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40 years computers-in-industry: Applied interdisciplinary research

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ABSTRACT

Computers in Industry started 40 years ago with a mission to promote research in the use of computers within manufacturing industry. The journal was started by IFIP TC5 and aimed to cross boundaries, not only between countries but also between disciplines, and specifically between academia and practice.

This paper provides a personal view on the journal's aims and scope over these four decades. Decisions were taken concerning these aims and scope which are described from a bird's eye view. The arguments for such changes are outlined. The paper can be seen as a plea to continue with journals in interdisciplinary applied research, with academic rigor but also with practical relevance.

1. Preamble

This paper is not an academic paper in the usual sense. No academic research has been done to expand the body of knowledge. Rather, the paper is a reflection on 25 years of editorship of Computers in Industry.

When the journal started, in 1979, we were junior researchers in academia with an interest in improving practice. In the early eighties we were members of IFIP working groups (WG 5.7) under the umbrella of TC 5.

The journal *Computers in Industry* started as the means of communication of IFIP TC5, which was devoted to computer applications in industry. Accordingly, the first editor-in-chief was the TC 5 chairman, Jacob Vlietstra. In line with the mission of TC 5, the journal had the ambition to bridge gaps. These gaps did not only exist between professional disciplines, such as between control engineering and mechanical engineering, but also gaps between academia and professional applications. Last but not least, there were large gaps between various countries and cultures.

In the course of the time, the journal transformed into an applied academic journal, focused at interdisciplinary engineering work. This paper describes the rationale behind this move. Moreover, it explains why certain fields were adopted and others were quit. We considered special issues to be key in this respect. Altogether, the journal is one of the few journals which welcomes applied, interdisciplinary academic papers. Such journals are precious.

2. The First 14 Years: from 1979 to 1993

As said, the journal *Computers in Industry* started as the vehicle for communication within IFIP TC5. This technical committee aimed to bridge the gaps:

- Between industry and academia.
- Between disciplines such as information systems/computer science and manufacturing engineering.

Accordingly, about 1/3rd of the journal were academic contributions, about 1/3rd professional contributions and about 1/3rd communications about conferences, workshops, calendars, reports, etc. Moreover, there were contributions from such diverging fields as Mechanical Engineering, Control Engineering, Production Planning and Control, Operations Research, Computer Science etc.

The journal started visionary: it formulated an early vision on digitization as the common driver of change in manufacturing. Although this vision was later adopted by e.g. the term Computer Integrated Manufacturing and recently by *Industrie 4.0*, it was revolutionary four decades ago. Moreover, even nowadays the vision of *Industrie 4.0* is more a challenge than reality.

However, in the early nineties there were a number of reasons to change the role of the journal as the means of communication within TC5. First of all, the emerging role of the internet and e-mail reduced the need to communicate in printed form. Second, academics were more and more forced to publish in highly cited peer reviewed academic journals. All stakeholders in these journals

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became reluctant to mix academic content with professional papers and with messages for a community.

Accordingly, academical mechanical engineers preferred to publish in specialized journals on CAD, CAD/CAM, CIM, CAE rather than in Computers in Industry. Similar developments were encountered in control engineering, in Operations Research, in Computer Science and Information Systems, and many other fields. Journals like IJPR and *Computers in Industrial Engineering* served the academic community of industrial engineers. Also, new journals such as Production Planning and Control emerged (IFIP WG 5.7).

Professional engineers in industry encountered another phenomenon. Professionals in many industries were less and less allowed and enabled to publish in professional journals, due to the increased awareness of intellectual property in the early nineties. This development also caused increased censorship by corporate communications departments in many companies. Because of all these reasons, the journal had to change its profile in the early nineties.

It was decided that *Computers in Industry* evolve into an applied academic journal in the frontier of digital industrial innovation – a platform for publications on new technologies, allowing publications in fields where there are not yet established academic journals. As a consequence, *Computers in Industry* would not focus on academic papers in mature fields for which there are sufficient academic outlets, such as control engineering, mechanical engineering, operations research, information systems, production planning and control, etc. Rather, the journal would focus on developments which are new and cut across disciplines. This choice was a clear focus on academic papers, while mitigating the risk of losing the ties with professionals and industry.

