International Federation of Automatic Control

Synthesis Report

STRUCTURE

1.   Background

 IFAC is a multinational federation tasked with promoting the science and technology of automatic control in all systems, and is distinct by its concern with the impact of control technology on society. Founded in 1957, its membership consists of 52 National Member Organizations (NMOs) who are responsible for furthering the aims and objectives of IFAC within their respective countries. Its organizational structure has sustained and expanded over 50 years with individuals participating in IFAC in a number of ways. However, even though IFAC has adapted to changing circumstances and evolved over time, the world environment has changed significantly from the era in which it was established; thus the importance of periodic reviews.

At the Milan World Congress held in September 2011, the then new IFAC President, Professor Ian Craig, announced that a review of the activities of IFAC will be undertaken to inform the development of a long term strategic plan. The aim is to ensure that what IFAC does − and how it pursues its vision, mission and goals − are optimally aligned with the current and anticipated future requirements of the automatic control community.[1] The strategic planning initiative received broad support from within the structures of IFAC, resulting in Council on 3 September 2011 approving the establishment of a Task Force to initiate the process.

Task Force Members:

I. Craig (Chair), J. Zaytoon (Vice-Chair), R. Goodall, S. Kahne, W.H. Kwon, I. Mareels.

The Task Force Report was approved by Council in January 2012, and focused on—

- strategic planning priorities for IFAC,
- the envisaged strategic planning process, and
- the membership of groups to undertake the environmental scans and analyses of possible future scenarios, as well as a survey of stakeholders' perceptions and expectations.[2]

The process and timelines envisaged:

September 2012, Gifu, Japan Council Meeting
— Council Strategic Planning Workshop: Group chairs report back to Council that formulates a vision and mission for IFAC
— Task Force groups are appointed to pursue specific recommendations, and to draft implementation plans.

July 2013, Zurich Council Meeting
— Task Force groups present outcomes of respective investigations to Council for approval
— Constitutional changes are formulated, if required.

September 2013
— General Assembly approval is sought, as required.

August 2014
— Plans are implemented in the 2014−2017 triennium or earlier, if possible
— Constitutional changes, if any, are put to vote.

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[1] Ian Craig, September 2011. http://www.ifac-control.org/message-from-the-president
[2] *Cf.* I Craig, IFAC Strategic Planning Task Force Summary Document, December 2011.

The purpose of this synthesis report is to provide an overview of the work undertaken in preparation for the Council workshop and meeting held in Gifu, Japan on 10−12 September 2012, as well as of the decisions reached on the way forward.

There is rich detail in each of the four environmental scans undertaken, as well as in the survey report on stakeholder perceptions and expectations. Each report should be studied in its entirety and the purpose here is not to repeat in any detail the analyses and recommendations presented. Instead, the main outcomes and overarching challenges and possibilities are summarized in order to frame the strategic direction of decisions taken in ensuring that IFAC is well-positioned to serve the automatic control community.

Similarly, the report does not attempt to capture the discussions at the Council workshop and meeting held in September 2012, but simply lists the main decisions taken by Council on the way forward (see section 4 below).

2.   Environmental scans and stakeholder survey

As noted in the earlier summary report to Council,[3] the mandates of the four groups were to a large extent similar, except that the distinct focus of each differed. There was intentionally a degree of overlap among the group activities in order to gather a wide spectrum of views and analyses from IFAC and its stakeholders.

The tasks of the four groups were given as follows:

Group 1—The macro environment (Iven Mareels, Chair)

> *To assess the broad macro environment in which IFAC is likely to operate in future, including cultural, demographic, economic, environmental, geo-political, social and technological factors. In addition, this group should also assess the financial sustainability of IFAC and analyze potential additional sources of revenue.*

Group 2—Technical fields (Frank Doyle, Chair)

> *To develop an understanding of possible developments in the technical fields of concern to IFAC and to consider how IFAC can fully exploit such developments. In addition, this group should also assess developments in the hosting of technical meetings, identify potential partners and competitors and explore changing technical meeting delivery modes resulting from advances in technology.*

Group 3—Publications (Frank Allgöwer, Chair)

> *To analyze possible developments in the field of journal, conference and other publications, identify potential partners and competitors and consider how IFAC can benefit from such developments. In addition, this group should also assess how IFAC can most effectively leverage the existing conference publication material available in POL. Changing publication delivery modes resulting from advances in technology should also be explored.*

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[3] IFAC Strategic Planning Task Force, Preliminary Group Reports and Questionnaire (12 April 2012).

Group 4—SWOT analysis (Paul van den Hof, Chair)

To perform a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of IFAC regarding its core functions, including technical meetings and publications. The issues of industrial participation, getting the younger generation and more women involved, and IFAC's communication with the broader community should form part of the SWOT analysis.

IFAC Stakeholder Questionnaire: Perceptions and Expectations

In parallel to the group investigations, a survey gauged the perceptions and expectations of IFAC stakeholders. The survey was managed by Juergen Hahn, newly elected Chair of the IFAC Policy Committee, with contributions from committee members as well as the four groups, and assistance from the University of Melbourne[4].

The executive summaries of the group reports and of the stakeholder survey are placed in the appendices for ease of reference.

3. Summary of outcomes

3.1 Stakeholder Questionnaire[5]

For the purposes of gauging the views of stakeholders via an online survey, IFAC stakeholders were broadly defined as anyone affected by what IFAC does, and anyone who can affect what IFAC does.[6]

The survey link was sent to the approximately 2000 individuals on the IFAC database (*i.e.* people who have attended IFAC meetings, are directly involved in IFAC, and also more indirectly, those linked to IFAC activities as professionals from industry and other organisations). In addition, National Member Organisations (NMOs) were asked to take responsibility for the further distribution of the survey.

