Data Access scenario: GDAS-OA-08

Scenario:
My target hss been observed by as part of a large spectroscopic survey (e.g. from 4MOST and/or WEAVE) - and I would like to be able to interface (in a seamless manner) that external spectroscopic data and the Gaia data

Specific example:

Urgency: 2	**General/Specific**: 2	**Science rank**: 2
Scale: 1	**Frequency**: 2	**Rating**: 12

Related to:

Inputs:
Target spec(s)

Tasks:
Service SSAP queries

Roles:
astronomer

Information required for the roles:
Spectra in VO format

Comments:
Assume tool/infrastructure like VOSpec/SSAP

Gaia Data Access scenario: GDAS-OA-09

Scenario:
Any query with constraints on Gaia measurements: Let the user provide the constraints in any commonly used unit, and give several options for the output units, if applicable. Example: Return the radial velocity in m/s for all objects within a certain volume of space, where the limits are specified in decimal degrees for galactic longitude and latitude and in kpc for the distance from the Sun.

Specific example:

Urgency: 3	**General/Specific**: 4	**Science rank**: 3
Scale: 1	**Frequency**: 3	**Rating**: 30

Related to:

Inputs:
Query and units spec

Tasks:
Transform to internal units; execute query; transform results to output request units

Roles:
astronomer/public

Information required for the roles:
Output attributes in specified units

Comments:
Needs disclaimer! Distance/velocity not available or precise to user-expectation!

Gaia Data Access scenario: GDAS-OA-10

Scenario:
I want the FULL catalog of Gaia data, ie all objects, from all directions, containing all Gaia measurements (except RVS spectra) with associated uncertainties.

Specific example:
gbin files avialable for download or come to ESAC to get them

Urgency: 3	**General/Specific**: 1	**Science rank**: 4
Scale: 2	**Frequency**: 4	**Rating**: 32

Related to:

Inputs:

Tasks:
Produce static catalogue files for download

Roles:
astronomer

Information required for the roles:
The static catalogue

Comments:
Intention to provide a static catalogue of astrometric, photometric and RVs etc. Probably 0.5TB

Gaia Data Access scenario: GDAS-OA-11

Scenario:
I want to retrieve ALL existing RVS spectra.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 4	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
Provide offline storage for bulk copy

Tasks:
Copy data onto transportable media

Roles:
power astronomer

Information required for the roles:
All RVS data (!)

Comments:
Only on very special case-by-case basis, e.g. for Data Centre mirror etc.

Gaia Data Access scenario: GDAS-OA-12

Scenario:
I would like to access the individual astrometric measurements or their residuals with respect to the standard astrometric model; similar information to what the Hipparcos Intermediate Data provide.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 3
Scale: 1	**Frequency**: 1	**Rating**: 9

Related to:

Inputs:
Source ID(s)

Tasks:
Provide residuals

Roles:
power astronomer

Information required for the roles:
Astrometric residuals from AGIS

Comments:

Gaia Data Access scenario: GDAS-OA-13

Scenario:
CU8 provides classes on all and APs on most objects using different algorithms and based on different combinations of input data (BP/RP only, BP/RP with parallax and magnitude, RVS only, etc.). For a given class/AP for a given object I would like to repeat the CU8 work using my own algorithms, but using the same input data. I therefore want to be able to access exactly these data as was used for a specified set of objects (specified via Gaia ID). (I actually would want to specify via the APs themselves, e.g. I want to reparametrize all hot stars, or everything classified by CU8 as a white dwarf. But I am assuming this could be achieved via a separate query I have requested elsewhere).

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 4
Scale: 1	**Frequency**: 1	**Rating**: 12

Related to:
GDAS-OA-04

Inputs:
Source ID(s)

Tasks:
Provide spectrophotometric data

Roles:
astronomer/power astronomer

Information required for the roles:
Epoch photometry/spectroscopy

Comments:

Gaia Data Access scenario: GDAS-OA-14

Scenario:
The posterior distribution function (PDF) over APs of objects in the Gaia catalogue (provided by CU8, but perhaps also by CU4 and CU7) are, in some cases produced by Bayesian algorithms using a specific prior. For the set of APs of a given object, I would like to be able to obtain (a) the full multiparameter posterior PDF and not just the estimate plus error bar, and (b) the prior PDF, (c) the likelihood function, so that I can apply my own prior and evaluate a new posterior PDF. I would also like to be able to do the same for object classes (where we have scalar class probabilities for each class rather than a PDF).

