International Union of Pure and Applied Chemistry
Vice President's Critical Assessment, 2005

Bryan R. Henry

ABSTRACT: The focus of this year's critical assessment is a review, assessment and analysis of our project system. The report is based on information obtained from interactions with members of various Divisions and Standing Committees, and attempts to provide an overview and to identify best practices. A series of Table provides data on a number of project related parameters from 1998 to the present. The report presents a set of observations and challenges, and concludes with five summary recommendations directed to project generation, monitoring, and funding, and to project activity in the Operational and Advisory Standing Committees. A final recommendation deals with increasing the profile of IUPAC.

LIST OF CONTENTS

1. INTRODUCTION

IUPAC is a worldwide organization that has an impressive track record in enabling the language of chemistry to be understood globally. It acts as an authoritative nongovernmental agency to provide standards for chemical nomenclature and terminology, and sponsors numerous conferences on a wide range of chemical themes. While these activities are well known and respected by the international scientific community, the IUPAC project system is perhaps less appreciated. This project system lies at the very heart of IUPAC activities. It involves the volunteer efforts of close to 1000 scientists worldwide. It is nurtured, monitored, and organized by IUPAC's eight scientific Divisions and three operating Standing Committees. Oversight is provided by the IUPAC Bureau and by advisory Standing Committees such as the Project Committee, the Evaluation Committee, and the Interdivisional Committee on Terminology, Nomenclature and Symbols (ICTNS). The range of projects covers the whole gamut of chemistry from chemical education, critically evaluated databases, and precise and reliable atomic weights, to the political arenas of chemical disarmament, sustainable development, meeting the needs of developing countries, the requirements of chemical industry, and a plethora of other areas.

The project system in its current form is a relatively new development in the history of IUPAC. Our organization, which was formed in 1919, operated for most of its existence on the basis of a commission system. It is not my purpose here to review that system, but rather to briefly summarize our passage from the commission system to our current project mode of operation. The transition was passed by the Bureau in 1998 and approved by Council in August 1999. While the vote in Council was overwhelmingly in favor, the topic was hotly debated with doubts expressed both by some Divisions and some National Adhering Organizations (NAO)s. The principal concern seemed to be that the fundamental focus of IUPAC operations would change. Reassurance was offered that any money saved by eliminating commissions would be devoted to scientific work. The project system was fully phased in within the 2002–2003 biennium.

The successful operation of the project system has been a clear priority for IUPAC. The transition was given strong support by the Bureau and by President Jortner in 1999. In his detailed and exhaustive 2001 Vice President's Critical Assessment (VPCA), President Steyn reviewed the new system and identified the challenges that would need to be faced for its successful implementation. In particular, he noted that the generation of new projects with broad international appeal would require "proactive efforts at all levels within the Union". In his 2003 VPCA, President Sydnes noted that although some observers believed that restructuring to the project system appeared to be beneficial, analysis of the full effects would require more time. However, he did point out a need to broaden the geographic participation in project Task Groups, and suggested that both improved visibility of IUPAC activities and improved communication within IUPAC would be helpful in this regard.

Two years have passed, and perhaps now is a good time to assess how our new system is functioning. This will be the principal topic of this VPCA. The preliminary answer is

that the system is functioning very well, perhaps even better than expected. However, as with any new system, there may be opportunities to improve performance by making incremental changes and attempting to benefit from best practices. One difficulty we have as a large and diverse organization is that we have a tendency to solve our problems in isolation. Joint meetings of Division Presidents and Standing Committee Chairs can serve to share best practices, but those meetings are rather infrequent and often rushed. In this report, I will attempt to provide an overview and to hone in on what is working well. I will address a number of project-related questions. Are there any problems involving project generation? Are project approval mechanisms working efficiently? How can we effectively control the length of time to complete projects? What steps are in place to monitor and improve the quality of projects? Are project dissemination methods functioning effectively? Do the Evaluation Committee and ICTNS have the best tools and resources to function effectively in the new system? Should changes in project funding allocations to Divisions and Standing Committees be determined on the basis of their success within the project system?

While the project system will provide the focus in what follows, other issues deserve some attention. We need to continue to seek ways to improve the involvement of industry in IUPAC activities. There may be opportunities for IUPAC to expand its impact through changes in its relationships with other organizations such as the International Council for Science (ICSU), the World Trade Organization (WTO), the United Nations Industrial Development Organization (UNIDO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the International Atomic Energy Agency (IAEA). For example, could IUPAC do more to help developing nations overcome non-tariff barriers that affect their market access?

2. METHODOLOGY

The philosophy in preparing this report was to listen and learn from the members, Officers and Chairs of the Divisions and Committees. In that way, the suggestions for change and improvement come from those directly involved in the project system. Prior to the Bureau meeting in Bled in October 2004, I was fortunate to be able to attend the off-year meetings of the Inorganic Chemistry Division (II), the Polymer Division (IV), the Analytical Chemistry Division (V), the Chemistry and Human Health Division (VII), and the Chemical Nomenclature and Structure Representation Division (VIII). Scheduling did not permit me to attend the remaining Divisional off-year meetings. Meetings with Tom Tidwell (Division Past President) and David Black (former Division Vice President) provided feedback on the Organic and Biomolecular Division (III). In addition, I met with the Chairs of the Committee on Chemistry and Industry (COCI), the Committee on Chemistry Education (CCE), and CHEMRAWN (CHEMical Research Applied to World Needs), and with representatives of the Royal Society for Chemistry (RSC) and the American Chemical Society (ACS). These were all useful meetings, and I learned a great deal. I would like to thank all of the individuals involved for their kindness and hospitality. Reports of the meetings were written and circulated to the IUPAC Officers and to the Division Presidents and Committee Chairs. These reports provide the basis for this document.

