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THE PROGRESSIVE WORLD PENETRATION OF THE STRASBOURG ASTRONOMICAL DATA CENTER (1970-1990)

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Abstract. Over roughly two decades, Strasbourg astronomical Data Center (CDS) managed to be recognized as an excellence center for stellar and non-stellar data (solar-system excluded) on a world-wide scale. After briefly recalling the CDS genesis, this chapter details the progressive international penetration of that small structure, ahead of the networking of the planet. Among the aspects reviewed are: the international membership of CDS Council, the participating observatories, the CDS international agreements, the geographical coverage of users, the international meetings, the publications, the staff, and, last but not least, the critical ventures with the space agencies without which CDS would not have remained on the international scene. Some tentative explanations of CDS' international acceptance are put forward, such as its genial basic idea (table of correspondence between catalog identifications) and more generally its excellent home-made products; right decisions taken at the right time by the initial managers; perceptiveness in terms of future needs; adequate response to the expectations of space agencies; and so on.

1. Introduction

The genesis of Strasbourg astronomical Data Center (CDS) has been detailed in an earlier paper (Heck 2005b). The context of the time was the advent of astronomical data centers world-wide, together with an increasing recognition of data-centered activities at the level of the International Astronomical Union (IAU).

After recalling the major milestones of the pre-CDS years, the present paper will be devoted to the two first decades of the center's existence. They correspond roughly to the period covered by the two first CDS Directors (Fig. 1), Jean Jung (1972-1975) and Carlos Jaschek (1975-1990), keeping in mind that CDS was already active before its official founding in 1972 (for instance, people operational in Strasbourg well before, two *Information Bulletins* published in 1971, etc.).

In line with the philosophy of the OSA volumes, we shall focus this paper on a specific theme: the progressive international recognition of the center through a number of facets. For the period under consideration, the evolution of CDS' technical activities and development (products, tools, support, staff, computer equipment, etc.) can be found in Issues 1 to 38 of its *Information Bulletin*, in progress reports regularly presented at conferences, as well as in the annual reports of the CDS Director.

Historical details on Strasbourg Observatory (hosting the center, cf. Fig. 2) can be found in a recent edited book (Heck 2005a). Interested readers can also refer to two other chapters of this OSA 7 volume: the genesis and early history of the IAU Working Group on Astronomical Data by G.A. Wilkins, and the interview of G. Eichhorn on the Astrophysics Data System (ADS).

2. The CDS Genesis

Towards the end of the 1960s, the idea of data centers (conceptually in the continuation of cataloguing) had been popping up here and there among astronomers, together with individual initiatives setting up what would be seen today as embryonic materializations.

The 14^{th} General Assembly (GA) of the International Astronomical Union (IAU), held in August 1970 in Brighton (UK), remains in history as the first one where the issue of astronomy-related data centers was officially debated at specific meetings. Refer to Heck (2005b) for details on the preparatory steps.

Thus the proceedings of this 14^{th} IAU GA, a compendium dated 1970 but published in 1971, contain the first appearance, at the IAU level, of the Strasbourg Data Center that would however exist officially only from 1972 onwards, and next to the name of Jung who was going to be its first Director (IAU Trans 1971, p. 247).

P. Lacroute, Director of Strasbourg Observatory for the period 1946-1976, stated in a few notes he put together (Lacroute 1980) that the need for an organization able to collect and to disseminate stellar information was every day increasingly more urgent as data were piling up. He listed

Figure 1. The two first CDS Directors: Jean Jung (left) served from 1972 to 1975 and Carlos Jaschek, from 1975 to 1990. (Photographs: J. Jung & A. Heck)

A. Blaauw, R. Cayrel and J. Delhaye among the European astronomers pushing, in the late 1960s, for such a structure.

The oldest trace we could find on the establishment of a stellar data center in Strasbourg goes back to the minutes of a meeting held in Strasbourg on 8 January 1969 with only six attendees from Paris and Strasbourg. Refer to Table 1 for the pre-CDS chronology and to Heck (2005b) for details and quotations.

At a CDS meeting held in Geneva on 27 November 1970, it was decided to publish an *Information Bulletin* (hereafter sometimes referred to as CDSIB) in English with a circulation of 600 copies (soon after brought up to 700) directed at astronomical institutions as well as at interested individuals. The first issue (May 1971) presented the Center's activities, reported on the then "participating observatories" (Marseilles, Lausanne-Geneva, Heidelberg, La Plata) and included a couple of papers listing catalogs recently published. A second issue appeared in December 1971.

Lacroute (1980) recalls that CDS started *de facto* to operate under the leadership of Jung at the end of 1970. As to the personnel, there was the active collaboration of the "participating observatories" (cf. Sect. 3.2) already mentioned and, in Strasbourg, the contribution from some members of the Observatory personnel. Some funding was received from the Institut National d'Astronomie et de Géophysique (INAG); some card-punching of catalogs was carried out on remaining funds from a local astrometric project, but most money was injected by Strasbourg Observatory.

After several administrative delays, the by-laws regulating CDS were

approved at the beginning of 1972 and issued as INAG Decision 1/72/D0. Here is the first article specifying aims and goals:

"L'INAG crée un Centre de Données Stellaires (CDS). Ce centre a pour buts, en vue d'études sur la Galaxie:
1. de rassembler les données les plus importantes sur les étoiles: positions, mouvements propres, magnitudes, spectres, parallaxes, etc.;
2. d'améliorer les données existantes grâce à leur confrontation;
3. de suggérer aux observateurs les observations les plus utiles pour compléter efficacement les informations disponibles;
4. de diffuser aussi largement que possible les résultats de ces travaux à la communauté astronomique;
5. d'effectuer des recherches sur la Galaxie à partir des données rassemblées."

[INAG creates a Stellar Data Center (CDS). This center has the following goals, in view of studying the Galaxy:
1. to collect the most important stellar data: positions, proper motions, magnitudes, spectra, parallaxes, and so on;
2. to improve the existing data by comparing them;
3. to suggest to observers the most useful observations to efficiently complete the available information;
4. to disseminate as widely as possible the results of those works to the astronomical community;
5. to undertake investigations on the Galaxy from the gathered data.]

The by-laws were completed by INAG decision 2/72/D0 nominating the first CDS Scientific Council made of six French and six foreign astronomers: A. Bijaoui (Nice Obs.), A. Blaauw (European Southern Obs.), J. Boulon (Paris Obs.), G. Cayrel de Strobel (Meudon Obs.), J. Delhaye (Paris Obs.), Ch. Fehrenbach (Haute Provence Obs.), W. Fricke (Astron. Rechen-Inst. Heidelberg), B. Hauck (Lausanne Inst. Astron.), C. Jaschek (La Plata Obs.), J. Jung (Strasbourg Obs.), G. Larsson-Leander (Lund Obs.), and C.A. Murray (Royal Greenwich Obs.) for a term of three years starting on 1 May 1972[1].

Their mission was specified in Article 5 of the by-laws:

"Le Conseil Scientifique:
– propose à l'INAG le Directeur du CDS;
– oriente les travaux du CDS;
– examine les projets de budget du CDS;
– examine, en vue de leur transmission à l'INAG ou à d'autres organismes, les demandes de moyens présentées par le CDS;
– approuve les rapports annuels du CDS."

[The Scientific Council:
– proposes to INAG the CDS Director;

[1]See Sect. 3.1 and Table 2 for the successive CDS Councils in the period 1972-1990.

Figure 2. The Big Dome, the most emblematic of Strasbourg Observatory's buildings. This institution is hosting Strasbourg astronomical Data Center since its foundation in the early 1970s. (Photograph: Strasbourg Obs.)

– orients the CDS activities;
– examines the CDS budget projects;
– examines, in view of transmitting them to INAG or to other organizations, the requests for means presented by the CDS;
– approves the CDS annual activity reports.]

And finally INAG Decision 3/72/D0 dated 31 May 1972 was installing Jung as the first CDS Director. CDS was then officially and totally in business. The inaugural Council meeting took place on 25-26 May 1972. The following excerpt of the meeting minutes is of interest here:

"J. Delhaye ouvre la séance en remerciant les membres d'avoir répondu à sa convocation, puis rappelle l'origine du projet de création d'un centre de

données stellaires. Vieux projet, dont la paternité revient en partie à lui-même, mais aussi à A. Blaauw et à R. Cayrel, son exécution a été retardée pour des raisons administratives. Dans un souci de décentralisation, Strasbourg a finalement été choisi comme siège de ce CDS.
Raisons de ce choix:
– l'activité de P. Lacroute qui collaborait déjà avec W. Dieckvoss de Hambourg,
– compétences du personnel.
L'INAG, qui ne peut avoir de laboratoire propre, est l'agence qui définit la politique scientifique. Le CDS est une partie de l'Observatoire, mais a une ouverture internationale: aussi 50% des membres du Conseil Scientifique sont-ils des membres étrangers. Pour éviter d'en faire un centre uniquement rhénan, l'INAG a tenu à la participation de MM. Murray (Grande-Bretagne), Larsson-Leander (Suède) et Jaschek (Argentine)." (Jung 1972)

[J. Delhaye opens the session and thanks the [Council] members for having come to this meeting. He then recalls the origin of the project to set up a stellar data center. An old project indeed – the fatherhood of which is partly due to him, but also to A. Blaauw and R. Cayrel – the materialization of which has been delayed for administrative reasons. In a decentralization move, Strasbourg has finally been chosen as the CDS location.
Reasons for that choice:
– P. Lacroute's activity as he already collaborated with W. Dieckvoss from Hamburg,
– the personnel's competence.
INAG cannot have its own laboratories and is the agency that defines the scientific policies. CDS is part of [Strasbourg] Observatory, but has an international opening: therefore 50% of the CDS Scientific Council members are foreigners. To avoid making of CDS a Rhenish-only center, INAG wished the membership of Messrs. Murray (Great Britain), Larsson-Leander (Sweden) and Jaschek (Argentina).]