Specific example:

Urgency: 3	**General/Specific**: 4	**Science rank**: 3
Scale:	**Frequency**:	**Rating**: 21

Related to:
GDAS-OA-05

Inputs:

Tasks:

Roles:

Information required for the roles:

Comments:
Duplicate of OA-4+5

Gaia Data Access scenario: GDAS-OA-15

Scenario:
I want to do rare object detection on the entire Gaia catalogue. Two possibilities: (1) I wish to find the (say) 0.01% of all objects (=>10^5 objects, call this number X) which have the highest/lowest value of some metric defined on the Gaia data. For example, this might be the X coolest stars, the X nearest/fastest relative to the Sun, or the X stars nearest to the Galactic centre (say) with extinctions less than (say) 1 magnitude where the extinction errors are also less than 0.1 mag. (2) like (1), but not fixing X but rather finding all objects which have a value of the metric above (or below) some threshold

Specific example:

Urgency: 1	**General/Specific**: 4	**Science rank**: 2
Scale: 3	**Frequency**: 3	**Rating**: 16

Related to:

Inputs:
Query/workflow

Tasks:
Execute query(s), caching intermediate results

Roles:
power astronomer

Information required for the roles:
IDs and attributes of rare objects

Comments:
should be able to make SQL for this ..

Gaia Data Access scenario: GDAS-OA-16

Scenario:
An object in the Gaia catalogue turns out to be misclassified, is of special interest, or needs to be discussed.

Specific example:

Urgency: 2	**General/Specific**: 4	**Science rank**: 2
Scale: 1	**Frequency**: 3	**Rating**: 18

Related to:

Inputs:
id , clasification

Tasks:
annotate

Roles:
general user

Information required for the roles:
confirm annotation

Comments:
process to incorporate user annotation needed

Gaia Data Access scenario: GDAS-OA-17

Scenario: Examine the properties of Gaia data in detail without querying the whole Gaia database.		
Specific example:		
Urgency: 2	**General/Specific**: 2	**Science rank**: 2
Scale:	**Frequency**:	**Rating**: 8
Related to: GDAS-BR-06		
Inputs:		
Tasks:		
Roles:		
Information required for the roles:		
Comments: covered by BR-6		

Gaia Data Access scenario: GDAS-OA-18

Scenario:
Use standard analysis and visualisation tools Aladin, Topcat, IDL, Python and compare Gaia data with data available in VO standard.

Specific example:

Urgency: 3	**General/Specific**: 4	**Science rank**: 3
Scale:	**Frequency**:	**Rating**: 21

Related to:
GDAS-BR-14

Inputs:

Tasks:

Roles:

Information required for the roles:

Comments:
SAMP - covered in BR-14

Gaia Data Access scenario: GDAS-OA-19

Scenario:
Any query I run on 'Release-N' I'd like to be able to run on any earlier release. This to confirm earlier results, look for sytematics due to improving accumulation of data etc

Specific example:
Assuming only new cols are added we should be able to store queries and run it on new releases. Vice versa possibly not. So history of queries kept and target release can be put in. Access to old releases must be allowed. Queries should not mix releases.

Urgency: 3	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 44

Related to:

Inputs:
query

Tasks:
keep releases available - keep queries for users - allow query to run against multiple targets

Roles:
astronomer

Information required for the roles:
query output

Comments:

Gaia Data Access scenario: GDAS-PR-01

Scenario: For my named constellation, fly me along the line-of-sight giving me information of interest on each star as I pass it.		
Specific example: Related to GDAS-PR-03		
Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale:	**Frequency**:	**Rating**: 24
Related to: GDAS-BR-14		
Inputs:		
Tasks:		
Roles: Public.		
Information required for the roles:		
Comments:		

Gaia Data Access scenario: GDAS-PR-02		
Scenario: Explain what is the Milky Way.		
Specific example: Provide page on MW ..		
Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 40
Related to:		
Inputs:		
Tasks: Outreach material.		
Roles: Public.		
Information required for the roles: Outreach material.		
Comments:		

Gaia Data Access scenario: GDAS-PR-03

Scenario:
Almost similar to GDAS-PR-1: Make a movie of a flight through the Milky Way disc, respecting the distances and apparent luminosity of objects.

Specific example:
Should not be an interactive tool of the archive system (would stress the requirements); can be provided separately as an outreach tool, ideally interactive, or otherwise as a movie. Related to GDAS-PR-07.

Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 40

Related to:

Inputs:

Tasks:
Outreach material.

Roles:
Public.

Information required for the roles:
Outreach material.

Comments:

Gaia Data Access scenario: GDAS-PR-04

Scenario:
Hi, I am a 10 years old kid. I'd like to know which basic science can be done with the data from the satellite

Specific example:

Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 40

Related to:

Inputs:

Tasks:
Outreach material.

Roles:
Public.

Information required for the roles:
Outreach material.

Comments:

Gaia Data Access scenario: GDAS-PR-05

Scenario:
Explain and illustrate the progress of our knowledge on the Milky Way science from Hipparcos to Gaia.

Specific example:

Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 40

Related to:

Inputs:

Tasks:
Outreach material.

Roles:
Public.

Information required for the roles:
Outreach material.

Comments:

Gaia Data Access scenario: GDAS-PR-06		
Scenario: Explain how Gaia will help to constrain the mass distribution of the Milky Way.		
Specific example:		
Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 40
Related to:		
Inputs:		
Tasks: Outreach material.		
Roles: Public.		
Information required for the roles: Outreach material.		
Comments:		

Gaia Data Access scenario: GDAS-PR-07

Scenario:
Make the Gaia Catalogue available in the data format used by Planetariums for the all-sky projection and by PC planetarium programs

Specific example:
Basically export in some format - can they not take the gbin files.

Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 40

Related to:
GDAS-PR-03

Inputs:

Tasks:
Generate once and provide the data.

Roles:
Public.

Information required for the roles:
Outreach material.

Comments:

Gaia Data Access scenario: GDAS-PR-08

Scenario:
Produce user friendly interfaces to the Gaia data base which can even by used by students at school or laymen

Specific example:
simple search interface with common boxes perhaps circle/rectangle in a form as well as full ADQL . Simple forms should show ADQL generated by them ..

Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 40

Related to:

Inputs:

Tasks:
Implement public-friendly UI (User Interface)

Roles:
Public.

Information required for the roles:
Outreach material.

Comments:

Gaia Data Access scenario: GDAS-SA-01

Scenario:
Can I get all microlensing events detected in real-time by Gaia and see their photometric light curves and astrometric curves?

Specific example:
should have SA table in archive - so this should just be a join. then use ids to get indiviual epoch/photo bundles

Urgency: 3	**General/Specific**: 1	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 32

Related to:

Inputs:
Event specification, e.g.VOEvent

Tasks:
Extract relevant data

Roles:
public and astronomer

Information required for the roles:
Epoch photometry and summary stats

Comments:
Not possible from day one because catalogue not available? Check with FvL

Gaia Data Access scenario: GDAS-SA-02

Scenario:
I would like check if there were any supernovae detected in real-time by Gaia in a given region of sky, e.g. in a galaxy cluster. Also it would be good to check what kind of follow-up data is available for these supernovae which was taken after the Gaia trigger.

Specific example:

Urgency: 2	**General/Specific**: 1	**Science rank**: 2
Scale: 2	**Frequency**: 2	**Rating**: 10

Related to:

Inputs:
Event type and location

Tasks:
Search science alerts log; use VO services to gather further info

Roles:
astronomer

Information required for the roles:
Links to VO-derived info plus any Gaia data

Comments:
Relies heavily on 3rd-party VO developments

Gaia Data Access scenario: GDAS-SA-03

Scenario:
Fermi has detected a flaring blazar. It has a certain error ellipse, say a few arc-minutes. An optical counterpart is not known. How can one get lightcurves for all objects in the error-ellipse to look for variability and thus possible counterparts to the blazar?

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 4
Scale: 3	**Frequency**: 3	**Rating**: 20

Related to:

Inputs:
Event position and error ellipse

Tasks:
Find Gaia sources; extract epoch photometry; cache in VOSpace

Roles:
astronomer

Information required for the roles:
Epoch photometry and summary stats

Comments:
webform ..

Gaia Data Access scenario: GDAS-SA-04

Scenario:
Advanced LIGO will start to generate a stream of Gravitational Wave alerts from 2014 or so. A rapid correlation of AdvLIGO 'gravitational' and Gaia 'electromagnetic' alerts will be required. The positional error box on advLIGO sources will be large, 2deg with advLIGO for high S/N events, and perhaps 10's of degrees for more common low S/N events. Thus the ability to provide effective cross matches will be important.