One side effect of these meetings was an improvement in communications between the Officers and Secretariat on the one hand, and the Divisions/Committees on the other. As President Sydnes has so clearly pointed out in his VPCA, communication within IUPAC is an important priority. In many instances, these interactions represented the first time that an officer had attended such a meeting. In most cases, there was a valuable exchange. I hope to be able to attend the off-year meetings of the Physical and Biophysical Chemistry Division (I), Division III, and the Chemistry and Environment Division (VI) in 2006, if only to complete my education. The 2004 Bureau meeting in Bled provided the opportunity to meet with all of the Division Presidents and Committee Chairs that were present. Subsequent to Bled, I was able to enjoy an afternoon with the Chair of ICTNS. As Vice President, I am a member of the Project Committee and thus have ongoing access to their activities.

3. DIVISION SUMMARIES

The following summaries reflect what I learned from the interactions described in the previous section. More detail is provided for those Divisions where I had the privilege of attending their meetings. It should be recognized that what is given here is my own perspective, and is nothing more than a snapshot in time. All of these Divisions are actively involved in strategic planning and are constantly evolving. The dedication and hard work of the Division Officers and the Division Committees represent a core strength for IUPAC.

Physical and Biochemistry Division (I): Overall, the project system seems to be working well, and the current officers support the new system. There has been a slight reduction in the number of projects approved, but the dollar value of the projects has increased. The Division has established an Advisory Committee consisting of 61 distinguished international scientists and engineers. One role of this committee has been in the assessment of project proposals and in generating new projects. A result has been the reduction in approval time for new projects. Once per year, a written report is expected from the Task Group Chair (TGC). The Division President and Vice President are both active in the monitoring process. ICTNS works well for their projects. The atmospheric kinetic database is currently stored on a Web site associated with Cambridge University. It is also mirrored on the server that hosts the IUPAC Web site. Although this arrangement has worked well, the Division would like to look at streamlining the current method of recording the number of hits.

Inorganic Chemistry Division (II): This Division has one of the two Commissions remaining within IUPAC (the Commission on Isotopic Abundance and Atomic Weights). Thus, in part, they have encountered some difficulties in the transition to the project system. There is no shortage of important projects meeting high scientific standards in the area related to their Commission. However, concentration in this area has resulted in decreased activities in their other two areas, materials and molecular. Generation of projects and increased activities in these latter areas are current Divisional strategic goals. In particular, they have set up a subcommittee in the molecular area to nurture and build

this aspect of their activities. The Division is moving toward some form of block funding for the Commission, but the Commission will continue to access the project system in the usual competitive fashion. The Division has a successful monitoring system whereby each project is assigned an active individual monitor. Currently, they are devising a common reporting form, which will be used by task groups to respond every six months through their monitors.

Organic and Biomolecular Chemistry Division (III): The current executive believes there are no inherent problems with the project system. However, they did experience some transitional difficulties. On passage to the project system, the authority to generate projects passed to the various Division Committees. Within Division III, their subcommittees have this responsibility. One Titular Member (TM) on each subcommittee is responsible for the organization of project generation. While this process was successful for some subcommittees, others experienced difficulties. However, all of the subcommittees now appear to be operating successfully. They perceive a need to get completed projects reviewed and evaluated.

One area of interest is documentation of the effects of herbal medicine. The aim would be to help people in areas of the world where international medicine is not always affordable. The Division is willing to look at improvements in project monitoring.

Polymer Division (IV): This Division seems to be thriving under the project system. They make extensive use of feasibility studies to generate projects. Typically, these studies are done by e-mail over a two-year period and are funded from the operating funds of the Division. A feasibility study goes back to the relevant subcommittee, which suggests any needed changes and assigns a priority. A given subcommittee will have six or more projects running and several ongoing feasibility studies. New projects also come from IUPAC-sponsored macromolecular conferences. Overall, the Division has no problem with project generation. Their problem is lack of funds to support existing projects. Currently, they impose a ceiling of $2000 per year per project in order to spread the funds around.

The Division is involved in several interdivisional projects, which they believe work very well, with one of the participating Divisions taking the lead. It is common for one person to work on several projects. The Division operates a taxing system to generate funds for face-to-face meetings that serve as breeding grounds for new projects. Projects are monitored, and project completion does not appear to be a major problem in that relatively few projects are classified as dormant. However, the Division sees benefits in a common, more regulated monitoring system. For some of their projects, citation numbers are particularly impressive. The Division has beneficial interactions with industry, and some of their projects have direct industry involvement. The Division makes use of their relatively high number of IUPAC-sponsored conferences to introduce additional participants into macromolecular projects. At the introduction of the new system, there was some strong opposition among veteran members of the Division. However, the current accepted view appears to be that the change has been a positive one and has introduced more flexibility.

Analytical Chemistry Division (V): The Analytical Chemistry Division has handled the move to the project system very efficiently. The Division Committee takes on the responsibility for generating projects, and the Division President serves as the project coordinator. In generating projects, they use young observers, both as a source of projects, and in an attempt to introduce new blood. They also use conferences and the corresponding IUPAC representatives in generating projects. They hold workshops at their Division meeting and at the General Assembly, and one goal of such workshops is project generation.

They have procedures for active guidance in bringing a project to a stage where it can compete for funding. This nurturing process clearly benefits the quality of the resultant projects. An example proposal is posted online, and they make extensive use of *Chemistry International* (*CI*) to advertise existing projects. In fact, communication within this Division is very good. They publish a Divisional newsletter. A project reporting form is required every six months. This monitoring system works very well. The officers carry out an in-depth review of all projects at their officers meeting, which precedes the Divisional meeting. Projects are also reviewed at the Divisional meeting. For most projects, one Task Group meeting is adequate. Under the project system, the average duration to carry out a given scientific investigation has decreased. They find ICTNS to be very helpful, particularly with regard to Gold Book entries. They believe that interdivisional cooperation is working well. An important issue for the Division is that IUPAC maintains access to the computer capability to maintain their project-generated databases such as the Stability Constants Database. The Division believes that the project system is more flexible, and they have no desire to return to commissions.