By the time of the CDS official existence, two issues of the *Information Bulletin* (May and December 1971) had already been published, with a third one scheduled for July 1972. The *Bulletin* would be published at an average rate of two per year until its discontinuation after Issue 48 (March 1996).

The pre-CDS chronology is summarized in Table 1. See also Jung (2005).

3. From the Start, an International Vision

The international visibility of an institution is not quite a measurable quantity. A number of its facets are however identifiable such as, in the case of CDS, the geographical coverage of its international agreements, the number of its users world-wide, the size of the international attendance at the meetings it organized, the circulation of its publications, and so on.

TABLE 1. Chronology of steps leading to the creation of the Stellar Data Center (CDS). (from Heck 2005b)

1969	Meeting on future CDS (Strasbourg, 8 Jan 1969) (Lacroute 1969a)
	IAU 32 Doc 11. on urgency to coordinate actions on astronomical data (Perek 1969)
	Meeting on future CDS (Strasbourg, 21-22 Oct 1969) (Lacroute 1969b)
1970	Letter from Lacroute to IAU announcing a report on CDS at the upcoming IAU GA in Brighton (Lacroute 1970a)
	Meeting on future CDS (Strasbourg, 4 Jul 1970) (Lacroute 1970b, Jung & Lacroute 1970)
	14^{th} IAU General Assembly (Brighton, 18-27 Aug 1970)
	Letter from CNFA Chairman to INAG Director (Pecker 1970)
	CDS Meeting (Geneva, 27 Nov 1970) (Jung 1970)
1971	CDS Information Bulletin **1** (Ed. Jung, May 1971)
	Meeting of INAG's *Conseil de Direction* (Paris, 12 May 1971) (Aubert & Charvin 1971)
	Meeting of INAG's Scientific Council (Paris, 26 May 1971) (Boulon 1971)
	CDS Meeting (Strasbourg, 25 Nov 1971) (Jung 1971)
	CDS Information Bulletin **2** (Ed. Jung, December 1971)
	MoU project between INAG and Strasbourg Observatory on CDS approved by Observatory Council (10 Dec 1971)
1972	INAG Decision 1/72/D0 creating CDS
	INAG Decision 2/72/D0 nominating the first CDS Council
	Inaugural Council meeting (25-26 May 1972) (Jung 1972)
	INAG Decision 3/72/D0 nominating J. Jung as first CDS Director (31 May 1972)

As explained in the previous section, CDS was conceived from the start as an international venture. Events preparing CDS were already largely international, such as the meeting held on 21-22 October 1969 with fifteen invited astronomers coming from institutions in Geneva, Heidelberg, Marseilles, Paris and Strasbourg (Lacroute 1969b).

The minutes of a subsequent meeting (Strasbourg, 4 July 1970) confirmed such an approach:

Figure 3. CDS Council meeting of December 1982 (cf. Table 2): (left to right) J.Cl. Mermilliod (Lausanne), G. Westerhout (USNO), D. Macchetto (STScI), F. Ochsenbein (CDS staff), M. Crézé (Besançon), T. Lederle (ARI), O. Dluzhnevskaya (Moscow), Ch. Bruneau (CDS Secretary), G. Paturel (Lyons), C. Turon (Paris), L. Houziaux (Mons), C. Jaschek (CDS Director), J. Delhaye (Paris) and D. Carnochan (invited Starlink representative). (Photograph: Strasbourg Obs.)

> "Le Centre coordonnera en effet les activités d'Observatoires français et étrangers qui acceptent de participer à des travaux du type envisagé. Dès maintenant, une collaboration est établie entre les Observatoires de Lausanne (6 personnes), Marseille (1), Paris (3), Strasbourg (5); Heidelberg ayant donné son accord de principe. D'autres collaborations seront sollicitées."
>
> (Jung & Lacroute 1970)
>
> [The Center will coordinate the activities of French and foreign Observatories that will accept to take part with contributions of the considered profile. As for now, a collaboration has been established with the Observatories of Lausanne (6 people), Marseilles (1), Paris (3), Strasbourg (5); Heidelberg has agreed in principle. Other collaborations will be sought for.]

3.1. COUNCIL MEMBERSHIP

As mentioned above, six foreign astronomers are statutorily among the CDS Council members. Table 2 details the Council membership for the two decades under consideration here. The international membership somehow

TABLE 2. CDS Councils in the period 1972-1990 featuring 50% of internationally-based members (in italics). (from Bruneau & Heck 2005)

1972-1975	
Blaauw, A. (ESO)	*Fricke, W. (ARI)*
Bijaoui, A. (Nice Obs.)	*Hauck, B. (Lausanne Univ.)*
Boulon, J. (Paris Obs.)	Jung, J. (CDS)
Cayrel de Strobel, G. (Meudon Obs.)	*Jaschek, C. (La Plata Obs.)*
Delhaye, J. (Paris Obs.)	*Larsson-Leander, G. (Lund Obs.)*
Fehrenbach, Ch. (Haute Provence Obs.)	*Murray, C.A. (Greenwich Obs.)*
1976-1978	
Blaauw, A. (ESO)	*Jung, J. (French Sc. Mission, Washington)*
Delhaye, J. (Paris Obs.)	*Lederle, T. (ARI)*
Duncombe, R.L. (Texas Univ., Austin)	Meyer, Cl. (CERGA)
Foy, R. (Meudon Obs.)	Monnet, G. (Lyons Obs.)
Hack, M. (Trieste Obs.)	Spite, Fr. (Meudon Obs.)
Hauck, B. (Lausanne Univ.)	
1979-1981	
Bijaoui, A. (Nice Obs.)	*Houziaux, L. (Mons Univ.)*
Crézé, M. (Besançon Obs.)	*Lederle, T. (ARI)*
Dluzhnevskaya, O. (USSR Astron. Cl)	Lortet, M.C. (IAP)
Foy, R. (Meudon Obs.)	*Macchetto, F.D. (STScI)*
Hauck, B. (Lausanne Univ.)	Turon, C. (Meudon Obs.)
Heidmann, J. (Paris Obs.)	*Westerhout, G. (US Naval Obs.)*
1982-1984	
Bijaoui, A. (Nice Obs.)	*Macchetto, F.D. (STScI)*
Crézé, M. (Besançon Obs.)	*Mermilliod, J.Cl. (Lausanne Univ.)*
Delhaye, J. (Paris Obs.)	Monsonego, G. (CCSC)
Dluzhnevskaya, O. (USSR Astron. Cl)	Paturel, G. (Lyons Obs.)
Houziaux, L. (Mons Univ.)	Turon, C. (Meudon Obs.)
Lederle, T. (ARI)	*Westerhout, G. (US Naval Obs.)*
1985-1987	
Abalakin, V.K. (USSR Astron. Cl)	*Jahreiss, H. (ARI)*
Andersen, J. (Copenhagen Obs.)	Mathez, G. (Toulouse Obs.)
Andrillat, Y. (Haute Provence Obs.)	*Mead, J. (NASA/GSFC)*
Benvenuti, P. (ST-ECF)	*Mermilliod, J.Cl. (Lausanne Univ.)*
Delhaye, J. (Paris Obs.)	Ochsenbein, Fr. (CDS)
Gaillard, Cl. (CCSC)	Requième, Y. (Bordeaux Obs.)
1988-1990	
Alecian, G. (Meudon Obs.)	Kunth, D. (IAP)
Delhaye, J. (Paris Obs.)	Mathez, G. (Toulouse Obs.)
Gaillard, Cl. (CCSC)	*Mead, J. (NASA/GSFC)*
Golay, M. (Geneva Obs.)	Perault, M. (ENS)
Grosbøl, P. (ESO)	*Piskunov, A.E. (USSR Astron. Cl)*
Jahreiss, H. (ARI)	*Wesselius, P. (SRON)*

Figure 4. CDS Council meeting of November 1985 (cf. Table 2): (left to right) J. Andersen (Copenhagen), J.Cl. Mermilliod (Lausanne), Cl. Gaillard (CCSC), C. Jaschek (CDS Director), Ch. Bruneau (CDS Secretary), Y. Andrillat (Haute Provence), J. Delhaye (Paris), H. Jahreiss (ARI), G. Mathez (Toulouse), Y. Requième (Bordeaux), P. Benvenuti (ST-ECF), A. Florsch (Strasbourg Obs. Director), J. Mead (GSFC), F. Ochsenbein (CDS staff), and J.Cl. Ribes (INSU representative). (Photograph: Strasbourg Obs.)

reflected the "participating observatories" (cf. Sect. 3.2) and the international agreements (cf. Sect. 3.5).

