

What is New in Industry?

Welcome to a new column of the IEEE Computational Intelligence Magazine devoted to Industrial Activities. In a previous communication¹, I described the vision for the newly formed IEEE CIS Industrial and Governmental Activities Committee (IGAC). With IGAC, we strive to provide services, products, and offerings of interest to Industry, ranging from webinars to tutorials, conferences, publications, standards, and other aspects of CIS activities, as illustrated in Figure 1, adapted from reference¹.

This issue's column will focus on *Industry Engagement in Conferences*. We want to offer industry-centered panels, workshops, and conferences with keynotes by Industry leaders. We wish to create a forum within CIS conferences, in which Industry can participate without necessarily having to submit scholarly papers. Industry leaders can define current and future challenges that AI/CI technology could address. We can achieve this goal with focused panels and keynote speeches. With increasing Industry participation in CIS conferences, we will grow conference exhibits, sponsorships, and, more importantly, guidance to make CI/AI technology relevant to Industry needs. In the sequel, we will describe two of our efforts in this direction.

¹Piero P. Bonissone, "IEEE CISVP Industrial and Governmental Activities Vision Statement", IEEE Computational Intelligence Magazine, 17(1):5-7, 2022.

Our first effort is the creation of a unique Industry-centered event within our flagship conference, the 2022 IEEE World Congress on Computational Intelligence (IEEE WCCI 2022). For the first time, we have established an *Industry Day* within the IEEE WCCI 2022 Program (<https://wcci2022.org/industry-day/>). This event, included in the IEEE WCCI 2022 regular registration, is also accessible, for a nominal fee, to non-WCCI participants.

During this inaugural *Industry Day*, which will take place in Padua, Italy, on July 20, 2022, we will offer a representative sample of industrial and commercial applications of CI and AI technologies. Industry Day's program will contain one keynote presentation, two special sessions, seven panels, and twelve short presentations from Industry. Furthermore, we expect to have over 100 application-oriented poster presentations throughout the day.

Industry Day's two special sessions will be devoted to *CI in Industry 4.0* and *CI in Metallurgy*. Specifically:

- ❑ *Industry 4.0* (i.e., the Fourth Industrial Revolution) covers cyber-physical systems, additive manufacturing, virtual and augmented reality, cloud computing, big data analytics, data science, etc. This session will describe the next level of manufacturing, where machines will redefine themselves in how they communicate and perform individual functions.
- ❑ *CI for Metals Science and Technology* covers the application and deployment of CI in metallurgy. This session will facilitate a dialogue among AI technology providers and end-users from the metal and alloy industry and explore further opportunities for cooperation.

Industry Day's seven panels will cover a variety of topics:

- ❑ *Outsmart Your Competitors: Real Examples of Value Extraction From the Data Journey*. Five representatives of the Swiss Data Innovation Alliance will share their best practices and real market experiences to demonstrate how to use data to extract

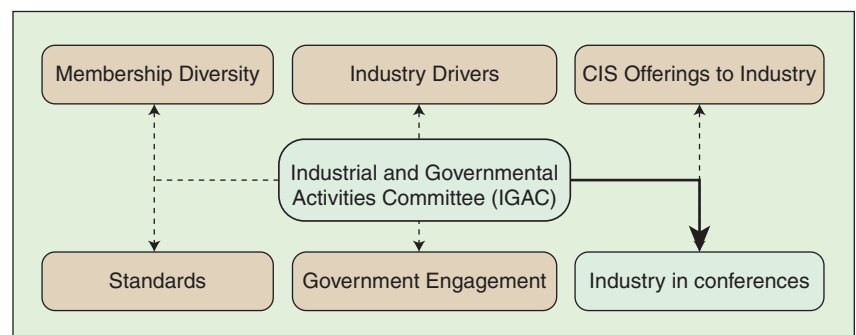


FIGURE 1 IEEE CIS Industrial and Governmental Activities Committee

... Create a forum within CIS conferences, in which Industry can participate without having to submit scholarly papers. Established Industry Day within the IEEE WCCI 2022 Program. Organizing the 2023 IEEE Conference on AI as an industry-centered conference.

value at each step of the data journey and be ahead of the competition.