Chemistry and the Environment Division (VI): There have been some difficulties in moving from the commission-based system to the project system. There is a perceived need to find new areas of strength as some traditional areas of strength are experiencing difficulties in generating new projects. However, in some areas, there are plenty of projects, and the Division usually spends all of its project money. (Note: In fact, this process of evolution was one of the reasons the project system was introduced. Under the project system, areas that do not generate projects do not consume resources, whereas within the commission system it was difficult to eliminate a commission due to lack of activity.) The Division believes that they could carry out more projects if they had more money. In fact, they have been successful in obtaining additional IUPAC funds to support projects beyond their budget. They are not using feasibility studies or scoping exercises for project generation.

Questions are sent out to all project leaders to assist in project monitoring. However, some members of the Division believe that monitoring is not always functioning as well as it should. They are also concerned about effective peer reviews of completed projects. Typically, projects are completed within two to three years. Division VI has been involved in collaborations with outside organizations associated with ICSU. In particular, they have had a very successful interaction on endocrine disruptors with the ICSU Scientific Committee on Problems of the Environment (SCOPE). They would like to see

expanded cooperation with other organizations. They believe that subcommittees function most effectively with face-to-face meetings.

Chemistry and Human Health Division (VII): They have a small Division Committee with two of the members from industry. They operate with three diverse subcommittees, but still believe that they have been very successful within the project system ("The project system is great"). The subcommittees attempt to meet at technical meetings which they would normally attend. The subcommittees generate the projects, with few projects coming from outside. Each project has an active mentor who is a member of a subcommittee or a Division Committee member. The Division uses the project system to actively recruit new blood. The subcommittees identify a technical need and go out and find new people with that expertise. They try to understand where their field is moving in the future and who they want to serve. In their words, they are "attempting to solve tomorrow's problems today". One of their strategic directions is to get less-developed nations more involved.

Most projects take two to three years. The Division believes that they could carry out more projects if they had more money. They were successful in obtaining additional IUPAC funds to support projects beyond their budget. They are looking into ways to raise funds beyond IUPAC to support their projects and meetings. One issue that is particularly important in the health field is that technical investigations can have political consequences. For example, the Division believes that patents in the health field should not prevent the development of that field.

Chemical Nomenclature and Structure Representation Division (VIII): This is the newest Division. It was established in 2002 in an attempt to bring all nomenclature-related activities within one Division. They use scoping exercises (feasibility studies) to generate new projects and to bring new people on board. There are several active projects with many waiting to be done. Several projects are interdivisional, particularly with Division IV. Progress on projects is generally very good although delays do occur. The difficulty is neither a lack of money nor a shortage of projects, but rather a need for scientists with the time, expertise, and inclination to help. There is a critical need to get more people involved in the nomenclature activities of IUPAC. One beneficial aspect of the project system is that it is easier to keep people working in the nomenclature area beyond 12 years by involving them in a number of projects. In fact, given the time it takes someone to be productive in nomenclature activities, the Division believes that it might be reasonable to extend time limits for the Divisional Committee beyond 12 years.

They have had some recent success in bringing younger people to serve on new projects and onto their Division Committee. Industry is actively involved in Divisional activities. They use both their Advisory Committee and National Representatives as a source of new people to work on nomenclature related projects. The Division uses a Web Board to facilitate communication between the Division Committee, Task Groups, and the Advisory Committee. One issue for them is an improvement in IUPAC computer resources in order to facilitate storage and access to Division VIII databases, and to support their Web Board.

4. OPERATIONAL STANDING COMMITTEES

The use of the project system is a more recent development for these committees, and so it is still too early to make definitive judgments. What follows is very much a progress report.

Committee on Chemistry and Industry (COCI): COCI has developed a project team that will monitor COCI projects and will vet all IUPAC projects for potential COCI interest. COCI is keen that projects be time-limited, demand-led, and meet IUPAC's strategic directions. Regarding the public perception of chemistry, COCI activity is a component of the CCE initiative in that it attempts to provide an industrial viewpoint.

COCI is particularly interested in the public appreciation of chemistry. They would also like to see a broadening of industrial interest in IUPAC to include areas like the pharmaceutical industries. A key issue here is the role of IUPAC as a nongovernmental organization (NGO) in its actions to bring rational discussion to chemical issues. They believe that the Company Associates (CA) program could be used to greater effect, and they have drafted a revised approach to industry regarding the CA program.

Committee on Chemistry Education (CCE): A system is in place for project review, evaluation, and recommendation. There is a need for joint projects with Divisions where there is an educational component. DIDAC will now be part of CCE, working jointly with COCI. In development projects, while CCE will do all that is possible to help project leaders achieve collaboration with local NGOs to get products distributed, CCE does not have the resources to distribute material. Continued partnership with UNESCO is very important to CCE, as is any initiative to help young people appreciate chemistry.

CCE can work effectively within the project system and believes it to be more flexible and adaptable. However, for many CCE activities, face-to-face meetings are needed in the sense that they can be more efficient than electronic communication. The existence of a separate project budget for CCE has been helpful.

CHEMRAWN Committee: They want to draw up a set of rules for future organizers of CHEMRAWN conferences to provide guidance for conference funding and interactions with IUPAC. CHEMRAWN wants to follow up on our work on chemical weapons, as well as extending the work they have done concerned with arsenic in drinking water in Bangladesh. They are very involved in chemical sciences and education in the Middle East with the Malta II conference.

Recently, the Chair of CHEMRAWN drafted a report that essentially summarizes the first 16 CHEMRAWN conferences. In many cases, these conferences produced a set of recommendations. Actions based on these recommendations are often followed up by a Future Actions Committee (FAC). Notable successes involved CHEMRAWNs II, IV, and XIV where the FACs sent copies of recommendations to a number of governmental personnel, including all members of the U.S. Congress and Senate. In other cases, the

conferences led to significant science. For example, CHEMRAWN VII launched a series of studies of atmospheric modeling.

