

IFAC Industry Committee—Chair’s Report

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Background

The IFAC General Assembly approved the establishment of a permanent “Industry Committee” at the World Congress in Toulouse, France in July 2017 as a result of an amendment to the IFAC Constitution. The Industry Committee is chaired by a new Vice Chair of the Technical Board, who is an *ex officio*, nonvoting member of the IFAC Council. The objectives of the Industry Committee include increasing industry participation in and impact from IFAC activities. For the 2017-2020 triennium, Tariq Samad was appointed the Industry Committee chair by the Council.

The Industry Committee membership roster currently stands at 95-strong. The majority of members are in industry and the majority of those who are not have spent most of their careers in industry. All sectors with significant control relevance are represented. The membership is also diverse geographically, with members hailing from over 25 countries, from all continents except Antarctica. See the table below for some additional statistics.

Membership	95
Affiliation	Industry: 52; Academia: 37; Government: 4; Retired: 2
Geographic distribution	Europe: 45; N. America: 25; Asia-Pacific: 14; C./S. America: 6; Africa: 5
Countries with the highest representation	US: 23; Germany: 7; Australia and Netherlands: 5 each; China, Czech Republic, Spain, Japan, and South Africa: 4 each
Active Workstreams (5)	<ul style="list-style-type: none">• Industry/Academia/Government Collaboration• Industry Engagement in IFAC TCs and Events• Gleaning the Voice of the Industry• Educating Control Engineers for Industry Roles• Industry Committee Communication

An Executive Subcommittee (ExCom) has also been established to oversee the workstreams, manage membership, serve as a liaison to the Technical Board and the Council, and provide general direction to the committee. The ExCom comprises Kevin Brooks (ZA), Roger Goodall (UK), Philippe Goupil (FR), Steve Kahne (US), Silvia Mastellone (CH), Carlos Pereira (BR), Tariq Samad (US), Atanas Serbezov (US), and Alex van Delft (NL).

Below we highlight accomplishments over the past triennium and plans for the Industry Committee as a whole and for each workstream. We conclude with a call for more discussion and action on industry engagement at the level of the IFAC Leadership.

Committee-Wide Accomplishments and Plans

Accomplishments

- We conducted a survey of Industry Committee members asking for their assessments of the impact of a number of advanced control technologies and of their views on challenges for industry applications of advanced control. This survey updated a prior one undertaken in the

previous triennium when the Industry Committee was operating in its “pilot” phase (<https://ieeexplore.ieee.org/document/7823045>).

- We completed and submitted a comprehensive article to *Annual Reviews in Control*, titled “Industry Engagement with Control Research: Perspective and Messages” (authors: T. Samad, M. Bauer, S. Bortoff, S. Di Cairano, L. Fagiano, P. Odgaard, R. Rhinehart, R. Sánchez-Peña, A. Serbezov, F. Ankersen, B. Grosman, P. Goupil, M. Heertjes, I. Mareels, R. Sosseh). Among other things, the article describes the results of the survey mentioned above, highlights several applications where advanced control has had substantial business impact, and offers ten “messages” for the control research community (below).

1. *Advanced Control Technologies Vary Significantly in Their Impact and Perceptions Thereof*
2. *The Control Research Community is Broadly Unaware of the Impact of Advanced Control*
3. *Real-World Success Requires Domain Understanding*
4. *Control Technology Implementation Infrastructures and Architectures Are Industry-Specific*
5. *Advanced Control Is More than Feedback Control . . . It’s even a Mindset*
6. *Control Science Has Broad-Based Relevance for New and Emerging Technologies*
7. *Corporate R&D Can (Sometimes) Serve as a Bridge for Tech Transfer of Academic Research*
8. *Cost Reduction Is a High-Priority for Industrial Innovation in Control*
9. *Economic Expectations Influence Industry Investment in Research*
10. *The Industry-Academy Disconnect Extends to Education*

- We are working with the Berlin World Congress organizers to organize industry outreach meetings during the event.

Plans

- We plan to restructure the Committee for the next triennium by focusing on “task forces” instead of workstreams to undertake activities. These task forces would be launched and monitored by the Executive Subcommittee and would be terminated when the activity was completed. A few workstreams would be maintained for ongoing activities (e.g., communications).
- More active dissemination of our activities and their outcomes are planned. These will include blog posts and articles. See plans below for Workstream 6 in this context as well.
- We will be requesting a budget for the Industry Committee in order to accelerate its work and impact.

Workstream 1: Industry/Academia/Government Collaboration

WS1, chaired by Silvia Mastellone (FHNW, Switzerland), consists of 45 members.

Accomplishments:

- A survey of industry was recently conducted, jointly with Workstream 4. The survey was completed by 78 industrial/government representatives and, among other questions, it inquired about the nontechnical requirement specifications that future products and processes should fulfill. The results have been analyzed (in collaboration with WS4) and presented within the Industry Committee.

- Clusters of industry sectors have been identified. For some of the sectors, based on the survey results and analysis, for each product/process system future requirements for control problems have been defined. These identified requirements create a direct link between innovation in the sector, next generation products and processes, and control research. A map has been created between each industry challenge and control technologies to address the challenge.
- Other activities have included the identification of some representative futuristic control applications and of implications for control in the digitalization paradigm.

Plans:

- A magazine article based on the survey results and related analysis is in the initial stages of preparation.
- We also plan to write and publish a series of articles, one for each identified sector, that links the challenges in the industry sector to control problems.
- Surveys to further explore futuristic control applications and synergy with digitalization imperatives are also under consideration.

Workstream 2: Industry Engagement in IFAC TCs and Events

WS2 is chaired by Philippe Goupil (Airbus, France) and has 43 members.

Accomplishments:

- A “best practices guide” on how to involve more industrial practitioners in IFAC TCs and events is under preparation, with a first version expected to be completed by the IFAC World Congress in Berlin.
- IFAC event reports sent by the IFAC Secretariat are being systematically analyzed to provide some statistics of Industry participation in IFAC events. 61 reports have been analyzed since the beginning of 2018. This data can serve as a benchmark for monitoring industry engagement.
- An Industrial benchmark was prepared and submitted to the IFAC World Congress in the “Competition” category (collaboration between Airbus and Stellenbosch Univ., South Africa) with the goal of bridging the gap between industrial needs and basic research.

Plans:

- As noted above, a first version of a “best practices” document for TCs and events will be prepared by the time of the World Congress. This document will need to be updated and enriched in the next triennium.
- The workstream considers industrial benchmarks an effective way to effect industry/academic collaboration. We hope to encourage more industrial benchmarks for IFAC events.
- In this triennium, 12% of new IFAC Fellow elevations were for industry-affiliated control experts. We plan to review the criteria and process for Fellow election and recommend changes that could increase this low proportion.

Workstream 4: Gleaning the “Voice of the Industry”

This workstream, chaired by Alex van Delft (DSM, Netherlands), includes 25 members.

Accomplishments

- Gleaning the Voice of the Industry starts with identifying the right channels. The workstream has been successful in doing this for the process automation sector by reaching out to end-user communities. In Europe, these organizations (e.g., Namur and WIB) represent over 300 of the major process industries. They have committed to serve as a sounding board. We have collected contacts for similar organizations in other sectors.

- The WS conducted some brainstorming to identify other ways of tapping into the voice of the industry, e.g., by making use of industry boards or industry panels that many universities have convened.
- WS4 has partnered with WS1 in developing and processing a survey amongst Industry Committee participants and associates (see WS1 update above).

Plans

- Further outreach for industries in sectors other than the process industries, through channels that have been identified (and other channels to be identified), is planned.
- Additional follow-up plans from the WS1/WS4 survey include: Summarizing viewpoints and business drivers for control, differentiated by industry sector. What control-related issues are faced by different sectors? What are the real business problems that control can help solve in each sector?
- We would like to collect ideas from industry sectors on how they believe organizations like IFAC can play a role to keep industry practitioners “ahead of the game.” We believe IFAC has the potential to become a forum to help industry envision and influence the (control-relevant) “industry future.”

