



GREAT

Kick-off meeting

Presentation of the DPAC

F. Mignard



Presentation primarily designed for non-DPAC participants

- Formation of the DPAC
- Organisation and responsibilities
- Composition



Gaia objective summary

- Gaia is before all a scientific mission
 - Astrometry for 10^9 stars, accuracy of $25 \mu\text{as}$ $V = 15$
 - position, PM, parallaxes
 - resolved and astrometric binaries
 - solar system objects
 - Multi-color, ~ 80 epoch spectrophotometry for all the sources
 - Vr and spectra for sources $V < 16.5$
- ESA mission with European astronomical community
 - ESA for the construction, launch and operations
 - Scientific community for the data processing
 - End products defined in the SMP



- The DP is a task shared between the community and the project
 - The project supports :
 - the spacecraft, launch, operations
 - data reception and archiving
 - initial treatment and part of the core processing
 - ESA does not fund the overall scientific processing
 - but ESAC is significantly involved
 - Community implications are nationally funded
 - visibility needed by every partners
 - national interests and priorities must be matched to the DP needs
 - scientific results are the real drive for the scientific community

- No duplication of the processing: a single pipeline
 - overall methodology learnt from Hipparcos
 - resources not available for a full duplication
 - specific parts could be duplicated if needed
- No way to set up a dedicated institute
 - S/W development distributed in many places
- H/W equipment in a small number of DP centres
 - this is where the data is received and processed

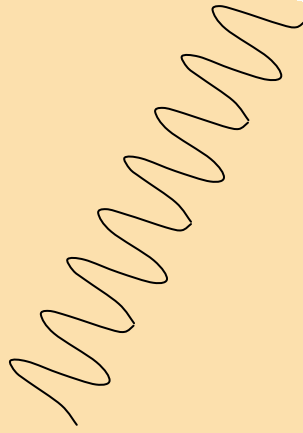
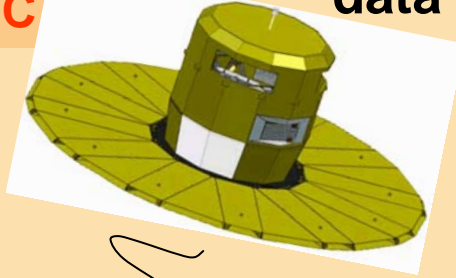


- ESA has issued an Announcement of Opportunity
 - released on Nov 2006
 - it deals with the Gaia Data Processing
- A Consortium has been formed to answer this AO
 - DPAC = Data Processing & Analysis Consortium
 - Forms the "Science Ground Segment" for Gaia
 - must transform the telemetry data into science products
 - a large catalogue of astrometry, photometry, spectroscopy
 - stellar sources, QSOs, Solar system objects
 - response compiled in a 700-page proposal
- Formally selected by ESA Science Program Com. in May 2007

Where do the DPAC activities lie?

ESA/ESOC

data acquisition



Telemetry data

data processing

DPAC

final results

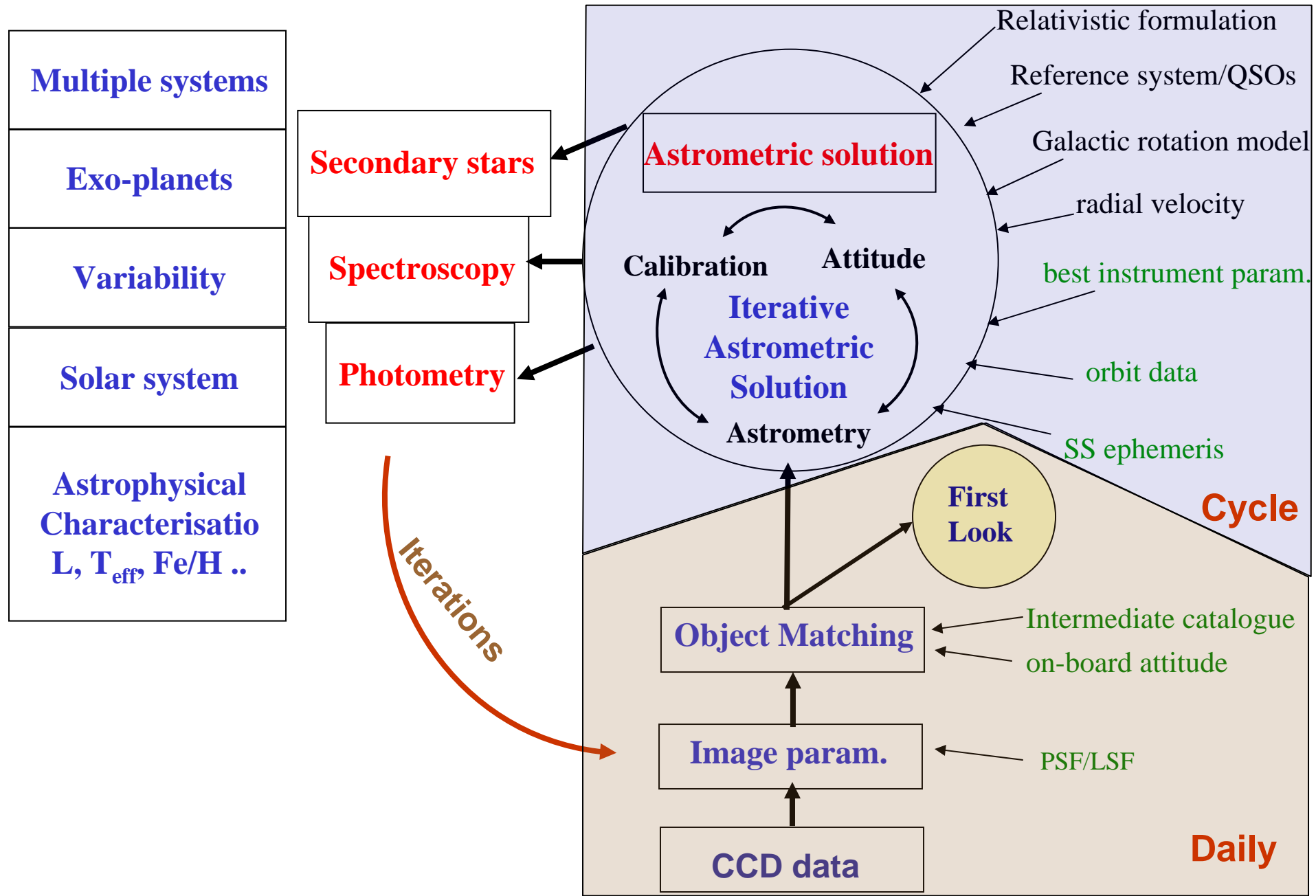
- position
- PM
- parallaxes
- radial velocity
- magnitude
- variability
- orbits, masses
- T_{eff} , $\log g$...
- ...
- ...



Responsibilities of the DPAC

- Preparation of the data processing
 - general analysis of the problem
 - choice of the overall architecture
 - design, programming and implementation of the algorithms
- Production of simulated data to assist in:
 - the general design
 - the algorithm development
 - the tests and validations
- Design and setting up of the DP chain
 - organisation and management of the data flow between the DPCs
 - integration and validation of the DP chains in the DPCs
 - procurement, maintenance of the H/W
 - production of the intermediate and final Gaia products

Overall Structure of the Data Processing



- Basic organization around Coordination Units (CU)
 - large and organizationally nearly autonomous structures
 - their boundaries are determined by the data flow
 - they share common tools and adhere to strict interface and schedule
 - a single centralized data base is the heart of the system
 - each CU is supported by at least on Data Processing centre (DPC)
- DPAC is coordinated by an Executive Committee
 - all CU leaders have a seat in the EC
 - The EC selects the chair and deputy chair
 - At the moment : F. Mignard & R. Drimmel
- Currently: 8 CUs, 6 DPCs, 2 WGs



The coordination units



Name

Leader

Deputies

- CU1: system architecture **W. O'Mullane** U. Lammers, T. Levoir
- CU2: data simulations **X. Luri** C. Babusiaux, F. Mignard
- CU3: core processing **U. Bastian** J. Torra, M. Lattanzi
- CU4: object processing **D. Pourbaix** P. Tanga
- CU5: photometric processing **F. van Leeuwen** A. Brown
- CU6: spectroscopic processing **D. Katz** M. Cropper
- CU7: variability processing **L. Eyer** D. Evans, P. Dubath
- CU8: astrophysical parameters **C. Bailer-Jones** F. Thévenin
- CU9: catalogue access To be activated later

