

EE HPC WG Teams:
join, engage, participate!



10th Annual Workshop



AGENDA

- Introduction – 10 minutes
- Team Members – 30 minutes
 - Greg Koenig
 - David Grant
 - Herbert Huber
 - Torsten Wilde



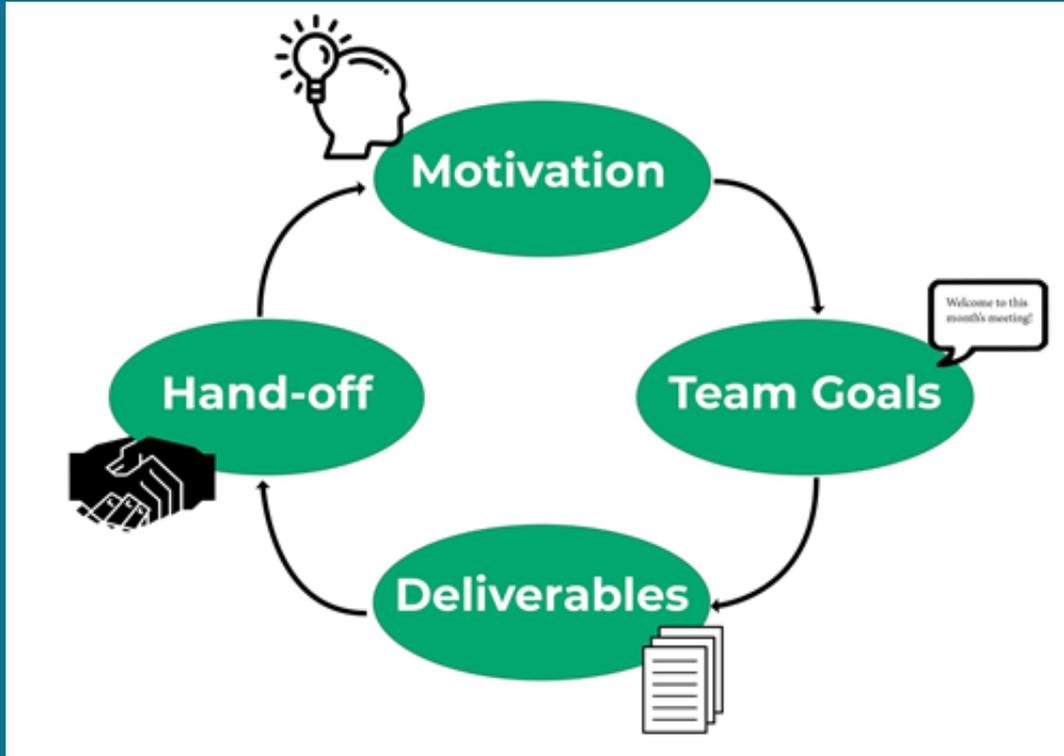
OUR MISSION

Sustainably Supporting Science through committed community action.



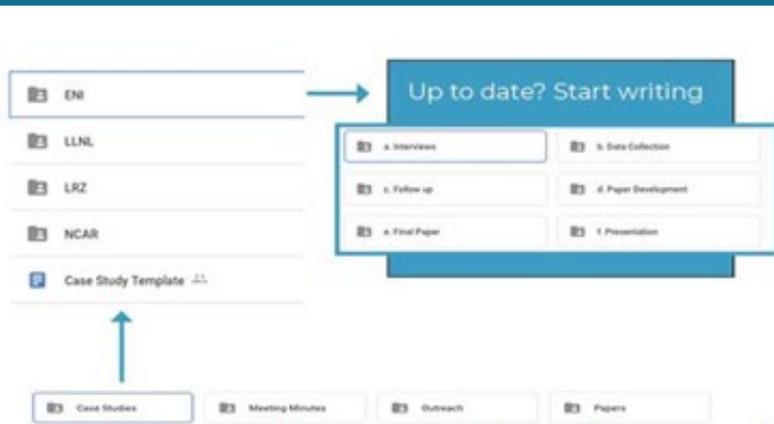


OUR TASK FORCE STRATEGY





OUR METHODOLOGY



Pro tip:
The *Navigation* document provides quicklinks to all of the documents in the Drive!

**COOLING
CONTROLS
TEAM**
REPOSITORY

Looking for more background information? Access minutes at any time to get more details.

October 1, 2019

Workshop: Multi-Source Cooling Control Algorithm
Luca Bortot, Walter Nardelli, Peter Seto

This paper describes how the automation team at ENI Green Data Center (GDC) solved the problem of controlling the temperature inside a data room that can be air cooled both with direct free-cooling and with water-based chillers and heat exchangers using a slide mode control design.



OUR TEAMS

	[TASK FORCE CONVENED]	[PRODUCING]	[PUBLICATION]	[HAND-OFF]
Cooling Controls				
Operational Data Analytics				
Power API				
Liquid Specifications				
Procurement				
Wx			CONFERENCE	ASHRAE
Power Measurement			CONFERENCE	GREEN500 & TOP500
Liquid Cooling Controls			WEBSITE	ASHRAE & REDFISH
EPA JSRM			CONFERENCE	POWER STACK
TUE			CONFERENCE	
Liquid Commissioning			WEBSITE	
Dashboard			CONFERENCE	
Grid Integration			CONFERENCE	
Commissioning				
Maintainability				
Policies				



Greg Koenig, KPMG

Computer and Data Scientist

- Why do I participate?
 - Years of research and experience
 - Opportunity to collaborate globally on areas of interest to my research focus.



EPA JSRM

Greg Koenig, KPMG

Panel: HPC, Big Data and AI
Friday 10:30-noon Room 205-207



TASK FORCE CONVENED

- Software is a big part of the opportunity for improved energy efficiency



PRODUCING

- Share early adopter experiences for Energy and Power Aware Job Scheduling and Resource Management (Global survey)
- Identify opportunities for influencing product development



PUBLICATIONS

- 2 workshop papers and 1 journal article (HPPAC'18, DAAC'18, Cluster Computing)



HAND-OFF

- Power stack
- *New Team? Policies wrt optimization capabilities*



Electric Grid Integration

Greg Koenig, KPMG



TASK FORCE CONVENED

- Linpack run stimulates WAPA call to LLNL
- Trend towards “Smart grid” and renewables



PRODUCING

- Share experiences with electric grid integration, esp. wrt demand response and contractual relationships (Europe and United States)
- Investigate impact of pre-exascale power loads and voltage swings on local electrical distribution systems and the grid (four sites in United States)



PUBLICATIONS

- 2 conference & 2 workshop papers (Energieinformatik'14, ISC'16, EEHPCSOP'19)



HAND-OFF

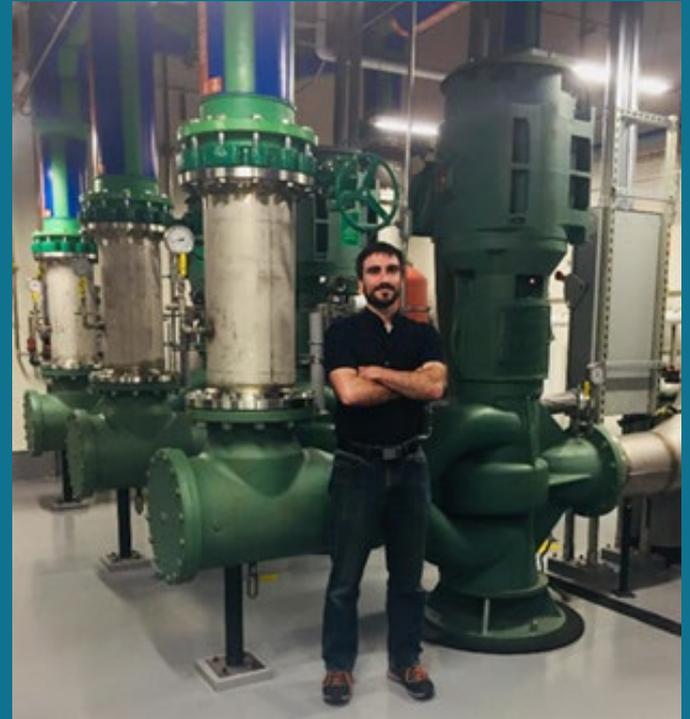
- Power stack



David Grant, ORNL

HPC Mechanical Engineer

- Why do I participate?
 - Top10 largest HPC facilities
 - Hear from and to share with other supercomputing centers about experiences and lessons learned.