Profile of respondents:

401 responses were received from 62 countries spanning all five continents. Most respondents were male (91.8%), employed in academia (86.5%) and holding doctoral degrees (90%). Two-thirds of the respondents are holding or have held an IFAC or NMO office, indicating that the majority of responses were from people who are familiar with IFAC. However, the profile of respondents also suggests that the views expressed may to a lesser extent reflect how IFAC is viewed by people from 'outside' the IFAC community, and in particular by women and those not employed in universities.

Highly positive responses and strong consensus related to:

IFAC's goals being met in terms of —

- organizing and sponsoring high-quality technical meetings that are relevant to the automatic control community (96.3%)
- being a trusted source of publication material on automatic control renowned for its technical excellence (95.5%)

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[4] See http://www.surveymonkey.com/s/H5P8V5R for a copy of the survey consisting of 43 questions.

[5] J Hahn and H Griesel, July 2012. IFAC Stakeholder Questionnaire: Perceptions and Expectations.

[6] See IFAC Strategic Planning Task Force Summary Document, December 2011.

- helping create an environment within which the automatic control community can prosper (92.8%).

The most important strengths of IFAC are recognised to be that it:
- is a truly international organization, and
- attracts widely recognised expertise.

The most important challenges relate to:
- attracting young scientists and larger numbers of women to IFAC,
- engaging industry more effectively,
- promoting IFAC more effectively, and
- expanding into emerging areas.

3.2   Environmental scans and group analyses

As already noted, the executive summaries of the four environmental scans are placed in appendix 2, outlining the main outcomes of each investigation. The group reports collectively point to considerable strengths in IFAC as an international organization, and in the range of activities that define its purpose and identity.

In order appropriately to harness the momentum generated in the current processes of strategic planning, the following are listed as *collective pointers* that in varying degree were identified by the groups as 'big areas' in need of discussion:

IFAC's management style, image and modes or communication

There is overwhelming evidence and argument that IFAC needs to pay attention to its image and branding, and establish a strong e-presence by harnessing the tools of communication made possible through innovation in information technology. More significant however are the changes suggested that would satisfy IFAC's present objectives, but with a broader outreach interpretation that transcends the boundaries of the 'IFAC family'.

In particular:
- Group 1 presents two possible future scenarios: one of 'no change', and the second, an e-presence scenario where IFAC leverages its existing momentum to become a truly global research *and* educational organisation. The latter will require substantial changes in governance and finances, and for the organisation to be run by a group of professional staff, including academic staff who report to the President and IFAC Council on a regular basis.
- Groups 2, 3 and 4 in different ways also echo the importance of a strong e-presence and ways in which IFAC communicates with its different constituencies and stakeholders, as well as the ways in which IFAC events are run and industrial participation secured.
- As a first practical step and priority, it is important that the IFAC www-site is re-designed to project a renewed image and with new functionalities, and that the IFAC newsletter be designed as an electronic newsletter with limited print copies made available.

National Member Organizations

NMOs are central to the identity of IFAC and what sets it apart from other (and competing) organizations in the field of control. All groups considered the role and purpose of NMOs, and perhaps some of the unintended negative consequences of this form of membership received more attention than the undisputable benefits.

The following brief points:

- IFAC is supported through 52 National Member Organisations (NMOs). As Group 1 points out, this may sound impressive but represents only a 25% share of all sovereign nations (196). The group also notes that a fair number of individuals participate in IFAC who are not represented through national member organisations, and that in some instances the distance between the actual volunteers in IFAC and their respective NMOs has become large. In its SWOT analysis it also identifies as a distinct threat the NMO-dependent nature of IFAC's funding.
- Group 2 illustrates the possibility of IFAC drawing on the strength and role of NMOs in organising meetings and position papers on the impact of control on pressing societal issues, and raising awareness of the role of control in society among decision makers in the public sector as well as in industry.
- In turn, Group 4 identifies as a distinct strength the well-established NMO structure of IFAC that renders it a truly international organisation.

Technical activities and events

The promotion of the science and technology of automatic control is achieved mainly by organizing and sponsoring technical meetings, and through publications. The task of Group 2 was explicitly to consider developments in technical fields and also to assess IFAC's hosting of technical meetings and modes of delivery that need to be considered. A detailed analysis is presented in the group report, pointing to a number of key issues and presenting 15 recommendations for consideration.

In particular:

- The group offers a number of observations with regard to the IFAC 'machinery' and makes concrete suggestions with regard to the re-organization of the TC/CC architecture to increase the impact of technical activities and events.
- Three organizing themes or principles are suggested, *i.e.* to focus technical activity on: theory, applications, and tools or implementation technologies.
- In addition, while IFAC events (congresses, symposia, conferences and workshops) serve a valuable role, there are distinct opportunities for improving quality, increasing attendance and enhancing the training of scientists and engineers, and attracting more industry participation.
- Group 2 further recommends that best practice guidelines for IFAC Conference Organizers need to be developed, that the 'human dimension' of IFAC in terms of the societal impact of activities need to be brought into sharper focus, and that it is important to attract industrial volunteers to IFAC activities.

- A recurring theme, also noted by the other groups, is that new formats need to be explored, including 'virtual conferences' and web-based delivery methods, and that the dramatic growth in the number of events and conferences require careful scrutiny.

IFAC Publications

While all groups commented on IFAC publications as a distinct strength, the task of Group 3 was focused on an analysis of developments in the field of publications. The detailed report culminates in 10 recommendations grouped into three action areas: journal portfolio management, conference and new publication venues, and publication process and operations.