Workstream 5: Educating Control Engineers for Industry Roles

Workstream 5 is chaired by Atanas Serbezov (Rose-Hulman Institute of Technology, US). It has 19 members.

Achievements:

- In cooperation with TC 9.4 (Education), WS5 completed an international survey of academics and industrialists on what should be prioritized in the first, and often only, control course taken by engineering undergraduates. The survey had around 500 respondents covering a good spread of nationalities (47 countries), employment status, and engineering disciplines. Industrial participation was 16%. Results from the survey will be presented at the 2020 IFAC World Congress and have been sent for publication to the *IFAC Journal of Systems and Control*.

Plans:

- The survey results will be publicized more broadly. We will also track the survey’s impact on curricular changes.
- A next project under consideration is the exploration of effective engagement models for industrial participation in control research.

Workstream 6: Industry Committee Communication

This workstream, with six members, is chaired by Kevin Brooks (BluESP, South Africa).

Achievements

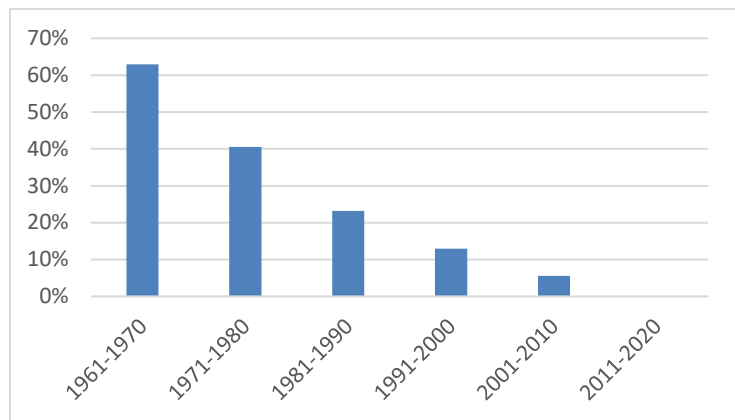
- The Industry Committee LinkedIn Group is being actively maintained. It now consists of 75 members, a reasonable proportion of the 95 Industry Committee members. Posts have been diverse including the Bloodhound Land Speed Record attempt, Formula E, our surveys, and open invited sessions at the IFAC World Congress 2020.
- Our Twitter and Facebook accounts have been quiet—maybe a reflection of the average age of the committee members?

Plans

- We are working on a classification of application domains for control, to be used, *inter alia*, for categorizing how well various domains are represented in the Industry Committee. In particular, we need to understand where we are weakly represented and need more members.
- Discussions among the committee have been held on “making practice publishable.” We plan to further this discussion and prepare an article on the subject.
- Various short blogs and summary write-ups are envisioned, including an “easy to digest for the boss” article based on the “Industry Engagement with Control Research: Perspective and Messages” manuscript submitted to *Annual Reviews in Control* and summaries of surveys conducted by the Industry Committee and its WSs.

Conclusion

As the committee chair, I have been grateful for and impressed with the enthusiasm shown by our members. It’s clear that a large contingent of control practitioners and researchers share the concern about industry engagement with organizations such as IFAC. To reinforce the concern, the figure on the right shows the percentage of leadership positions (essentially Executive Committee members / Officers) in IEEE Control Systems Society held by industry representatives over the society’s history. A drastic and extended downturn has led to the point of zero industry representation currently. (This figure is included in the *Annual Reviews in Control* submission, where additional details are included.)



The situation with IFAC is, we believe, no better. The Industry Committee is committed to helping increase industry engagement through its efforts and we look forward to continuing our activities in the next triennium at a grass-roots level, focusing on TCs, events, and collecting and disseminating information to better connect the research community and industry practitioners.

Yet action is also required at the level of the IFAC leadership. Enhancing industry engagement needs to be a regular part of the agenda for Council and Officers Meetings. I would welcome the opportunity to lead a discussion on the topic—a discussion that is currently untenable within the short time allotted for Industry Committee updates in these meetings.