

**Meeting Minutes of the National Associations (NAs) meeting on Research Evaluation**

**9 July 2019 - 11:00-17:00 (CEST)**

**Zurich, Switzerland**

**Agenda**

1. Welcome and Introductions / Objectives of the Meeting (10 min)
2. Research Evaluation - The Current Situation in Different European Countries (2h)
  - a. Germany (Norbert Ritter, University of Hamburg; Gregor Engels, University of Paderborn) (10 + 10 min)
  - b. Italy (Paolo Ciancarini, University of Bologna) (10 + 10 min)
  - c. Netherlands (Lynda Hardman, CWI and Utrecht University) (10 + 10 min)
  - d. Spain (Antonio Vallecillo, University of Malaga) (10 + 10 min)
  - e. Austria (Gerald Steinhard, Vienna University of Technology) (10 + 10 min)
3. Lunch Break 13:00-13:45
4. The GII-GRIN-SCIE Conference Rating system (Stefano Paraboschi, University of Bergamo, Italy) (20 + 15 min)
5. Open Publications (Serge Bauin, CNRS, France) (20 + 15 min)
6. DBLP (Marcel Ackermann, Leibniz Center for Informatics, DBLP, Germany) (20 + 15 min)
7. OpenCitations (Silvio Peroni, University of Bologna, Italy) (20 + 15 min)
8. Coffee Break
9. Discussing Joint Activities and Future Plans/Meetings (30-45 min)
10. Announcing ECSS (5 -10 min)
11. Wrap-Up

### **11:00 - 11:10 Welcome and Introductions / Objectives of the Meeting**

Twenty people from eleven different National Associations (NAs) participated in the meeting.

Enrico Nardelli, President of Informatics Europe (IE), welcomed the participants and opened the meeting. The purpose of the meeting was to share knowledge about initiatives ongoing in various national communities on the general topic of Research Evaluation and to openly and constructively discuss whether there is the possibility for shared actions at the European level - leveraging the national initiatives - so as to build something that can be helpful beyond the national scenarios. Research Evaluation in the field of Informatics is critical and difficult because of the specifics of the subject. As such, national experiences in Europe may be highly beneficial not only to other countries but also to Europe as a whole.

The agenda was adopted with no further changes.

Participants to the meeting made their presentations available on google drive and these will be later available on the IE website.

### **11:10 – 13:10 Research Evaluation - The Current Situation in Different European Countries**

The morning was devoted to concise presentations on the situation of Research Evaluation in the different European countries. Each presentation was followed by a brief question and answer session, and discussion.

a. Germany (Gregor Engels, University of Paderborn).

The main message of the presentation was that there is no commonly agreed Research Evaluation approach in Informatics in Germany. Intense discussions have been ongoing for the last decade, but there was no agreement on Research Evaluation standards and practices. The ranking of conferences and journals is particularly critical because different sub disciplines of Informatics are hard to compare, it leads to pure counting of quality characteristics, and it may hinder the evolution of new topics.

With regard to the evaluation of departments and faculties in Germany, three main types of evaluation are taking place. The evaluation from the CHE (Centrum für Hochschulentwicklung) which allows a comparison of German universities in a certain discipline. Since this evaluation relies heavily on subjective measures as student questionnaires, its objectivity is questioned. A second measure of evaluation is based on third-party funding and in particular the scientific review of proposals submitted to the German Research Foundation (DFG); the amount of funding received by a specific institution can be used to evaluate and rank institutions. Third and last, critical friends also is a way of evaluation. With regard to the evaluation of individuals, this is taking place for applications for professorship positions, tenure-track evaluation, and grant/award evaluation. Individuals are evaluated by peers according to a set of criteria (publications, awards, third-party funding, teaching evaluation, etc.)

During the discussion, participants from Germany confirmed the difficulties to find an agreement despite long discussions at local and national level. It was also mentioned that evaluations are now sometimes taking place because of consolidation of universities and/or university departments; but this evaluation and the consequent recommendations on university structuring are problematic because these are local evaluations and not state level evaluations.

The high level of autonomy of German Institutions and the state responsibility for education were mentioned as crucial factor making hard to have comparable and reliable Research Evaluation practices at federal level.

Norbert Ritter, Fakultätentag Informatik, recalled the position of the German NA, stating that Research Evaluation should not rely extensively on purely quantitative metrics.