The following are key issues also echoed in other group analyses:

- IFAC's brand is closely tied to the six IFAC journals as the principal publication outlet. Recommendations are made regarding the more structured and deliberate operation of the set of IFAC journals in order to maximize effectiveness.
- One of the recommendations is that guidelines for scientific publishing and area-specific quality control standards are developed, with related performance metrics.
- It is also suggested that an approach to managing 'the connected set' of publications is developed, which might include the sharing of editorial information and processes, and the identification of emerging or diminishing areas of interest.
- The group recommends that guidelines be developed for publishing overlapping material, and the idea is mooted that IFAC should consider becoming a publisher in its own right.
- The group recommends that a control systems publications web portal be developed for searching and accessing the control literature.
- Linked is the recommendation that IFAC's web presence is restructured.
- Key in effectively adapting to changes in scientific publishing is a thorough understanding of the rapidly evolving economics — as well as modes of publishing — that characterize the publication business.

Research funding and industrial partners

The issue of research funding and industrial partners was addressed by all groups. As succinctly captured in the Group 1 report, increasingly government funding is conditional on co-investment from industry (or society) and short term outcomes, much of which is an anathema to 'blue sky' research. The report notes that alignment of the two agendas is however not impossible if appropriate advice and guidance can be provided through trusted think tanks.

In turn, Group 4 was specifically tasked with considering the issue of industrial participation, and offers practical suggestions with regard to developing synergies between academic/ research agendas and technology applications.

In brief, the following pointers:

- It is clearly important that researchers are part of networks that can influence funding policies of national and international bodies. IFAC can potentially play a significant role in this regard by connecting people through strategic networks, in collaboration with

national and regional organizations. This could also provide a natural link with industrial partners.

· Many of the research and technology domains in which IFAC is involved show a growing dependence on developments in (and support of) industrial partners. It is important that IFAC events are structured to accommodate the contribution of industrial participants, which can take a number of formats (*e.g.* guest speakers in plenary sessions, co-organizers of special sessions, etc.).

· In addition, soliciting and promoting industry-based conference contributions that focus on challenging and relevant questions in research and technology development would be a welcome addition to the standard conference papers that IFAC publishes. (It is noted that this might require a review process that is different from the standard scientific review process that emphasizes scientific academic contributions.)

· Group 4 also notes that ensuring more effective access to resources and materials through an enhanced e-presence could be attractive instruments in strengthening the participation of industrial partners.

The SWOT analysis undertaken by Group 4 can be summarized as follows:

STRENGHTS	THREATS
— Truly international — High quality of volunteers/ staff, publications and meetings	— Merging areas and key new people accommodated elsewhere, resulting in loss of market share to competitors — Dependence on publication income
WEAKNESSES	OPPORTUNITIES
— Old fashioned, lacking in diversity and often also transparency — Lack of indexation of IFAC *PapersOnLine*	— Improving diversity by involving young people, women and people from industry — Raising visibility of IFAC among e.g. the general public and funding organisations — Adapting to rapidly expand into emerging areas

4. The way forward

The depth of analysis of the issues considered in the four environmental scans, as well as the analysis of stakeholders views, constitute an important baseline and the conclusion to the important first phase in developing IFAC's long term strategic plan.

The next step was for the IFAC Council to consider the ideas, propositions and recommendations made in the group reports, first debated in an open discussion at the Council workshop on 10 September, followed by the Council meeting on 12 September 2012.

In summary, the following were agreed to:

→ Council formally adopted the proposed vision and mission, for approval by the General Assembly.

→ Appoint three Task Force groups to undertake further investigation identified in the Council workshop and meeting:

· *Task Force 1: PoL Indexation*

- *Task Force 2: Human dimension and societal impact of IFAC's activities*
- *Task Force 3: Promotion strategy for IFAC*

A number of other equally important recommendations were assigned to the IFAC Executive and Technical Boards, as detailed below.

Strategic planning priorities: IFAC's vision and mission

Vision

…for IFAC to be the worldwide federation for promoting automatic control for the benefit of humankind

Mission

…to promote the science and technology of automatic control through technical meetings, publications and other means consistent with the goals and values of IFAC.

Goals

- Organize and sponsor high-quality technical meetings that are relevant to the automatic control community
- Be a trusted source of publication material on automatic control renowned for its technical excellence
- Help create an environment within which the automatic control community can prosper
- Provide volunteers and staff with meaningful and rewarding opportunities for career-enhancing participation in the Federation
- Help promote the benefits of automatic control among the public at large.

Values

- honesty and integrity
- excellence and relevance
- sustainability
- diversity and inclusivity.

Task Force Groups

TASK FORCE 1: *PapersOnLine* Indexation	By 30 November 2012
MEMBERS: *Ian Craig (Chair), Juan De la Puente (POL EiC), Mayuresh Kothare (POL D-EiC), Denis Dochain (Pubcom Chair), Hideaki Ishii, Aberto Isidori, Pradeep Misra, Radhakant Padhi, Fei-Yue Wang*	

PURPOSE:
– Identify where PoL should be indexed, e.g.:
  ° Engineering Index, part of Elsevier's Engineering Village
  ° The Conference Proceedings Citation Index (CPCI), a Web of Science® database (formerly ISI Proceedings)
– Determine what should be done to get PoL indexed
– Get POL indexed by the indicies identified above. This could include physically visiting the evaluators, if required.	

TASK FORCE 2: Human dimension and societal impact of IFAC's activities	By end March 2013

MEMBERS: *Shinji Hara (Chair), Francoise Lamnabhi-Lagarrigue (CC Chair), Ian Craig, Thierry Floquet (TC Chair 9.2), Iven Mareels, Paul vd Hof, Janan Zaytoon, and to be determined.*

PURPOSE:

– Develop a 'glossy' marketing document that concisely describes what IFAC is doing for the benefit of society and humanity.

Why?

— Clarify the vision statement
— Use as a marketing document for IFAC in engaging with funding organizations, the general public, etc.

TASK FORCE 3: Promotion strategy for IFAC	By end March 2013

MEMBERS: *Frank Doyle (Chair), Sergio Bittanti, Steve Kahne, Derik le Roux, Kurt Schlacher, Jakob Stroustrup, Houria Siguerdidjane, Janan Zaytoon, and to be determined.*

PURPOSE:

– Develop a promotion and marketing strategy for IFAC together with an implementation plan.

Why?

— Address deficiencies highlighted by group reports and questionnaire (e.g. IFAC's web presence)
— Develop a strategy to improve IFAC's performance in meeting the goal to 'help promote the benefits of automatic control'
— Help make IFAC more attractive to young people and women
— Better articulate to industry the value of IFAC's activities

Additional Actions	Responsibility
→ ***Involving more women:*** — Ask election committees to include more women on slate 1 (Council), 2 (EB and TB members), 3 (EB committees), and 4 (TC Chairs) — Nominate women for IFAC Awards and for IFAC Fellow	Election committee Executive Board and Technical Board TC Chairs

Executive Board Actions	Responsibility
— Journal portfolio Management Plan	EB to report
— Guidelines for overlapping material in conference and journal publications	With input from TB members
— Backup plan addressing the threat of a declining publication income	Administration and Finance committee
— Involving more women	EB election committee
— Industrial participation	Consider separate committee under Leadership of vice-chair

Executive Board Actions	Responsibility
— IFAC's role in education	Policy committee in consultation with TB
— Control systems publications web portal	Publications committee
— Area-specific performance metrics	Policy committee

Technical Board Actions	Responsibility
— In order to address the goal: "Provide volunteers and staff with meaningful and rewarding opportunities", develop more recognition opportunities within TCs (e.g. TC awards, senior membership (voting members), and advertising ways of participation)	
— Involve more women	TB election committee
— Create special structure in TCs for young scientists (e.g. TC young member committee)	
— Develop a formal structure for rapidly adopting emerging areas	
— E-participation in IFAC events	

Appendix 1

Executive Summary

IFAC Stakeholder Questionnaire: Perceptions and Expectations

J. Hahn (Chair, IFAC Policy Committee) & H. Griesel (on behalf of IFAC Task Force)

IFAC promotes the science and technology of automatic control, and is concerned with the impact of control technology on some of the major imperatives of a 21st century knowledge-driven world. As an international federation it has a long history and, as any organization of its nature, it is important periodically to take stock of achievements and challenges.

This report on stakeholder perceptions and expectations forms part of the strategic planning process of IFAC that is currently underway. An important component of this process is gauging the perceptions and expectations of IFAC stakeholders. A survey consisting of 43 questions was developed and the link sent directly to individuals who are on the IFAC database, and also to National Member Organizations (NMOs) for further distribution.

In summary, the following key findings from the analysis of the responses and feedback received from IFAC stakeholders:

The profile of respondents

- A total of 401 responses was received from 62 countries spanning all five continents. The profile of respondents confirms the international nature of IFAC, indicating that the survey reached a diverse audience in terms of geographic distribution. However, a similar diversity was not reflected in the gender and employment profiles of respondents: the vast majority of responses received were from men (91.8%), those in academia (86.5%), and those holding doctoral degrees (90%).
- It is also significant that two-thirds of respondents (65.8%) are holding or have held an IFAC or NMO office. It can therefore be assumed that the views expressed are from a reasonably informed basis. However, it also needs to be taken into account that the survey may reflect to a lesser degree how IFAC is viewed by people from the 'outside'.

Goals and activities of IFAC

- The broad areas explored in terms of stakeholder views relating to the goals and activities of IFAC generated rich data on: a) the quality and relevance of technical meetings; b) publication material and technical excellence; c) career-enhancing opportunities; and d) IFAC's contribution to the broader environment.
- The vast majority of respondents evaluated IFAC's performance in all four areas as highly positive or positive. The views of those who disagreed with particular statements, and offered additional input, illustrate important areas of concern or

dissatisfaction pointing to areas of potential weakness or existing gaps in the activities of IFAC, such as making the general public aware of what IFAC does and ensuring that IFAC events have broad participation from academics and practitioners alike.

The macro environment

- IFAC's responsiveness to the broader technical environment was gauged through questions that focused on: a) NMOs; b) IFAC in comparison to other societies; c) technical fields not currently addressed by IFAC; and d) areas where IFAC should broaden its scope.

- Again, the majority of respondents evaluated IFAC highly positively, with comments indicating areas in need of attention, the most obvious being the role of NMOs, and the need for IFAC to remain conscious of its relevance and its position in relation to competing organizations.

Technical meetings and structures

- The response to several questions on the quality and relevance of technical meetings and structures generated, in general, positive responses from the majority of respondents, and valuable additional comments on how technical meetings can address the dual concerns of theory and applications.

- However, it is clear from the responses that the quality of meetings is variable (and that quality concerns not only technical quality), and that attention needs to be paid to the current number of meetings, workshops, symposia etc. A recurrent theme in responses was that IFAC should also pay attention to web-based modes of interaction and information dissemination.