It is worth pointing out that this pre-Internet era is characterized by slow communications. Authors were required to submit three paper copies of their manuscript. These copies were further sent to the reviewers via snail-mail. Initially all communications were also conducted via post. However, with the emergence of email, many communications were facilitated electronically. Because, old-style post was the principal means of communication and exchange of information – especially the exchange of papers and reviews – the cycle times were considerably large – extending to several months.

This era is also marked by filing cabinets full of papers in progress, paper reviews and correspondence with the authors and reviewers. Management of papers' progress was all manual – handwritten lists and tables in MS Word/Excel – updated manually, of course. Our memory of this distant past is of devoting most evenings and weekends merely to manage the flow of papers with much support of student assistants.

3. The turn of the century: 1994–2004

Hans Wortmann was asked to become editor-in-chief in 1993 and Harinder Jagdev joined him after a few years. First, the role of Hari was informal, later it was formalized as joint editorship. Obviously, many developments happened in society and in technology in this first decade which are well known, and had huge impact. The dominant technological development in ICT was the development of the internet, which went hand in hand with the dominance of the PC. The internet gave a boost to telecommunications technologies such as 4 G, Wi-Fi, Bluetooth, and many others, which found their way to the factory floor, to offices and to supply chains. The internet also created business opportunities for e-commerce, allowing companies such as Amazon and E-bay to take off.

The IBM-compatible PC appeared everywhere in offices and factories, and the market share of Wintel (Windows operating system, Intel processor) was overwhelming. However, Microsoft was late in acknowledging the importance of the internet, allowing companies like Apple and Google to gain positions in the consumer markets. Despite of this, the Windows PC gained a leading role in server technology, as well as in manufacturing industry.

These developments played against a background of huge societal changes, such as the emergence of the BRIC countries (Brazil, Russia, India and especially China), further globalization of supply chains and the shrinking distances on earth, and the burst of the internet bubble after the turn of the millennium, followed by a quick revival of digitization.

In *Computers in Industry*, the editors searched for new areas, for which no established academic outlets existed, and which could find received a platform in our journal, e.g.:

- Enterprise modelling and business process modelling
- Holonics and agent-based approaches
- Collaborative design and PLM/PDM
- Agile manufacturing and supply chain collaboration
- Workflow management technology
- Enterprise Resource Planning.

For such new topics, it was appropriate to ask new members to join the editorial board. These members would take the role of *associate editor*, taking the responsibility for papers in a specific area. The associate editors took an important role in developing such areas within the journal.

Special Issues are another mechanism which helped us to identify promising topics where the journal could provide a platform. Special issues were already a tradition in the journal from early 1990s, but mostly to help good conference papers to become a journal paper. However, increasingly the journal was critical on topics to be selected, and as editors we became convinced that special issues should be reserved for addressing new topics, especially if these were multi-disciplinary and application oriented. A special issue should set the agenda for the journal in the period ahead highlighting a new multidisciplinary topic. Nick Szirbik took the role as managing editor of special issues and he developed with Harinder Jagdev the rules of the game. In particular, we requested that the guest editor should publish a SOTA paper *before* the call for papers was published.

It was indeed a challenge to keep the link with practice, although we favoured papers with applications. We tried to include professionals in the field as members of the guest editorial team. Sometimes this was successful, sometimes not.

In 2003 Hans and Nick moved from Eindhoven to Groningen, along with the Computers in Industry offices. Around this period Elsevier, the publisher of Computers in Industry, delivered first generation of Internet based journal management system called EES. This system, with a slight steep learning curve, facilitated the management of the flow of papers enormously. The system acted as a database with all papers in progress, and supported the selection of reviewers, the archiving of correspondence, generation of reminders and so on. All this resulted in an enormous reduction of the effort needed in the editorial office. Moreover, it allowed us to speed up the manuscript processing and reviewing cycle times.

4. From 2004 to 2018: the last 14 years

Some years after the turn of the century, new focus for the journal was required. For academics, seminal work which highly cited, is usually work in a well-established discipline, with a formal theoretical body of knowledge. Applied work, in particular design work, which covers most of the work done by scholars in engineering, is usually a trade-off between various disciplines.

For *Computers in Industry*, this trade-off usually is encountered between a computer science or information systems discipline and

engineering discipline, whether industrial engineering, mechanical engineering, electrical engineering, or e.g. ergonomics. Therefore, *Computers in Industry* welcomed *interdisciplinary* work – which often is difficult to publish and has no established journals.

However, not all applied, engineering interdisciplinary work is good academic work – there has to be a sound problem statement, the work should be new, but properly rooted in academic theory and literature, there should be a generalized statement, there should be validation. From a methodological point of view, the emerging interest in design science has been helpful in setting the norms for good interdisciplinary academic engineering work.

Our goal with *Computers in Industry* was therefore, that articles were indeed applied and interdisciplinary. The quality index of the journal, in terms of citation index, was and is steadily increasing. Apparently, *Computers in Industry* serves a need in academic market. A point of concern is still the link with industry and with the professional world.

5. Reflection on the role of editors in the review process

One of the key role of editors is to manage conflicting reviews. It is not uncommon that a paper attracts conflicting reviews due to different emphasis put by the reviewers. In such cases, it is incumbent on the editors to go through the paper and resolve the conflicts. As *Computers in Industry* is an application-oriented journal, it is mandatory for authors to present a real-life case study to validate the scientific methodology presented and clearly show its novelty.

However, such papers pose a unique dilemma for the editors: The reviewers required should be both proficient in the presented scientific methodology and the operations of the industry where the presented methodology is validated. It is hard to find such reviewers.

Often, Computers in Industry editors need to assign reviewers who are either practicing engineers or academics proficient in the presented methodology. These reviewers, obviously, put different and selective emphasis on the manuscript. Therefore, editors frequently – more frequently than other scientific journals! – need to intervene and use their expertise to resolve the conflicts. This, more often than not, results in an additional review by the editors that summarises the key points raised by various reviewers.

Finally, a few words about how we presided over the day-to-day practicalities of managing the journal.

How we processed the new submissions.

- List of weekly new submissions would arrive at the desk of Editors latest by Friday.
- Editors would spend the weekend independently reading the new manuscripts and form opinions.
- Detailed notes were prepared on each manuscript and it was categorized as Out of Scope, In Scope or Edge of Scope.
- On Monday morning Editors would hold the Skype call and discuss respective comments on each submission.
- In case of differing opinions between the Editors, individual opinions regarding pros and cons of the submission were discussed and joint decision arrived at.
- Papers considered to be on the Edge of Scope were discussed in detail regarding their subject matter, its novelty and style of presentation. After mutual discussion, such papers were either marked as Out of Scope or In Scope.
- All papers deemed to be In Scope were filtered through plagiarism-check software. Papers passing this test were ready for the assignment of reviewers.
- Papers which were clearly in the field of an associate editor were assigned to this associate editor and the related responsibility to manage the reviews. Final decision, nevertheless, always rested on the Editors.
- At least four reviewers were assigned to each In Scope paper.
- Even though most reviewers were expected to review complete manuscripts, in some unique circumstances, Editors requested certain reviewers to check the novelty and accuracy of only certain aspects of the manuscript.
- While processing the new submissions, if Editors observed significant weaknesses in a manuscript that was otherwise In Scope, and that would invariably attract negative comments from the reviewers, Editors did the first formal review of the manuscript (with a note to the authors!). Almost every week there were a few papers belonging to this category and in some extreme circumstances, eight to ten manuscripts were provisionally reviewed by the Editors. Upon the receipt of the revised manuscript, reviewers from various disciplines were assigned to provide a balanced opinion.

How we dealt with the reviews.

- Editors *always* read the full reviews to form an opinion on the quality – seriousness and comprehensiveness – of the review.
- Even though four reviewers were assigned to each manuscript, Editors could consider forming a judgement with two or three reviews – provided the reviews were detailed and recommendation unanimous or nearly unanimous.
- Invariably, there were instances where the reviews were conflicting. In such situations, Editors sought the opinion of additional reviewers. If there were still conflicting recommendations, it was incumbent on the Editors to do an additional formal review before deciding on the direction of the decision. In such editorial reviews, seriousness of other reviewers' comments was taken into account.
- On very rare occasions, the reviews merely recommended additional citations primarily authored by the reviewer. Unless there was a justification as to how such inclusions would improve the paper, such reviews were either ignored (not forwarded to the authors) or forwarded to the authors with editor's note.

How we dealt with the revised manuscripts.

- While asking the authors to revise their manuscripts, Editors requested the authors to highlight the changes in a different colour font so that the revised text could be easily located. Authors also had to provide an itemised list of how they addressed all reviewers' comments.
- On the receipt of the revised manuscript, Editors *always* checked if all the reviewers' comments were addressed and how thoroughly. In cases of incomplete revisions, paper was sent back to the authors with Editor's comments.
- In cases of satisfactory revisions, manuscript was sent to the original reviewers for their opinions.
- If the reviewers' comments required only minor changes, Editors took the responsibility of ascertaining the quality of revision and in such circumstances, Editors made the final decision without involving the reviewers any further.
- There were rare occasions when authors did not agree with some of reviewers' comments and provided justification for their disagreement. This happened when the reviewers misunderstood the message (this can and does occasionally happen!) in the paper. In such circumstances Editors made the balanced decision, which could go either way.

How we dealt with the authors.

- In our eventful tenure of over 25 years as Editors, our interaction with the authors has always been cordial and professional. Well mostly, with very few exceptions.
- Most of the authors, irrespective of their academic position, took the reviewers' comments and editorial decisions gracefully.
- However, a few instances come to mind when the authors took offence to the fact that their paper was rejected. In all these cases author had just received the PhD and submitted paper that reflected their PhD research. Typically, they would, rather aggressively, argue and complain that the paper was part of a successfully completed PhD thesis; or the PhD was mentored by such and such eminent professor and he approved the paper; or such and such eminent professor was the external examiner and he recommended the research for PhD – how dare we reject the paper. And so on. . .
- In all such instances we had to explain that our decision did not consider who supervised or approved their research. Our and reviewers' decision was solely based on the quality of the presented work.
- Dear reader, we would like to put on record that our editorial decisions were never influenced by personal or professional relationships or the eminence of the authors. We *always* did our utmost to base our decisions on the quality of the presented work. There were many instances when even close professional colleague's papers were rejected!

Changeover to new Editors.

- During our last few years, we were informally discussing among ourselves that we should schedule our departure from Computers in Industry and handover the reigns to someone new. In 2017 this decision was catalysed by a ruling from Elsevier putting a time limit of ten years for the Editorship of all its journals. We had been steering Computers in Industry for over 25 years!
- In summer of 2017 we started looking for our successor. Professor Bernard Grabot was on the top of the list of potential successors. His knowledge, skills and experience were eminently suited to lead the journal.
- We were fortunate that Professor Grabot was equally enthusiastic in leading the Computers in Industry.
- Takeover date was set to 1st January 2019.
- It was the top priority of all involved that the transition to new editorship be as smooth as possible. To this effect all through 2018 we had three-way (Hans, Hari and Bernard) video conference calls on Monday mornings to discuss the papers pipeline.
- Prior to conference call, each of us prepared notes on existing papers as well as the new submissions.
- During the conference calls, three of us compared our notes and arrived at acceptable decisions.
- Hans and Hari processed the papers submitted in their tenure ship and Bernard started managing all new submissions.
- The changeover to new Editorship was finalised in December 2018.
- Having noted the success of the journal since 2019, we are confident that the journal is in very safe hands. indeed
- Nick continues to manage the Special Issues in his usual super-efficient style.
- We wish Bernard and Nick all the very best.

6. Concluding remarks

Computers in Industry is an applied, academic interdisciplinary engineering journal. There are not many such journals. Moreover, such journals are precious, if academia wants to put value on issues like applicability, scalability, architecture, and industrialization of products. Let us, the academics, and professionals, continue to value these outlets in general and our journal *Computers in Industry* in particular.

Declaration of Competing Interest

The authors report no declarations of interest.