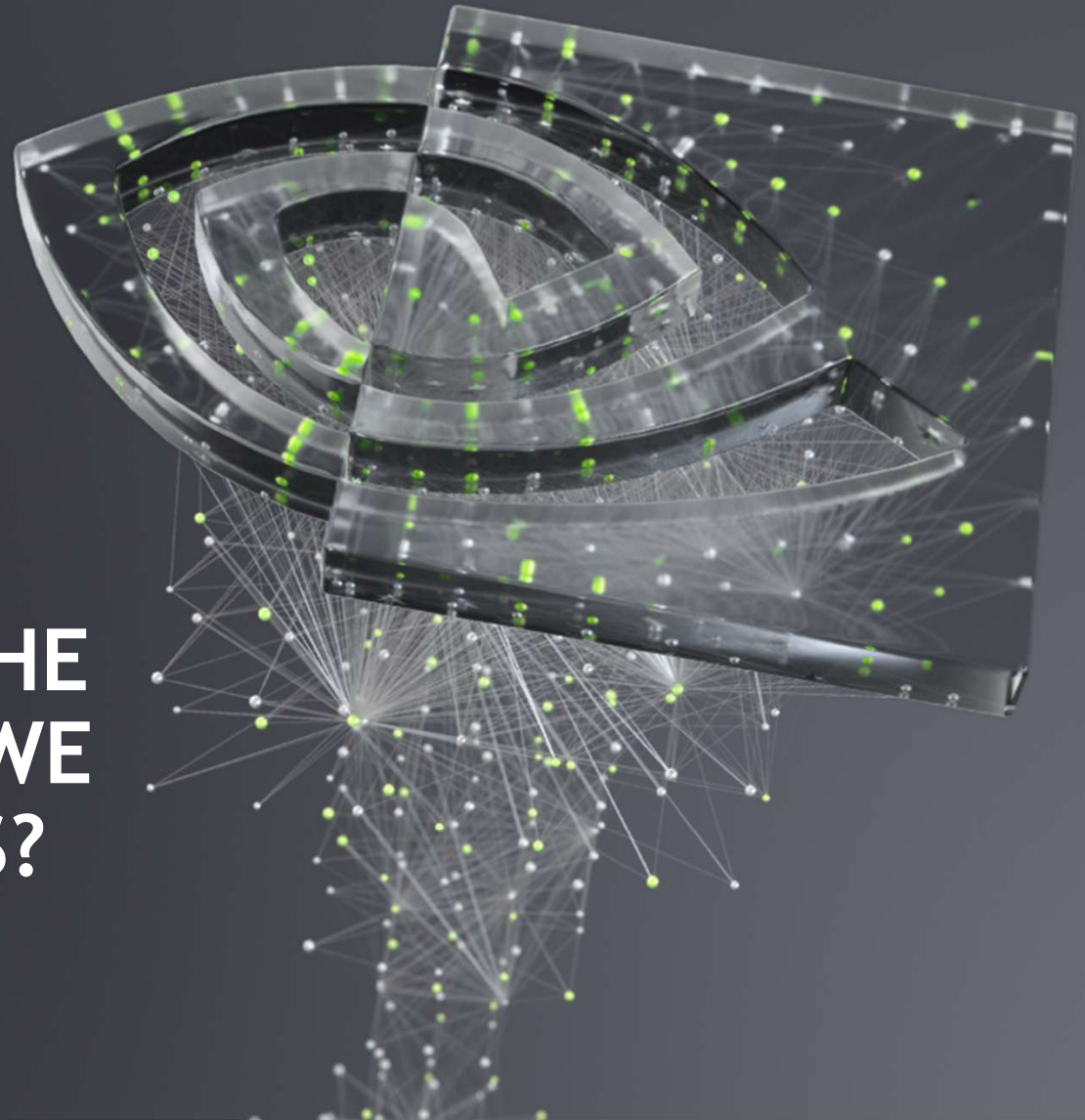




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# WORKFLOWS ARE THE FUTURE. HOW DO WE MEASURE PROGRESS?