3.2. PARTICIPATING OBSERVATORIES

As seen above, "participating observatories" were part of the CDS venture even before the official existence of the center. Their rôle was *de facto* to provide an international flavor to the project, but also (and mainly) to bring in manpower and to contribute with their expertise in specific fields.

The first issue of the *CDS Information Bulletin* (CDSIB **1**, May 1971) provides a list of those involved at the time (Table 3), together with their representatives ("corresponding members"). It is interesting to note that the two first CDS Directors (Jung & Jaschek) are then listed as corresponding members for their respective observatories (Paris & La Plata).

After CDS' official foundation and Jung's nomination as first Director, F. Spite took over as Paris Observatory representative (CDSIB **3**, July

TABLE 3. First List of Participating Observatories and Corresponding Members (from *CDS Information Bulletin* **1**, May 1971)

•	Institut d'Astronomie de Lausanne et Observatoire de Genève	Switzerland	B. Hauck
•	Astronomisches Rechen-Institut Heidelberg	Germany	T. Lederle
•	Observatorio Astronómico, La Plata	Argentina	C. Jaschek
•	Observatoire de Paris	France	J. Jung
•	Observatoire de Marseille	France	M. Barbier
•	Observatoire de Strasbourg	France	P. Lacroute

TABLE 4. Participating Observatories and Associated Institutes (time range from the back covers of the *CDS Information Bulletins – CDSIBs)*

Place	First issue	Last issue
	"Participating Observatories"	
Bordeaux	CDSIB **28** (Mar 1985)	CDSIB **39** (1991)
Heidelberg (ARI)	CDSIB **1** (May 1971)	CDSIB **39** (1991)
La Plata	CDSIB **1** (May 1971)	CDSIB **9** (Dec 1975)
Lausanne/Geneva	CDSIB **1** (May 1971)	CDSIB **39** (1991)
Lyons	CDSIB **26** (Mar 1984)	CDSIB **39** (1991)
Marseilles	CDSIB **1** (May 1971)	CDSIB **39** (1991)
Paris (IAP)	CDSIB **25** (Oct 1983)	CDSIB **39** (1991)
Paris (Obs.)	CDSIB **1** (May 1971)	CDSIB **39** (1991)
Potsdam-Babelsberg	CDSIB **5** (Jul 1973)	CDSIB **24** (Mar 1983)
Strasbourg	CDSIB **1** (May 1971)	CDSIB **24** (Mar 1983)
	"Associated Institutes"	
Beijing	CDSIB **36** (Jun 1989)	CDSIB **39** (1991)
Ganeshkhind	CDSIB **39** (1991)	CDSIB **39** (1991)
Greenbelt (ADC)	CDSIB **26** (Mar 1984)	CDSIB **39** (1991)
Moscow	CDSIB **26** (Mar 1984)	CDSIB **39** (1991)
Pasadena	CDSIB **39** (1991)	CDSIB **39** (1991)
Porto Alegre	CDSIB **39** (1991)	CDSIB **39** (1991)
Potsdam-Babelsberg	CDSIB **26** (Mar 1984)	CDSIB **38** (Dec 1990)
Tokyo	CDSIB **39** (1991)	CDSIB **39** (1991)

1972). Corresponding members were no more listed in CDSIB **5** (July 1973) where a new participating institution appeared: Potsdam-Babelsberg Zen-

tralinstitut für Astrophysik (GDR). In CDSIB **10** (January 1976), La Plata Observatory disappeared from the list (Jaschek had meanwhile become the second CDS Director).

In October 1983 (CDSIB **25**), Potsdam-Babelsberg and Strasbourg were removed from the list, but Paris Institute of Astrophysics had entered it. In the next issue (CDSIB **26**, March 1984), Lyons Observatory was included in the list of participating observatories, and Potsdam-Babelsberg reappeared, but in a new category of "Associated Institutes" together with NASA's ADC (Greenbelt MD, USA) and the Data Center of the USSR Academy of Sciences (Moscow, USSR).

In CDSIB **28** (March 1985), entered Bordeaux Observatory as participating institution while CDSIB **32** (May 1987) mentioned for the first time the membership in the Federation of Astronomical and Geophysical Services (FAGS). CDSIB **36** (June 1989) listed the Academia Sinica (Beijing, PRC) as Associated Institute.

New Associated Institutes were mentioned in CDSIB **39** (1991):
– the Astronomical Data Analysis Center (ADAC, Tokyo, Japan);
– the Inter-University Centre for Astronomy and Astrophysics (IUCAA, Ganeshkhind, India);
– the Instituto de Fisica, Universidade Federal do Rio Grande do Sul (Porto Alegre, Brasil); and
– the Infrared Processing and Analysis Center (IPAC, Pasadena CA, USA).
Potsdam-Babelsberg (now in reunited Germany) had disappeared. Note also that Moscow was by then the capital of Russia since the URSS had been dismembered.

No list of participating nor associated institutions has been included from CDSIB **40** (January 1992) on. A new Editorship was then producing the Bulletin. All the above is summarized in Table 4.

3.3. MEETINGS

The agenda of the CDS twice-yearly meetings always included a scientific session where data-related issues were presented, sometimes in a kind of medley covering CDS broad fields, but otherwise focussed on dedicated themes (cf. Table 5). CDS Meetings were traditionally taking place in Strasbourg in November and elsewhere in May. Given the then CDS limited available funding for such events, the attendance was generally restricted to the Council members, plus a few invited guests.

Organizing colloquia with a larger attendance – often in collaboration with other institutions – was also a good way to gain international visibility. Table 6 gathers together the main international colloquia initiated during the period covered by this paper. Note that some meetings were for-

TABLE 5. Identified thematic scientific sessions held at the same time as CDS Councils meetings in the period 1972-1990.

Mar 1978	Strasbourg	Astrometry	CDSIB **15**, 51-82
Apr 1979	Strasbourg	Bibliography	CDSIB **17**, 2-20
May 1984	Grasse	Astrometry	CDSIB **27**, 3-56
Nov 1984	Strasbourg	Radial Velocities	CDSIB **28**, 3-40
May 1985	Bordeaux	Solar System	CDSIB **29**, 3-16
Nov 1985	Strasbourg	Astronomical Data Network (Fig. 9)	CDSIB **30**, 3-54
May 1986	Montpellier	Archiving of Astronomical Data	CDSIB **31**, 3-54
May 1987	Toulouse	Calibration of Magnitudes	CDSIB **33**, 3-61
May 1988	Grenoble	Data & Catalogs in Radioastronomy	CDSIB **35**, 3-34
May 1989	Geneva	Digitized Optical Sky Surveys	CDSIB **37**, 3-92
May 1990	Lyons	Extragalactic Data	CDSIB **38**, 1-12

mally organized by Strasbourg Observatory for internal political reasons, with an obviously heavy CDS involvement and fully within the CDS scope. Many of those gatherings were discussing pioneering methodologies and data/information handling aspects.

It is of course out of the scope of this paper to list the meetings attended round the world by individual CDS staff members (and it would probably be impossible to compile such a list).

3.4. PUBLICATIONS

Publications are another outlet ensuring international coverage.

CDS *Information Bulletins* (CDSIBs) were produced as early as May 1971 (see Table 1) and until March 1996 (CDSIB **48**). The successive issues have been gathering together data-related communications and reports from meetings, as well as regular features on catalogs, development of resources, and related issues. In other words, the CDSIB has been an information vector not only on CDS itself, but also on other data centers, on data, on their archiving, and on their scientific exploitation.

CDSIB issues have included the newsletters of the IAU Working Group of Astronomical Data (WGAD – cf. Wilkins 2006 – this volume):
– Nr **1** in CDSIB **30** (1986) 187-190,
– Nr **2** in CDSIB **33** (1987) 157-162,
– Nr **3** in CDSIB **35** (1988) 167-188,
– Nr **4** in CDSIB **37** (1989) 183-204.
as well as the newsletters of the informal Working Group on Modern Astronomical Methodology (WGMAM):

TABLE 6. Main international colloquia (co-)organized by CDS in the period 1972-1992 (see text). The successive lines of each entry list the title; the place, dates and possible co-organizers, as well as the bibliographical reference of the proceedings. See the appendix for the explanations of acronyms.

• Compilation, Critical Evaluation, and Distribution of Stellar Data (*)
(Strasbourg, 19-21 August 1976, with IAU) (Jaschek & Wilkins 1977)
• Automated Data Retrieval in Astronomy (Fig. 5)
(Strasbourg, 7-10 July 1981, with IAU) (Jaschek & Heintz 1982)
• The Scientific Aspects of the Hipparcos Space Astrometry Mission
(Strasbourg, 22-23 February 1982, with ESA) (Perryman & Guyenne 1982)
• Statistical Methods in Astronomy (Fig. 6)
(Strasbourg, 12-16 September 1983, with ESA, INAG, and ULP) (Rolfe 1983)
• L'Avenir des Données Non-Stellaires
(Strasbourg, 6 March 1984) (Egret & Guibert 1984)
• Sky Surveys
(Schloß Ringberg, 21-23 November 1984) (CDSIB 1985a)
• Second Meeting on Astronomical Data Networks
(Strasbourg, 29-30 May 1986) (CDSIB 1986a)
• The Coordination of Observational Projects in Astronomy
(Strasbourg, 23-26 November 1987, with CNES and INSU) (Jaschek & Sterken 1988)
• Impact des Surveys du Visible sur notre Connaissance de la Galaxie
(Strasbourg, 18 March 1987) (Fresneau & Hamm 1987)
• Astronomy from Large Databases
(Garching, 12-14 October 1987, with ESA/ESO's ST-ECF) (Murtagh & Heck 1988)
• Détection et Classification des Étoiles Variables
(Strasbourg, 21 April 1988) (Halbwachs *et al.* 1988)
• Artificial Intelligence Techniques for Astronomy
(Strasbourg, 4 April 1989) (Heck 1989)
• Errors, Bias and Uncertainties in Astronomy
(Strasbourg, 11-14 September 1989) (Jaschek & Murtagh 1990)
• Fractals in Astronomy
(Strasbourg, 26 June 1990) (Heck 1990)
• Desktop Publishing in Astronomy
(Strasbourg, 1-3 October 1991) (Heck 1992)
• Astronomy from Large Databases II (**)
(Haguenau, 14-16 September 1992, with ESA/ESO's ST-ECF) (Heck & Murtagh 1992)

(*) See Fig. 1 in Wilkins (2006 – this volume).
(**) Initially intended in Strasbourg and moved out for lack of accommodations.

– Nr **2** in CDSIB **30** (1986) 165-183,
– Nr **3** in CDSIB **31** (1986) 201-215,
– Nr **4** in CDSIB **32** (1987) 87-109,

Figure 5. Group photograph of the 64^{th} IAU Colloquium on *Automated Data Retrieval in Astronomy* held in Strasbourg from 7 to 10 July 1981 (Jaschek & Heintz 1982). (Photograph: Strasbourg Obs.)

Figure 6. Group photograph of the ESA-INAG-ULP International Colloquium on *Statistical Methods in Astronomy* held in Strasbourg from 12 to 16 September 1983 (Rolfe 1983). (Photograph: Strasbourg Obs.)

– Nr **5** in CDSIB **33** (1987) 147-156,
– Nr **6** in CDSIB **34** (1988) 215-238,
– Nr **7** in CDSIB **35** (1988) 187-212,
– Nr **8** in CDSIB **36** (1989) 183-223.

Librarians might note that CDSIB carried different titles over the years:
– from Issue 1 (January 1971) to Issue 12 (January 1977), it was known as *Centre de Données Stellaires – Information Bulletin*, while
– from Issue 13 (July 1977) onwards, that title switched to *Bulletin d'Information du CDS* with the ISSN 0242-6536. From Issue 40 (January 1992) onwards, that ISSN became 1169-8837 as the new CDS explanation (Centre de Données astronomiques de Strasbourg[2]) appeared on the cover.

CDS also produced a collection of some 33 *Special Publications*. For a complete list, see Vonflie & Heck (2005). Please refer to Table 6 for the proceedings of the (co-)organized international conferences.

3.5. THE FIRST INTERNATIONAL AGREEMENTS

The available archives are very poor on the steps leading to the first CDS international agreements, as well as on their materialization. The following is extracted from sketchy minutes of the CDS Council meetings, as well as from the Director's annual reports (when recorded) and from announcements published in the CDSIBs.

The CDS Council, meeting on 14 April 1974 at Haute Provence Observatory under the chairmanship of G. Larsson-Leander,

> "... approuve le projet présenté par M. Jung de la création à Potsdam d'un sous-centre facilitant l'échange des données avec les pays socialistes, et engage le Directeur du CDS à poursuivre les discussions dans ce sens avec les organismes responsables de la RDA."
>
> [... approves the project presented by Mr Jung to create in Potsdam a sub-center facilitating the exchange of data with the socialist countries and invites the CDS Director to continue discussing in that direction with the GDR responsible organizations.]

This seems to be the first recorded mention of formal steps towards an international agreement, then with an institution of the German Democratic Republic (GDR) and in the context of the Cold War. Was this going to be successful? Three years later, at a meeting held on 22 April 1977 at Strasbourg under the chairmanship of A. Blaauw (and C. Jaschek being now CDS Director), the issue is brought up again. The following excerpt

[2]Proposed by the author in the mid-1980s to take into account the inclusion, from then on, of non-stellar data in the center's holdings, the new label had the advantage to retain the CDS acronym. It entered quickly everyday usage, but took much more time to be integrated in official documents.

deserves to be reproduced *in extenso* as it illustrates to which diplomatic complications were leading international agreements at the time:

> "L'échange conçu avec Potsdam n'est pas concluant. M. et Mme Jaschek ont reçu une invitation à se rendre en URSS en juillet afin de discuter d'un accord entre le CDS et l'Académie des Sciences. M. Delhaye précise que cet accord doit se faire dans le cadre des accords déjà existants entre le CNRS et l'Académie des Sciences de l'URSS, vu que le CDS n'a pas de statut international. La proposition d'accord sera donc transmise à M. Delhaye. De plus, une entrevue avec M. Mustel sera possible le 10 mai, ce dernier étant actuellement de passage en France.
> M. Blaauw remarque que l'existence d'accords entre le CDS et la NASA d'une part, et l'Académie des Sciences de l'URSS d'autre part, implique dans les faits un échange d'informations entre les USA et l'URSS. M. Duncombe propose d'évoquer ce problème à la NASA, par l'intermédiaire de Mme Mead."
>
> [The exchange conceived with Potsdam is not conclusive. Mr and Mrs Jaschek received an invitation to go to the USSR in July in order to discuss an agreement between the CDS and the USSR Academy of Sciences. Mr Delhaye precises that such an agreement must be reached in the framework of agreements already existing between the CNRS and the USSR Academy of Sciences, as CDS has no international status. The agreement proposal will then be transmitted to Mr Delhaye [INAG Director]. Moreover, an interview with Mr Mustel [Chairman of the Astronomical Council of the USSR Academy of Sciences] will be possible on 10 May, as he is currently visiting France.
> Mr Blaauw points out that the existence of agreements between CDS and NASA, on one hand, and, on the other hand, with the USSR Academy of Sciences, implies *de facto* an exchange of information between the USA and the USSR. Mr Duncombe proposes to raise this issue with NASA, by means of Mrs Mead.]

Was then some agreement already existing with NASA? Something was probably under way as CDSIB **14** (January 1978) carried the following announcement:

> "Cooperation between NASA and CDS
> An agreement has been reached for mutual cooperation between the NASA, through the Goddard Space Flight Center (data bank), and the CDS. The scope of this agreement is to facilitate the exchanges and to establish a coordination of efforts. We hope that this agreement, and others to follow in a near future, will possibilitate *(sic)* an easy access of the whole astronomical community to all machine-readable data."

The next CDSIB **15** issue (July 1978) replicated with an announcement of cooperation with the USSR (note the quasi-identical wording):

TABLE 7. Synthesis of international agreements in the period 1972-1991.

1977	NASA's Astronomical Data Center (ADC), Greenbelt, USA-MD
1978	Astronomical Council, Moscow, USSR
1979	ESA's IUE Observatory, Vilspa, Spain
1980?	Faculdad Ciencias Astron. Geofís. Univ. La Plata, Argentina
1982?	Zentralinstitut für Astrophysik, Potsdam, GDR
1988	Inst. Fis. Univ. Rio Grande do Sul, Porto Alegre, Brazil
1989	NASA Extragalactic Database, Pasadena, USA-CA
1989?	Academia Sinica, Beijing, PR China
1990	Inter-University Centre Astron. Astrophys., Ganeshkhind, India
1990	Astron. Data Analysis Ctr, Univ. Tokyo, Japan
1991	ESA's European Space Information System, Frascati, Italy

Note: A disclaimer on this table is in order as CDS archives are sketchy and some international agreements somehow amateurishly put together. It is indeed not always clear whether some projects or MoUs got confirmed into effective official agreements. Other papers are signed or stamped, but amazingly not dated. In one instance at least (PR China), the agreement reached seemed to have been invalidated (for some obscure reason) by some central CNRS office. But this table has the merit to give an idea of the various official contacts established – which, in any case, meant ongoing working relationships between the institutions. See the appendix for explanations and acronyms.

"Cooperation between the Astronomical Council
of the USSR Academy of Sciences
and the CDS

An agreement has been reached for mutual cooperation between the Astronomical Council of the USSR Academy of Sciences and the CDS. The scope of this agreement is to facilitate the exchanges and to establish a coordination of efforts. We hope that this agreement, as the one with NASA, will make possible easy access of the whole astronomical community to all machine-readable data."

As the last words of each announcement let it understand, the agreements were essentially dealing with catalog exchanges, in machine-readable format. Networks were still quite a few stone throws away and, as reminded in each CDSIB (see *e.g.* Ochsenbein 1978), data were made available 'only' via magnetic tapes, microfiches, punched cards, computer printout or plots, as well as telex messages.

The master CDS products of the time were,
– on one hand, its *Catalog of Stellar Identifications (CSI)*, a huge table of correspondences between identifications of a growing number of stellar catalogs, and,
– on the other hand, the *Bibliographical Star Index (BSI)*, an object-

oriented bibliographical database linked to CSI.
See for instance Ochsenbein *et al.* (1977) for a situation report of the time.