Publication issues

- Several questions were dedicated to IFAC publishing that generated compelling feedback from respondents, with additional comments and suggestions offered that can be grouped into three broad categories: a) comments on the review process; b) suggestions about open access and electronic publishing; and c) the disconnect between theory and applications.

- The vast majority of respondents evaluated IFAC publications as very good or excellent (75.1%), with *PapersOnLine* and the IFAC Newsletter receiving still positive, but less favorable, ratings.

- While a little less than half of the respondents is satisfied with the review and publication speed for journals, this is a topic of general debate in research/development and should be compared to views regarding publishing papers in other fields. Importantly too, the view was expressed that IFAC must ensure the visibility of presented and published papers in major search engines, and that conference proceedings should be indexed in ISI and Scopus.

- Even though the majority (74.6%) considers IFAC's e-presence to be sufficient, there were also detailed suggestions by those who expressed the view that IFAC's website must be improved, and that its web-presence needs to be benchmarked against its competitors.

Summary evaluation

- The questions posed to elicit respondents' overall evaluation of IFAC related to: a) the most important strength; b) the most important challenge; and c) increasing the participation of young scientist and engineers, and of women.

- The responses showed strong consensus on IFAC's strength: it is a truly international organisation that attracts widely recognized expertise, and that is known for its high quality publications and technical meetings. The challenges relate to: a) attracting young scientists and larger numbers of women to IFAC; b) engaging industry more effectively; and c) promoting IFAC more effectively and expanding into emerging areas.

Appendix 2

Executive Summaries of Group Reports

[1]

The Macro Environment and Financial Sustainability

GROUP MEMBERS: Iven Mareels (Chair and author), Siva Banda, Tamar Basar, Eduardo Camacho, Peter Fleming, Shinji Hara, Francoise Lamnabhi-Lagarrigue, Tshilidzi Marwala, Carlos Eduardo Pereira, Jurek Sasiadek, Fei-Yue Wang.

A broad spectrum of factors is considered in the environmental scan presented in this report. From this analysis flows a summary of the strengths, weaknesses, opportunities and threats (SWOT) that need to be considered in aligning IFAC with future demands and prospects. The report concludes with two plausible scenarios for the future:

→ A no-change scenario; and
→ A scenario where IFAC leverages the existing momentum to become a truly global research and educational organisation.

The socio-political world environment has changed significantly since the inception of IFAC 50 years ago. Some of the main factors considered in the environment scan include the following:

- The general field of control and automation is both strong in numbers and is experiencing healthy growth. From a scientific research perspective the field is presented with many opportunities, driven by both technology push and pull factors.

- The number of engineering and science graduates keeps on increasing, therefore the assumption is that as long as the IFAC community is well funded to train new PhD students, there will be a growing pool of people to draw on to contribute to IFAC activities. However, while the quality of the talent pool is not of concern at present, gender diversity is: fewer than 30% of engineering graduates are women.

- At present IFAC is supported through 52 National Member Organisations (NMOs), representing a 25% share of all sovereign nations (196). However, it is also significant that IFAC NMOs represent most of the top 50 economies in the world, as measured in terms of GDP.

- The IFAC journals and IFAC conferences constitute the backbone of IFAC's brand that is very strong at present. The IFAC journals occupy enviable positions in the literature, leading in citation impact and having a commanding share of articles in the field.

- However, IFAC's PapersOnLine still suffers from a sub-standard participation in global indices, without clear SCOPUS dedication and as yet no ISI support.

- While the IFAC journals have embraced the "on-line" world of publishing with Elsevier a strong leader in this space, much further work is required to find the right balance between quality assurance, archival quality publications/ repositories, and access.

- IFAC sponsored technical gatherings, in particular the main symposia and the world congress, do well. But many of the workshops and conferences are of variable quality and interest.

- In internet presence, IFAC is a poor cousin to most other professional organisations, who typically maintain a far more appealing on-line presence.

- On-line educational materials in the control theory space are remarkably poor and there is a distinct opportunity for IFAC to be the host for an open online course in control.

- In terms of its main competitor, the IEEE CSS and IFAC are closely aligned in objective, mission and relevance to the scientific community. The membership base overlaps significantly, and many prominent members in IFAC are also Fellows of the IEEE through CSS.

- The significant difference is that IEEE CSS is based on individual membership rather than National Member Organisations.

- IFAC derives income from the contributions of the National Member Organisations as well as Elsevier publications. Unlike most other professional organisations, IFAC does not charge individual membership fees. IFAC does not charge fees for its services and does not require a fee for its conference sponsorship.

- Increasingly government funding is conditional on co-investment from industry (or society) and short term outcomes, much of which is an anathema to "blue sky" research. Alignment of the two agendas is however not impossible if appropriate advice and guidance can be provided through trusted think tanks.

In weighing up the pros and cons of the two plausible scenarios for IFAC's future, the following:

The no-change scenario

- Building on the existing momentum, and considering incremental improvements in the IFAC activities presents a viable future in the short to medium term. It is clearly an affordable future. It achieves the vision and mission of IFAC, when these are narrowly interpreted to apply to the IFAC family.

- In this scenario, IFAC does not aspire to play a role on the world scene of science and technology, other than serving its own community of scholars well, providing them with a quality controlled environment of publications and conference outlets. This is an acceptable way forward, which has served IFAC well for over 50 years.

- However, the no-change scenario may not provide for a more resilient and longer term future as control technology becomes as ubiquitous as communication technology. The broader community may well lose all appreciation for IFAC and its community of scholars.

- Perhaps, more significantly, IFAC will not have the financial means to assert itself beyond its boundaries, and will not be able to participate in shaping the future, even the future of its own community.

