The Networking Channel
February 19, 2025
https://networkingchannel.eu/

Outcomes of Dagstuhl Seminar 24462:

https://www.dagstuhl.de/24462

Research Infrastructures and Tools for Collaborative Networked Systems Research

Georg Carle, Serge Fdida, Kate Keahey, Henning Schulzrinne




Outline

Dagstuhl

Participants

Goals

Conclusions and Recommendations

Questions and Answers

Dagstuhl

Schloss Dagstuhl

- Founded in 1990, retreat for computer science researchers
- https://www.dagstuhl.de/

Seminar program

- seminars focus on exchange and development of ideas, participation by invitation, establishing trust and friendship
- often praised by participants as most productive academic events they have experienced
- https://www.dagstuhl.de/en/seminars/dagstuhl-seminars

Participants

28 Participants

Tom Barbette (UC Louvain, BE)
Terry Benzel (USC, Marina del Rey, US)
Georg Carle (TU München, DE)
Hakima Chaouchi (IMT - Palaiseau, FR)
Walid Dabbous (INRIA - Sophia Antipolis, FR)
Yuri Demchenko (University of Amsterdam, NL)
Serge Fdida (Sorbonne University - Paris, FR)
Sebastian Gallenmüller (TU München, DE)
Jorge Gasos (European Commission, Brussels, BE)
Michael Goedicke (University Duisburg-Essen, DE)
Cheikh Ahmadou Bamba Gueye (Université Cheikh Anta Diop de Dakar, SN)
Tobias Hoßfeld (Universität Würzburg, DE)
Kate Keahey (Argonne National Laboratory, US)
Wolfgang Kellerer (TU München, DE)
Jim Kurose (University of Massachusetts Amh, US)
Raymond Knopp (EURECOM, FR)
Deep Medhi (NSF, US)
Jelena Mirkovic (USC - Marina del Rey, US)
Andrew W. Moore (University of Cambridge, GB)
Paul Michael Ruth (RENCI - Chapel Hill, US)
Damien Saucez (INRIA - Sophia Antipolis, FR)
Björn Scheuermann (TU Darmstadt, DE)
Henning Schulzrinne (Columbia University, US)
Jörg Widmer (IMDEA Networks Institute, ES)
Walter Willinger (Niksun - Princeton, US)
Adam Wolisz (TU Berlin, DE)
Ellen Zegura (Georgia Tech & NSF, US)
Martina Zitterbart (KIT - Karlsruhe, DE)

Conclusions and Recommendations

Conclusions

Research infrastructures for computing and communications experiments

- should evolve towards advanced scientific instruments
- offer a vital insight to the underlying information
- improving the understanding of scientific methodologies and practices
- reliably and precisely help the scientist to measure the subject of their investigations.

Strong agreement among Seminar Participants

- Large-scale Research Infrastructures are essential
  in providing scientists access to
  specialized, advanced resources
  enabling cutting-edge experiments.

Conclusions

A. Strategic Investment & Community Engagement
- Research infrastructures represent a vital and long-term investment
- Active participation from research communities
- Sustained human capital development
- Financial sustainability

B. Open Access & Data Sharing
- Open access to shared physical infrastructure is essential
- Access to open research data is equally critical
- Digital sharing of scientific results accelerates innovation, enhances reproducibility
- Metaservices strengthen FAIR (Findable, Accessible, Interoperable, and Reusable) data sharing

C. Amplified Impact & Network Effects
- Research infrastructures inherently complement and amplify each other
- creating a synergistic network effect
  (Metcalfe's Law: value of a network grows with square of number of participants)
- Interconnection fosters rigorous scientific approach and methodology
- Strengthening of collaboration and knowledge advancement.

Recommendations

1. Define Clear **Scientific Objectives**
- Research Infrastructures must explicitly articulate their scientific goals
- Establish a well-defined set of research questions to address

2. Foster a Strong **Scientific Community**
- Success of Research Infrastructures depends on strong community engagement.
- Support measures are essential to strengthen and sustain the scientific community.
- Effort of support teams should be better recognized

3. Implement **EasyFAIR** Principles:
- EasyFAIR framework - comprehensive and automated support for researchers is crucial to ensuring **FAIR principles** (Findability, Accessibility, Interoperability, and Reusability)
- **Open research data and reproducibility** to be mandated by funding agencies/scientific societies
- Scientists making an effort to **share research data** should be **rewarded**

4. Enhance **Reproducibility**
- Reproducibility is a critical priority
- Concrete **methodologies** must be established to ensure **comparability of experimental results** across different Research Infrastructures.

Recommendations

5. **Multi-year investment strategy**
- Research infrastructures should be designed according to a **longer-term roadmap**
- The roadmap should be supported by a **sustained investment strategy**

6. Establish **Common Abstractions**
- Standardized models should be widely adopted
- Describing experiments and associated frameworks
- This includes information models, data models, and ontologies.