As we shall see in the following sections, the situation would quickly evolve as a result of several factors: the needs generated upstream and downstream by space experiments, the development of the CDS database SIMBAD, and the progressive networking of our planet Earth. CDS would develop other international agreements (cf. Table 7), but the CDS resources would first gain operational dimensions, then a formidable boost in terms of international visibility, with the IUE spacecraft.

3.6. IUE-VILSPA, THE FIRST INTERNATIONAL SIMBAD TERMINAL

The *International Ultraviolet Explorer (IUE*[3]), launched on 26 January 1978, has been the first space-borne instrument welcoming visiting astronomers in real time, just like most ground-based observatories – with the difference that the telescope was not in an adjacent dome, but in a geosynchronous orbit over the Atlantic Ocean. It was shut down on 30 September 1996 after 18.7 successful years of operations (while its expected lifetime was three years), having become by then the longest astronomy space mission with more than 100 000 observations of celestial objects of all kinds, ten dedicated international symposia and more than 3 500 scientific papers at the time it was turned off. A fantastic achievement for a 45cm telescope.

In many respects, IUE has been the precursor of modern astronomical observing[4]. Among other issues, the space agencies operating IUE (NASA, ESA & SERC) agreed on effective data policies which inspired modern astronomical archives avoiding, as had happened too often in the past, data disappearing forever on the shelves or in the drawers of the original observers – if they were logged at all.

An IUE policy was to declare the data publicly available one year after the corresponding observations had been conducted. This meant too that an *ad hoc* service had to be set up by the agencies, providing access to the data archived. This, in turn, involved not only reprocessing sometimes large amounts of data or transfering data to new media as the technology evolved, but also having a well-defined, understandable and consistent policy in terms of objects identifiers. This *de facto* outlawed some secrecy practices that were taking place here and there round the world, with astronomers using sometimes personal identifiers ("my star 27") by fear that subsequent

[3]For details on IUE, see for instance the eight post-commissioning papers published in *Nature* **275** (5 October 1978) and the commemoration volume edited by Kondo *et al.* (1987). See also Stickland (1996) and the IUE chapter in Wilson (2001).
[4]See for instance OSA 4's Editorial and the references quoted therein.

Figure 7. The European IUE Observatory referred to CDS resources as of the launch of the satellite (see text). The initial team of astronomers is pictured here in front of the IUE downlink antenna at Villafranca Satellite Tracking Station (Vilspa) in December 1978: (left to right) A. Heck, A. Cassatella, M.V. Penston, P. Selvelli, J. Clavel, P. Benvenuti, Fr. Beeckmans, and D.J. Stickland. Not on this picture, D. Macchetto was the IUE European Observatory Controller at the time of the launch in January 1978 and became a CDS Council Member (cf. Fig. 3). In January 1981, Vilspa became operationally the first foreign station connected to the CDS database SIMBAD. The bottom picture reproduces a historical sticker featuring the old logos of the three operating space agencies and the two ground observatories, in Greenbelt (USA-MD) for NASA and in Vilspa (Spain) for ESA (formerly ESRO) and the SERC (formerly SRC). (Top photograph: A. Heck)

observers could guess what they were after just by looking at the objects studied if these had been logged under common names.

Another critical issue was the operational safety of the spacecraft as its attitude had to be updated at each pointing by uploading the precise coordinates of the target before the next slew. Loosing attitude meant wasting a lot of expensive and otherwise useful time, plus potential hazard for the spacecraft instrumentation in case of accidental proximity to overbright objects.

Initiated in 1970 with J. Jung at Paris Observatory before he became the first CDS Director, my PhD work made of me the first CDS scientific user, even before the center's official existence, and converted me into a kind of expert in cataloguing subtleties. This was certainly one of the reasons, together with an extensive observing experience, for my appointment in mid-1977 within the founding team of the IUE European Observatory in Vilspa, Spain (Fig. 7) and of my assignment as being in charge of scientific operations. Duccio Macchetto, at that time still the ESA IUE Observatory Controller before being fully absorbed by the Space Telescope project, was very attentive to what could be called the 'CDS culture', advocating it towards the other partners/space agencies.

As explained in Heck (1978), the US IUE Observatory at NASA/GSFC used then a CSI-based software package. At Vilspa, during an introductory phase called "training" with each ESA or SERC observer, the coordinates of his/her targets and guiding objects were checked against the CSI if they were stars or against other specific catalogs provided by CDS if they were non-stellar objects. Strong recommendations urged priority usage (in proposals, operations, and logs) of the most prominent identifiers when available (HD numbers for stars and NGC identifiers for non-stellar objects), leading *de facto* to a homogenization of IDs in the various project procedures and documents.

Spacecraft safety was paramount. Whoever has been called into a control room because a multimillion-dollar bird up there has lost its pointing attitude knows what it means to rely on a consistent set of celestial coordinates in such circumstances. The worried faces – and voices on the lines – of people representing three space agencies, a couple of shadows keeping low profile in a corner because feeling responsible for the mishap, the silent interrogations of visiting astronomers ticking the time passing, otherwise authoritative spacecraft controllers hanging on your lips for the recovery maneuvers that you have no right to miss – all this builds up a unique atmosphere, as well as memories for the rest of your life. And I dedicate the bottles of champagne won that way to those wonderful teams, but also to the many hours spent in ground-based observing implying countless field identifications and total reliance on the coordinate sets at hand. The

cumbersome 'jig' machine using Palomar Sky Survey plates proved to be no match to well-trained and well-supported brainware and was actually removed from the observatory room.

The collaboration with CDS would quickly go one step further as indicated by the following excerpt:

> "At the end of August 1978, a collaboration between the Villafranca Station and the Stellar Data Center was set up for stellar observers. At the end of their run, they receive from the CDS all measurements and the bibliography available for the stars they have observed with the IUE. This service will be provided free of charge until the end of the first block of observations (March 1979). Because of budget restrictions, the CDS will have to assess handling costs for all future services. However, it should be said that studies are already well under way to make available at Villafranca a terminal connected with the CDS. Apart from the obvious advantages of this direct link, this improvement should help astronomers not only in the discussion of their data, but also in the preparation of their observations." (Heck *et al.* 1979)

This already gave a formidable international visibility to CDS through the IUE users who, at the time, were a kind of astronomical avant-garde, a pre-space-telescope generation.

In those years, things were also evolving rapidly not only in Strasbourg with the development of the database SIMBAD[5] integrating the facilities of both the CSI and BSI, but also in the national telecom offices finalizing pioneering X25 networks, such as Transpac in France and Datapac in Spain. Involving these into setting up an at first stammering international link between Vilspa near Madrid and the CNRS computer in Cronenbourg near Strasbourg was the natural consequence mentioned in the above excerpt. The link became official in January 1981 (Heck 1981a,b):

> "This new link has also an important operational rôle for Vilspa since the Resident Astronomers have now a permanent access to a unique, cross-checked and constantly updated set of stellar positions and magnitudes." (Heck 1981b)

The IUE-CDS collaboration was supported by the successive European Observatory Controllers and their management. Quite naturally then, when based in Strasbourg a few years later, I had no difficulty to convince both parties to agree that CDS would carry out the homogenization of the IUE log of observations (Wamsteker 1985), one of the cornerstones on which is built the IUE Uniform Low-Dispersion Archive (ULDA, see Wamsteker *et al.* 1989).

[5]See various reports published in the CDSIBs to follow the developments of SIMBAD, starting with the first announcement in CDSIB **20** (Wenger 1981).

TABLE 8. Statistics of nodes connected to CDS.

Year	French	Foreign	Source
1981	2	1	(Jaschek 1982)
1982	6	1	(Jaschek 1983)
1983	15	3	(Jaschek 1985a)
1984	19	16	(Jaschek 1985b)
1985	24	27	(CDSIB 1985b)
1986	28	37	(CDSIB 1986b)
1987	32	71	(CDSIB 1987)
1988	44	91	(CDSIB 1988)

4. Spreading User Network

With the growing international profile of CDS and the progressive networking of the planet (still remember SPAN and Bitnet?), the number of people with a connection to SIMBAD increased steadily.

It is however not possible to take a census of the actual users over time: a userid could hide an indefinite number of people and those userids were assigned inhomogeneously (in the sense that one whole institution would sometimes get only one userid while others would get several). Therefore there is some confusion in the CDS reports and papers behind the term "user" and we prefer speaking here of "nodes" or "stations" connected to CDS. The evolution is outlined by Table 8 and illustrated geographically by the maps reproduced in Figs. 8, 10 and 11.

CDS did not just collect registrations from users, but also organized specific meetings on network problematics, such as the scientific session at a CDS Council Meeting in November 1985 (cf. Table 5 and Fig. 9) and a follow-up one in May 1986. Both of these gatherings were co-hosted by the European Science Foundation (ESF), also based in Strasbourg.

It became also obvious that a more assertive policy had to be followed, and in the first place towards North America where networks were then more developed. Thus the first historical demonstration of the database SIMBAD in that part of the world took place at the 169^{th} Meeting of the American Astronomical Society held in January 1987 in Pasadena (Fig. 12).

In spite of lines plagued with interferences in the local convention center (this was still the very beginning of the public-network era), the success was smashing with excited attendees getting overnight their userids thanks to the time difference between California and Europe. My personal connections in the space communities worked marvels and dedicated demonstrations impressed key NASA and NSF managers, something that would

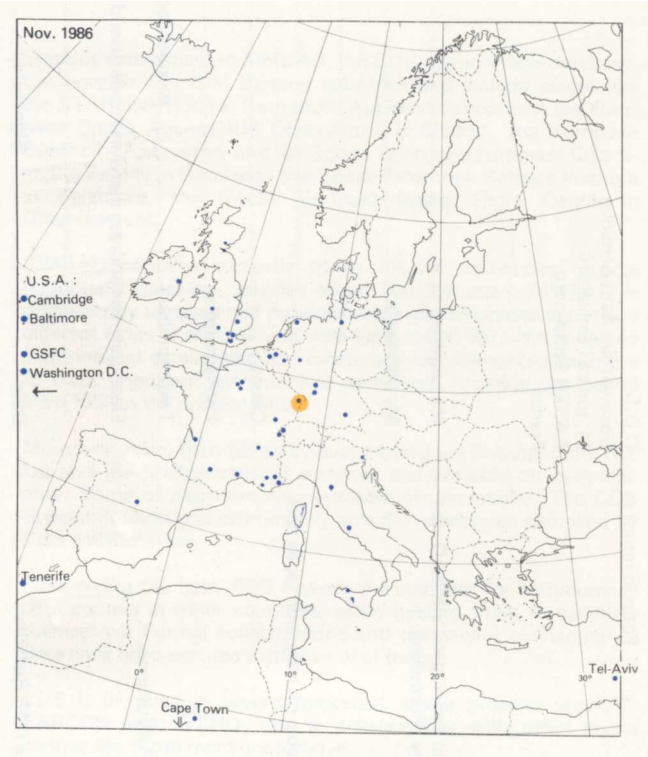

Figure 8. Map of CDS user stations published in a 1986 CDS leaflet.

result in an invitation to attend a subsequent workshop in Annapolis (August 1987) centered on the foundation of the Astrophysics Data System (see Sect. 5.2).

As evidenced by Table 8, the show in Pasadena doubled the number of foreign nodes during the first half of 1987 and induced the following opening statements in the CDS Director's report for that year:

> "The year 1987 was characterized by a very rapid growth of the number of users of the CDS, which passed from 80 to 120, and includes now a large number of American Observatories. This rapidly growing number constitutes the best comment of the feelings of the international community toward the CDS."
> [...]
> "The CDS was presented by A. Heck at the meeting of the American Astronomical Society. This presentation was partially responsible for the large increase in the number of American users." (Jaschek 1988)

Figure 9. International attendance to the first CDS meeting on data networks in astronomy (Strasbourg, November 1985). In the first row (left to right): J. Andersen (Copenhagen Obs.), P. Bartholdi (Geneva Obs.), Ph. Crane (ESO) and R. Albrecht (ST-ECF). (Photograph: Strasbourg Obs.)

5. The Space Agencies Get Organized

As seen earlier (Table 2), some representatives from space agencies had served as CDS Council members since the end of the 1970s (Macchetto 1979-1984, Benvenuti 1985-1987, Mead 1985-1990); some agreements had been reached (NASA, IUE) as discussed in Sect. 3.5 and 3.6; but more was to come as the agencies realized that the accumulation of space data had to be cared of in some more efficient way that had been in practice so far.

In the mid-1980s, this triggered initiatives in which it became crucial to position properly CDS for the future, and for its own future, as the agencies were contemplating – and had the means – to set up competitive services able to wipe CDS off the world map.

5.1. ESA'S ESIS

On 7-8 March 1985, ESA's Space Science Department (SSD) convened at ESRIN (Frascati, Italy) a *Spacenet Advisory Panel* made of a mixture of astro- and geophysicists to decide what would be best to do with the data already collected and to be gathered in the future by space experiments – and this, on the background of a return for Italy within ESA's policies (in other words, if a center or service was going to be created, it had to be located at ESRIN).

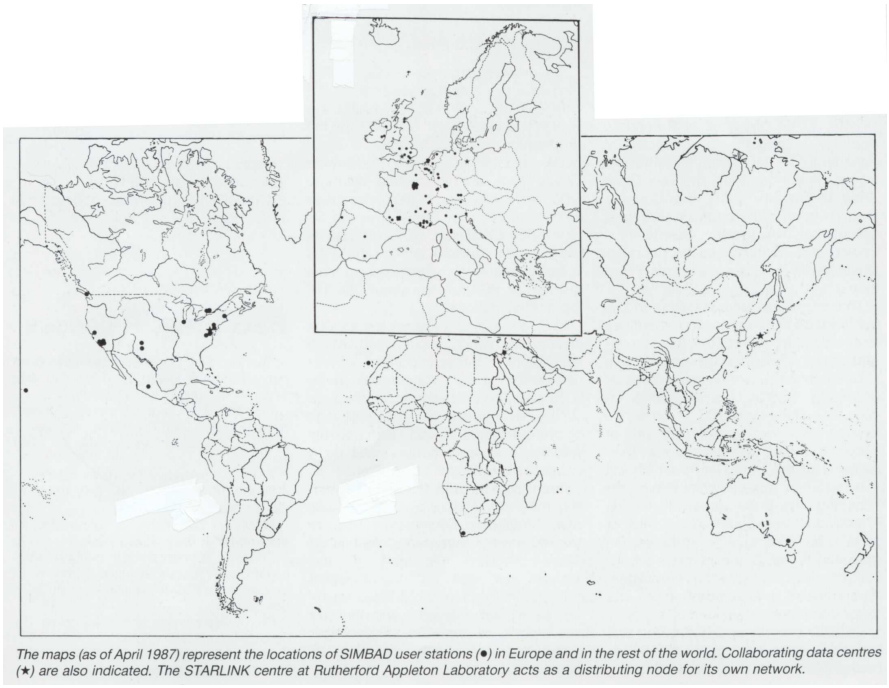

Figure 10. Map of CDS user stations published in Heck & Egret (1987).

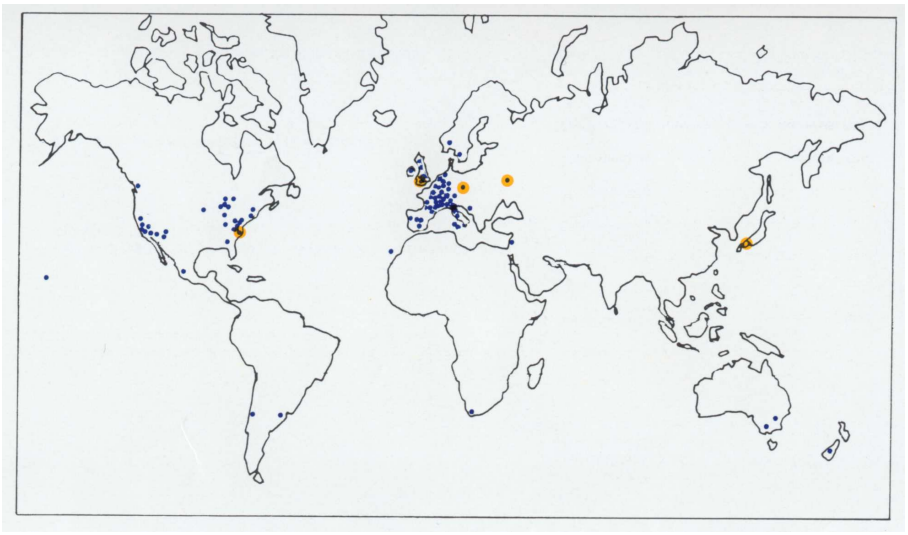

Figure 11. Map of CDS user stations published in a 1988 CDS leaflet. (Courtesy CDS)

It quickly appeared that the problematics for geophysical and astronomical data were quite different. As far as the latter ones were concerned, I managed to get SIMBAD, and more generally CDS, to be recognized as an excellence center to be linked to any structure set up by ESA.

The following month (18-19 April 1985), another meeting was held at ESTEC (Noordwijk, Netherlands) where all this was confirmed, which led me to issue the following memorandum directed to the CDS Director (20 April 1985):

> "Une des importantes conclusions de la dernière réunion du "European Space Science Data Center Study Panel" de l'Agence Spatiale Européenne est qu'un logiciel conçu essentiellement pour une gestion bibliographique (comme celui de l'IRS à l'ESRIN) n'est pas du tout adapté à la gestion d'une base de données du type spatiales ou astronomiques.
>
> Cette conclusion acquise après les études et tests appropriés par des personnes compétentes à l'échelle européenne devrait certainement être prise sérieusement en considération par ceux qui voudraient imposer au CDS un logiciel inapproprié à ses buts et fonctions.
>
> L'operating system recommandé a été l'un de ceux dérivés d'Unix.
>
> Enfin, la reconnaissance de l'importance du CDS en soi a été confirmée, SIMBAD étant repris dans les exemples de connexions de centres d'excellence nationaux."
>
> [One of the important conclusions of the last meeting of the "European Space Science Data Center Study Panel" of the European Space Agency is that a software package designed essentially for bibliographic handling (such as the IRS one at ESRIN) is not at all suitable for the management of space or astronomical data.
>
> This conclusion from ad hoc studies and tests by competent people at the European level should definitely be seriously considered by those who would like to impose to CDS a software package inadapted to its aims and functions.
>
> The recommended operating system has been a Unix-derived one.
>
> Finally, the recognition of CDS' intrinsic importance has been confirmed, SIMBAD being retained in the examples of connections to national centers of excellence.]