Slides of the presentation are available for download at: [https://www.informatics-europe.org/images/national-associations/Research\\_Evaluation\\_in\\_Germany.pdf](https://www.informatics-europe.org/images/national-associations/Research_Evaluation_in_Germany.pdf)

b. Italy (Paolo Ciancarini, University of Bologna)

The presentation dealt with evaluation of research in Computer Science (CS) in Italy. The Italian Agency for Research Evaluation started in 2010 and is tasked with national evaluation exercises (evaluation of universities and departments, not individuals). As today there have been two evaluation exercises, both based on bibliometric analysis for journal articles and on peer review for conference articles. Bibliometric analysis plays a key role but it is problematic as it relies on commercial repositories and because CS Conferences are under-represented. Comparing bibliometric evaluation and peer review it was noted that the latter is much more penalizing.

The Italian experience has taught that Research Evaluation for CS cannot be based only on bibliometric, because the major commercial repositories (WoS and Scopus) are expensive, opaque, and do not cover research papers in CS conferences; other important CS research products (software, datasets, patents) are also difficult to evaluate. Hence, lists of conference ratings are useful and there is a need for more journals publishing research software products.

The discussion that followed the presentation focused on three issues that emerged from the current Italian situation but that were shared by participants from other countries too. Institutional settings and allocation of funds are bringing forward the need to compare and rank CS and Informatics departments with the departments of other scientific fields, such as engineering, medicine and humanities; these rankings are complex and controversial because of the specifics of CS Research Evaluation. A connected issue is finding reliable and objective ways to compare the different fields inside the Informatics discipline. The third shared matter concerns the risks associated to use the automatic approach used for ranking universities and departments for individuals as well.

Slides of the presentation are available for download at: [https://www.informatics-europe.org/images/national-associations/Research\\_Evaluation\\_in\\_Italy.pdf](https://www.informatics-europe.org/images/national-associations/Research_Evaluation_in_Italy.pdf)

c. Netherlands (Lynda Hardman, CWI and Utrecht University)

The presentation dealt with the researcher and department/institute evaluation of the Dutch Research Council NWO (Nederlandse Organisatie voor Wetenschappelijk Onderzoek). The NWO allocates research funding and funds researchers via competition and selection by national and international peer review in many science domains, including CS. There are different types of “talent schemes” and funding opportunities depending on the amount of funds requested. The assessment criteria look at the scientific quality of the proposals as well as at their scientific and/or societal impact.

The presentation then introduced the Standard Evaluation Protocol (SEP) 2015-2021 published under the authority of the Association of Universities in the Netherlands (VSNU), the NWO, and the Royal Netherlands Academy of Arts and Sciences (KNAW). The focus was on the Standard Evaluation Protocol for research units. According to the SEP, every unit within an institution is assessed once every six years, and it is up to the university departments to decide the level and some details of the evaluation – provided that some minimum requirements are met.

The Standard Evaluation Protocol 2015-2021 for research units presented was the centre of interest for the discussion. Its assessment dimensions include: overall highlights, publications highlights, Invited lectures and talks highlights, peer recognition and service highlights, software highlights, use of research results highlights, public lectures, media appearances and outreach highlights, grants and prize highlights. Participants stated and agreed that the Dutch SEP for research units can provide a good base for evaluating research units of CS. It provides mainly qualitative information, but some quantitative evaluations elements could be drawn. It offers the possibility for a research unit to provide reporting of their activities in open fields and the automated evaluation seems to be limited.

The Standard Evaluation Protocol 2015-2021 is available at: <https://www.nwo.nl/documents/nwo/juridisch/standard-evaluation-protocol-2015-2021>

Slides of the presentation are available for download at: [https://www.informatics-europe.org/images/national-associations/Research\\_Evaluation\\_in\\_the\\_Netherlands.pdf](https://www.informatics-europe.org/images/national-associations/Research_Evaluation_in_the_Netherlands.pdf)

d. Spain (Antonio Vallecillo, University of Malaga)

The presentation described the current situation of Research Evaluation in Spain and its most recent developments. Research Evaluation in Spain is provided by different bodies/actors: two recent National Agencies (Agencia Estatal de Investigación and Agencia Nacional de Evaluación de la Calidad y Acreditación), Regional Evaluation Agencies, other units of the Ministry of Science, Innovation and Education, and university departments (Evaluation of researchers for hiring). Some recent developments were mentioned as positive experience that improved Research Evaluation in Spain: the evaluation of the research activity of university professors and staff carried out by the National Commission for the Evaluation of Research Activities (CNEAI “sexenios”), the establishment of the new agencies, and the official adoption of the GGS (GII-GRIN-SCIE) conference rating.