This report is the beginning of an attempt to help CHEMRAWN publicize its contributions. It is a very important report and it needs to be given wide publicity and a high priority. More information will be gathered, and hopefully in some cases, it will be possible to demonstrate why the world has become a better place because of a given CHEMRAWN conference.

FACs have been most successful when there have been funds available to finance their activities. For example, these funds can come from the conference making a profit. If the FAC has one or more focused initiatives growing out of a CHEMRAWN conference, they could be encouraged to use the project system to accomplish their goals.

5. PROJECT-RELATED ADVISORY STANDING COMMITTEES

I have included a few comments here in recognition of the extent to which these three committees are involved in the project system. The Evaluation Committee is still in its early days, as the opportunity to evaluate completed projects under the new system is just beginning. ICTNS has extensively revised its operations in response to the new system, and it is timely to examine its activities over the last two years.

Project Committee: The description of the activities of the Project Committee can be found in the terms of reference in the current *IUPAC Handbook* and in the Chair's (Prof. Gus Somsen) recent report to the Bureau in Bled. In summary, this committee makes funding decisions on projects that are interdisciplinary in nature or where the funds requested are beyond the Division/Standing Committee budget. They also review applications for financial support for conferences in scientifically emerging regions, and for financial support for conferences on new directions in chemistry.

The committee operates efficiently, and funding decisions are reached in a timely fashion. Critical factors in making decisions are the expert analyses provided by Divisions and Standing Committees. The Project Committee did not spend the project part of its biennial allocation in either of its first two biennia (2000–2001 and 2002–2003). However, they are on track to completely use their current 2004–2005 budget of $110,000. It also appears that the 2004–2005 conference budget of $65,000 will be fully utilized.

The committee is in the process of considering a change in their procedures for awarding financial support for conferences. They are discussing a system whereby they consider applications two or three times per year. Such an approach would permit a ranking of the relevant conferences and make the procedure more competitive.

Interdivisional Committee on Terminology, Nomenclature and Symbols (ICTNS): ICTNS exists primarily to provide quality control for IUPAC recommendations on nomenclature, terminology, symbols, and units, and to act as a means of liaising with

other Unions and cognate bodies in these areas. Under the previous regime (as IDCNS), this was done in part by asking IDCNS members (primarily the Chairman and the Secretary) to review all documents submitted for publication, and to propose additional reviewers if it was felt that this was necessary. The composition and terms of reference for the committee can be found on pp. 66 and 67 of the current *IUPAC Handbook*. The current version of ICTNS was established in 2002 and since 2003 has successfully cleared a backlog of reports and recommendations.

ICTNS deals with both Technical Reports and Recommendations.

Technical Reports (TRs): TRs go first to the Division, which ensures that the science is correct and that the report is written according to the Guidelines for Drafting Technical Reports and Recommendations. This may or may not involve external reviews. The Division President approves the TR and sends it to the Secretariat who forwards it to ICTNS. They check the compatibility of the document with IUPAC recommendations on terminology, nomenclature, and symbols. The manuscript is then forwarded to the Production Editor, for publication in *Pure and Applied Chemistry* (*PAC*).

ICTNS guidelines for technical reports as outlined in the *IUPAC Handbook* are not always followed, which causes delays and frustration. Divisions differ in the degree to which they carry out scientific review. A solution would be for Divisions to both thoroughly review the science and to keep potential authors informed as to the need to follow the guidelines. The latter could become a routine part of the project monitoring process. Alternatively, there is the possibility that ICTNS could simply refuse to accept TRs that don't follow the guidelines. The current ICTNS committee does not believe that their role should be to act as copy editors.

Recommendations: These can be divided into two types. The first type deals primarily with non-nomenclature items such as terminology and glossaries. The second type involves recommendations on nomenclature. For the first type, the Recommendation document is sent initially to ICTNS to check conformity with ICTNS guidelines. After ICTNS approval, the document is submitted through the Secretariat to the Division President who arranges for the Secretariat to submit it to a panel of 15 experts. After the Division President's approval, the Secretariat posts the title, synopsis, and full text on the IUPAC Web site as a Provisional Recommendation. At this point, the Recommendation begins a period of public review (5 months). At the completion of the expert review, the Recommendation is returned to ICTNS. ICTNS attempts to complete their review at least one month before the end of the public review period.

As with TRs, problems can occur when Recommendations do not take account of existing IUPAC definitions. Provisional Recommendations are posted when the Division President approves. This step can take place before the expert reviews are received. If a Provisional Recommendation subsequently proves to be incorrect, it can create problems in that it is not always easy to remove it expeditiously. The procedure could be changed such that the document could be posted as a Provisional Recommendation only after the

completion of expert review. However, such a change would require attention to timing as an extension of the overall time for approval would be undesirable.

The second type of Recommendation involves nomenclature. The procedures are the same as for non-nomenclature Recommendations, except that the report is vetted by Division VIII before it is sent to the 15 experts. ICTNS believes that this procedure is working well and that the resultant reports are consistently of high quality.

Perhaps it would be timely to reconsider the role of ICTNS in the review of nomenclature recommendations in light of the creation of a Division devoted entirely to nomenclature. In a sense, Division VIII produces the rules and ICTNS applies them. In that light, ICTNS can act as a valuable additional source of expert input. However, the identification of 15 expert reviewers outside of Division VIII could be problematic. In addition, it is worth reconsidering whether terms of reference (v) and (vi) on p. 67 of the current *IUPAC Handbook* should be the sole responsibility of ICTNS or whether Division VIII should play a defined role. There is also a need to find better mechanisms to obtain meaningful outside reviews of the Red Book (*Nomenclature of Inorganic Chemistry*) and the Blue Book (*Nomenclature of Organic Chemistry*).