Of an apparently innocuous internal nature, this memorandum was intended to be used by Jaschek to overcome, with a gentle touch of bluff and barely pushed European blessing, the last Parisian resistances regarding database conversion (attempts to impose commercial packages) and computer hosting on specific machines (while the Unix-based ones were reaching general acceptance within the astronomy community). That strategy proved to be successful. A green light was given for the development of home-made software and grounds were laid for the acquisition by CDS of its own computers – a couple of critical milestones from which CDS' success would later depend on.

As to *Spacenet*, it was to be renamed the *European Space Information System (ESIS)*. As stated for instance in ESA's *Space Science Newsletter* **4** (February 1986), p. 2, its main features were outlined as follows[6]:

> "1. the design and development of a space information network system – based on standard PTT-supported lines;
> 2. to carry out pilot studies on the scope of the network by using it to access existing and future project-related data bases, such as those associated with IUE, EXOSAT, ST, etc.;
> 3. to consider the relative advantages of project-related data bases or specialised data bases at host institutes, or at a single institute, for longer term archiving;
> 4. the development of central directory and data catalog facilities at ESRIN."

CDS was of course plugging in at Point 3 and its involvement, politically acquired at the Spacenet gatherings, was later confirmed by various agreements coming out of a number of meetings, such as a memorable one at Logica headquarters in Cobham on 20 March 1986. ESA/ESIS staff would also be assigned to Strasbourg Observatory (ESA 1991), the managers of which would use this in turn to emphasize the international recognition of the place by an organization such as ESA.

5.2. NASA'S ADS

The January 1987 CDS presence at the 169^{th} AAS Meeting in Pasadena (cf. Sect. 4) has undoubtedly been a gateway for being invited to the *NASA Astrophysics Data System Workshop* convened in Annapolis on 18-20 August 1987. The purpose of this gathering was stated in the letter dated 10 August 1987 received from Gael F. Squibb (Acting Manager, NASA Observatories Operations Branch, Astrophysics Division):

> "The purpose of this Workshop is to study the needs for accessing space-acquired astrophysics data sets. The focus of the Workshop will be on the scientific requirements, the data which will be available, and the technology which will be in common usage in the mid-1990's. The panels will consider the needs of the scientist with access to significant processing and analysis capabilities, as well as the scientist with very limited resources."

What seemed at first to be one of those standard meetings where to present CDS and SIMBAD turned out quickly of unusual importance with the presence of major project leaders[7] as well as that of Charles J. Pellerin, then NASA's Director of Astrophysics. With a talk scheduled in the

[6]Remember that World-Wide Web browsers were still quite a few years away (1993).
[7]Including Al Boggess who had been leading the overall IUE project for years.

late afternoon, it became a real fight with jetlag to re-tailor in real time the presentation of SIMBAD emphasizing the differences with the individual papers on space logs and catalogs filling in the agenda, insisting on the integrated-database character, and clearing any possible suspicion of chauvinism by praising, as a Belgian, that French-based jewel. Believe it or not, the subsequent questions and comments showed that this had made an impact!

The next morning, with typical American efficiency, NASA Headquarters' Anthony J. Villasenor shook hands in an elevator of the Annapolis Hotel and, between the ground and third floors, declared he was going to support a link between CDS and the Astrophysics Data System (ADS) being set up, as well as to likely complete the arrangements by installing a machine at Strasbourg Observatory and even possibly putting at our disposal a couple of yearly grants. This excellent contact with Tony paved the way to a soft subsequent materialization of the agreement. From then on indeed again, the political decision having been acquired, the story became essentially technical.

A specific resolution on SIMBAD was issued at the end of the Workshop:

"SIMBAD

SIMBAD is recognized as the most comprehensive astronomical database in the world. It is run by the Strasbourg Data Center (CDS) and provides basic data and bibliography on stellar, galactic and extragalactic objects. It has proven to be an enormous asset in planning observations and interpreting data; however, communication costs are inhibiting its use by US-based astronomers.

We recommend that NASA implement a plan to provide no-cost access to SIMBAD for all US-based astronomers by:

1. covering communication costs
2. paying a lump sum to cover SIMBAD charges.

We recommend also that NASA assist CDS in incorporating into SIMBAD catalogs from all available space experiments (as IUE merged log, Einstein, Exosat, IRAS point source catalogs, etc.) in order to link the astronomical observations made from space with the corresponding data and bibliography already available in SIMBAD."

All this not only opened the door to intensified access from the US community to SIMBAD, but also laid grounds for a strong collaboration with ADS[8]. The Annapolis meeting saw also the initial discussions of what was to become a fruitful collaboration with the Infrared Processing and Analysis Center (IPAC) in Pasadena for their NASA Extragalactic Database (NED), formalized by an official agreement proposed by NASA on 13 March 1989 and approved by INSU on 28 April 1989.

[8]On this, see also the interview of Günther Eichhorn in this volume (Heck 2006a).

Figure 12. Several key figures for CDS in North America, photographed at the 169^{th} American Astronomical Society Meeting in Pasadena (January 1987): left, Joyce Watson (CfA) with Wayne Warren (NASA/ADC); top right, Gart Westerhout (USNO) together with the author; lower right, Wayne Warren overlooking the author busy demonstrating SIMBAD at the historically first demontration booth for the CDS database in North America. Wayne had already been for almost a decade the ADC interface for catalogs and other CDS products. Joyce was to become the "face" of SIMBAD in the US for quite a number of years. Gart has been one of the long-time US supporters of CDS and a member of the CDS Council (cf. Fig. 3), as was the case for Jaylee Mead (NASA/GSFC – cf. Fig. 4). (Photographs: A. Heck)

5.3. HIPPARCOS

A section devoted to CDS' involvement in space projects would not be complete without a few words on the astrometric Hipparcos project, the genesis of which took place essentially at Strasbourg Observatory (see *e.g.* Kovalevsky 2005).

Accepted as a program by the European Space Agency in 1980, the Hipparcos satellite was launched on 8 August 1989. Its operational life ended on 15 August 1993. The data collected led to very numerous investigations, a first flavour of which was given by an impressive colloquium organized in Venice in 1997 (Perryman & Bernacca 1997).

Hipparcos – a project with a strong French component – contributed perhaps more to the CDS notoriety within France than abroad. It has been indeed often commented that, until then, CDS was better known internationally than nationally. More generally, it is certainly appropriate to include here the following excerpt from the CDS Director's 1982 annual report, emphasizing the importance of the collaboration[9]:

> "Probably the most important [development] is the extensive link with the Hipparcos project – as somebody put it: *If the CDS had not existed, it would have to be created for Hipparcos.* Similar but less extensive cooperations exist for IRAS, ANS and EXOSAT." (Jaschek 1983)

6. CDS' International Success Story

CDS' success story has already been commented elsewhere (Heck 2000, 2002). Over three decades now, CDS moved from a file holder to an impressive information hub. It is recognized world-wide for the excellence of its work and its products, something also acknowledged through the collaborations established with CDS by the other astronomical data centers created subsequently. CDS has been an evolving structure, taking advantage of new media and often pioneering their usage before they became popular world-wide.

In an epoch when it has become common that new managers tend to believe the history of their organization begins with themselves, a few basic points should probably be reminded, starting with the fact that seemingly modest decisions by courageous and clear-sighted people initially in charge of fledging structures lead often to far-reaching fruitful consequences, without which subsequent development would not be possible (and those later managers disregarding history would not even enjoy their positions).

A second step is certainly to refer to Schumpeter's cycles in organizations' life where brilliant phases of creativity, inventiveness, and expansion are followed by less glamorous periods generally characterized by prevalence of administrative aspects.

A third point is to recall what was CDS at the time in terms of very limited means and manpower – a context quite different of what is experienced today with all those Virtual Observatory projects. An illustration

[9]Refer also to the Hipparcos colloquium hosted in February 1982 (cf. Table 6).

TABLE 9. CDS personnel and responsibilities in November 1986. (Jaschek 1986)

a) **Researchers**	
– P. Dubois	SIMBAD maintenance (bibliography, galaxies)
– D. Egret	relationships with users, Hipparcos
– A. Fresneau	astrometry
– J.L. Halbwachs	integration of catalogs, exploitation for research
– A. Heck	international relationships, directories, IUE log, statistical methodologies
– M. Jaschek	orders of spectroscopic nature
– C. Jasckek	director
b) **Technicians**	
– Ch. Bruneau	secretariat (Bulletin, publications, mail, orders, accounts, etc.)
– R. Messmer	handling of orders (printing shop, varia)
– M.J. Wagner	data keying, monitoring work of temporary auxiliaries
– M. Wenger	SIMBAD software development

[Note that F. Ochsenbein, one of the CDS kingpins (see *e.g.* Ochsenbein 1981), was then on leave (1985-1990) at the European Southern Observatory (ESO) in Garching.]

is given by Table 9 extracted from the Director's report at a CDS Council meeting towards the end of the period under consideration in this paper.