Specific example:

Urgency: 2	**General/Specific**: 1	**Science rank**: 1
Scale: 2	**Frequency**: 1	**Rating**: 4

Related to:

Inputs:
xmatch with big box

Tasks:

Roles:
power astronomer

Information required for the roles:
match?

Comments:
really a cross match

Gaia Data Access scenario: GDAS-SA-05

Scenario:
based on selection criteria, flux alerts meeting those criteria should trigger observations on robotic observational facilities - e.g. the Liverpool Telescope

Specific example:

Urgency: 4	**General/Specific**: 1	**Science rank**: 2
Scale: 2	**Frequency**: 2	**Rating**: 14

Related to:

Inputs:

Tasks:
Produce VOEvents

Roles:
astronomer

Information required for the roles:
VOEvent published via service

Comments:
Specifically autonomous

Gaia Data Access scenario: GDAS-SA-06

Scenario:
Provide an alert if an object if now at a level below the standard flux alert threshold BUT was previously also just below an flux alert threshold.

Specific example:

Urgency: 1	**General/Specific**: 2	**Science rank**: 2
Scale:	**Frequency**:	**Rating**: 6

Related to:

Inputs:

Tasks:

Roles:

Information required for the roles:

Comments:
requirement on alerts pipe

Gaia Data Access scenario: GDAS-SO-01

Scenario:
I want to know if a given asteroid was observed and retrieve a list of epochs corresponding to the object transits.

Specific example:
standard names should be in CU4 data then retrieve the epoch data using the gaia ids.

Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 2	**Rating**: 32

Related to:
GDAS-EG-09

Inputs:
Asteroid name.

Tasks:
Name resolving and get the epochs of the observations.

Roles:
Astronomers.

Information required for the roles:
Epochs of observations.

Comments:

Gaia Data Access scenario: GDAS-SO-02

Scenario:
Get a catalogue of Gaia-determined orbits as a function of different parameters (a range of semi-major axis, and/or inclinations, and/or eccentricity, etc)

Specific example:
select from sso where ecentricity between ...

Urgency: 3	**General/Specific**: 3	**Science rank**: 4
Scale: 1	**Frequency**: 2	**Rating**: 32

Related to:

Inputs:
Orbital selection criteria.

Tasks:
Execute query.

Roles:
Astronomers.

Information required for the roles:
Orbital parameters.

Comments:

Gaia Data Access scenario: GDAS-SO-03

Scenario:
I'd like to have access to observed barycentric longitudes and latitudes of asteroids and masses of asteroids deduced from Gaia observations of asteroids

Specific example:

Urgency: 4	**General/Specific**: 1	**Science rank**: 4
Scale: 1	**Frequency**: 1	**Rating**: 24

Related to:

Inputs:
Selection criteria.

Tasks:
Execute query.

Roles:
Astronomers.

Information required for the roles:
Barycentric longitudes and latitudes and masses.

Comments:
It is a normal query as it should be part of the catalogue.

Gaia Data Access scenario: GDAS-SO-04		
Scenario: find me all objects with colours of asteroids, located within our solar system, not classified as asteroids		
Specific example:		
Urgency: 2	**General/Specific**: 4	**Science rank**: 2
Scale: 3	**Frequency**: 2	**Rating**: 16
Related to:		
Inputs: standard query		
Tasks: Execute query.		
Roles: Astronomers.		
Information required for the roles: selected params		
Comments: standard query		

Gaia Data Access scenario: GDAS-ST-01

Scenario:
I am studying stars in a cluster. I want to know the probability that these stars are binary/multiple systems. It is important that I can set the cut-off on this probability, it should not have been set in the catalogue itself.

Specific example:
select binaryprobility from completesource where id in my list

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**:	**Rating**: 32

Related to:

Inputs:
ID list or sky region

Tasks:
Query of catalogue flags

Roles:
Astronomer

Information required for the roles:
Multiplicity flags

Comments:
Likely there will not be probabilities of binarity in the catalogue, but rather flags indicating the possibility of the object bein a binary. Maybe such probability could be constructed from them.

Gaia Data Access scenario: GDAS-ST-02

Scenario:
I want to fit a synthetic spectrum to the observed fluxes (BP/RP and/or RVS), as well as additional fluxes from other catalogues (e.g. 2MASS). I would like those data to be directly available in the Gaia catalogue, I don't want to copy/paste from the 2MASS catalogue. I need to be able to degrade the synthetic spectrum with all the Gaia instrumental effects for a useful comparison between observation and theory.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 1	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
Source ID + program from the user

Tasks:
Query for BP/RP spectra + execute user program

Roles:
Astronomer

Information required for the roles:
Spectral fitting algorithm

Comments:
The availability of 2MASS (or other) data in the Gaia catalogue is not realistic, but an automatic cross query through stored IDs from other catalogues could do the job.

