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Breaking Boundaries Initiative: Workshop on Industry-Academia Collaboration

COVID-19 may be over as a global health emergency, but in our academic community, its downstream effects are still very much present. As the world locked down and countries imposed travel restrictions, our conferences went virtual, in-person meetings turned into Zoom calls, and coffee breaks were spent alone. As a result, the organic and spontaneous ties that kept parts of our community together faded, and new ones were not formed. In other words, silos formed and boundaries were erected. The 2022 IEEE World Congress on Computational Intelligence, the first major Computational Intelligence Society (CIS) conference to return to in-person format, demonstrated the benefits of leaving our silos and once again interacting face to face. At the same time, it showed that some technical activities must be redefined while others should be launched. In response to this, CIS sponsored the Breaking Boundaries initiative, which aims to break the boundaries formed by not just COVID-19 but also those which have plagued the community before the pandemic broke out.

One of the boundaries identified is the one that exists between industry

and academia, specifically in terms of project collaboration. Collaboration between industry and academia is crucial as their respective strengths and weaknesses complement each other. For instance, academia may have the knowledge about the state-of-the-art techniques to solve a problem but no relevant business cases. Industry, on the other hand, may have a plethora of business cases but lack the technical expertise to solve them. The boundary between these two worlds motivated the first technical activity undertaken by the Breaking Boundaries initiative.

Specifically, the Breaking Boundaries: Industry-Academia Workshop took place on the 27th and 28th of June 2023 at Maastricht University in The Netherlands. The workshop was organized by Anna Wilbik (Maastricht University), Marcin Pietrasik (Maastricht University), Paul Grefen (Eindhoven University of Technology and Eviden Digital Transformation Consulting), Christian Wagner (University of Nottingham), Jon Garibaldi (University of Nottingham), and Luis Magdalena (Technical University of Madrid). Invitations to the workshop were sent to the chairs of IEEE CIS technical committees, CIS administrative committee

members, and a local network with ties to Maastricht University. The workshop was attended by a diverse group of participants from eight different countries, representing both industry and academia perspectives.

The workshop addressed the topic of industry-academia collaboration through breakout sessions, plenary discussions, and presentations from invited speakers. What follows is a brief outline of the execution of the workshop, the results obtained, and the next steps for the initiative going forward to facilitate research collaboration between academia and industry.

The workshop began with a roundtable introduction of all the attendees along with the question “what does good collaboration between academia and industry look like?” A range of responses to this question highlighted the diversity of the participants, although common themes emerged. For instance, strong communication and goal alignment were mentioned by several attendees.

Following this, everyone was divided into groups to play the Five Whys game. The objective of this game is to discover the root cause of an issue by successively asking players to answer the “why” question to their previous responses – five levels deep. The game is started with a motivating issue, in this case “collaboration between industry and academia is



FIGURE 1 Group photo of participants.



FIGURE 2 Alex Shenfield presenting results of Five Whys exercise.

not easy.” An example of the outcome of this game is captured in the accompanying figure where columns represent identified issues and rows represent the five levels of “why” explanations. Each group was then asked to present their answers to the rest of the participants. The following discussion resulted in the identification of five root obstacles:

- ❑ Conflicting attitudes towards intellectual property (IP) between industry and academia.
- ❑ Expectations are not clear and goals are misaligned.
- ❑ Academia has longer time horizons for project work than industry.
- ❑ Academia is stuck in a vicious cycle when reaching out to industry for project collaboration.
- ❑ There are problems related to the data provided by industry to academia.

After identifying these five obstacles, participants were divided into five groups with the goal of brainstorming solutions to each one of them. As before, solutions were shared in a plenary discussion. The conclusions are summarized as follows.

To overcome the obstacles introduced by IP concerns, faculty should be encouraged to file for more patents. This can be accomplished by considering the number of patents filed in tenure and promotion selection. To help academics navigate the world of IP, universities should provide training and resources in the form of workshops and dedicated help centers.

The key to managing expectations and alignment of goals is clear communication when defining the project. Expected outcomes (project

deliverables) should be documented explicitly before the onset of the project. This documentation should be specific enough to avoid ambiguities, whilst still allowing room for adjustments to the project. A prerequisite for this is a common language between industry and academia, as the interpretation of terms may differ between both worlds, e.g., there may be highly different views on what constitutes a “prototype.” Using a common language may require the help of a liaison officer to act as a translator between academia and industry.

In order to align the differing time horizons between industry and academia, projects should be broken into smaller, more manageable chunks. Industry may be more willing to collaborate on these as the outcomes arrive sooner and can be realized by step-wise funding. Furthermore, universities need to become more agile in their funding schemes to match the time horizons of industry, for instance, by changing policies regarding short-term contracts.

The solution identified to breaking the vicious cycle described earlier is to start small and prototype. Small-scale endeavors require little funding and time commitment but may be enough to sway industry to collaborate. Furthermore, unsuccessful prototypes can be reused for other project proposals ensuring that resources are not wasted. Another point raised was the importance of having ambassadors in industry who can vouch for the quality the research and its benefit to a company.

Several solutions were proposed to overcome the problems that arise when exchanging data between industry and academia. Specifying in the documentation of the required formats and its confidentiality overcomes formatting issues and privacy down the line. Data profiling and exploratory data analysis before using the data for its intended purpose can help overcome issues of data quality. Development of data dictionaries and leveraging the expertise of domain experts are ways to overcome a lack of understanding of the data and assessing its relevancy to the overall project.