Liquid Cooling Commissioning

David Grant, ORNL



TASK FORCE CONVENED

- Issues with commissioning large scale liquid cooled facility systems



PRODUCING

- Share early adopter experiences with commissioning large-scale facility systems for liquid-cooled HPC



PUBLICATIONS

- Whitepaper (<https://eehpcwg.llnl.gov/>)



HAND-OFF

- ASHRAE, in process
- *New Team? Investigate commissioning requirements for exascale; including local electrical distribution systems and the grid*



Liquid/Cooling Controls

David Grant, ORNL

Multi Source Cooling Control Algorithm
Friday 10:30-10:45 Room 704-706



TASK FORCE CONVENED

- Instrumentation and data collection opens doors for controls



PRODUCING

- Share early adopter experiences for cooling control systems for HPC data centers
- Identify opportunities for influencing product development- data inputs



PUBLICATIONS

- Whitepaper (<https://eehpcwg.llnl.gov/>) - data inputs
- Workshop paper (DAAC'19)



HAND-OFF

- Redfish, ASHRAE, Power API - data inputs
- TBD
- Procurement Considerations Team



RAS and Maintainability

David Grant, ORNL



TASK FORCE CONVENED

- Opportunity for predictive and condition based preventive maintenance



PRODUCING

- Share experiences on metrics, collaboration between diverse organizations, predictive and condition based preventive maintenance



PUBLICATIONS

- TBD



HAND-OFF

- TBD



Herbert Huber, LRZ

Department Head of HPC Systems

- Why do I participate?
 - Innovator for direct liquid cooling.
 - Opportunity to influence the broader ecosystem with a global voice.





Procurement Considerations

Herbert Huber, LRZ

Procurement BoF (Gert Svensson)
Tues 12:15-1:15 Room 607



TASK FORCE CONVENED

- Encourage HPC sites to consider energy and cooling efficiency during procurement of HPC systems
- Influence product development for energy efficient HPC system design



PRODUCING

- Update document with focus on improving document structure & major content update to Cooling Section and new Facility Integration Section



PUBLICATIONS

- EE Considerations for HPC Procurements: 2013, 2014 and 2017
- 2019 version under final review



HAND-OFF

- On-going updates



Operational Data Analytics, Herbert Huber, LRZ

Data Analytics BoF (Michael Ott)
Thursday 12:15-1:15 D171



TASK FORCE CONVENED

- Dashboard Task Force identified a few early adopter sites
- Investigate 'why' do it



PRODUCING

- Collected/synthesized general information on integrated data analytics from several early adopters
- Gather information on other early adopters and focus on use cases and implementation challenges



PUBLICATIONS

- 2 workshop papers and a Poster (EEHPCSOP'19, IPDPS'19)



HAND-OFF

- TBD



System Power Measurement, Herbert Huber, LRZ

Green500 BoF (Wu Feng)
Wed 17:15-18:45 Room 503/504



TASK FORCE CONVENED

- More accurate HPC system architectural trend data



PRODUCING

- Develop system workload power measurement methodology
- Encourage adoption of highest quality power measurement submissions to Top500 & Green500



PUBLICATIONS

- 2 Conference Papers (ACM/SPEC 2014, SC15)
- Power Measurement Methodology (<https://www.top500.org/green500/resources/>)



HAND-OFF

- Green500 & Top500
- *Other benchmarks (e.g., GreenGraph500)*



Torsten Wilde, HPE

Master System Architect

- Why do I participate?
 - Opportunity to understand user requirements and to interact collaboratively with other vendors.
 - It helps me to design better solutions.
 - Enables me to do a better job as an influencer within and outside of HPE.



Liquid Cooled Rack Spec

Torsten Wilde, HPE



TASK FORCE CONVENED

- Encourage liquid-cooled solutions that do not require compressors
- Increase ease of deployment by “standardizing” facility & HPC equipment.



PRODUCING

- Input to next edition of ASHRAE TC9.9 Liquid Cooling Guidelines for Datacom Equipment Centers.
- Input to Open Computer Project specification for warm water liquid cooled rack



PUBLICATION

- TBD



HAND OFF

- TBD



Power API

Torsten Wilde, HPE

Power API BoF (Ryan Grant)
Tue 12:15-1:15 Room 607



TASK FORCE CONVENED

- Power API Specification promises cross-platform power management tools
- EE HPC WG can help to promote and encourage deployment



PRODUCING

- Comprehensive specification that covers multiple interfaces for many roles/levels of system
- Reference implementation, a community effort – multiple stakeholders



PUBLICATIONS

- Specification and implementation - <https://eehpcwg.llnl.gov/power-api.html>



HAND-OFF

- Next version of the specification



OUR COLLABORATION

Contribute your expertise and join us for **monthly membership meetings, webinars, or publish a paper!**



ODA team on-site in Kobe

We'll be back in Kobe for
EE HPC SOP, September 2020!

What do YOU want to
contribute?



Thank you!

<http://eehpcwg.llnl.gov>

natalie.jean.bates@gmail.com