Gaia Data Access scenario: GDAS-ST-03

Scenario:
I want to find clusters of stars in the following way: I select a core set of the stars in the catalogue. The archive then finds me stars that are ”similar” in distance, proper motion, radial velocity, ... On all these parameters I can set cut-off values that define what ”similar” means.

Specific example:

Urgency: 3	**General/Specific**: 2	**Science rank**: 2
Scale: 2	**Frequency**: 2	**Rating**: 14

Related to:

Inputs:
ID list + program from the user

Tasks:
Query for astrometry + execute user program

Roles:
Astronomer

Information required for the roles:
ID list

Comments:
The tasks involved are quite straightforward, but the requested procedure is quite specific. This is left for the user to write its own simple piece of code to run in the catalogue framework.

Gaia Data Access scenario: GDAS-ST-04

Scenario:
I want to find stars with exceptional properties, i.e. those stars that are outside a certain statistical range. E.g. extreme proper motion, extreme variability, ...

Specific example:
Precomputed stats will be available plots histograms etc. Then this becomes a standard query with cuts

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1 to 4	**Frequency**: 2	**Rating**: 40

Related to:

Inputs:
Search criteria

Tasks:
Query for ID list

Roles:
Astronomer

Information required for the roles:
ID list

Comments:
This is just a special case of a general query.

Gaia Data Access scenario: GDAS-ST-05

Scenario:
Standard Queries
Filter operations: ==, ! =, <, >, <=, >= Combination logic: and, or, not, xor
Rather often a group of targets to be queried is not aligned along the axes of the parameter space provided by the Archive. Therefore also linear combinations of quantities should be queriable. E.g.: 3 <= a*X + b*Y + c*Z <= 4 with a,b,c provided by the user and X,Y,Z three quantities archived for every star.

Specific example:
ADQL

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 4	**Frequency**: 2	**Rating**: 40

Related to:

Inputs:
Query criteria for the basic combinations + user program for formula-based queries.

Tasks:
Normal query or execute user program

Roles:
Astronomer

Information required for the roles:
Specific parameters

Comments:

Gaia Data Access scenario: GDAS-ST-06

Scenario:
Proximity Queries
Select targets in rectangle, polygon, ellipse Select objects in this circular part of the sky that are closer to target X than to target Y Coordinate systems: equatorial, ecliptic, galactic

Specific example:
Ref GDAS-BR-7

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
Selected sky region

Tasks:
Query and data retrieval.

Roles:
Anyone

Information required for the roles:
parameters requested.

Comments:
This is a sophistication of a regular query by sky region. Maybe we should not provide the fanciest shapes (e.g. polygon) and just restrict to the basic ones.

Gaia Data Access scenario: GDAS-ST-07

Scenario:
Fuzzy Queries
Most quantities in Gaia archive will have errorbars. This is relevant for queries. E.g. asking for all stars with Teff <= 4000 K, would not include a star with Teff = 4050 +/- 250 K. Fuzzy querying should allow this. This requires for each quantity: the value, a standard deviation (errorbar), and a probability distribution for this quantity. Most often this will be a gaussian distribution, but this may not always be the case, particularly if a quantity was computed by dividing two gaussian quantities. A fuzzy query could add a qualifier to the request:
almost certain (P > 90%)
likely (70% <= P <= 90%)
perhaps (30% <= P < 70%)
unlikely (10% <= P < 30%)
almost certaintly not (P < 10%) The probabilities are computed using the density; the exact definition of the qualifiers could be configured by the user.

Specific example:

Urgency: 3	**General/Specific**: 3	**Science rank**: 3
Scale: 1 to 4	**Frequency**: 2	**Rating**: 24

Related to:

Inputs:
Query parameters and probabilities

Tasks:
Query, retrieve data and filter by probability.

Roles:
Astronomer

Information required for the roles:
Requested parameters

Comments:
This is a nice idea, but it is unclear if it would be widely used.