- ❑ *AI-enabled Cybersecurity and Privacy:* This panel will share real-world challenges, novel applications, and the most recent advances in security AI, and privacy from theoretical and empirical perspectives. It will address questions such as: How can we make a system robust to novel or potentially adversarial inputs? How can machine-learning systems detect and adapt to changes in the environment over time? When can we trust that a system that has performed well in the past will continue to do so in the future?
- ❑ *Industrial AI:* This panel will cover industrial applications of AI, ranging from production to manufacturing, quality control, operations, and maintenance. We will show illustrative examples from large and small companies. We will extend the discussion beyond the underlying AI technology to cover Business and Technology Challenges. We will explore Business Models to monetize AI-improved processes or AI-enabled services or products; KPIs for AI-enabled process improvement; Productization of AI-enabled services and products; AI Technology development and deployment; Technology sustainability, such as Model maintenance, etc.
- ❑ *Technology and Regulatory Challenges for AI in Europe:* We will share the latest policy document on AI of the IEEE European Public Policy Committee ICT Working Group and discuss the technology and regulatory challenges for AI in Europe, hearing from experts from Academia, Industry, and EU Policymakers.
- ❑ *Applied Deep Learning in Satellite Images using Small Supervised Data:* Deep Learning technologies need to have annotated data to train their models. This issue is particularly severe in operational scenarios where it is not possible to annotate data in a reasonable time frame or in cases in which we do not have enough available data related to rare scenarios. This panel will deal with methodologies for training neural networks with little data, using Self-Supervised Learning techniques.
- ❑ *AI Techniques for Natural Language Processing (NLP):* Questioning Evaluation and Resource consumption for Deep Language Models in real-world scenarios. Large Language Models (LMs), currently reaching a trillion parameters, need reliable, complete, and representative benchmarks. This task usually requires significant effort in text annotation, intensive in both time and required knowledge, except for simple cases. These benchmarks are far from real industrial NLP use cases. Moreover, some LMs provide limited benefits to NLP tasks, where sometimes cheap, known, ML techniques are as effective with a tiny fraction of cost/time/resources/carbon footprint. This panel will focus on how to understand in advance when such an effort can bring significant benefits.
- ❑ *AI for Earth Observation:* AI for Earth Observation (AI4EO) focuses on harnessing the power of AI with the vast amount of EO data now available. While today the new boost of AI4EO is mainly related to Computer Vision applied to high-resolution satellite imagery, there are many

other areas for Earth Science, prediction and big data analytics that could benefit from AI for the deployment of practical applications. The panel will discuss some of the main challenges in AI for Earth Observation of interest for research and business communities, i.e., scalable big data analytics, trustworthy and explainable AI, physics-aware AI, self-learning AI, AI-based EO data fusion and prediction for Digital Twin Earth (DTE). Here are examples of issues that will be discussed: How to augment EO capability with AI? How to make the AI decision-making more transparent? How to integrate “first principles” and “domain knowledge” into the AI statistical approach? How to develop unsupervised learning for EO data without labels? How to leverage the combination of EO, models and AI techniques to support high-resolution prediction and informed decision making with DTE?

The interested reader can find additional information on this event at <https://wcci2022.org/industry-day/>.

Our second effort in industry-centered conferences is the organization of the 2023 IEEE Conference on AI (IEEE CAI) – <https://cai.ieee.org/2023/>. This conference, co-sponsored by the Computational Intelligence, Computer, Signal Processing, and Systems Man and Cybernetics Societies, will take place on June 7-8, 2023 in Santa Clara, CA, USA. IEEE CAI 2023 will be the first full-fledged conference following this new format. Different Industry segments have different needs, requirements, regulatory constraints, and levels of technology adoption. To reflect this heterogeneity, we will structure IEEE CAI along six verticals, covering *AI in Energy, Healthcare/Life Science, Transportation/Aviation, Earth System Decision Support, Industrial AI, and Social Implications of AI/Privacy*. As we get closer to that date, we will provide additional information in our next columns.