7. Improve **Findability and Accessibility**
- Comprehensive **catalogues on available hardware and functionalities**
- **Discovery** and accessibility of testbeds resources
- Facilitates to **assess** how planned infrastructures contribute to **scientific diversity**

8. Define Standardized **Evaluation Criteria**:
- Clear **set of evaluation criteria** to assess the relevance and impact of Research Infrastructures
- “Testbed Evaluation” World Café outcome (c.f. report) collected suitable criteria
- **Different categories of testbeds** exist, so different assessment frameworks are needed

Recommendations

9. Optimize **User Experience**
- **Usability** for researchers must be a priority
- **Time to First Experiment** (TTFE) is an innovative metric
- **Education and training** is important

10. Ensure **Interoperability and Openness**
- Support for **interoperability between** testbeds
- Using **open components**
- Ability to easily **port experiments** across different infrastructures

11. Promote **Flexibility and Adaptability**
- Facilitating the modification of software artefacts, i.e. **malleability** of experiments
- Supporting **composability**

12. Support **Sustainable Development Goals** (SDGs)
- Large-scale Research Infrastructures can directly contribute to the SDGs
- Optimizing efficiency of **testbed hardware resource usage**
- Improving **workflows** from experiment design to result dissemination.
- Research findings allow to improve sustainability of **global IT infrastructure**

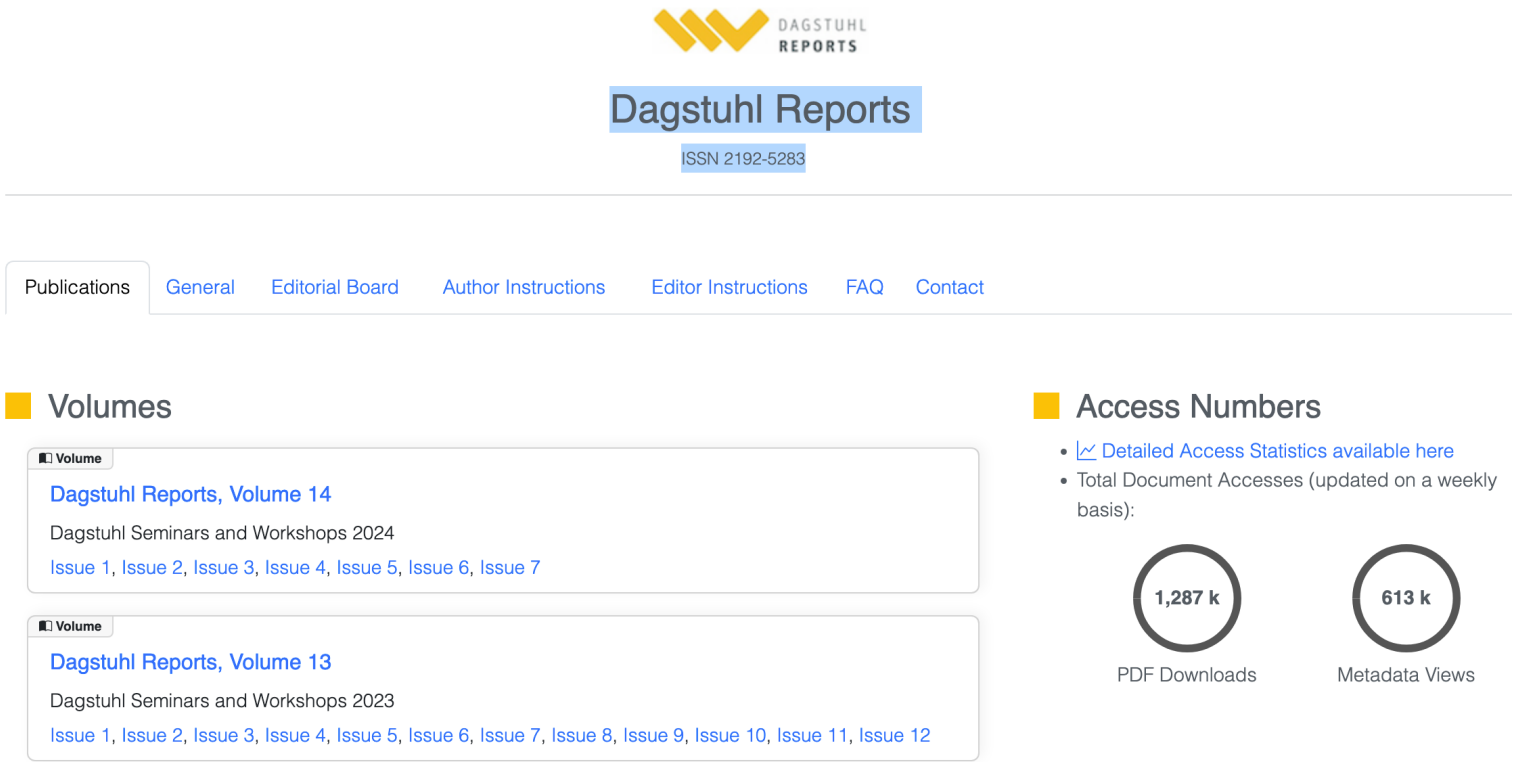
Report

SCHLOSS DAGSTUHL
Leibniz-Zentrum für Informatik

Report

Report of Seminar 24462 (32 pages) is published in Dagstuhl Report Series

- Dagstuhl Reports ISSN 2192-5283
- https://drops.dagstuhl.de/entities/journal/DagRep
- https://drops.dagstuhl.de/entities/document/10.4230/DagRep.14.11.60
- see https://www.dagstuhl.de/24462



The Networking Channel

Summary on Dagstuhl Seminar 24462

- Report on the Dagstuhl Seminar “Research Infrastructures and Tools for Collaborative Networked Systems Research”
- Wed, 19th of February 2025
- Time: 5 pm CET, 8am PST / 11am EST / 1am JST
- Speakers / Organisers:

- Georg Carle – TUM – Germany
- Serge Fdida – Professor of Computer Sciences, Sorbonne Université
- Kate Keahey – University of Chicago
- Henning Schulzrinne – Columbia University

- https://www.networkingchannel.eu
- Archived video from Wed, 19th of February 2025: https://www.youtube.com/watch?v=bUoNPBQ1xd0

Questions?