Gaia Data Access scenario: GDAS-ST-08

Scenario:
Pattern Queries
Example: ”Return stars like this set of stars, but avoid stars like that set of stars”, where the two sets are defined by the user. Rather challenging to implement, but incredibly useful.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 2
Scale: 4	**Frequency**: 1	**Rating**: 6

Related to:

Inputs:
Lists of IDs

Tasks:
Execute user data mining program

Roles:
Astronomer

Information required for the roles:
List of IDs

Comments:
This is a quite specialised data mining task; it should be implemented in a user program to be run in the archive framework

Gaia Data Access scenario: GDAS-ST-09

Scenario:
Group Queries
Rather than constraining the properties of targets, it is sometimes needed to constrain the relation between two or more targets.
E.g.: return all stars with an apparant distance on the sky <= alpha E.g.: return all stars within this circle on the sky that have the same apex with a tolerance of alpha.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 4	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
Lists of IDs

Tasks:
Execute user search program

Roles:
Astronomer

Information required for the roles:
List of IDs

Comments:
This is a quite specialised search task; it should be implemented in a user program to be run in the archive framework

Gaia Data Access scenario: GDAS-ST-10

Scenario:
Random Queries
Return an unbiased random subset of size N of the Gaia Archive, according to a user-specified multivariate distribution for quantities X, Y, and Z. Computing a reliable histogram, for example, can be done without using the entire archive, as long as you have a unbiased subset of the archive.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 1	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
Lists of IDs

Tasks:
Generate random sample, execute query for it and retrieve requested parameters

Roles:
Astronomer

Information required for the roles:
Selected parameters and List of IDs

Comments:
Assume that a random selection of the archive (or a given type of objects) will provide a representative sample for any X,Y,Z set of parameters.

Gaia Data Access scenario: GDAS-ST-11

Scenario:
Whole-database queries
Sequentially According a space-filling curve

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 4	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
User program

Tasks:
A whole database query will likely require a server-side user program processing the outputs to obtain a result.

Roles:
Astronomer

Information required for the roles:
Assume it's the output of some user program processing the whole database

Comments:
A whole database query will likely require a server-side user program processing the outputs to obtain a result.

Gaia Data Access scenario: GDAS-ST-12

Scenario:
Queries in the frequency domain
E.g.: return stars with an excess in the Fourier spectrum in the frequency range [x,y]
E.g.: return stars with a 1/f noise profile in the Fourier domain

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 3 (assuming it only applies to stars flagged as variables)	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
User program

Tasks:
Query light curves and execute user program for FFT and filtering of results

Roles:
Astronomer

Information required for the roles:
List of IDs

Comments:

Gaia Data Access scenario: GDAS-ST-13

Scenario:
Queries in the time domain
E.g.: return stars with at least N points that are 5 sigma below the median of the lightcurve.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 3 (assuming it only applies to stars flagged as variables)	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
User program

Tasks:
Query light curves and execute user program for FFT and filtering of results

Roles:
Astronomer

Information required for the roles:
List of IDs

Comments:

Gaia Data Access scenario: GDAS-ST-14

Scenario:
Return all epoch radial velocities (with date of observation) of all stars classified as Cepheids (based on Gaia data) with an error in metallicity (based on Gaia data) below x-dex, when there are at least N epoch RV with an error below y km/s.

Specific example:

Urgency: 3	**General/Specific**: 4	**Science rank**: 3
Scale: 1	**Frequency**: 3	**Rating**: 30

Related to:

Inputs:
Query parameters

Tasks:
Query and data retrieval.

Roles:
Astronomer

Information required for the roles:
Radial velocities and epochs

Comments:
This is just a special case of a general query.

Gaia Data Access scenario: GDAS-ST-15

Scenario:
One wish would be to have more than only cross-matches to external catalogs but also the data values, so I assume there is a link to e.g. WISE or VISTA Hemisphere survey, say a K-band magnitude.
Query: return the epoch radial velocities of all stars with ABS(a Log P + b - K-mag) $<$ sigma, where a,b,sigma are user-supplied, K-mag would come from the cross-matched external catalog and P is the Gaia-derived period.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 4	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
Query parameters + user program

Tasks:
Execute user program that does cross-queries between catalogues and filters the output

Roles:
Astronomer

Information required for the roles:
Radial velocities and epochs

Comments:
This requires the execution of a quite specialised program in the archive framework, using cross-matching facilities with other catalogues (e.g. through stored external IDs in the Gaia catalogue)

Gaia Data Access scenario: GDAS-ST-16

Scenario:
I would like to select all Gaia measurements of all objects of a certain kind that also have certain data in a certain public archive. Example: I need Gaia astrophysical parameters for all red giants (logg<3, 4000<T<5000, for example) that also have high resolution spectra present in the UVES archive (or in any other VO archive).
Commentary: This means interfacing effectively with the VO.