Many challenges remain in Spain. Evaluation of publications is still based on the Impact Factor of the venue (journal or conference), not on the merits of the individual publications (cites, downloads, etc.). The budget dedicated to Research Evaluation is very scarce (<0.5% of total research budget) and it is supplemented by personal efforts from a motivated (but rather exhausted) community. Nevertheless, the experience with the GGS conference rating and the receptivity of the major Evaluation Agencies offer concrete opportunities for the Spanish Informatics Societies (and in particular SCIE) to play a key leading role for maintaining the consensus, harmony and consistency in the evaluation criteria used in Informatics in Spain, and promoting changes in Informatics Research Evaluation.

The presentation concluded highlighting some of the current challenges faced by all European countries and suggesting to the participants some opportunities for concerted actions. In this respect, it was suggested that Informatics Europe can: play a leading role in harmonizing evaluation, and promoting changes by reusing successful experiences at national/international level; provide similar guides and criteria adopted by Evaluating Agencies, Institutions and Centers across Europe; build a national/transnational initiative (e.g., around a EU project proposal; and it may involve not only national societies but also Agencies and Data Providers, e.g., Google Scholar). The new initiatives (Open Access) and “the JCR crisis” could be used to leverage the change.

Slides of the presentation are available for download at: [https://www.informatics-europe.org/images/national-associations/Research\\_Evaluation\\_in\\_Spain.pdf](https://www.informatics-europe.org/images/national-associations/Research_Evaluation_in_Spain.pdf)

e. Austria (Gerald Steinhard, Vienna University of Technology)

The presentation introduced Research Evaluation in Austria specifying that there are no general rules and standards; different practices of institution-related evaluations exist, while there is some more convergence of practices with regard to individual-related evaluations in CS. Information on the different levels of evaluation was then provided. With regard to the evaluation of universities, this is ordered by the Ministry of Science & Research with the (hidden) objective that each university gets nearly the same percentage of the total government funding as a core funding as in the previous years. With regard to the evaluation of faculties/departments/research groups, this is mainly ordered by the university with the main goals of resource allocation and comparison of different disciplines; these are often quantitative evaluations and rarely qualitative evaluations based on informed peer-review processes. Individual-related Research Evaluation, mainly for hiring and career progression, is instead based on a qualitative approach, underpinned and supplemented by quantitative data, when appropriate ("informed peer review"). Research Evaluation of individuals is challenging when comparing individuals from different fields of CS; "informed peer reviewing" was reported in this case as a positive experience, even if demanding.

Conclusions and discussion brought up some problematic issues for Research Evaluation that were recognized by participants as common issues. The continuous comparisons between disciplines on the basis of journal publications by university management is biased. Income from Industry funding is often misused as an indicator of research quality of faculties/institutes. There is a strong need not only for a greater number of peers for peer reviewing, but also to follow consistent approaches across different disciplines, especially since in CS science reviewers are too often hypercritical.

Slides of the presentation are available for download at: [https://www.informatics-europe.org/images/national-associations/Research\\_Evaluation\\_in\\_Austria.pdf](https://www.informatics-europe.org/images/national-associations/Research_Evaluation_in_Austria.pdf)

f. Final comments on the session:

Enrico Nardelli concluded the session on the Current Situation in Different European Countries by briefly highlighting some of the common points that emerged from the presentations and the discussion.

Research Evaluation is used in many European countries as a method to allocate funding. Leaders in the field of CS and Informatics need to provide the community with stronger tools to fight this battle for funds against other disciplines. Moreover, the impression and the anecdotal evidence that reviewers in our field are often too strict and critical in their peer reviews, is supported by some evidence; see for example the article on the CACM blog by Jeannette M. Wing (<https://cacm.acm.org/blogs/blog-cacm/134743-yes-computer-scientists-are-hypercritical/fulltext>). This is a very critical issue and the community has to educate and raise awareness among the current, and especially the new generation of reviewers.

The misuse of bibliometric in Informatics is a common European issue. The community needs to face it and deal with it to improve the current situation.

**13:15 - 13:45 Lunch Break**

**13:45 – 14:30 The GII-GRIN-SCIE Conference Rating system (Stefano Paraboschi, University of Bergamo, Italy)**

The presentation illustrated the Conference Rating System elaborated by the 3 NAs: GII - Gruppo di Ingegneria Informatica (Italy), GRIN – Gruppo di Informatica (Italy), and SCIE - Sociedad Científica Informática de España (Spain). Research assessment in Italy and Spain mostly uses a bibliometric approach, but conferences are still not adequately considered by the main

repositories such as Scopus, ISI/WoS. As a consequence the evaluation exhibits a systemic bias and it disincentives publications at major conferences, reducing the impact of national research. This was the reason for creating a Conference Rating System. This rating system is based on an algorithm and it is built from multiple sources starting from freely available data. The algorithm is structured around 5 steps: 1) The data are selected from 3 sources: CORE, MAS, and LiveShine. 2) An entity resolution is applied to analyze the correspondence between events extracted from distinct sources. 3) Evaluation of primary class and IF. 4) Combination of primary class and IF. 5) Indexes are aggregated and each event is finally associated with one of 7 classes A++, A+, A, A-, B, B-, and W (“Work in Progress”). Conferences are then finally grouped into 4 different classes: Class 1 (A++,A+: excellent, top notch conferences), Class 2 (A, A-: very good events), Class 3 (B, B-: events of good quality), and Work in progress (W). W does not necessarily mean that the event has a low profile, possibly there is limited coverage in the sources.

The discussion that followed touched on different aspects: issues with the data and the final scoring, the recognition of conference’s role in CS, and the general use of bibliometrics.

Participants signalled as problematic the fact that the rating system places around ¾ of the conferences in the last class called “Work in Progress”. This is critical from a political point of view as it may convey wrong messages on the quality of our activities. The proponents noticed that this can also support the idea that top events are a small fraction and their prestige is justified. New conferences seem to suffer a strong bias according to this rating system and fall easily in the lowered ranked category. It was also mentioned that the Community should support new conferences and this rating system risks to favour more established conferences.

Concerns were raised on the quality of the data behind the rating system. While the model and the algorithm are clearly transparent, the core data of the models are not. The criteria for rating the conferences used by the three sources and especially by CORE are not transparent and are likely to be biased. The proponents noticed that the combination of multiple sources mitigates the bias of a single one. Participants agree that problems with the data repositories exist and shall be taken into account.

Some participants also signalled that in some countries there is still a lack of agreement and understanding on the importance of conferences in Informatics. The issue is then to first clarify and explain to evaluators the role of conferences in this field. As a consequence, comparisons with other disciplines is an issue and there is no equal treatment of Informatics with other disciplines. It was suggested that the first step should then be to re-state that in Informatics conference shall be considered as relevant as journals. The need is to agree and stress the importance of Informatics conferences rather adopting a specific conference rating system.

Some participants have stressed their strong preference for qualitative evaluation over bibliometrics. Therefore, they cannot support the adoption of automated quantitative system but they would rather support a change of approach in the countries that are using bibliometric instruments.

Concluding, the proponents of this rating system have encouraged colleagues to provide suggestions, improvements, and alternatives, to their system. They explained that it will not be possible to design the perfect conference rating system but still there is a need to have a solution that at least addresses some of the current problems.

Slides of the presentation are available for download at: [https://www.informatics-europe.org/images/national-associations/GII-GRIN-SCIE\\_Conference\\_Rating\\_System.pdf](https://www.informatics-europe.org/images/national-associations/GII-GRIN-SCIE_Conference_Rating_System.pdf)

#### **14:30 – 15:00 Evaluation and Open Science (Serge Bauin, CNRS, France)**

The presentation discussed the relation between evaluation and Open Science, in the context of the National Centre for Scientific Research (CNRS), an interdisciplinary public research organisation under the administrative supervision of the French Ministry of Higher Education and Research. Evaluation was presented as a potential impediment to an open science policy. Evaluation and Open Science are linked by a double bind: on the one hand, following an open science policy researchers should be as open as possible with their publications; on the other hand, peers evaluate researchers on their publication record in prestigious venues, which are not open, and they will not take into consideration or acknowledge any effort to share.