Evaluation Committee: The beginnings of this group can be traced back to 1999. The Evaluation Committee developed a set of Guidelines for project evaluation which was based on test evaluations of selected projects. They published a document entitled "Advice to Task Group Chairmen". They have made a list of projects completed in 2002–2003. Since the first projects within the new system have only recently been completed, the Evaluation Committee has just begun to function fully. There was a particular concern about the length of time to complete projects, and whether projects were meeting their originally stated completion deadlines. Obtaining the necessary data to provide meaningful evaluation has proven to be problematic. The evaluation of conferences is just beginning. Some of these issues will be dealt with in the next section.

6. TABULAR OVERVIEW OF THE CURRENT PROJECT SYSTEM

Tables I–VI contain a summary of the status of the total number of IUPAC projects over the last five years as of 17 January 2005. The best comparisons occur from biennium to biennium, and since the project system was fully operational in the 2002–2003 biennium, it is still far too early to trace trends in any quantitative sense. Nevertheless, some qualitative observations can be made that indicate areas to watch in the future.

Tables I–IV focus on the number of projects. There was clearly a decrease in the number of projects as we moved from the old commission-based system in 1998–1999 through the transitional years 2000–2001 to the project-based system in 2002–2003. However, the last column of Table I indicates a resurgence. Perhaps the most hopeful sign in Table II is the marked decrease in the number of abandoned projects from January 2002 onward. The abandoned projects in the years 2000, 2001, and 2002 were primarily projects initiated under the commission system, and not projects that had been reviewed and

evaluated under the new system. This process of "cleaning house" helped to launch the new system with a minimum of inherited problems.

The tracking of projects has improved dramatically, and hopefully this will allow Divisions and Committees to focus not only on project generation but also on project completion. The newly approved projects in Table III are a reflection of how quickly the Divisions and Committees adapted to the new system and reflect the comments given previously in Sections 3 and 4. Table IV indicates little change in the number of submitted proposals when 2000–2001 is compared to 2002–2003.

Table I Current projects.

	IUPAC Handbook 1998–1999	*IUPAC Handbook* 2000–2001 (as of 1 Jan 2000)	*IUPAC Handbook* 2002–2003 (as of 15 Feb 2002)*	*IUPAC Handbook* 2004–2005 (as of 31 Dec 2003)
CTC/CCE	9	9	Nr	7
Other STCs	9	14	5	10
Div I	51	40	10	14
Div II	22	22	8	10
Div III	21 + 4 biotech	22	6	14
Div IV	33	30	11	22
Div V	111	88	25	23 + 17 SDS
Div VI	52	40	12	15
Div VII	28	17	9	17
Div VIII			8	10
TOTAL	340	282	94	143**

*Starting with that compilation, only the projects approved in the new system were accounted for.

**The sum of 142 does not include all the solubility data series. 143 accounts for one "umbrella" project for the "solubility data series".

Table II Completed projects.

	IUPAC Handbook 2000–2001 Completed in 1998–1999*	*IUPAC Handbook* 2002–2003 Completed in 2000–2001	*IUPAC Handbook* 2004–2005 Completed in 2002–2003	From the Web Completed since Jan 2004
CTC/CCE	1	1	1	2
Other STCs		6	4	2
Div I	11 (3)	10 (6)	3	1 (1)
Div II	6	9	2	0
Div III	5 (5)	5 (1)	4	3
Div IV	5 (1)	6 (1)	12	3
Div V	18 (14)	23 (17)	17	8 (2)
Div VI	13 (6)	17 (3)	11 (1)	3 (1)
Div VII	4 (8)	7 (2)	3 (1)	2
Div VIII			1	0
TOTAL	63 (37)	84 (31)	58 (2)	24 (4)

*These numbers reflect projects completed (or abandoned) since the previous compilation of current projects published in the 1998–1999 *IUPAC Handbook*.

Table III Newly approved projects.

	Approved in 2000–2001	Approved in 2002–2003	Approved in 2004
CTC/CCE	2	6	1
Other STCs	3	6	5
Div I	7	8	3
Div II	6	3	2
Div III	5	9	1
Div IV	12	18	4
Div V	12	11	2
Div VI	10	9	9
Div VII	4	14	7
Div VIII	3	5	1
TOTAL	64	89	35

Note: The numbers reflect the tabulations presented online under <http://www.iupac.org/projects/new_projects.html>, and summed by biennia.

Table IV Number of proposals submitted per year.

2000	37
2001	87*
2002	65
2003	63
2004	48

*Includes a few "old projects" reintroduced into the system.

Table V Current and "overdue" projects as of 18 Jan 2005.

	Total current projects	Current project "overdue"	Overdue + 6 months*
CTC/CCE	6	3	2
Other STCs	14	2	1
Div I	18	9	7
Div II	11	7	6
Div III	14	10	7
Div IV	26	13	8
Div V	37	29	16
Div VI	19	7	5
Div VII	22	13	8
Div VIII	12	7	4
TOTAL	179	100	64

*Current projects where the originally intended date of completion was 30 June 2004 or later.

Table V indicates an area of some concern. We are a volunteer organization, and we depend on talented and committed scientists from all over the world to carry out IUPAC projects. One of our very real strengths is the willingness of scientists to take time from their hectic schedules to work on IUPAC projects. These tasks are inevitably taken on with the best of intentions, but other pressures frequently cause delays. In Table V, a comparison of columns 2 and 4 shows that an average of 36 % of projects are overdue by more than six months (the range is 7 to 54 %). A mitigating circumstance is that completion dates on the project submission forms are usually overoptimistic. Moreover, delays in the approval process can cause hold ups. However, even in light of these considerations, the numbers in column 4 are higher than they should be. In three cases, the ratio of significantly delayed projects exceeds 40 %. Another possible reason for these delays is the reduction of face-to-face meetings of Task Groups in lieu of more frequent use of e-mail correspondence. The requirement to face your peers and present

progress on a project is one of the best inducements to meet deadlines. One possible way to alleviate the delays is improvement in project monitoring.