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 4	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
Query parameters + user program

Tasks:
Execute user program that does cross-queries between catalogues and filters the output

Roles:
Astronomer

Information required for the roles:
Radial velocities and epochs

Comments:
This requires the execution of a quite specialised program in the archive framework, using VO facilities to access other catalogues (e.g. through stored external IDs in the Gaia catalogue)

Gaia Data Access scenario: GDAS-ST-17

Scenario:
I have my own private catalogue (of magnitudes, or positions, or chemical abundances or other properties) of a globular cluster. I would like to upload it or anyway match it with the Gaia catalogue and visualize any of the chosen properties of common objects in a graph, maybe even in 3D form. I also want to do some statistical tests. Maybe in the first exploratory phases I do not want my private catalogue to become public, but I still would like to avoid downloading locally a large chunk of data because I want an instant check of some idea that came when analyzing my data. An example: I want a 3D plot of all the stars spatial positions (from Gaia), and I want the stars colored differently according to their carbon abundance (that I measured). Then I want to project this in different ways and planes, and perform some Kolmogorov-Smirnov statistics, for example.
Commentary: This would be immensely useful to understand the physical object you are studying!

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 3	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
Source list

Tasks:
Upload, cross-match, query, server-side processing for visualization

Roles:
Astronomer

Information required for the roles:
Visualization

Comments:

Gaia Data Access scenario: GDAS-ST-18

Scenario:
I have my own radial velocity measurements in the core of a globular cluster, and some literature proper motions that I collected, with some overlaps for some of the stars. Gaia measurements, due to crowding from the other line of sight are for many less stars than my catalogue, but they are much more precise and accurate. I want to cross-match the various catalogues with Gaia data on the fly, online, and check zeropoints, trends with magnitude and color, eventually correct my data and homogeneize all the measurements (mine, Gaia, and literature) with meaningful errors through robust statistics (medians, whatever) and have that resulting catalogue on my laptop for further science exploration of that cluster.
Commentary: This would be immensely useful to understand the physical object you are studying!

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 1
Scale: 3	**Frequency**: 1	**Rating**: 3

Related to:

Inputs:
Source list

Tasks:
Upload, cross-match, query, server-side processing for visualization

Roles:
Astronomer

Information required for the roles:
Visualization

Comments:

Gaia Data Access scenario: GDAS-ST-19

Scenario:
I want to analyze the per CCD photometry for stars where I expect variability on very short time scales. This represents a 10-fold increase in the stored G-band photometry but would be very much appreciated.

Specific example:

Urgency: 3	**General/Specific**: 3	**Science rank**: 2
Scale:	**Frequency**: 2	**Rating**: 16

Related to:

Inputs:
Source ID

Tasks:
Retrieve CCD-level photometry

Roles:
Astronomer

Information required for the roles:
CCD-level photoetric data

Comments:

Gaia Data Access scenario: GDAS-ST-20

Scenario:
Object selection for observational programmes: Return a list of positions and other selected measurements for all binaries (with a probability >x), with certain constraints for the components, e.g. a G dwarf and an M dwarf (could be specified via Teff, logg) with minimum separation y arcsec, brighter than z magnitudes, at declinations north of 30 degrees.

Specific example:
select ra,dec from complete source where logg, teff, distance among binary components, some other measurements of components and RECTANGLE(30deg north)

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 2 to 4 depending on the search criteria	**Frequency**: 3	**Rating**: 44

Related to:

Inputs:
Search criteria

Tasks:
Query and retrieve astrometric and photometric data

Roles:
Astronomer

Information required for the roles:
astrometric and photometric data

Comments:
This is a special case of a general query

Gaia Data Access scenario: GDAS-ST-21

Scenario:
Radial velocities of bright stars observed with Gaia and in particular with the RVS will be measured for the majority of bright single stars and average spectra will be computed and included in the catalog. The pipe-line processing will usually have two weaknesses. The first weakness is that the catalog pipe-line will be limited in processing time and thus a few computations of interest will be missing. The second is that the processing should be blind and robust which is very difficult to afford. Therefore some sophisticated techniques do not have their place in the pipe-line processing. We can consider that the exploitation of the catalog should include the possibility to perform further (re)processing of a limited number of objects... and thus the related possibility.
For example, CU4 will deal with Non-Single-Objects but not all the possibilities will be included. For example, very weak binaries and multiple (above 2) star systems will not be included in the basic processing. In this context, it is possible to imagine that the methods used by DPAC for the pipeline can be extended and improved for future use in the framework of the catalog exploitation. An example is the case of spectroscopic multiple (triple or quadruple) gravitationally linked systems not treated by the pipe-line. However such systems must enter the statistics about binarity and should also be exploited to derive masses (or more). At the very least, users of the catalog should be able to recompute the ephemerids of any binary present in the catalog. In addition, the catalog is of little interest if one does not investigate its biasses and weaknesses. In this framework, we think that we should give the opportunity (or even use it) to analyze the relatively small number of multiple stars. In addition, the distribution of binaries should be investigated in the general frame of star formation, clusters and global structures in the galaxy. Therefore, the statistical distribution of the orbital parameters (period eccentricity, orientation) should be analyzed both to address well-known reported anomalies (eg the Barr effect), and other related aspects. To study these anomalies, it is necessary to define the selection function of the survey. We are particularly well placed to perform such a work since we are part of the DPAC at the level of the measurements of the radial velocities of non-single stars and at the level of the related derivation of the orbital parameters according to Keplerian laws.
The pipe-line is deriving radial velocities through correlation functions, no spectral disentangling will (at least for the moment) be included because these methods always need tight supervision of the intermediate results. Completeness of the catalog could be improved by performing this type of study in a systematic way after the edition of the catalog. This approach will of course necessitates additional tools that will be developed for this purpose and should be made available to the whole community.
Commentary:

Specific example:

Urgency: 1	**General/Specific**: 1	**Science rank**: 2
Scale:	**Frequency**:	**Rating**: 4
Related to:		
Inputs: source ids		
Tasks: query,extract data		
Roles: power astronomer		
Information required for the roles: data		
Comments: how do we put this back in the archive ???		

Gaia Data Access scenario: GDAS-ST-22

Scenario:
I would like to retrieve the RVS spectra (combined, normalized, in rest-frame) having S/N > some value and (Teff,logg,[Fe/H]) within a specified range.

Specific example:

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 2 to 4 depending on the query parameters	**Frequency**: 2	**Rating**: 40

Related to:
GDAS-EG-04

Inputs:
Query parameters

Tasks:
Query and retrieve RVS data

Roles:
Astronomer

Information required for the roles:
RVS spectra

Comments:
This is a special case of a general query

Gaia Data Access scenario: GDAS-ST-23

Scenario:
I would like to use G mag, BP/RP, RVS data for Be stars to cross match them with existing surveys like OGLE, MACHO, EROS ...

Specific example:
upload list to gaia - do crossmatch . download gaia BP/RP etc refine your match. Or do match on CDS first. then get data. Good CANFAR type use case where we write a prgram against multiple archive ed pints and rn it ”somewhere” out there.

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 1	**Rating**: 36

Related to:

Inputs:
List of Be stars

Tasks:
Query, retrieve data and cross-match with other archives

Roles:
Astronomer

Information required for the roles:
Cross-match results

Comments:
Pre-defined XM with other archives will be provided in the catalogue. If the user wants to do its own XM using the specified parameters he/she should run its own program

Gaia Data Access scenario: GDAS-ST-24

Scenario: Find binary stars with specific colours - where the colours of one or both of the binaries can be specified		
Specific example:		
Urgency: 3	**General/Specific**: 3	**Science rank**: 3
Scale: 3	**Frequency**: 2	**Rating**: 24
Related to:		
Inputs: Query parameters		
Tasks: Select binaries and apply query parameters on the pair		
Roles: Astronomer		
Information required for the roles: ID list		
Comments: This will require a special type of combined query for binary components		

Gaia Data Access scenario: GDAS-ST-25

Scenario:
Display the information for a given source (for variability analysis):

- Source Attributes. E.g. mean magnitude, mean color, period, amplitude, etc
- Light curve
- Folded light curve
- Frequency gramme

Specific example:
Get object data by object ID, see See GDAS-EG-04. In this case epoch data is requested,make apps availabe for display interaction especially on variabilty - CU7 have tools

Urgency: 4	**General/Specific**: 4	**Science rank**: 4
Scale: 1	**Frequency**: 4	**Rating**: 48

Related to:

Inputs:
Source ID

Tasks:
Retrieve general parameters, light curve and associated information for given source

Roles:
Anybody

Information required for the roles:
General parameters and light curve info

Comments: