

**v1: Distribution to EC and DPs for feedback at EC89**

## The IAU Divisional Structure: Proposal for Evolution

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### *List of Appendices:*

- A. L. Woltjer (President-Elect) to EC, Aug. 13, 1994
- B. Current IAU Divisions and Commissions [IB106]
- C. **Proposed New IAU Divisional Structure**

ABSTRACT. The current IAU Divisional structure will be almost 20 years old at the Beijing GA. The need for restructuring the Divisions has been expressed several times, but never put into effect. The present proposal is meant to capitalize on the cross-fertilization and impact of the IAU within the non-astronomical world, and to reorganize its scientific Divisions in a more compact form. As a result, the number of Divisions is reduced from 12 to 9, with an almost equal balance between 4 "cross-community" Divisions, and 5 "topical" Divisions.

### **1. Historical context and motivations**

The current divisional structure of the IAU is essentially unchanged from its creation. The original structure, with 12 Divisions, was introduced at the XXIIInd General Assembly (GA) in The Hague (1994), and formally adopted at the XXIIIrd GA in Kyoto (1997), following preparatory work and consultations by the Executive Committee in the 1991-1994 period (with J. Bergeron, GS; I. Appenzeller, AGS; A. Boyarchuk, P; L. Woltjer, PE). An internal report by L. Woltjer to the EC (Appendix A), dated Aug. 13, 1994, shows the state of reflections at the time of the XXIIInd GA. It can be seen that, apart from "legal" considerations (future GA vote in Kyoto for adoption), the IAU divisional structure as we know it today will be almost 20 years old at the XXVIIIth GA in Beijing.

The original idea in 1994 was basically "bottom-up": out of the 40 already existing Commissions (the same number as today), to group together those with common or neighboring interests, into Divisions, making sure that no Division would dominate the others in terms of membership. Out of the 12 Divisions proposed by L. Woltjer (see Appendix A), 9 were classified as "Scientific" (including a "General" Division "9" gathering History, Education, and, interestingly, Bioastronomy<sup>1</sup>), two as "Technically Oriented" (optical and radio), and one "Mixed" (space/high-energy). A few Commissions did not fit easily in this classification scheme, and the possibility was raised "to attach them directly to the EC, or to Division 9".

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<sup>1</sup> The subtitle was : "Search for Extraterrestrial Life", dropped in 2006

The motivations of the time are also interesting, because the arguments to make the original structure evolve remain basically the same today as they were at the time. It is worth quoting here integrally what L. Woltjer wrote 18 years ago:

Whatever views one may have about the merits of specific proposals, it seems difficult to simply do nothing. It has been frequently mentioned that the younger members seem disaffected with the IAU. While a certain lack of interest in commission matters on their part may be rather natural, nevertheless the general perception of the IAU as being an organization mainly preoccupied with "old fashioned" scientific topics, in which the practitioners of the newer subjects have only limited influence, is worrisome. And such opinions prevail not only among the young. In addition, rightly or wrongly, many of the commissions are perceived to be little closed "clubs" that have not much interest in letting new winds blow through. Finally, the discussions of the last three years have raised expectations among those favoring change, and doing nothing will lead to a strong sense of deception.

Since then, the IAU demography, and astronomy in general, have undergone enormous changes. The IAU membership has risen from 7839 at The Hague in 1994 to 10144 at Rio in 2009, a 30% increase, and nearly 400 new members join every triennium. At the time of The Hague, the VLT did not exist, SOHO was not launched, the HST was still in need of correcting "glasses", there were no Rovers on Mars, extrasolar planets around normal stars had not been discovered,<sup>2</sup> the acceleration of the universe was unsuspected, etc. The list is endless.

In parallel, astronomy retains a tremendous impact on the public, as the IYA has vividly shown, and the IAU is now engaged in high-profile initiatives for the development of astronomy worldwide, outlined in its Strategic Plan and the recent creation of the GOAD.

Astronomy is thriving, the IAU as a professional international organization is healthy, its educational impact is significantly growing. We think however that the current Divisional structure, the most immediately visible backbone of its activities, for astronomers as well as for the public, must evolve to better reflect its present-day scientific and societal activities. The existence of the Divisions is now well established, so we adopt here a "top-down" approach to propose a new structure to the community. In this first step, the Commissions are left unchanged (like at the time of L. Woltjer). However, it is clear that they must eventually evolve too, in order to adapt more quickly to the rapid pace of astronomical discoveries, and also to take into account increasingly important related fields so diverse as computer science, new technologies, the origin of life, astroparticle physics, etc.

## ***2. Guidelines for evolution***

After some preliminary internal exchanges took place since the Rio GA, the EC, at its EC88 meeting in Baltimore in May 2010, decided to set up a "Task Group" (TG), with the mission to elaborate and report to the EC various scenarios that could be the basis for a new Divisional structure. The members of this TG are: R. Williams (P), I. Corbett (GS), T. Montmerle (AGS, coordinator), M. Haynes (VP), and G. Setti (VP).

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<sup>2</sup> The first extrasolar planets had been discovered around a pulsar in 1992.

Various tools were used, including astronomical publications, number and activity of Commissions and Working Groups (web pages), etc.; several non-EC colleagues were also consulted.

The main recommendations of the TG can be summarized as follows:

- a. Give a high visibility to cross-fertilization with the non-astronomical world, of interest for the whole astronomical community ("cross-community" Divisions), in particular:
  - *Engineering world*: create a broader, multiwavelength "instrumental" Division, by merging the "Optical and IR Techniques" (IX) and "Radioastronomy" (X) Divisions, as well as the "Data" part of Div. XII; add "Facilities";
  - *Education world*: create an "educational" Division, from part of Div. XII (Commission 46, etc.);
  - *Physics world*: expand "high-energy astrophysics" (Div. XI) to explicitly include the emerging fields coming from particle physics.
- b. Restructure the scientific Divisions in a more compact form ("topical Divisions"), in particular by:
  - merging the two "stars" Divisions (IV and V) into one;
  - merging "Interstellar Matter" (Div. VI) and "Galactic System" (Div. VII).

The other changes, when proposed, are more cosmetic and concern various rearrangements of Commissions within Divisions. New names are suggested.

As a result (to be compared with the structure proposed by L. Woltjer), the number of Divisions would be reduced to 9 :

- (a): 4 "cross-community Divisions";
- (b): 5 "topical Divisions".

No attempt was made to "force" Divisions to have comparable membership, but estimates based on astro-ph publication statistics (kindly provided by Cornell University Library: arXiv.org) indicate that the respective scientific output of the new topical Divisions should be more or less similar.

The following Appendices B and C give, respectively, the current IAU Divisions and Commissions (for reference, from IB106; numbered with Roman numerals), and the proposed new structure (with Divisions ordered using capital letters, except "I", to avoid confusion), in which the Commissions remain unchanged at this stage, but have been redistributed.

### ***3. Consultation of the community***

**The proposed new structure is open to wide discussion and feedback.**

The present proposal is to be circulated among the EC and DPs, in view of a first discussion to be held at EC89 in Prague (24-26 May 2011). In the meantime, this document is intended to percolate down among the community via hierarchical steps: (i) The DPs are responsible for distributing this document widely,

primarily to their Division SOCs (name suggested to be changed into "DACs": "Division Advisory Committees"), and to the relevant Commissions Presidents (CP); (ii) in turn, the CPs consult their SOCs. Reactions and comments should then be fed back to the DPs who will report on them at EC89. The document can be freely distributed even more widely, if the DPs and CPs think appropriate. *Thus, for this consultation the contact persons between the EC and the community will be the DPs* (using much the same channels as for the selection of IAU meetings), and this "POC" ("point-of-contact") role is expected to be reinforced in the new structure.

If the proposal receives support by the community, the discussions will continue with the DPs to resolve potential problems and make adjustments. A new version (v2), hopefully close to the final one (v3), will be elaborated by the TG before the end of this year and circulated again. The goal is to have the new Divisional structure formally adopted by a vote at the Beijing GA in 2012.

**APPENDIX A: L. Woltjer (President-Elect) to EC: Aug. 13, 1994**

From : L. Woltjer, President Elect

Geneva, 13 August 1994

To : Executive Committee IAU

### **Restructuration of IAU Commissions : An alternative**

#### **Introduction**

It is not a simple matter to analyze the responses to the proposals for restructuring made by the General Secretary (Sept. 13, 1993). Some presidents favor overall restructuring provided their own commission is left out. Others make a joint proposal, just in case restructuring will occur, but at the same time their individual responses indicate serious reservations. Overall, I conclude that 2/3 - 3/4 of the commission presidents who have expressed an opinion do not favor the proposals for "super commissions"; however, when weighting the opinions by the commission membership the opinions more nearly balance.

Whatever views one may have about the merits of specific proposals, it seems difficult to simply do nothing. It has been frequently mentioned that the younger members seem disaffected with the IAU. While a certain lack of interest in commission matters on their part may be rather natural, nevertheless the general perception of the IAU as being an organization mainly preoccupied with "old fashioned" scientific topics, in which the practitioners of the newer subjects have only limited influence, is worrisome. And such opinions prevail not only among the young. In addition, rightly or wrongly, many of the commissions are perceived to be little closed "clubs" that have not much interest in letting new winds blow through. Finally, the discussions of the last three years have raised expectations among those favoring change, and doing nothing will lead to a strong sense of deception.

At the same time it is clear that the Executive Committee cannot and should not try to force extreme changes on the commissions against their will. A solution has to be found which preserves the positive of the present situation, while satisfying those who want renewal.

#### **Proposal**

In view of the various aspects mentioned by the commission presidents and others, and in order to create a flexible mechanism for change which fosters increased interaction, I would propose the following:

- I. All of the commissions as presently constituted stay in place and continue their work in the usual way.
- II. A divisional structure is introduced to which the commissions may affiliate. These divisions are run by a board composed of :
  - (a) the commission presidents for divisions with more than 3 commissions;
  - (b) the presidents and vice-presidents of commissions for divisions with 2-3 commissions;
  - (c) the president and vice-president plus 3 other members for divisions which are composed of 1 commission.

Thus, each divisional board is composed of  $5 \pm 1$  persons. These boards elect their own president.

The tasks of the divisions or rather of the divisional boards would include :

- (1) The endorsement of symposia and colloquia.
- (2) The organization of Joint Discussions.

- (3) To propose candidates for the Special Nominating Committee (requires a change in the Bye-Laws).
- (4) To coordinate the activities of the commissions in the division, including the making of proposals for new commissions, proposals for dissolving or combining existing commissions and proposals for working groups.
- (5) To advise the EC, in particular by having the division presidents attend the meetings of the EC at the time of the GA.

With regard to (1), this does not change the role of the commission presidents, except that consultation across commission boundaries will take place, which would seem to be very positive. Item (2) also does not much change the present situation, except, again, that consultation with all adjacent commissions will take place. Of course, this does not in any way exclude meetings sponsored by more than one division.

Item (3) : Since the divisions would have globally equal numbers of members, it would seem to enhance the fairness in the election process for the EC. Still, as at present, the Nominating Committee would have its role (as specified in Bye-Law 12 a) to ensure that a reasonable balance of nationalities be achieved.

Concerning (4), the divisional structure provides a flexible framework for adapting the commissions to evolving circumstances, without creating the feeling that such adaptation is "imposed" from the outside. Finally, with regard to (5), the present meetings of the EC with some forty commission presidents hardly seem to allow effective communication to be established, while a meeting of the 12 member EC with some 12 representative division presidents would be more practical.

An example of a framework for the divisional structure follows :

*A possible set of divisions and the affiliated commissions*

| <u>Scientific Divisions</u>         | Commissions        | Members |
|-------------------------------------|--------------------|---------|
| 1. Fundamental Astronomy            | 4, 7, 19, 31       | 424     |
| 2. Sun, Heliosphere                 | 10, 12, 49         | 763     |
| 3. Solar System                     | 15, 16, 20, 21, 22 | 667     |
| 4. Stars                            | 26, 29, 35, 36, 45 | 964     |
| 5. Variable Stars                   | 27, 42             | 619     |
| 6. Interstellar Matter              | 34                 | 657     |
| 7. Galactic System                  | 33, 37             | 512     |
| 8. Galaxies and the Universe        | 28, 47             | 915     |
| 9. General                          | 41, 46, 51         | 500     |
| <u>Technique oriented Divisions</u> |                    |         |
| 10. Optical                         | 8, 9, 24, 25, 30   | 779     |
| 11. Radio                           | 40                 | 752     |
| <u>Mixed Divisions</u>              |                    |         |
| 12. Space / High Energy             | 44 / 48            | 645     |

Commissions 5, 6, 14, 38 and 50 do not easily fit into such a framework and might be directly attached to the EC, or included in division 9.

### **Conclusion**

The present proposal would create a high visibility divisional structure with some well defined functions. Moreover, it is a flexible structure : If the proponents of the "super commissions" are right, gradually the divisions may take over from the commissions. If they are wrong, the commissions will continue to flourish in a framework which fosters communication but leaves each commission master in its own house. There is no need to foresee the outcome now, and one can let the situation evolve naturally over the coming decade. Perhaps equally important, one would obviate the need to raise this rather divisive and distracting issue again and again.

The presently proposed divisions would face none of the problems which the "super commissions" would meet. Commission members and their presidents would communicate in the same way as in the past, and so there would be no problems of mass mailings. Also the many commission members who feel more comfortable in smaller, more cohesive units would continue to have these. Nevertheless, more cohesion would be achieved between the related commissions, as well as indirectly between the commissions and the EC.

The triennial "Reports on Astronomy" would continue to be prepared by the commissions as usual with possibly some synchronization by the divisional boards to avoid both duplication and lacunae.

Some direct communication between the divisions and their members might also be useful. The simplest way of achieving this could be through the IAU Bulletin, if each divisional board would have, say, two pages reserved for it in each bulletin; perhaps this might also make the Bulletin more readable.

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| <b>Appendix B: IAU Current Divisions &amp; Commissions</b> [ref. IB106] |
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**Division I Fundamental Astronomy**

- Commission 4 Ephemerides
- Commission 7 Celestial Mechanics & Dynamical Astronomy
- Commission 8 Astrometry
- Commission 19 Rotation of the Earth
- Commission 31 Time
- Commission 52 Relativity in Fundamental Astronomy

**Division II Sun & Heliosphere**

- Commission 10 Solar Activity
- Commission 12 Solar Radiation & Structure
- Commission 49 Interplanetary Plasma & Heliosphere

**Division III Planetary Systems Sciences**

- Commission 15 Physical Study of Comets & Minor Planets
- Commission 16 Physical Study of Planets & Satellites
- Commission 20 Positions & Motions of Minor Planets, Comets & Satellites
- Commission 22 Meteors, Meteorites & Interplanetary Dust
- Commission 51 Bio-Astronomy
- Commission 53 Extrasolar Planets

**Division IV Stars**

- Commission 26 Double & Multiple Stars
- Commission 29 Stellar Spectra
- Commission 35 Stellar Constitution
- Commission 36 Theory of Stellar Atmospheres
- Commission 45 Stellar Classification

**Division V Variable Stars**

- Commission 27 Variable Stars
- Commission 42 Close Binary Stars

**Division VI Interstellar Matter**

- Commission 34 Interstellar Matter

**Division VII Galactic System**

- Commission 33 Structure & Dynamics of the Galactic System
- Commission 37 Star Clusters & Associations

**Division VIII Galaxies & the Universe**

- Commission 28 Galaxies
- Commission 47 Cosmology



**Division IX Optical & Infrared Techniques**

Commission 21 Galactic and Extragalactic Background Radiation

Commission 25 Stellar Photometry & Polarimetry

Commission 30 Radial Velocities

Commission 54 Optical & Infrared Interferometry

**Division X Radio Astronomy**

Commission 40 Radio Astronomy

**Division XI Space & High Energy Astrophysics**

Commission 44 Space & High Energy Astrophysics

**Division XII Union-Wide Activities**

Commission 5 Documentation & Astronomical Data

Commission 6 Astronomical Telegrams

Commission 14 Atomic & Molecular Data

Commission 41 History of Astronomy

Commission 46 Astronomy Education & Development

Commission 50 Protection of Existing & Potential Observatory Sites

Commission 55 Communicating Astronomy with the Public

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| <b>Appendix C: Proposed New IAU Divisional Structure</b> |
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1. "Cross-community" Divisions

**Division A Fundamental Astronomy**

Commission 4 Ephemerides  
 Commission 7 Celestial Mechanics & Dynamical Astronomy  
 Commission 8 Astrometry  
 Commission 19 Rotation of the Earth  
 Commission 31 Time  
 Commission 52 Relativity in Fundamental Astronomy

**Division B New Technologies, Facilities, Data**

Commission 5 Documentation & Astronomical Data  
 Commission 6 Astronomical Telegrams  
 Commission 14 Atomic & Molecular Data  
 Commission 25 Stellar Photometry & Polarimetry  
 Commission 40 Radio Astronomy  
 Commission 54 Optical & Infrared Interferometry

**See Note b**

**Division C Education, Heritage, Outreach**

Commission 41 History of Astronomy  
 Commission 46 Astronomy Education & Development  
 Commission 50 Protection of Existing & Potential Observatory Sites  
 Commission 55 Communicating Astronomy with the Public

**See Note c**

**Division D High Energy & Astroparticle physics**

Commission 44 Space & High Energy Astrophysics

**See Note d**

2. "Topical" Divisions

**Division E Sun & Heliosphere**

Commission 10 Solar Activity  
 Commission 12 Solar Radiation & Structure  
 Commission 49 Interplanetary Plasma & Heliosphere

**Division F Planetary Systems & Origin of Life**

Commission 15 Physical Study of Comets & Minor Planets  
 Commission 16 Physical Study of Planets & Satellites  
 Commission 20 Positions & Motions of Minor Planets, Comets & Satellites  
 Commission 22 Meteors, Meteorites & Interplanetary Dust  
 Commission 51 Bio-Astronomy  
 Commission 53 Extrasolar Planets

**See Note f**

### **Division G Stellar Structure & Evolution**

- Commission 26 Double & Multiple Stars
- Commission 27 Variable Stars
- Commission 29 Stellar Spectra
- Commission 30 Radial Velocities
- Commission 35 Stellar Constitution
- Commission 36 Theory of Stellar Atmospheres
- Commission 42 Close Binary Stars
- Commission 45 Stellar Classification

### **Division H Interstellar Matter & Local Universe**

- Commission 33 Structure & Dynamics of the Galactic System
- Commission 34 Interstellar Matter
- Commission 37 Star Clusters & Associations

**See Note h**

### **Division J Distant Universe & Cosmology**

- Commission 21 Galactic and Extragalactic Background Radiation
- Commission 28 Galaxies
- Commission 47 Cosmology

## **Notes**

**Note b.** This Division would also include new topics such as:

- Computational astrophysics
- Large surveys and databases
- Astrostatistics
- High-energy instrumentation
- Astroparticle detectors

**Note c.** This Division could also include two existing WG:

- Historic Radio Astronomy
- Communicating Heliophysics

**Note d.** This Division would include astroparticle topics at the boundary with fundamental physics, such as non-electromagnetic "messengers" (cosmic rays, neutrinos, gravitational waves, etc.), the nature of dark matter and dark energy, etc.

**Note f.** "Origin of Life" is chosen here as a common denominator for "Bioastronomy", "Astrobiology", "Exobiology", etc.

**Note h.** This Division would include, for instance, "ecosystems" (structure, stellar populations, etc.) of resolved, nearby galaxies, e.g., the Local Group, nearby starbursts, etc., compared with our Galaxy.