In many ways, the most interesting of these tables is Table VI. There are small differences between the number of projects in round brackets in Table VI and the corresponding number of newly approved projects in Table III. The Table III numbers come from the Web and do not include projects that are extensions of existing projects. In addition, Web pages are at times created for projects early in a new year where the project was approved in the previous year. Table VI represents the core data that are maintained systematically during the submission, review, and final accounting of the allocated funds, for each project. They include projects that are classified as dormant. Thus, the project numbers in Table VI are often slightly larger than those in Table III.

The comparison that stands out for Table VI is the change in the total funds devoted to IUPAC projects as we moved from the transition years of 2000–2001 to the first years of the project mode in 2002–2003. The dollars made available to projects changed from $376,350 to $622,472, which represents an increase of 65 %. Based on the figures for 2004, we appear to be maintaining this level of funding for the 2004–2005 biennium. Thus, the promise that any savings from the shift to the project mode would be passed on to scientific endeavors appears to have been kept! The net result has been an increase in the average grant per project, although that change has been far from uniform from Division to Division.

It is worth noting here that the system has considerable flexibility. Divisions or Committees that have suitable reviewed projects ready to be funded, but that have run out of project funds, can apply to the Secretary General and Treasurer for additional funds from their reserve for a given biennium. In 2002–2003, all but one of the Divisions and all of the Standing Committees did just that. A total of 12 additional projects were funded.

A version of Table VII also appeared in President Sydnes' VPCA. In all, 57 countries are represented. The Table specifically notes those countries with Task Group Members (TGMs) that are Associated National Adhering Organizations (ANAOs) or that are not an NAO or an ANAO (noted as a nonmember, NM). In general, the countries that have members on Division/Executive Committees or governing bodies like the Bureau or Executive Committee have the most TGMs. However, the distribution is impressive and emphasizes the global nature of IUPAC.

It is a continuing goal of IUPAC to increase the geographic representation on Task Groups. Division V uses IUPAC conferences to generate new projects and to attract new scientists into IUPAC projects. Division VII actively recruits new TGMs to expand the scientific scope of their project portfolio. These sorts of activities should be encouraged and adopted more widely. The recent formation of the Union Advisory Committee (UAC) could be used to make scientists more aware of IUPAC project activities, and thus serve to increase participation by a wider range of countries.

Table VI Dollar values of projects granted in year X*.

	2000	2001	SUM 2000 + 2001	2002	2003	SUM 2002 + 2003	2004
CTC/CCE*		6000 (1)	6000 (1) [6000]	37000 (5)	6000 (1)	43000 (6) [7167]	16000 (1)
All other STCs above	5000 (1)	20000 (3)	25000 (4) [6250]	22000 (4)	55600 (7)	77600 (11) [7055]	21000 (4)
Div I	15500 (3)	70800 (7)	86300 (10) [8630]	30000 (4)	61300 (7)	91300 (11) [8300]	54100 (5)
Div II	14500 (3)	16600 (3)	31100 (6) [5183]	4800 (1)	40000 (4)	44800 (5) [8960]	14800 (1)
Div III	16700 (2)	7000 (3)	23700 (5) [4740]	16500 (5)	28600 (6)	45100 (11) [4500]	14000 (1)
Div IV	34000 (9)	4500 (2)	38500 (11) [3500]	24500 (10)	19000 (6)	43500 (16) [2719]	31250 (9)
Div V	24000 (5)	21730 (17)	45730 (22) [2079]	22900 (4)	41450 (11)	64350 (15) [4290]	19100 (3)
Div VI	65000 (10)	0 (0)	65000 (10) [6500]	28802 (5)	76000 (5)	104802 (10) [10480]	58400 (9)
Div VII	12500 (2)	7000 (2)	19500 (4) [4875]	48000 (13)	11500 (2)	59500 (15) [3967]	29200 (7)
Div VIII	23000 (1)	12520 (2)	35520 (3) [11840]	29500 (5)	19020 (3)	48520 (8) [6065]	43000 (4)
TOTAL	210200 (36) [5839]	166150 (40) [4154]	376350 (76) [4952]	264002 (56) [4714]	358470 (52) [6894]	622472 (108) [5764]	300850 (44) [6838]

*The values represent the total dollar commitment summed on the leading Division from all sources.

**The notation is in the form of dollars (corresponding # projects) [$ average per project].

Table VII Task Group membership by NAO (as of 14 February 2005).

NAO	TGM
United States	190
United Kingdom	101
Germany	82
Japan	54
France	44
Australia	36
Russia	32
Canada	27
Czech Republic	26
Netherlands	25
Belgium	24
Switzerland	23
India	21
Italy	20
Sweden	17
Poland	16
Brazil	14
China/Beijing	13
Argentina	12
Portugal	12
Spain	12
Israel	11
Korea	11
Hungary	10
Denmark	9
South Africa	9
Austria	8
New Zealand	8
Turkey	7
Bangladesh	6
Finland	6
Mexico (ANAO)	6
Bulgaria	4
Chile	4
Ireland	4
Kenya (ANAO)	3
Malaysia (ANAO)	3
Nigeria (NM)	3
Norway	3
Slovakia	3
Botswana (NM)	2
Costa Rica (NM)	2
Croatia	2
Egypt	2
Pakistan	2
Singapore (NM)	2
Slovenia	2
Thailand (ANAO)	2
Uruguay (ANAO)	2
Venezuela (NM)	2
Armenia (NM)	1
Ethiopia (NM)	1
Greece	1
Hong Kong (ANAO)	1
Jamaica (NM)	1
Philippines (ANAO)	1
Kuwait	0
Puerto Rico	0
Serbia & Montenegro	0
China/Taipei	0

Note: NM corresponds to a nonmember.