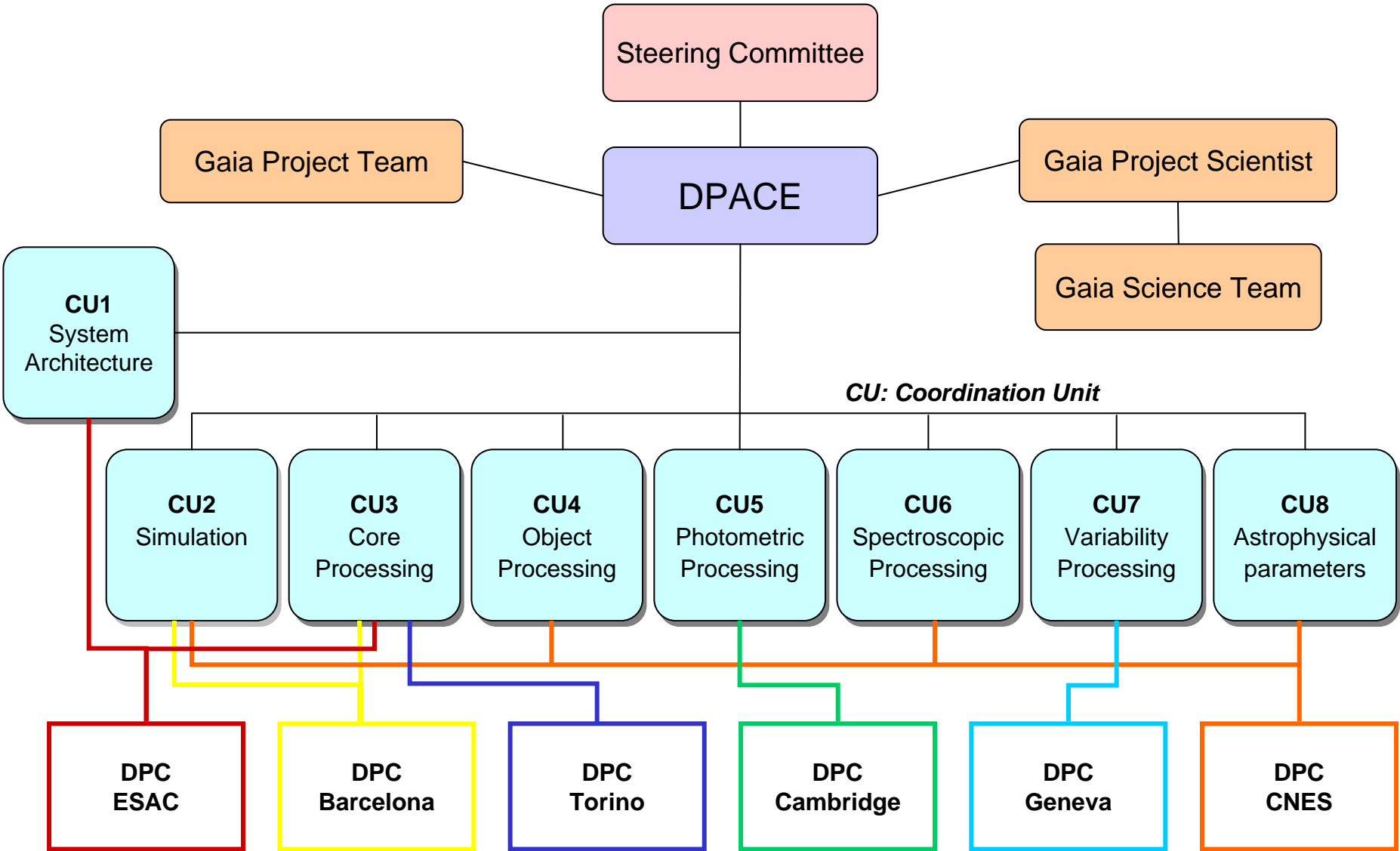


The DPCs (Data Processing Centres)



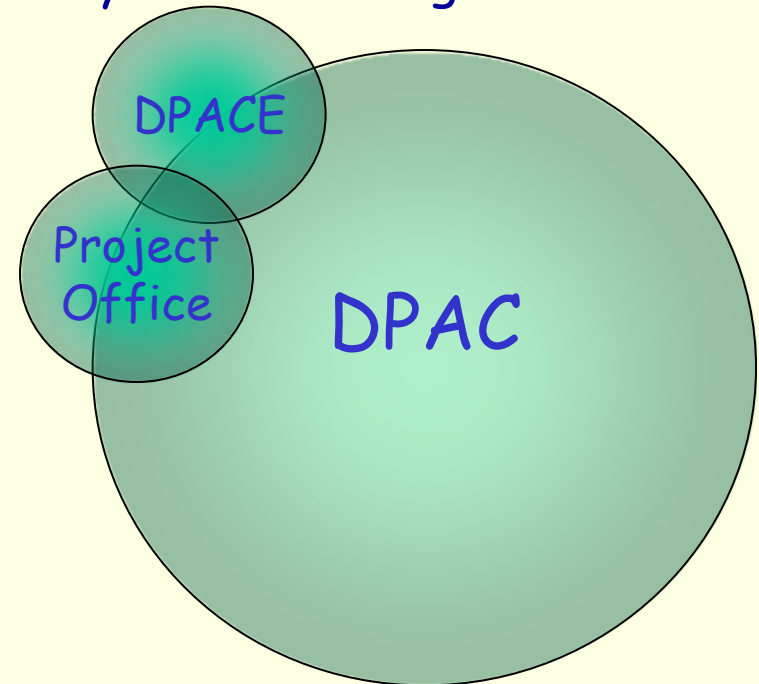
- DPC-E ESAC Villafranca J. Hoar
- DPC-C CNES Toulouse X. Passot
- DPC-I IoAC Cambridge F. de Angeli
- DPC-G ISDC Geneva M. Beck
- DPC-B BPC Barcelona J. Portell
- DPC-T OATo Torino M. Martino