The presentation continued explaining recent developments on the evaluation of researchers at the CNRS. Within the National Committee for Scientific Research (CoNRS), the researchers' evaluation body for the CNRS, it was decided to draft 4 common criteria that will be "open science friendly" and include those sets of evaluation criteria for all the disciplines at the CNRS. The 4 principles are the following: 1) It is only the scientific results that must be evaluated, not merely the fact that they may have been published in a prestigious journal or other renowned media; 2) For each of the research outputs listed in their evaluation dossiers, researchers must explain its scope, impact, and their personal contribution to it; 3) All types of outputs must be eligible for evaluation; 4) Whenever possible, all outputs listed in the evaluation dossiers must be accessible in HAL or alternatively in another open archive.

A brief discussion followed on the remuneration of peer reviewers. Reviewers at the CNRS are not paid for their work of peer-reviewing. Opportunity for remunerating peer reviewers could be explored but peer-review is often considered as part of the mission and implicit duties of a researcher. Nevertheless, it was mentioned that peer review work should be more acknowledged and recognized; for instance, researchers could receive a sort of proof of the peer-reviews completed and this could be listed and considered when evaluating individuals.

With regards to Open Science and Open Access, OpenAIRE was referenced. It is a pan-European research information system, which provides services to discover, store, link and analyse research output from all disciplines (<https://www.openaire.eu/>)

Slides of the presentation are available for download at: [https://www.informatics-europe.org/images/national-associations/Evaluation\\_and\\_Open\\_Science.pdf](https://www.informatics-europe.org/images/national-associations/Evaluation_and_Open_Science.pdf)

#### **15:00 – 15:40 DBLP (Marcel Ackermann, Leibniz Center for Informatics, dblp, Germany)**

The presentation introduced dblp computer science bibliography (<https://dblp.uni-trier.de/>), the on-line reference for bibliographic information on major CS publications. Currently dblp indexes over 4.6 million CS publications, published by more than 2.3 million of authors and editors, and it indexes 5600 conference series and 1600 journals. New venues are added to dblp via metadata submission, publisher's data deliveries, community suggestions, or discovery by the dblp team. Criteria for inclusion (aspects of the venue, aspects of authors/editors, publication standards, accessibility) aim to guarantee the reliability of the venues.

In its conclusion, the presenter started discussing the "grading" of science, from excellence down to bad, and then focused on the fact that the real issue at stake, not only for our community but for the outside world too, is the separation of science from "fake science". While it appears simple and straightforward to track excellence in science venues (e.g. prominent and relevant workshop and meetings), it is more complicated to draw a clear border for fake science; for instance some work-in-progress presentations or well-intended but badly organized events run the risk of being too easily categorized as "fake science".



Discussion started from the last point of “good-fake” science. Participants agree that further discussion on the topic would be beneficial for the entire community. Plagiarism shall also be included in this discussion.

With specific regard to the dblp system, discussion revolved around efforts to link dblp bibliographies to ORCID IDs used by that author. Participants also asked about any “European” plan for dblp. While there is no specific plan and answer at the moment, possibilities may be explored, even if the dblp ability to grow is currently limited by the resources available.

Slides of the presentation are available for download at: [https://www.informatics-europe.org/images/national-associations/dblp\\_Computer\\_Science\\_Bibliography.pdf](https://www.informatics-europe.org/images/national-associations/dblp_Computer_Science_Bibliography.pdf)

#### **15:40 – 16:15 OpenCitations (Silvio Peroni, University of Bologna, Italy)**

The presentation discussed the concept of Open Citations, and introduced the organization OpenCitations. Open Citations are bibliographic citations when the data needed to define the citation is structured, separate, open, identifiable, available. OpenCitations (<http://opencitations.net>) is a scholarly infrastructure organization dedicated to open scholarship and the publication of open bibliographic and citation data by the use of Semantic Web technologies; it is highly engaged in advocacy for open citations. In April 2017, OpenCitations collaborated to the Initiative for Open Citations (<https://i4oc.org>) which was launched to persuade the major academic publishers to open their deposited references all at once. As of February 2019, the fraction of publications with open references has grown from 1% to 55% out of 43.2 million articles with references deposited with Crossref – and more than 500M citations are now open.

