Current provision & future directions at Pawsey Supercomputing Centre

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The Pawsey Supercomputing Centre is an unincorporated joint venture between

CSIRO, Curtin University, ECU Edith Cowan University, Murdoch University, The University of Western Australia

and proudly funded by

NCRIS National Research Infrastructure for Australia, An Australian Government Initiative; Government of Western Australia

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Pawsey Supercomputing Centre

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supercomputing centre

Supporting Australian Researchers

1673
researchers

179
projects

46
staff

MAKING TOMORROW HAPPEN TODAY

through

- supercomputing
- data
- visualisation
- training & consulting

National Reach

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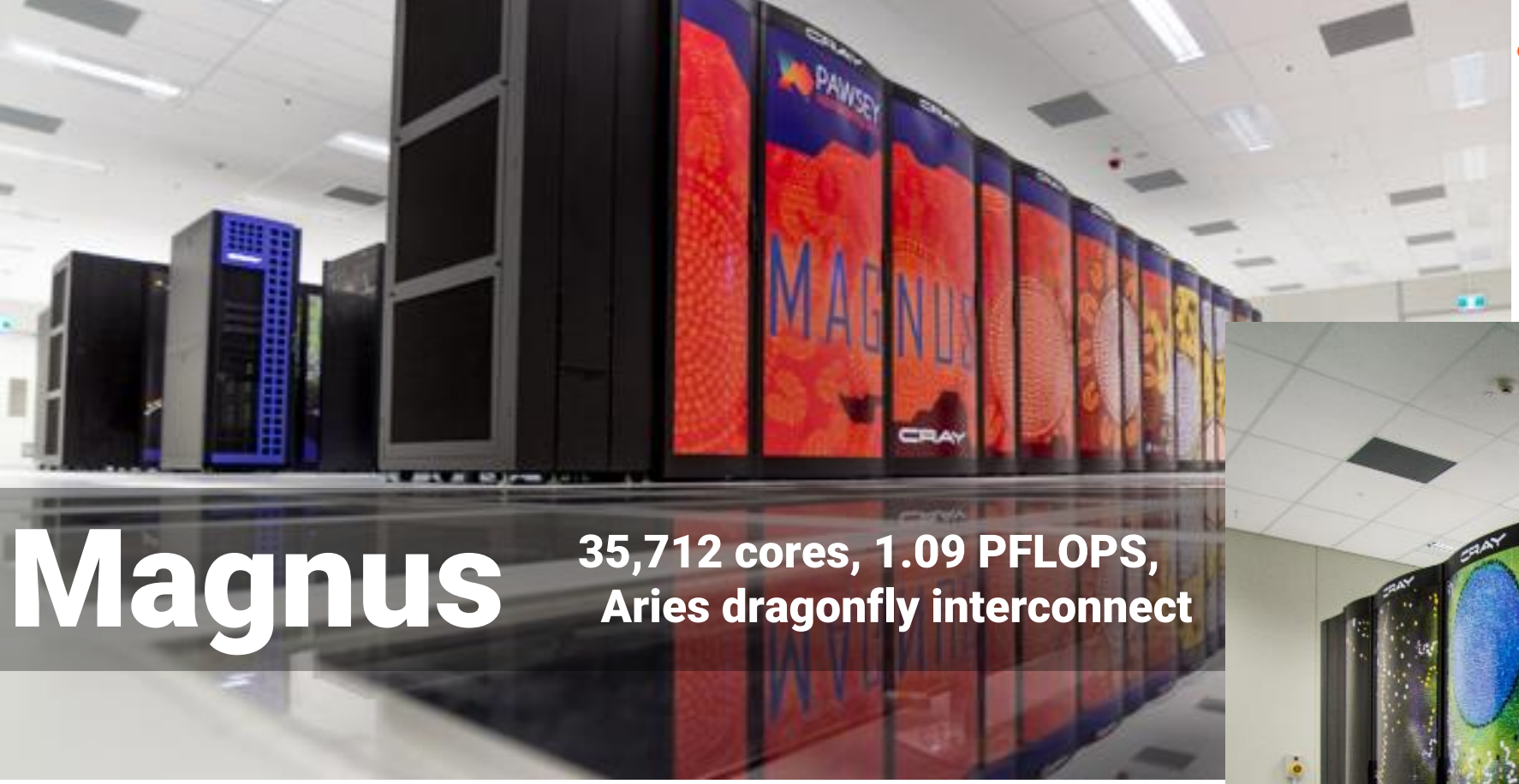
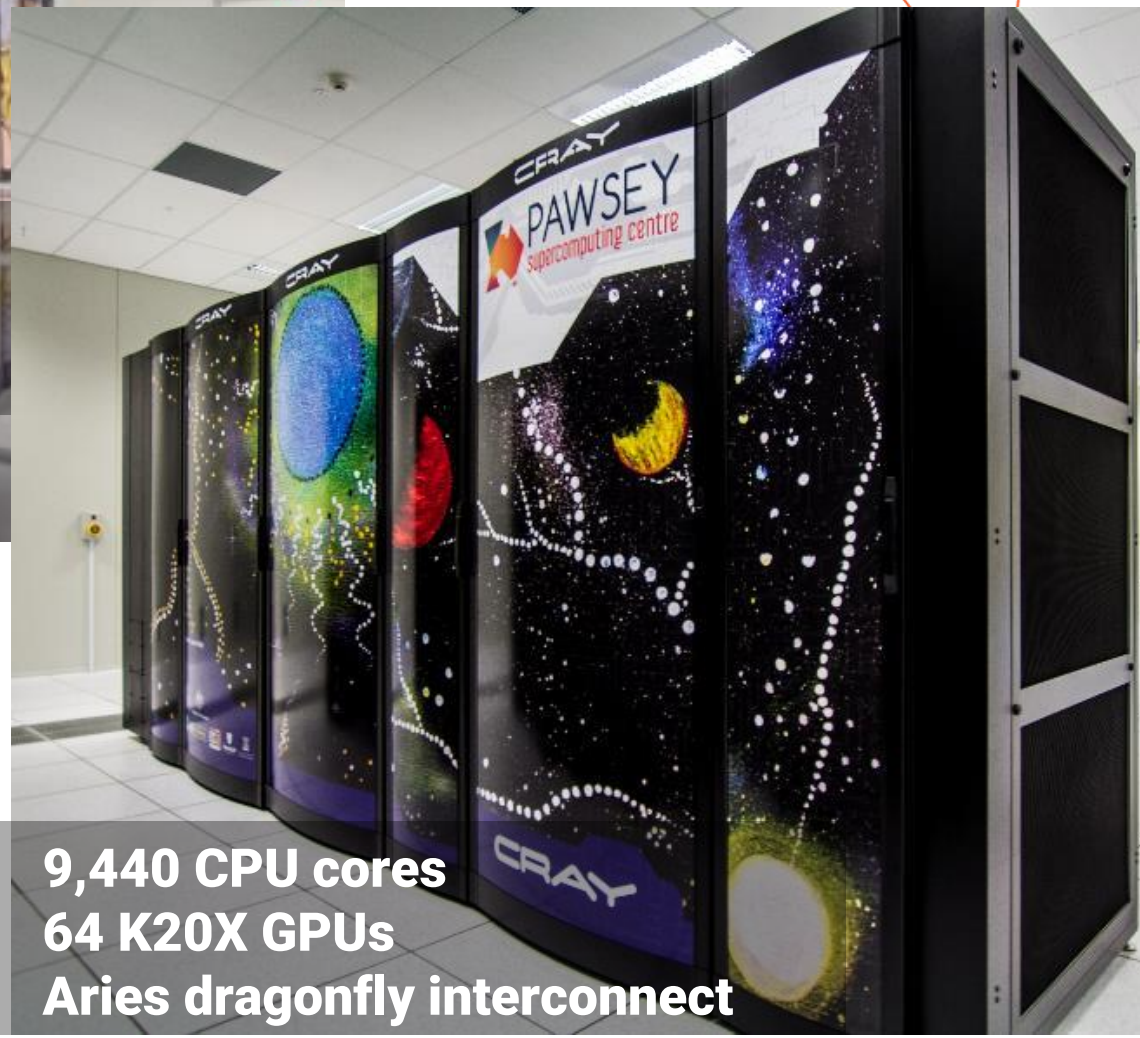