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DPC: Data Processing Centre

- In charge of the day-to-day management of the overall DPAC development and operations
- The Project Coordinator has a standing invitation to DPAC meetings
- His designation is formally approved by the Steering Committee
- Areas covered:
 - Schedule Monitoring
 - Risk Management
 - Interface Management
 - Internal Coordination
 - External Interface





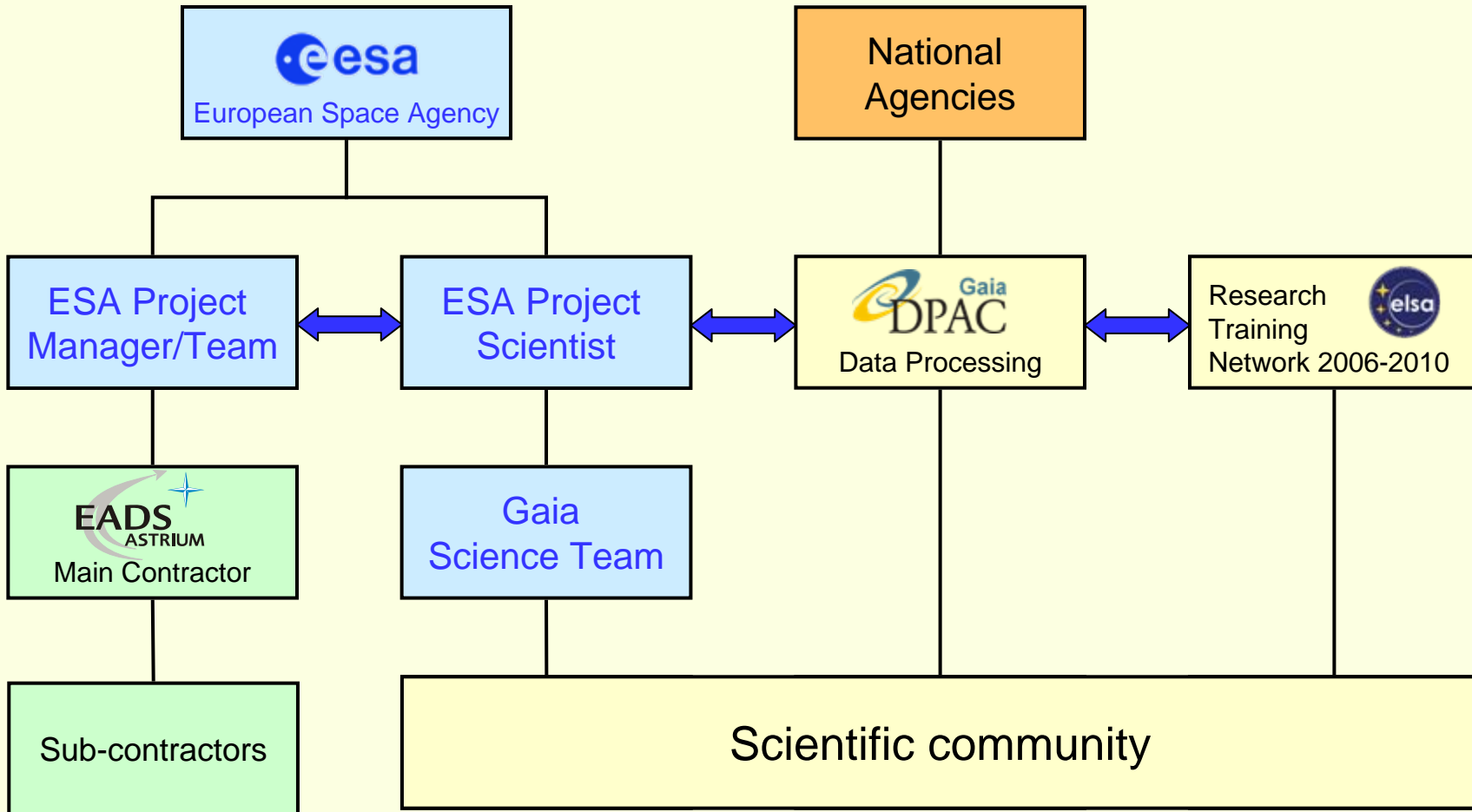
- Radiation Task force [GDTRF]
 - Goal : Coordinate DPAC activities on the CCD radiation damage
 - investigate methods to compensate effects on science data
 - monitoring the DPAC developments and tests on these issues
 - production of a DPAC Radiation Recovery Plan
 - chair : F. van Leeuwen
 - membership: 10 representatives of CUs (none from CU7-CU8)