The strong e-presence scenario

- In this scenario IFAC will need to develop a much stronger financial basis, and use this to create a significant e-presence. Through this e-presence IFAC will achieve outreach beyond its present community of specialists, and reach the community at large. Leading IFAC members will produce position papers and think tank reports on all aspects of control and

automation, and IFAC's www-site will provide for a quality controlled educational framework as well as research contributions.

- If so desired, IFAC could engage in an open-university style control course delivery, either through partnership or by setting it up in-house. The education provided through IFAC could benefit the entire community, an editorial board could oversee the development of the www-sites, materials could be contributed through volunteer participation (like paper submissions), vetted for content and pedagogy, and if accepted, massaged into the IFAC-style for on-line delivery.
- In order to expand IFAC's activities and to afford a strong, professional e-presence across all the activities, IFAC will need an expanded core of permanent (academic and IT-professional) staff, as well as semi-permanent staff.

Both models can work, each with particular consequences for governance and finances.

[2]

Technical Fields

> *GROUP MEMBERS: Francis (Frank) Doyle III (Chair), Yaman Arkun, Sergio Bittanti, Daizhan Cheng, Dong-il (Dan) Cho, Alexandre Dolgui, Sebastian Engell, Didier Henrion, Tariq Samad, Sigurd Skogestad, Yutaka Yamamoto, Detlef Zuehlke.*

This group was charged with analyzing developments in the technical fields of concern to IFAC and to consider how IFAC can fully exploit such developments. In addition, this group needed to assess developments in the hosting of technical meetings, identify potential partners and competitors and explore changing technical meeting delivery modes resulting from advances in technology.

Our key findings are highlighted below:

- There are tremendous opportunities for IFAC to enter into new technical fields (*e.g.,* embedded systems, financial engineering, systems biology). There is a particular need for a more agile Technical Board (TB) architecture that allows "emerging topics" to be addressed. This new organizational element must be created/organized with a "networking" or "cross structure" to interface with the existing Technical Committees (TCs).
- The current Technical Board (TB) is a static "vertical" architecture with a large number of defined areas (nine Coordinating Committees). This group proposes the creation of a more dynamic architecture, with working groups, and a consolidation of the Coordinating Committees to three:
  1) Theory (primarily current TCs associated with CC1 and CC2);
  2) Applications (aerospace, process, automotive, etc.); and
  3) Tools or Implementation Technologies (real-time systems, control system design tools, control networks, etc).
- The IFAC Congresses, Symposia, Conferences and Workshops serve a valuable role for the technical community, but there are opportunities to improve the quality of the papers, to

increase the attendance, to enhance the training of scientists and engineers, and to attract more industry participation. New formats need to be explored, including "virtual conferences" and web-based delivery methods. Other formats that should be explored in greater depth include a poster-only format for contributed papers. The dramatic growth in the number of conferences and workshops should prompt a more measured evaluation of opportunities for cancelling or merging existing series.

- The connection between the Technical Board and publications from the IFAC Conferences, Symposia, Workshops and Congress needs to be improved, both to increase the visibility of IFAC and attract top researchers to IFAC conferences. Variability in paper quality is a significant issue, and while we recognize that there is an unavoidable hierarchy of technical contributions, IFAC must create a system that is attractive for all constituents.

- IFAC needs to explore improved ways for post-conference publications, particularly for "emerging topics" in fields where there are much higher impact publication opportunities (*e.g.,* based on citation indices and other metrics).

- A greater effort is required in the area of publicity and outreach for IFAC. It is important to get the word out that control is no longer a hidden technology, and to emphasize the impact of control. IFAC should utilize social media more effectively to enhance communication with industry, recruiters, medical professionals, scientists and other constituents.

- At the level of the IFAC President's Office, there should be coordination of lobbying work to generate position papers and statements on important technical and R&D planning issues.

- Related to the topic of publicity and outreach is the importance of societal impact in prioritizing IFAC's technical activities. This speaks both to the mission of our scientists and engineers within IFAC, and the need to highlight the relevance of the work done within the fields of interest covered by "automatic control". In line with its mission, IFAC should focus on new technical fields in which control science and technology is likely to have societal impact. Representative areas that are appropriate would include: systems biology, medicine and cognitive neuroscience, social science (social networks, population dynamics, etc.), the environment, economics and finance, politics and globalization, and business enterprises.

- Interwoven with the presentation of the outcomes of the work undertaken by Group 2 are our specific recommendations (15 in total) for the consideration of Council.

For ease of reference, the 15 recommendations are repeated here:

Recommendation 1—

Broaden the scope of TC 8.4 (and consider a title change) to include Systems Biology as a core area, and establish networking opportunities with other TCs for collaborations on workshops, conferences and publications.

Recommendation 2—

Reinforce the mission of Societal Impact across the full IFAC portfolio of Technical Committees, particularly for conference and publication activities.

Recommendation 3—

Establish a Task Force to explore new, high impact publishing opportunities for (selected and substantially modified) conference papers, with an emphasis on drawing in new participants

(i.e., from outside the IFAC community, such as biology, physics, psychology, computer science, etc.).

Recommendation 4—

Establish a broader category of "short papers" (extended abstracts) for conference proceedings.

Recommendation 5—

Adopt a set of IFAC Guidelines for publication of overlapping material (e.g., conference paper and journal manuscript).

Recommendation 6—

Reorganize/consolidate the Coordinating Committees to the following three: (1) Theory (primarily current TCs associated with CC1 and CC2); (2) Applications (aerospace, process, automotive, etc.); and (3) Tools or Implementation Technologies (real-time systems, control system design tools, control networks, etc.).