The OpenCitations organization provides now data models, bibliographic and citation data, software, and online services. Among the bibliographic and citation data, the dataset OpenCitations Corpus (OCC) currently contains around 14M citation links to over 7.5M cited resources, and the OpenCitations Indexes COCI and CROCI contain around 445M citations between 46M bibliographic entities and 76 citations between 81 bibliographic entities, respectively.

Participants signalled that although the number of citations is not a perfect indicator, it is necessary to at least to have a reliable source for the number. The discussion then focused on the possibility of increasing pressure to convince more publishers to distribute open references; currently, five publishers among the top 20 DOI depositors are not distributing open references. At the same time, Informatics Europe suggested the idea of looking for EU funding to expand the project. Lastly, some possibilities for integrating and creating synergies between dblp and OpenCitations were brought up. There was some consensus that it would be highly useful for the community to try to enlarge dblp with citation data using the work from OpenCitations, since dblp is the authoritative source for scientific publications in Informatics; however, the problem of availability of the resources needed to implement it was brought up.

Slides of the presentation are available for download at: <https://www.informatics-europe.org/images/national-associations/OpenCitations.pdf>

#### **16:15 – 17:00 Discussing Joint Activities and Future Plans/Meetings**

Participants reflected on the common themes and matters that emerged from the different presentations and the discussion.

There was a consensus that the “dblp computer science bibliography” and “OpenCitations” are important initiatives in the field of Informatics and they shall be supported at national level and at European level.



The meeting reinforced the understanding that Research Evaluation is a complex and multifaceted topic. It is necessary to continue discussing different aspects of Research Evaluation at local, national, and European level. Drawing on today's inputs, some specific suggestions emerged for topics that should be dealt in the next meeting(s) of the NAs. These include: the quality of research and how to tackle and fight “fake science” in Informatics, fake venues, and plagiarism; how to sustain science, improve and promote quality of science. With specific regard to Research Evaluation, evaluation of software and other artifacts would benefit from further technical discussion.

→ Informatics Europe will be in charge of planning and organizing a meeting early next year, ideally in January 2020.

Research Evaluation clearly comes with political issues, particularly when evaluation is used for resource allocation. There are some issues that are specific to the Informatics discipline and are therefore common to the European Countries. There is room to identify actions to bring to the attention of European national and international Institutions. In this respect, participants agreed that conference shall be regarded as important as journal in Informatics. There was also a large agreement that the use of bibliometrics shall not be encouraged, but including conferences is fundamental for more correct Research Evaluation in Informatics. The Informatics community shall then stress the importance of conferences in the field. It was agreed to produce a short statement, around one page, on the topic. The statement can draw on the 2018 [Informatics Europe report on Informatics Research Evaluation](#). The statement shall refer to the evaluation of departments/research units as well as to the evaluation of individuals.

→ Norbert Ritter, Gregor Engels, and Gerald Steinhardt, will draft a Memorandum of Understanding stating the key points mentioned above (including the importance of conferences for Research Evaluation in Informatics). This will then be circulated among the NAs for comments and signatures. The possibility of having this in the format of an open letter should also be considered.

→ The Informatics Europe office will prepare a press release; Hannes Federrath will help with style and targeting special organizations/countries.

→ Participants aim to launch and release the Memorandum and the press release at the 2019 ECSS (Rome, 28-30 October).

In closing the meeting, Enrico Nardelli renewed the invitation to all the meeting's participants to take part in the European Computer Science Summit 2019 in Rome. Although there is no specific meeting of the NAs at this year the ECSS, an informal meeting will be organised over lunch on Wednesday the 30th of October. An invitation will be sent by email in the next weeks.

**List of National Associations participating to the meeting:**

- AT: Informatik Austria
- CH: Schweizer Informatik Gesellschaft
- CH: SIRA - Swiss Informatics Research Association
- DE: Fakultätentag Informatik
- DE: Gesellschaft für Informatik
- ES: CODDII - Conferencia de Directores y Decanos de Ingeniería Informática
- ES: SCIE - Sociedad Científica Informática de España
- IT: GII - Gruppo di Ingegneria Informatica
- IT: GRIN - Gruppo di Informatica
- NL: IPN - ICT-research Platform Netherlands
- UK: CPHC - Council of Professors and Heads of Computing

**List of Participants:**

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