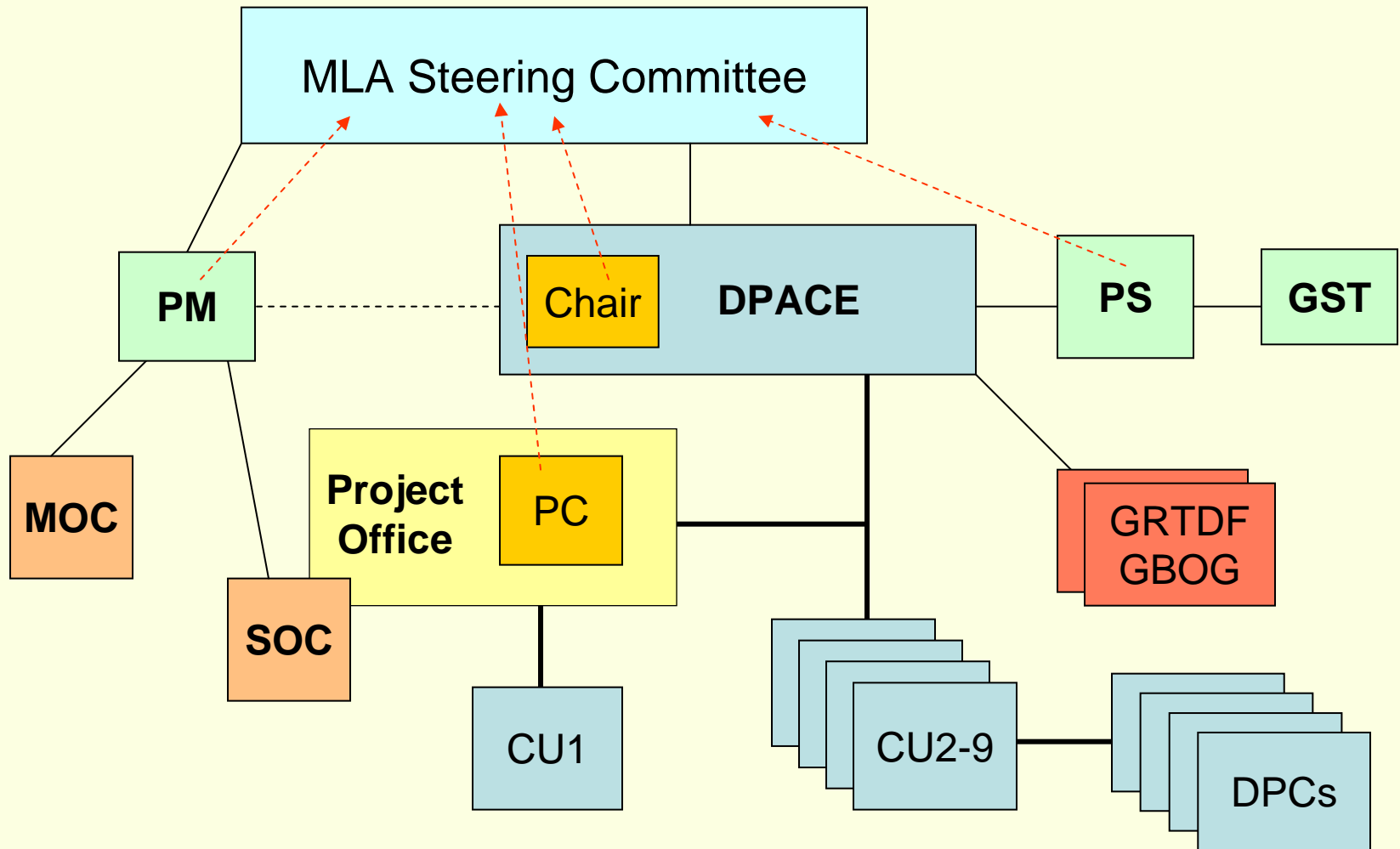
- Ground based observations [GBOG]
 - Goals: Coordinate the GB observations needed for Gaia data processing
 - compile the requirements
 - set a long term planning for the proposals
 - define priorities for these observing programs
 - Chair: C. Soubiran
 - membership: one or two representatives per CU