FIGURE 3 Judith Kamalski presenting results of Five Whys exercise.

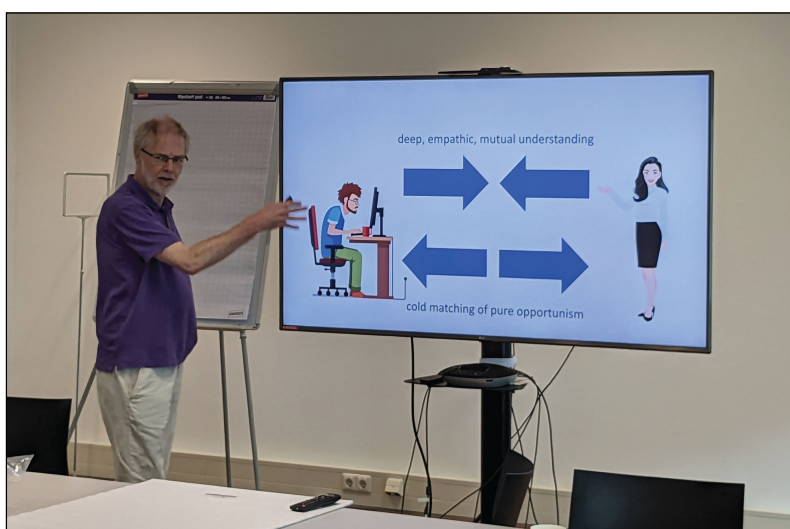


FIGURE 4 Paul Grefen delivering his presentation on the importance of bridging academia and industry.

analytics strategies in industry. Specifically, he presented several projects he had collaborated on with academia. One of these concerned building a data management platform for gathering dairy farm sensory data for animal research. He also highlighted the importance of working on projects that one is passionate about, as the passion becomes a driving force. He illustrated this with two of his passion projects involving building a data platform for a record company and marketing an app for connecting local citizens with refugees to help ease their transition to their new country. The main learning points are to start data-oriented projects with proper data profiling, to communicate continuously between stakeholders throughout the project, to make projects smaller to avoid unrealistic expectations, and to pay adequate attention to data governance and quality.

Frank Thuijsman (Maastricht University) spoke about his project at Maastricht University, KE@Work, which connects highly-achieving Bachelor students in Data Science and Artificial Intelligence with local business organizations. Students work at their host organization two days per week alongside their studies, providing them with valuable industry experience and providing industry with access to young talent. The program was modeled after a similar initiative in Germany and faced challenges from both sides in its early stages. Industry took issue with the fact that students only worked on their projects part-time. The university required significant convincing to modify the structure of their curriculum program to allow for the work placement. The key to the success of this project was created by the successes of the individual work placements themselves. The presentation demonstrated the importance of a clear long-term vision incrementally fueled by many short-term successes.

The final activity of the workshop was a plenary discussion on the next steps to take as part of the Breaking Boundaries initiative. The discussion followed the What/Who/When

The breakout session was followed by presentations from the invited speakers. Three presenters were invited, representing the perspectives of academic research, industry, and academic education. In keeping with the theme of the workshop, each presenter shared their own examples of successful industry-academia collaboration and gave the reasons that contributed to that success.

Paul Grefen (Eindhoven University of Technology and Eviden) delivered a talk from the perspective of academic research. The talk discussed the importance of bridging academia and industry and stressed that each has what the other needs. To illustrate, he explained that industry can provide data sets with contemporary relevance, reducing the

need for academia to keep resorting to old and not-so-relevant data sets — like the well-known Iris data set from 1936 used for the development of classification algorithms. He pointed out that academics have the knowledge about cutting-edge technologies with few industry-relevant use cases. Industry, on the other hand, has a plethora of business cases to show the relevance of such technologies and allow academics to showcase their work. To bridge the gap and increase industry-academia collaboration, he presented a list of good practices revolving around clear communication.

Pieter Rambags (Nippur) shared his experiences working with academia as a consultant focusing on data and



FIGURE 5 Pieter Rambags presenting his experiences working with academia as a consultant.



FIGURE 6 Frank Thuijsman describing his project at Maastricht University, KE@Work.

methodology for assigning tasks and resulted in three main action points.

The first action point is to grow an online presence of the Breaking Boundaries initiative by launching a website with tools and resources, and create social media accounts for outreach. Initiatives should get a “tangible embodiment.” The second action point is to organize workshops for training academics on good communication practices when interacting with industry. After all, many boundaries are formed inevitably by the lack of proper communication. The third main action point is to create outreach to other societies such as IEEE Systems, Man, and Cybernetics and the IEEE Consultants Network. The workshop showed that many of the identified issues are not CIS-specific and hence their solutions can be addressed at a more general level within the IEEE community.

In addition to these action points, the workshop provided an effective in-person venue for networking between representatives of industry and academia that was lost due to COVID-19. It highlighted that despite the difference in perspectives, the two worlds are able to come together to identify the challenges that exist between them and agree on solutions for better collaboration. The success of the workshop paves the wave for future Breaking Boundaries initiatives. We look forward to seeing you at the next one!



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