Recommendation 7—

Establish a Conference Task Force to survey the range of formats currently employed in IFAC workshops and conferences. Establish a "best practice" set of guidelines, particularly with regard to "emerging" technology (e.g., web-based delivery, virtual conferences, etc.). A work product of that group can be a set of "IFAC Conference Organizer Guidelines".

Recommendation 8—

Formalize the structure of "voting members" and "corresponding members" for all Technical Committees.

Recommendation 9—

Revitalize the TC and CC leadership training program, and expand the scope of the annual report to focus more on planning, as opposed to accounting from the past year.

Recommendation 10—

Establish an Emerging Topics initiative (task force and associated workshop). Build in appropriate "cross structure" to allow other TCs to seamlessly interact with this initiative. By design, these working groups would have a finite duration, and would evolve into TCs or dissolve altogether.

Recommendation 11—

The group has made a number of concrete suggestions for CC/TC re-organization, but recognizes that the TB does a periodic review for such issues (new TCs, retiring TCs, etc.). The group urges a more comprehensive review of the portfolio at this time, coinciding with this detailed Strategic Planning exercise.

Recommendation 12—

> *Resolve, within a very short time scale, the indexing problems associated with the IFAC conference papers. As necessary, explore other options, including partnerships with other publishers.*

Recommendation 13—

> *Conduct a coordinated lobbying effort to generate position papers and press releases that emphasize the societal impact of the technical fields encompassed by IFAC.*

Recommendation 14—

> *Establish a task force to work on the "human dimension" of IFAC – the role IFAC plays in training future scientists and engineers to advance the societal impact of these technical fields. Encompass both academic research training, as well as applied training for industry and intellectual property creation and protection.*

Recommendation 15—

> *Utilize the Stakeholder Survey (specifically industry respondents), as well as follow-up surveys to key industrial scientists and engineers, to identify more effective mechanisms to attract industrial volunteers to IFAC. A task force activity may be appropriate to poll current volunteers, as well as explore best practices in competing organizations and activities.*

[3]

Publications

> *GROUP MEMBERS: Frank Allgöwer (Chair), Robert Bitmead, Patrizio Colaneri, Denis Dochain, Chris Greenwell, Henk Nijmeijer, Shimon Nof, Jakob Stoustrup.*

IFAC has established an enviable reputation in the service of the field of Automatic Control in the realm of publications, primarily through the publication of the IFAC journals and the Master Plan conferences but also through more specialized IFAC affiliated journals and additional events. IFAC, together with its foil in the IEEE Control Systems Society, occupies pride of place in the generalist areas of control publications. This pre-eminence has been achieved and maintained over many years because IFAC has adapted to the field as it has evolved and the needs of IFAC stakeholders have changed. A new raft of challenges and opportunities face the publications activities of IFAC due to technological, sociological and geopolitical changes at the present time. The technical "public" of publications is altering its demands and expectations of IFAC, which creates an opportunity to affirm the role of IFAC publications through strategy and action. This report presents a first strategic cut at this process, and some of the recommendations to follow are more "a call to arms" than solutions in themselves. In total, ten recommendations are given that are grouped into three action areas:

- Journal portfolio management,
- Conferences and new publication venues, and
- Publication process and operations.

[1]

Journal portfolio management describes a focus on the totality of IFAC's journals and affiliated journals: Journals are still seen as a principal publication outlet and recommendations are made concerning the more structured and deliberate operation of the set of IFAC journals to maximize effectiveness in their respective sectors. Understanding the interaction, overlap or complementarity of the journals' scopes could be used to advantage to develop an approach to management of the connected set. This might include: the capacity to pass papers among these journals without full re-review, subject to author assent; the sharing of editorial information and processes; and the identification of emerging or diminishing areas of interest.

A superstructure needs to be developed for searching and accessing the control literature, and not necessarily IFAC's alone. One model is that of the Amazon Marketplace, where purveyors and suppliers of control materials can be found and accessed. If successfully matched, a small fee passes from supplier to locator. Understanding the rapidly evolving economics of the publication business, and the demands and desires of the readership, should guide consideration of whether IFAC could benefit from becoming a publisher in its own right.

[2]

Conferences and new publication venues delineate a changing landscape for conference papers, which were once regarded as preliminary, subject to less rigorous review and somewhat ephemeral, but now are as available as archival journal papers. It is clear that there is community value in the continuance of this type of publication: limited time for review, one opportunity for revision, tied to the oral or poster presentation. Copyright and fabricated ethical questions, which threaten this type of antecedent work from being evolved into fuller papers with the benefits derived from oral disclosure and commentary, need to be countered, lest impediments be developed to this highly regarded and effective publication, where timeliness is traded for completeness. Control Systems, as opposed to, say, certain demonstration areas of Computer Science, continues to profit from the distinction between conference and journal papers.

Along with the advent of these unanticipated obstructions due to the improved availability of conference papers, the capability and demand for a wider type of commentary and dialog has emerged and been enabled by the electronic access to all IFAC publications. The inclusion of linked data to published files already provides for access to references. This might be extended to include access to other material from the author such as images, video, data, expanded reports, etc. On another tack, commentary from others might be tagged on the paper. This might include reviewer and editor comments and be extended to comment posts, similar to those that appear in newspapers. Clearly, responsibilities would need to be assigned from within the editorial system.

A third direction could be for IFAC to host a blog section, where under some moderation, technical issues and more might be discussed in a free format. It is strongly recommended to improve, and in

fact completely restructure, the IFAC web presence. The control systems blog section could be part of the new web presence.