The DPAC and the mission overall chart



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Schedule for the DPAC



- 2006 June Creation of the DPAC
- 2006 Nov AO release for the Data Processing by ESA
- 2007 April Response of the DPAC to the AO
- 2007 May Selection of the DPAC
- 2007-2010 Development of the DP pipeline
 - 10 cycles of 6 months
 - SDR (11/2007), CDR (05/2009)
- early 2011 end-to-end testing
- early-2012 Gaia launch
- 2012 July Start of the observations
 - start of the data processing
- 2017 End of the observing program
- 2018/2020 Final processing and publication

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What the DPAC *is* and *is not*

- DPAC is a big European collaboration to carry out the Gaia DP
 - the goal is to produce the final Gaia scientific data
 - the goal is not to produce S/W packages, although this is necessary

- DPAC is a big scientific project
 - There are major engineering aspects in the DPAC
 - but the DPAC is not a big engineering project

- DPAC is a key element of the Gaia mission
 - but DPAC is not (primarily) funded on the project budget
 - national funding is granted but not managed by DPAC

What the DPAC *is* and *is not*

- DPAC is not an Instrument Consortium
 - it produces nothing directly related to the S/C
 - it has a role in the instrument sanity check
 - the final system will remain distributed over six Data Centres,
 - there is not a classical "integration"
- DPAC is primarily composed of positions from the academic world
 - this is a community team of scientists and engineers with a common goal
 - the DPAC management has no direct authority on the people and their funding
 - but DPAC fosters a collaborative open spirit which is the optimum way to achieve the Gaia goals