7. OTHER ISSUES

While the project system occupies the principal focus of this VPCA, there are a number of other issues that deserve mention. For most of these, either an observation or a suggestion that the topic merits further discussion will be found in the following section of this document. Here, I will simply mention the issues and indicate why they are of interest or concern.

President Sydnes fully addressed the need for improved communication in his VPCA. As I visited the various Divisions and Committees in the process of gathering data for this report, it is clear that we have a ways to go in improving communications within the IUPAC family. In an organization as large, diverse, and complex as ours, full understanding and communication will be a constant challenge, and we must continually search for improvements. In particular, as I have alluded to previously, there appears to be a lack of full awareness of the activities of the Divisions and Standing Committees on one hand, and the Officers and Secretariat on the other. The difficulty is certainly not one of ill feeling or mistrust, but simply a lack of understanding as to how the various bodies function.

One of the principal reasons for the formation of IUPAC in 1919 was to meet the international needs of chemical industry. Over the years, industry has been closely associated with IUPAC activities, and has contributed a great deal to IUPAC's success. However, at least in the last decade, industry has been less involved. There are some bright spots, for example, within Divisions IV, VII, and VIII. However, in my view, there is ample room for improvement. President Hayes identified this area as a priority in his 1999 VPCA. Recently, Dr. David Evans, the current chair of COCI, and his COCI colleagues have introduced a number of new initiatives to attempt to address this problem. We can offer industry a voice through exploiting our status as a respected and independent NGO. In this way, we can assist in bringing rational scientific viewpoints to issues that are often judged on emotional grounds without any basis in science. Increased involvement of industry has the potential to provide leadership and guidance as IUPAC searches for instances where we can contribute and make a difference. These issues need not be limited to scientific areas such as our work on chlorine and endocrine disruptors. For example, is there a role for IUPAC in assisting industry with the internationalization of initiatives like "Responsible Care"?

Is there any prospect of including pharmaceutical and small chemical process industries within IUPAC? Can we work more closely with trade associations? Can closer ties with industry help us improve our communication and continuing contacts with CAs? How can we increase the number of CAs and use them to help us to serve the needs of chemical industry?

We need to work at increasing the profile of IUPAC. While our name is certainly recognizable, often there is little recognition of our activities outside of traditional areas such as nomenclature. Hopefully, the formation of the UAC will assist in promoting IUPAC within NAOs. However, we can and should investigate other opportunities. For

example, the Thieme-IUPAC prize awarded by Division III is currently the only prize of this type. Prizes such as this can offer industry an opportunity to achieve wider recognition and can help IUPAC increase its profile. The Samsung-IUPAC fund is another valuable initiative along similar lines.

We have traditionally developed relationships with other organizations such as ICSU and UNESCO. Those relationships require ongoing attention if we are to continue to achieve meaningful goals in a global environment. In the past, such partnerships have helped us contribute to issues of global concern such as chemical weapons, the contamination of drinking water, and overcoming non-tariff barriers to trade in developing countries. I think we could do a better job of publicizing our involvement in these kinds of activities. The earlier discussion of CHEMRAWN initiatives is a step in that direction. Moreover, perhaps we need to look more broadly at developing partnerships with other organizations like UNIDO, IAEA, and the WTO. In this way, we could significantly increase our involvement in fields that are vital to the improvement of our world.

8. OBSERVATIONS, CHALLENGES, AND TOPICS FOR DISCUSSION

For the project system, the following points, for the most part, comprise a set of observations and suggestions that are based primarily on best practices from the current procedures used by Divisions and Committees. The other suggestions follow largely from Section 7 on other issues. They are meant to provide guidance for our discussions as we continue our quest to improve the profile, impact, and universality of IUPAC.

Project System:

1. Feasibility studies appear to work well in generating projects for those Divisions that have used them. Other Divisions might want to consider such an approach, especially if they are experiencing difficulties in generating projects in particular areas.

2. IUPAC conferences can be valuable in generating projects, as can workshops at Division meetings.

3. Publicity can be useful in generating new projects. In particular, each project has its own Web page, and it helps if the approved project Web pages are kept up to date. General descriptions of projects are requested by the editor for *CI*, and these articles can also provide valuable publicity.

4. The use of subcommittees and/or project coordinators to foster and to nurture prospective proposals works well. Divisions should be encouraged to adopt such approaches, especially with task groups involved with IUPAC projects for the first time.

5. Some Divisions have experienced difficulties in obtaining timely and useful project peer reviews. We need to initiate discussions to address this issue.

6. Face-to-face meetings of technical subcommittees can often be accomplished at little cost to IUPAC through attendance at a relevant scientific meeting where professional considerations dictate attendance. One model that has seen limited use is for the participants to have the expenses for an extra day covered from the Division Committee's budget. Divisions might want to actively consider such opportunities in their planning. Moreover, despite the undoubted efficiency and cost effectiveness of electronic interactions, IUPAC should recognize that face-to-face meetings are sometimes essential to deal with aspects of project generation, monitoring, and completion.

7. Monitoring needs some attention. There are considerable differences among Divisions, and more uniformity would be helpful. For example, differences in monitoring procedures can make interdivisional projects more difficult. One system that seems to work well is a standard project reporting form that is filled in and filed with the Division President or his/her delegate every six months.

8. Project monitoring can be used effectively to make TGCs aware of standard accounting procedures as well as ICTNS guidelines for Technical Reports and Recommendations.

9. Project completion is a problem especially in some Divisions (see Table V). Hopefully, a more systematic approach to monitoring will help produce improvements. In general, projects should be completed within a two- to three-year time span.

10. Science in general increasingly requires a multidisciplinary approach to solve today's problems. Within IUPAC, we should encourage interdivisional projects, including interdivisional projects that involve CCE and COCI.