That reduced staff had sometimes to go through unsecured phases, with unclear future and rumors of removal to some other city, with complications generated by a central Parisian administration, for instance at the level of material support, machines, software packages to be used to handle the database, and so on. Until towards the end of the 1980s, CDS had no proper machine and its activities had to be hosted in remote big computers, with real pressure to use French-manufactured equipment. An idea of the stress generated at a specific time can be given by the fact that the CDS Director received phone calls from a wife anxious to know how long that unpleasant situation would last. As alluded in Sect. 5.3, CDS did not always receive appropriate support from the French community, being occasionally labeled as an *astrogrocery* with its utility not well perceived and questioned.

In terms of international notoriety, which is the focus of this paper, Jaschek[10] has definitely to be credited for an acute perceptiveness[11]: he felt it necessary to associate to the center someone with numerous connections in the space communities in Europe and in the US (at a time when

[10]By birth a non-French citizen with an ample international career (Heck 2006b).

[11]This clearsightedness is also evident in his seminal paper (Jaschek 1968) that triggered the initial IAU steps in matters of astronomical data (see Heck 2005b).

astronomy space-related experiments were taking full momentum and generating data in amounts unknown earlier), and with a profile completed by an extensive experience in ground-based observing and data handling methodologies. I felt deeply honored by his confidence and very much appreciated to be put in charge of the CDS international relationships upon my arrival in Strasbourg (1983), with virtually total freedom, since I could also apply my training in communication, advertizing and marketing. Some of the successes achieved have been described in the previous sections.

But one of the basic principles in advertizing/marketing is that only good products can be 'sold' sensibly and sustainably. CDS' basic idea was a genial one: creating a huge table of identification synonyms giving access to all individual data from the integrated catalogs, all of this being completed by an object-oriented bibliography linked to the database. And CDS provided first-class services in a dedicated niche.

By the end of the 1980s, CDS was thus set on the world-wide international scene. Its challenges would now be of another nature: whether it would keep up with the evolution of technology and the requirements from astronomical research.

7. Personal Epilogue

Initiated in 1970 with J. Jung as my PhD supervisor at Paris Observatory where I became *de facto* the first CDS scientific user even before its official existence, my own association and deep involvement with CDS – especially as its "international salesman" in the 1980s – ceased officially towards the end of that decade with my reorientation towards other activities (Duerbeck 2006) and my election as Strasbourg Observatory Director. A number of tensions internal to the institution had to be cleared up and some official neutrality was needed with respect to the various components of the house in order to put an end to recurrent managerial conflicts.

The CDS key rôle was nevertheless reaffirmed as shown by the following excerpt from the minutes of the Observatory Council meeting held on 2 May 1988 and electing me as Observatory Director:

> "Il considère dans sa majorité que le développement du CDS et des thèmes scientifiques orientés vers l'utilisation de la banque de données doit être prioritaire. L'accent devrait être mis sur les méthodes de traitement statistiques de données, si possible en collaboration avec d'autres départements de l'Université. C'est en effet le domaine de compétence de choix de l'Observatoire, domaine qui va se développer naturellement dans les prochaines années, lors de l'arrivée des données en provenance des expériences spatiales."
>
> [The Observatory Council in its majority considers that the development of CDS and of scientific themes oriented towards usage of the database must have priority. The emphasis should be put on the methodologies of statistical han-

dling of data, if possible in collaboration with other University departments. It is indeed the prime field of competence of this observatory, a domain that will quite naturally be developed in the upcoming years with the arrival of data from the space missions.]

Many data handling methodologies had already been investigated, catalyzed and even initiated, through the various international encounters organized (cf. Tables 5 & 6). However, if most of the goals set by the CDS founders have been reached, at least one of them did not really come through: astrophysical research directly geared to the center. This is worth stressing since such an ambition was explicitly written in the statutes (see Sect. 2). And this can probably be blamed onto the networks allowing astronomers to stay at their home institutions rather than coming to CDS – the other face of the coin.

As far as international visibility is concerned, there is no golden rule as each situation is a specific one. Beyond keypoints mentioned in the course of this paper – developing and maintaining excellent international contacts, relying on first-class products, fostering confidence from people, lobbying persistently, helping luck with gentle touches of bluff, developing flexibility to foreign cultures, exercising (away from both arrogance and toadyism) top-level respectful diplomacy helped by well-trained acute intuitions – trust and credibility are certainly the essential and complementary virtues.

And it makes no harm to exercise all this in a cosy context. If the city of Strasbourg and its region Alsace offer gorgeous surroundings in terms, for instance, of eating places where some of the achievements above have been secured, this aspect is however totally ignored by civil-service regulations in terms of funding! Trahit sua quemque voluptas.

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Main Abbreviations and Acronyms

AAS	American Astronomical Society (USA)
ADAC	Astronomical Data Analysis Center (Japan)
ADC	Astronomical Data Center (NASA)
ADS	Astrophysics Data System (NASA)
ANS	Astronomische Nederlands Satelliet
ARI	Astronomisches Rechen-Institut (Heidelberg, Germany)
Astron.	Astronomical, Astronomische, Astronomy, ...
Bitnet	"Because It's Time" Network
BSI	Bibliographical Star Index (CDS)
Bull.	Bulletin
CCSC	Centre de Calcul de Strasbourg-Cronenbourg (France)
CDS	Centre de Données Stellaires (France), later: Centre de Données astronomiques de Strasbourg (France)

CDSIB	Information Bulletin of the Centre de Données Stellaires
CERGA	Centre d'Études et de Recherches en Géodynamique et Astrométrie (France)
CfA	Center for Astrophysics (Cambridge MA, USA)
Cl	Council
CNES	Centre National d'Études Spatiales (France)
CNFA	Comité National Français d'Astronomie (France)
CNRS	Centre National de la Recherche Scientifique (France)
Comm.	Commission
CSI	Catalogue of Stellar Identifications (CDS)
Doc.	Document, Documentation, ...
ENS	École Normale Supérieure (France)
ESRO	European Space Research Organization (now ESA)
ESA	European Space Agency
ESF	European Science Foundation
ESIS	European Space Information System (ESA)
ESO	European Southern Observatory
ESRIN	European Space Research Institute (ESA/Italy)
ESTEC	European Scientific and Technological Center (ESA/Netherlands)
EXOSAT	European X-ray Observation Satellite
FAGS	Federation of Astronomical and Geophysical Services
GA	General Assembly
GDR	German Democratic Republic (obsolete)
GSFC	Goddard Space Flight Center (NASA)
HD	Henri Draper (catalog)
HIPPARCOS	High-Precision Parallax Collecting Satellite
IAP	Institut d'Astrophysique de Paris (France)
IAU	International Astronomical Union
IAU Trans	International Astronomical Union Transactions
Id.	Identification
INAG	Institut National d'Astronomie et de Géophysique (France) (now INSU)
Inform.	Information
INSU	Institut National des Sciences de l'Univers (France) (formerly INAG)
Inst.	Institut, Institute, ...
Internat.	International
IPAC	Infrared Processing and Analysis Center (USA)
IRAS	Infrared Astronomical Satellite
IRS	Information Retrieval Service (ESRIN)
ISBN	International Standard Book Number
ISSN	International Standard Serial Number

IUCAA	Inter-University Centre for Astronomy and Astrophysics (India)
IUE	International Ultraviolet Explorer
MoU	Memorandum of Understanding
Nachr.	Nachrichten
NASA	National Aeronautics and Space Administration (USA)
NED	NASA Extragalactic Database (IPAC)
Newsl.	Newsletter
NGC	New General Catalog
NSF	National Science Foundation (USA)
Obs.	Observatoire, Observatory, ...
OSA	Organizations and Strategies in Astronomy (volumes)
PPARC	Particle Physics and Astronomy Research Council (UK)
PRC	People's Republic of China
Proc.	Proceedings
Publ.	Publications, Publishers, ...
RDA	République Démocratique Allemande (obsolete)
SAO	Smithsonian Astrophysical Observatory (USA)
SERC	Scientific and Engineering Research Council (UK) (now PPARC)
SIMBAD	Set of Identifications, Measurements and Bibliography for Astronomical Data
SP	Special Publication
SPAN	Space Physics Analysis Network
SRC	Scientific Research Council (UK) (later SERC)
SRON	Stichting Ruimte Onderzoek Nederland
SSD	Space Science Department (ESTEC)
ST	Space Telescope
ST-ECF	Space Telescope – European Coordinating Facility (ESA/ESO)
STScI	Space Telescope Science Institute (USA)
UK	United Kingdom
ULDA	Uniform Low-Dispersion Archive (IUE)
ULP	Université Louis Pasteur (Strasbourg I) (France)
Univ.	Université, University, ...
URSS	Union des Républiques Socialistes Soviétiques (obsolete)
US	United States (of America)
USA	United States of America
Userid	User Identification
USNO	United States Naval Observatory (USA)
USSR	Union of the Soviet Socialist Republics (obsolete)
Vilspa	Villafranca Satellite Tracking Station (Spain)
WGAD	Working Group on Astronomical Data (IAU Comm. 5)
WGMAM	Working Group on Modern Astronomical Methodology