F. Mignard
France

X. Passot C. Bailer-Jones
CNES Germany

X. Luri
Spain

W. O'Mullane
ESAC

F. van Leeuwen
UK

R. Drimmel
Italy

D. Pourbaix
Belgium

L. Eyer
Switzerland

U. Bastian
Germany

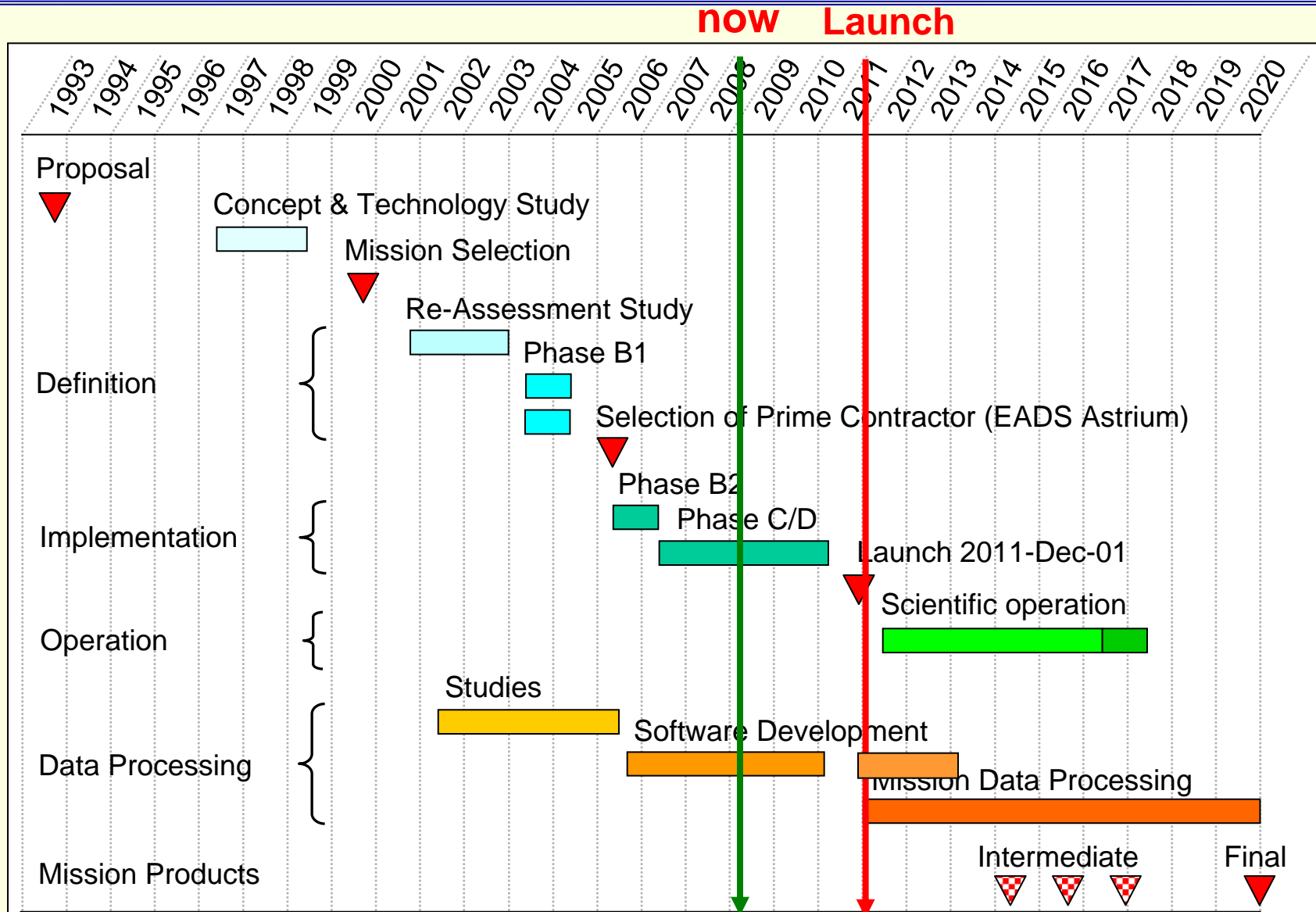
D. Katz
France



The DPACE, Jan 2008



Gaia – Project status and schedule



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MLA Steering Committee



- Created by the MLA
 - basically to monitor the activities under this agreement
 - one representative per funding agency + 2 for ESA
- Place to discuss and act on any funding issue for the DPAC
- Met already three times
 - chair nominated : C. Castelli (UK)
 - status of project, DPAC, funding
 - funding of the PO positions
 - 3 agreement for one position (Germany, Italy, Spain)
- Next meeting 16 June, 2009, ESTEC

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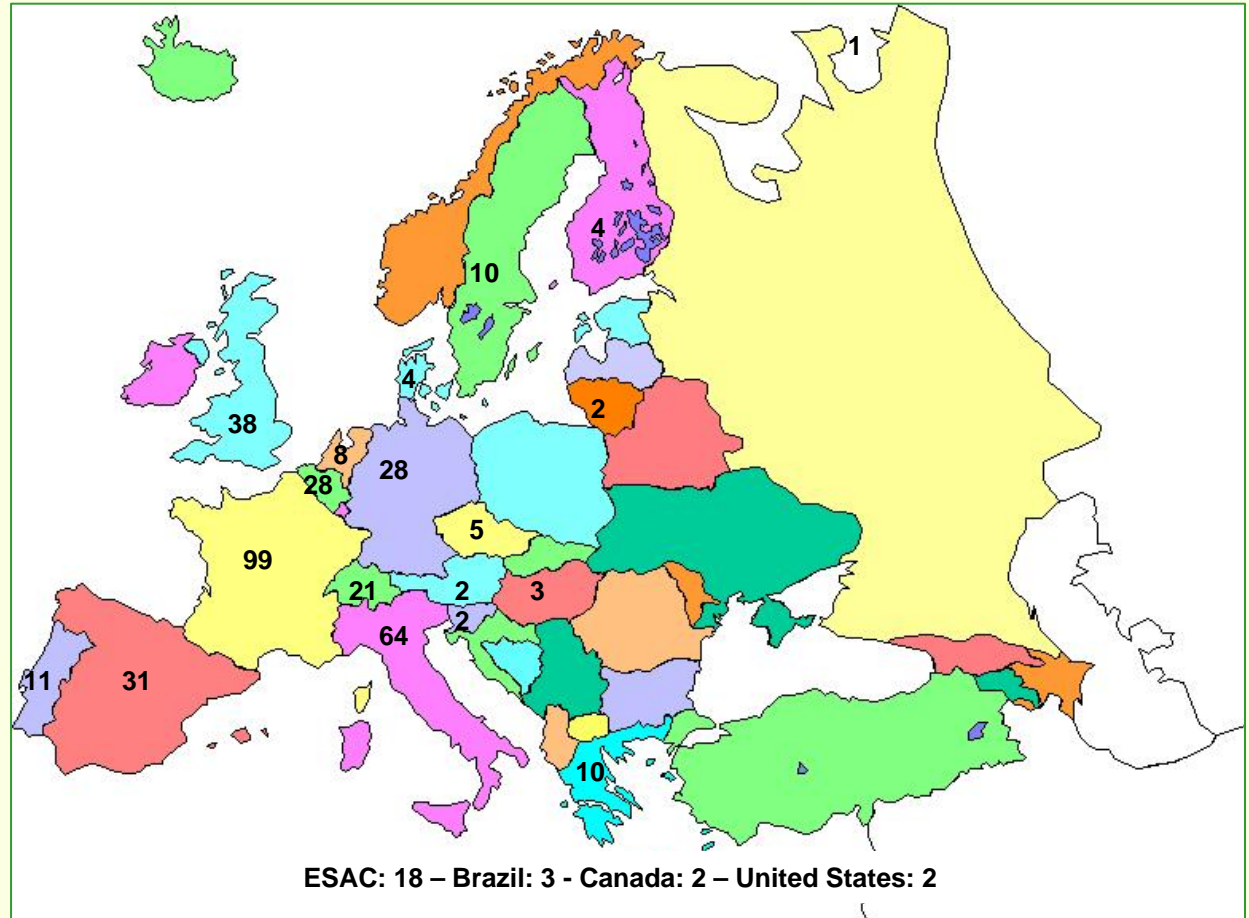