[3]

Publication process and operations targets the effective supervision of the publications aspects of IFAC in quite pragmatic terms. One core threat to IFAC technical publications comes from a burgeoning flood of submissions combined with existential requirements of academic authors for publication and citation. Bibliometrics is increasingly being used as a human resources tool for measuring productivity, when this is coupled with the growth in developing countries of internationally benchmarked academe, there is an increasing load placed on editors, reviewers and page counts. IFAC has a central role to play in ensuring that quality and impact are not affected, that the capacity to attract technical leaders to editorial duties is not impaired, and review times remain acceptable. This will involve rethinking the editorial process to concentrate on papers likely to pass muster eventually.

Equally critical are the development of uniform ethical guidelines and the management of author expectation and behaviour. Clear promulgation of editorial policy will be needed, including the ethical responsibilities of authors, reviewers and editors. Performance metrics should be developed to assist in establishing the behaviour desired.

Group 3 is aware that these are weighty questions posed in an uncertain and evolving environment. We trust that this brief report helps to focus on the key issues.

SUMMARY OF RECOMMENDATIONS

Recommendation 1—

> *IFAC should increase its efforts to participate actively in existing discussions across cognate disciplines as they try to adapt to changes in the scientific publishing business and formulate responses to technological developments and sociological changes in the conduct and evaluation of science. The existing relationship with Elsevier should be used to access some of these discussions and to develop an appreciation of their core issues.*

Recommendation 2—

> *IFAC should specify its own expectations of the subject coverage for the journals in its portfolio and examine how the current list might develop and be organized into a structured system. For this IFAC Policy Committee should develop a strategy for managing the portfolio of IFAC and IFAC-affiliated journals.*

Recommendation 3—

> *IFAC should investigate the pros and cons of becoming its own publisher.*

Recommendation 4—

IFAC should investigate the development of a Control Systems Publications web portal capable of providing searches tuned to control systems technical materials across a large range of sources.

Recommendation 5—

The role of conference publications should be critically assessed. Especially, IFAC should work to ensure that a mechanism is found to preserve the capability of using technical material published in a conference as the basis for the development of a subsequent journal paper. This should be coordinated with cognate societies in the Control area.

Recommendation 6—

It is strongly recommended to improve, and in fact completely restructure, the IFAC web presence. Furthermore the IFAC Newsletter needs to be redesigned and distributed electronically only.

Recommendation 7—

A professional, informative, active, and well written blog on issues in the field of interest of IFAC appears to be desirable, provided a group of suitable bloggers can be found. It is recommended to search actively for suitable candidates and to examine a means of ensuring that this functions well.

Recommendation 8—

IFAC should take the lead to develop clear guidelines and principles of conduct related to submitting, publishing, reviewing, citing etc. of scientific publications. Communication to potential authors of both the process and the expectations of the editors should be a priority. Both an appeals process and clearly defined consequences for violators should form part of this system.

Recommendation 9—

It is recommended that IFAC develops area-specific publication quality control standards and procedures for its journals and conferences that better reflect the needs of its stakeholders, but take into account the range of different publications.

Recommendation 10—

IFAC should take the lead in developing meaningful, area-specific performance metrics related to individuals publishing for our community. This could spill over into developing personal metrics besides publication and citation counts to take into account reviewing and other services to the community. The particularities of application related work also have to be considered. For this a committee should be installed.

[4]

SWOT Analysis

GROUP MEMBERS: Paul Van den Hof (Chair), Serge Boverie, Hyung Suck Cho, Peter Fleming, Paul K. Houpt, Karl Henrik Johansson, Gennadiy Leonov, Manfred Morari, Hervé Panetto, Radhakant Padhi, Jacquelien Scherpen, Michael Sebek, Toshiharu Sugie, Karl Johan Åström.

The truly international character of IFAC, together with its wide coverage of the scientific and technological area of control, is one of the anchor points of IFAC, that is supported by a well-recognized brand in terms of journals, among which is the leading journal Automatica. To the outside world the brand of IFAC works as a quality tag connected to events. Whether the quality of IFAC activities (IFAC Congress and other events) is a particular strength of IFAC is under debate.

The organizational structure of IFAC seems to contribute strongly to its image. As an organisation with a long-standing tradition and its origins in the cold war, IFAC's organizational structure is perceived as rigid and old fashioned. As a result it may appear rather unwelcoming to new (younger) people to enter the organization, leading to the perception that it is a conservative organisation, not capable of responding fast enough to changes in the scientific/technological fields.

IFAC is missing a clear policy on how to attract young people, and lacks a policy on gender-related questions. The absence of women in the IFAC organization (and in the group of IFAC Fellows) is remarkable.

The question of industrial participation in IFAC, in conjunction with the question on an appreciation of theory-applications, is a point that has been on IFAC's agenda presumably from its conception. Any future policy of IFAC should include a clear delineation of realistic ambitions in terms of relations with industry, the start point being clarity on what the benefits would be for industrial people to participate in IFAC and its events.

The general view of the group is that IFAC should be attractive enough to stay an organization that plays a central role in the core developments of our field, where the top people are involved. However, contemporary organizations should be effective, visible, work on their branding, and have a clear communication policy with tools and facilities based in modern information technology.

There are many challenges for IFAC ahead. Future developments in control related research is increasingly influenced by the funding policies of national and international bodies. It therefore has become important for researchers to be part of a network that can influence these developments, and jointly with industrial partners, can set the research and development agendas in several regions of the world. IFAC has a great role to play in this context by connecting people, and leading the strategic networking in collaboration with local/regional organizations. The exact route to follow and actions to take are not clear yet.