11. The central computer capability of IUPAC and its Web site are issues that are important to the project system, as well as to other areas such as IUPAC's profile, publicity, and accessibility. Access to central computer facilities, and the nature and function of those facilities, is currently under active review. The resolution of perceived difficulties and improvements should be a matter of high priority.

12. The Operational Standing Committees should continue to explore opportunities to use the project system. In particular, CHEMRAWN should use the project system where appropriate to fund activities of FACs. The current CHEMRAWN initiative to document measures taken as a result of past CHEMRAWN conferences should be encouraged and given a high priority.

13. The level of project funding is not a specific indication of a project's significance. There are important projects with zero funding, and they should still be tracked in the usual fashion.

14. It may be possible to improve timing issues with regard to ICTNS operations particularly with regard to the posting of Provisional Recommendations. It would be helpful for a small committee consisting of the ICTNS Chair, a Division President, an Officer, and a member of the Secretariat to attempt to find a solution to the current perceived problems.

15. The Project Committee should be encouraged and supported in its current initiative to move to competitive procedures in awarding financial support for conferences.

16. The terms of reference of ICTNS should be reconsidered in light of the creation of Division VIII.

17. The Evaluation Committee was envisioned as a valuable component of the project system. We must find a method whereby they can obtain expeditiously the data that they need to carry out their job.

18. We should continue to strive to increase the geographic representation on Task Groups through a number of strategies including those used by Divisions V and VII.

19. The increase in project funding has been used very well by the Divisions and Committees. A system that allows applications for additional project funds after budgets are used up has proven to be flexible and useful, and should continue, at least until current reserves are expended. Most of the Divisions and Committees have indicated that they can use additional project funds. Given this scenario, I believe that it would be helpful to begin discussions to achieve a consensus as to how future increases in Division/Committee project funding can be tied to success within the project system.

Additional Priorities:

1a. The visits to the off-year meetings of Divisions and visits with Committee Chairs were an essential part of gathering data for this VPCA. In addition, as noted previously, I believe they played a valuable role in increasing communication and understanding between the Divisions/Committees and the Officers/Secretariat. In my view, such interactions should continue but perhaps on a reduced scale.

2a. The very worthwhile initiatives of COCI in attempting to broaden and strengthen interactions between IUPAC and industry should be encouraged and given a high priority. We very much need industry involvement to help guide our priorities. Only then will we be able to contribute significantly to industry needs. In this regard, as COCI has recognized, we need to be much more aggressive in promoting our CA program. The CA program is a source of income, but I believe it is even more valuable as a tool to increase the involvement of industry in IUPAC activities.

3a. One mutually beneficial way in which industry and IUPAC can interact is through the endowment and awarding of prizes for prominent scientists, especially those directly involved in IUPAC work. I believe we can do much more in this area, and I believe there is a positive role to be played by Officers, Division Presidents, and Committee Chairs. Such prizes can serve to provide wider recognition for an industry and to enhance the profile of IUPAC.

4a. Interactions with multidisciplinary, multifaceted organizations like ICSU and UNESCO can be a challenge. Nevertheless, if IUPAC is to play a significant role in helping solve the major problems of a global society, we need to find a way to successfully interact with such organizations. I believe we need to increase our efforts to achieve productive partnerships. Moreover, we should look beyond our traditional partners to others such as the WTO, UNIDO, etc.

5a. As mentioned in Section 7, IUPAC has had some success in contributing to issues of global concern. I believe that we should aggressively seek opportunities to expand our activities in these areas. Moreover, we should seek better ways to publicize these efforts within the international scientific community.

9. SUMMARY RECOMMENDATIONS

In the following project related recommendations, reference to "Divisions" can also include Operational Standing Committees if appropriate. Bracketed numbers refer to the observations in Section 9.

1. If Divisions want an increase in the quantity and/or quality of new projects, they should consider employing strategies that include feasibility studies, workshops, publicity, nurturing mechanisms, and face-to-face meetings of subcommittees (1, 2, 3, 4 and 6).

2. It would be helpful if projects were monitored with a standard instrument (see 7), and the process used to encourage timely project completion as well as compliance with ICTNS guidelines (8 and 9).

3. The Operational Standing Committees should continue their full integration into the project system. In particular, CHEMRAWN should consider using the project system to fund activities of their FAC's (12).

4. The Advisory Standing Committees should continue to revise their procedures to adapt to the project system. In particular, an ad hoc committee should examine timing and terms of reference for ICTNS, and discussions should ensue regarding provision of data for the Evaluation Committee (14, 15, 16, 17 and 18).

5. Discussions should begin in an attempt to achieve a consensus as to how any future increases in Division/Standing Committee project funding might be tied to success within the project system (19).

6. IUPAC needs to give high priority to increasing its profile. In particular, efforts should continue to increase participation in the Company Associates program, and to attract further endowment of industrially sponsored IUPAC prizes (2a and 3a). We need to continue to achieve productive partnerships with a variety of other organizations, and to increase publicity for our own global activities (4a and 5a).

10. LIST OF ACRONYMS

ACS	American Chemical Society
ANAO	Associated National Adhering Organization
CA	Company Associate
CCE	Committee on Chemistry Education
CHEMRAWN	CHEMical Research Applied to World Needs
CI	*Chemistry International*
COCI	Committee on Chemistry and Industry
FAC	Future Actions Committee
IAEA	International Atomic Energy Agency
ICSU	International Council for Science
ICTNS	Interdivisional Committee on Terminology, Nomenclature and Symbols
NAO	National Adhering Organization
NGO	Non-Governmental Organization
NM	Non-Member
PAC	*Pure and Applied Chemistry*
RSC	Royal Society for Chemistry
STC	Standing Committee
SCOPE	Scientific Committee on Problems of the Environment
TGC	Task Group Chair
TGM	Task Group Member
TM	Titular Member
TR	Technical Report
UAC	Union Advisory Committee
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
VPCA	Vice President's Critical Assessment
WTO	World Trade Organization