Ian Karlin



# HPL HAS MANY VIRTUES

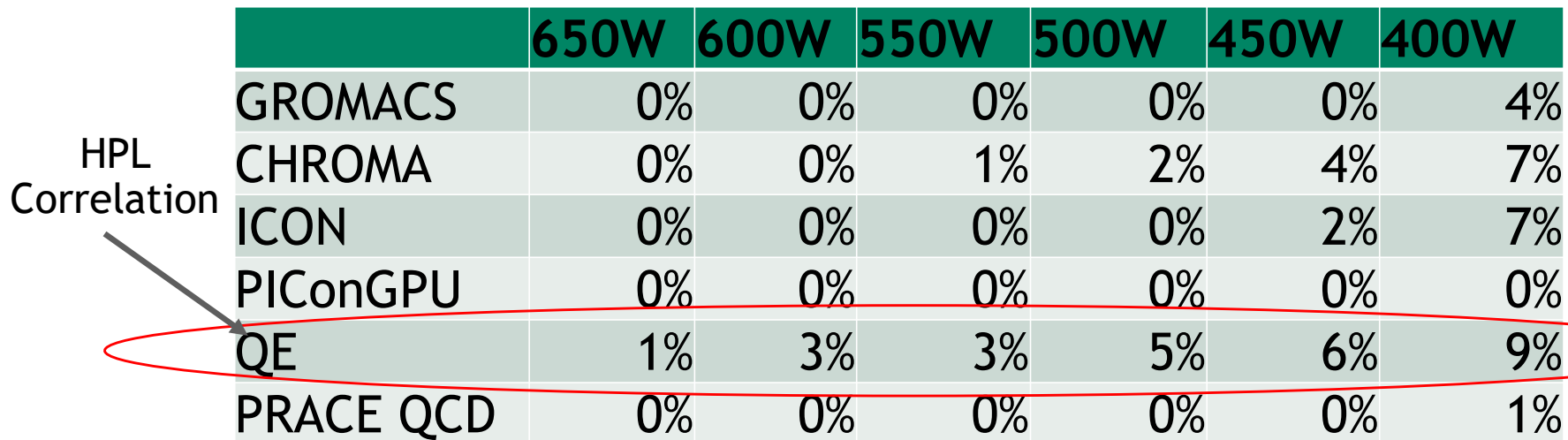
Many pointed out at this conference

- Easy to run benchmark that doubles as a burn in test
- Long set of historical data showing progress and trends in HPC
- When created highly correlated with most applications
- Messaging of systems on the list is easy
  - One number that is easy to compare and message in the press and congress

# HPL IS NOT ALIGNED WITH ALL APPS

In addition to things mentioned earlier it leads to power overprovisioned systems

HPL Correlation



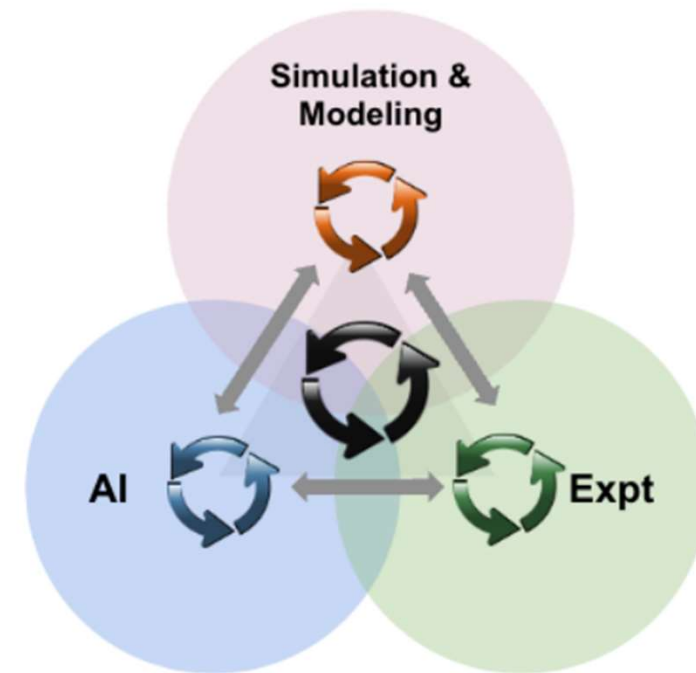
	650W	600W	550W	500W	450W	400W
GROMACS	0%	0%	0%	0%	0%	4%
CHROMA	0%	0%	1%	2%	4%	7%
ICON	0%	0%	0%	0%	2%	7%
PICongPU	0%	0%	0%	0%	0%	0%
QE	1%	3%	3%	5%	6%	9%
PRACE QCD	0%	0%	0%	0%	0%	1%

Can lead to systems running at about half the system level TDP.  
Another form of stranded resources in systems.

# ALSO THE SCIENTIFIC WORKLOAD IS EVOLVING RAPIDLY

Mixed workflows are driving science forward

- AI enhanced simulation increasing efficiency
- Edge connected computations increasing in importance
- Digital twins used to enhance scientific insight
- Simulations for these workflows often use multiple fidelities some CPU and some GPU



N10 RFP Workflows

# AS MENTIONED THIS WEEK SYSTEM CHANGE MIGHT BE NEEDED

Multiple partitions in system could evolve to run a workload more efficiently

- Optimizations of sections via different:
  - Nodes
  - Network ratios
  - Etc.
- While better for science how do we make sure these systems are not devalued because HPL can not run on/across all node?

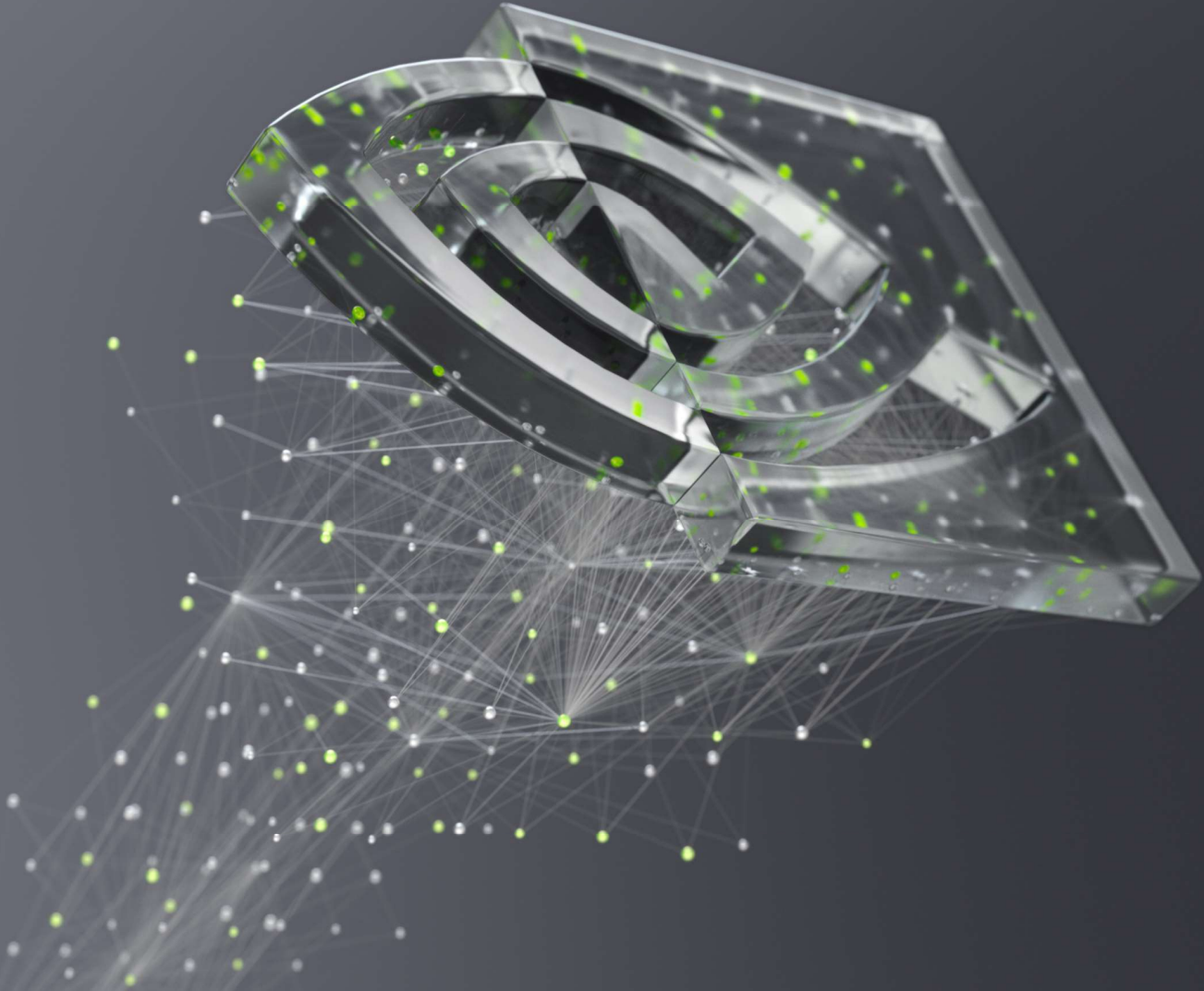
## WHAT IS NEEDED?

- We need a new way of ranking systems that keeps the good of HPL
  - Easy to message
  - Easy and not too expensive to run
  - Trackable over time
- While rewarding innovative designs and not creating bad incentives
  - Once again correlated with science needs
  - Flexible with changing applications needs

# POINT SOLUTIONS EXIST BUT NOT COMMUNITY ONES

Also, most do not reflect the modern emerging science workflows

- SPEC Benchmarks
- HPC Challenge included HPL
- Large procurements use application suites that reflect each sites needs and evolve



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