DPAC Membership

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- 396 members
- 22 Funding agencies
- 92% in the 10 largest





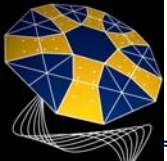
CU membership: February 2008



■ Distribution through the CUs

| National Agency | CU0 | CU1 | CU2 | CU3 | CU4 | CU5 | CU6 | CU7 | CU8 | Total |
|--------------------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| Belgium | | 1 | | | 13 | | 11 | 13 | 8 | 46 |
| France | 2 | 9 | 30 | 11 | 29 | 2 | 29 | 5 | 15 | 132 |
| Germany | | | 3 | 18 | 2 | 1 | 3 | | 6 | 33 |
| Greece | | | 7 | | 2 | | | | 8 | 17 |
| Italy | 1 | 3 | 14 | 22 | 6 | 21 | | 11 | 8 | 86 |
| Netherlands | | | 2 | | | 8 | | | | 10 |
| Portugal | | 2 | 3 | 2 | | | | 4 | | 11 |
| Spain | 1 | 6 | 15 | 14 | | 11 | | 1 | 5 | 53 |
| Sweden | | 1 | | 3 | | | | | 7 | 11 |
| Switzerland | | 2 | 1 | | 4 | | 3 | 16 | | 26 |
| United Kingdom | | 3 | 3 | 3 | | 30 | 8 | 1 | | 48 |
| ESAC (...) | 1 | 17 | | 12 | | | | | | 30 (...) |
| Total of this group | 5 | 44 | 78 | 85 | 56 | 73 | 54 | 51 | 57 | 503 |
| Total of the whole DPAC | 5 | 44 | 82 | 86 | 61 | 74 | 58 | 61 | 62 | 533 |

| | | | | | |
|---------------|------|-------|------|------|------|
| Persons | 287 | 89 | 14 | 4 | 2 |
| Contribute to | 1 CU | 2 CUs | 3CUs | 4CUs | 5CUs |



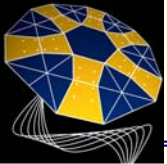
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DPAC membership (evolution)



| | 02/08 | 09/08 | 02/09 |
|-------------|-------|-----------|-----------|
| Belgium | 28 | 28 | 28 |
| ESAC | 21 | 20 | 20 |
| France | 89 | 99 | 99 |
| Germany | 29 | 29 | 28 |
| Greece | 9 | 10 | 10 |
| Italy | 65 | 62 | 64 |
| Netherlands | 4 | 6 | 8 |
| Portugal | 11 | 10 | 11 |
| Spain | 23 | 26 | 31 |
| Sweden | 12 | 10 | 10 |
| Switzerland | 17 | 18 | 21 |
| UK | 38 | 39 | 38 |
| Others | 28 | 29 | 28 |
| Total | 375 | 386 (+3%) | 396 (+3%) |

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CU membership (evolution)



| | 02/08 | 10/08 | 02/09 |
|--------------|------------|------------|------------|
| CU0 | | 3 | 5 |
| CU1 | 48 | 45 | 44 |
| CU2 | 76 | 78 | 82 |
| CU3 | 73 | 86 | 86 |
| CU4 | 68 | 64 | 61 |
| CU5 | 65 | 69 | 74 |
| CU6 | 60 | 63 | 58 |
| CU7 | 53 | 58 | 61 |
| CU8 | 73 | 61 | 62 |
| Total | 516 | 527 | 533 |
| mult. factor | 1.37 | 1.35 | 1.35 |

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