

# IEEE Signal Processing Society Challenge Program

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This document defines the aims and operational protocol of the SPS Challenge Program operated by the Challenges and Data Collections (CDC) Committee of the Technical Directions Board of the IEEE Signal Processing Society.

## **Aims**

- to stimulate new and adventurous research into timely problems within the technical scope of SPS, thereby driving forward the scientific development of signal processing;
- to encourage research and development with comparable and reproducible results;
- to identify the state-of-the-art methods in defined signal processing tasks and their performance;
- to disseminate widely within the society and externally the results of Challenges and subsequent scientific insights.

## **Conferences**

All IEEE SPS Conference Challenges must be coordinated with the Challenges and Data Collections Committee. This coordination will ensure a streamlined process and the CDC Committee will oversee, track, ensure standards of quality set by the Society are met, and publicize the scientific challenges.

Conferences are still permitted to foster the organization of scientific challenges on hot topics, various in nature, with significant relevance and/or of tutorial/review values, but in coordination with the CDC Committee.

The Conference Challenges would follow these steps:

- The CDC Committee will appoint a representative to sit on the Conference Organizing Committee to help support the challenge.
- The Conference Challenge Organizing Committee and the CDC representative will select the challenges to be hosted by the conference. In that process, the CDC representative may consult with the CDC committee as necessary.
- The Conference Challenge Organizing Committee will provide the CDC Committee with all information related to the proposed challenges, both the hosted and rejected ones, notably contact information, so that the CDC Committee can take the required action to make the challenges visible on the CDC website and to contact the challenge organizers. In return, the conference site will refer to the CDC website.
- The Conference Challenge Organizers will communicate with the CDC Committee to discuss potential follow-ups (long-term/broader visibility, review/challenge/database paper publication). This step is not to be mandatory, but it will help further support the challenge.

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## Governance

A Challenges and Data Collections Committee of the Technical Directions Board, hereafter known as the CDC, is responsible for the successful operation of an on-going series of challenges. The overall composition of each subcommittee should have a balance of regional, technical, gender, and industry/academia diversity. Unless otherwise specified, the CDC operates under the same rules as a Technical Committee.

## Process

Challenges typically include these five stages.

### Stage 1 - Proposal

Calls for Challenges are regularly issued by the CDC. The CDC publishes guidelines on the information required in a proposal, guidance on how to write a good proposal and the list of questions against which the proposal will be reviewed. Prospective organizers submit proposals to organize future challenges.

Proposals should normally include:

- a textual description of the Challenge and its context (1 to 2 pages);
- a clear formulation of the problem to be addressed;
- a suitable evaluation methodology leading to one or more objective figures of merit (FoMs) and, where appropriate, a software tool to compute the FoMs;
- a development dataset which represents the task(s) of the Challenge and which will be made open access to registered participants (a training dataset may also be needed in some challenges);
- a test dataset which also represents the task(s) of the Challenge, but which will remain private for the purposes of evaluation on unseen data;
- a commitment to reach out to all relevant scientific communities to maximize impact and visibility;
- a commitment to provide a website to disseminate the Challenge itself and, eventually, the results;
- a commitment to evaluate the submitted results and publish the comparison on the website and elsewhere as appropriate;
- a proposed schedule for the Challenge (date of launch of the Challenge, deadline for results submission, schedule for comparative results publication);
- a proposed plan for data hosting together with control and monitoring of access; while it should normally adopt hosting options preferred by IEEE SPS, alternative hosting partners ensuring longevity and proper access control are welcome if shown advantageous. Factors including (open) access, longevity, availability, access control and cost should be discussed in the justification of a non SPS-preferred hosting solution.
- a proposed financial plan for the Challenge including, where appropriate, details of sponsorship agreements.

### Stage 2 - Review and Refinement

Submitted proposals are subject to two rounds of review. In Round 1, the CDC makes an initial assessment and immediately rejects, without detailed review, proposals that do not address all the aims listed above. Proposals

that are deemed to address the aims and are likely to be successful in the second-round review are forwarded to a TC/PTC/TWG/Megatrends chosen by the CDC. The chosen TC/PTC/TWG/Megatrends makes a detailed review of the proposal, led by the TC/PTC/TWG/Megatrend's Challenges Subcommittee Chair or an alternative appointed by the TC/PTC/TWG/Megatrends Chair.

The aim of the review is to assess and contribute to improving the scientific value of the proposed Challenge and to check the methodology and practical feasibility. The review process may typically request modifications to the proposed Challenge as a condition of acceptance.

### **Stage 3 – Active**

After launching a Challenge, researchers can register to enter the challenge. Registration is free of charge and open to all.

### **Stage 4 – Evaluation**

At the end of the Challenge, the organizers will coordinate a comparative evaluation employing the defined FoMs. The evaluation may be done for example by releasing the test dataset and asking the participants to return their results on the test data within a short period of time (short enough to discourage the possibility of any significant tuning to the test data). Alternative evaluation procedures can also be proposed by the organizers during Stages 1 and 2 and should be suitable for the task(s) and context of the Challenge.

### **Stage 5 – Reporting and Dissemination**

The comparative evaluation results are then published. Participants can choose to remain anonymous in publications. Challenge organizers will normally organize a dissemination event linked to IEEE SPS in the form of, for example, a dedicated workshop, satellite workshop or conference special session. The dissemination event is attended by the Challenge participants to share, discuss and gain insight from the results and the proceeding should be subsequently made available with open access. Wherever feasible, discounted registration fees apply to SPS members. The CDC will work with the challenge organizers towards publication of the Challenge and its outcome in relevant IEEE publications. In addition, the challenge organizers' website will be linked from the CDC webpage.

### **Schedule**

There is a strong motivation to synchronize the Challenge's schedule to make the best use of exposure through ICASSP or another high-profile SPS event. Challenge organizers should propose an appropriate schedule with the normal expectation that a challenge should be open for between 6 and 18 months and that the comparative evaluation should be published within 3 months of the closing date.