Magnus

35,712 cores, 1.09 PFLOPS,
Aries dragonfly interconnect



Galaxy

9,440 CPU cores
64 K20X GPUs
Aries dragonfly interconnect

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Zeus Supercomputer

20 visualization nodes
44 Pascal GPUs for GPU computing
80 Xeon Phi nodes for many core jobs
1 TB large memory nodes
2,240 CPU cores for serial codes
FDR/EDR Infiniband interconnect

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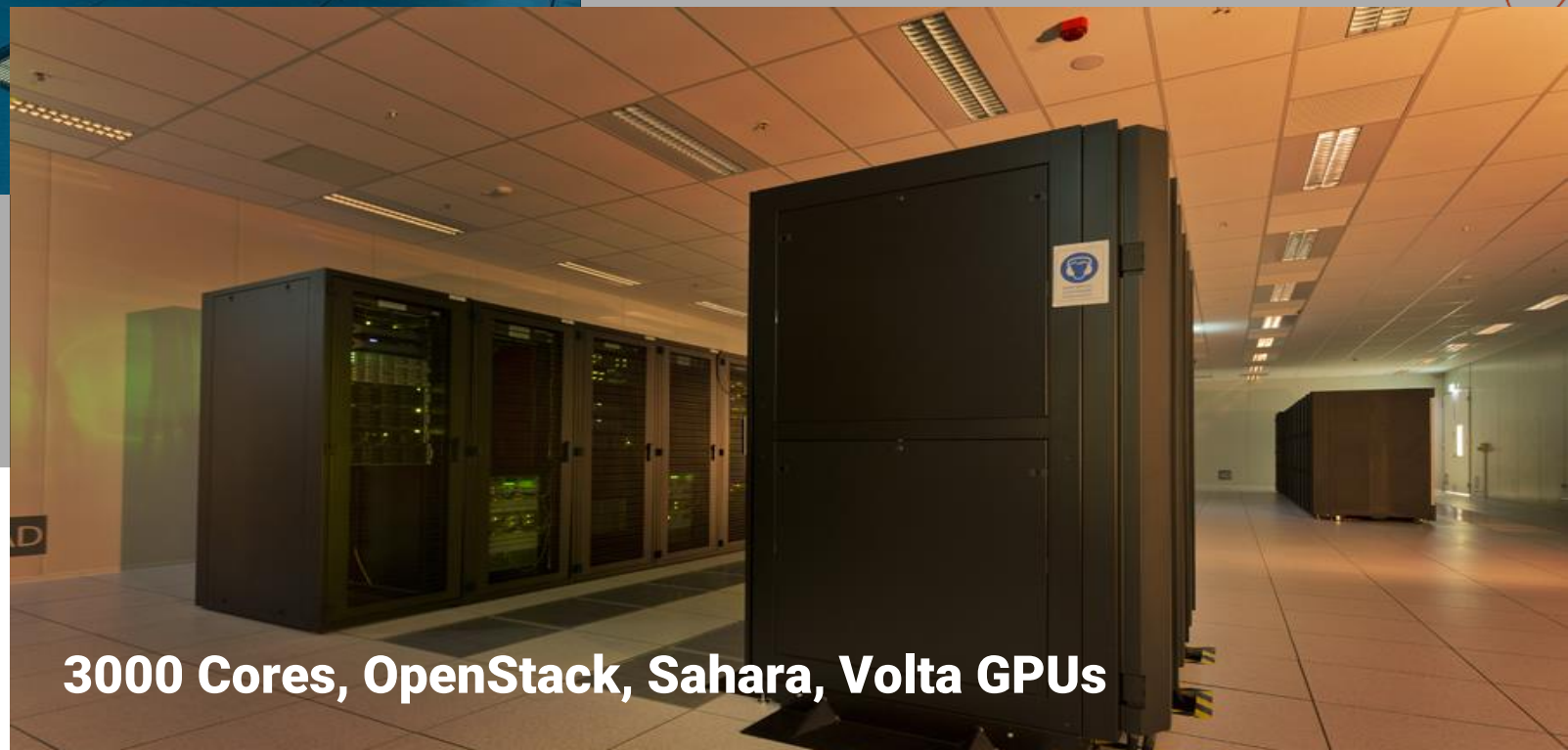
65 PB Migrating Disk and Tape

Data Storage

Nimbus Research Cloud



3000 Cores, OpenStack, Sahara, Volta GPUs

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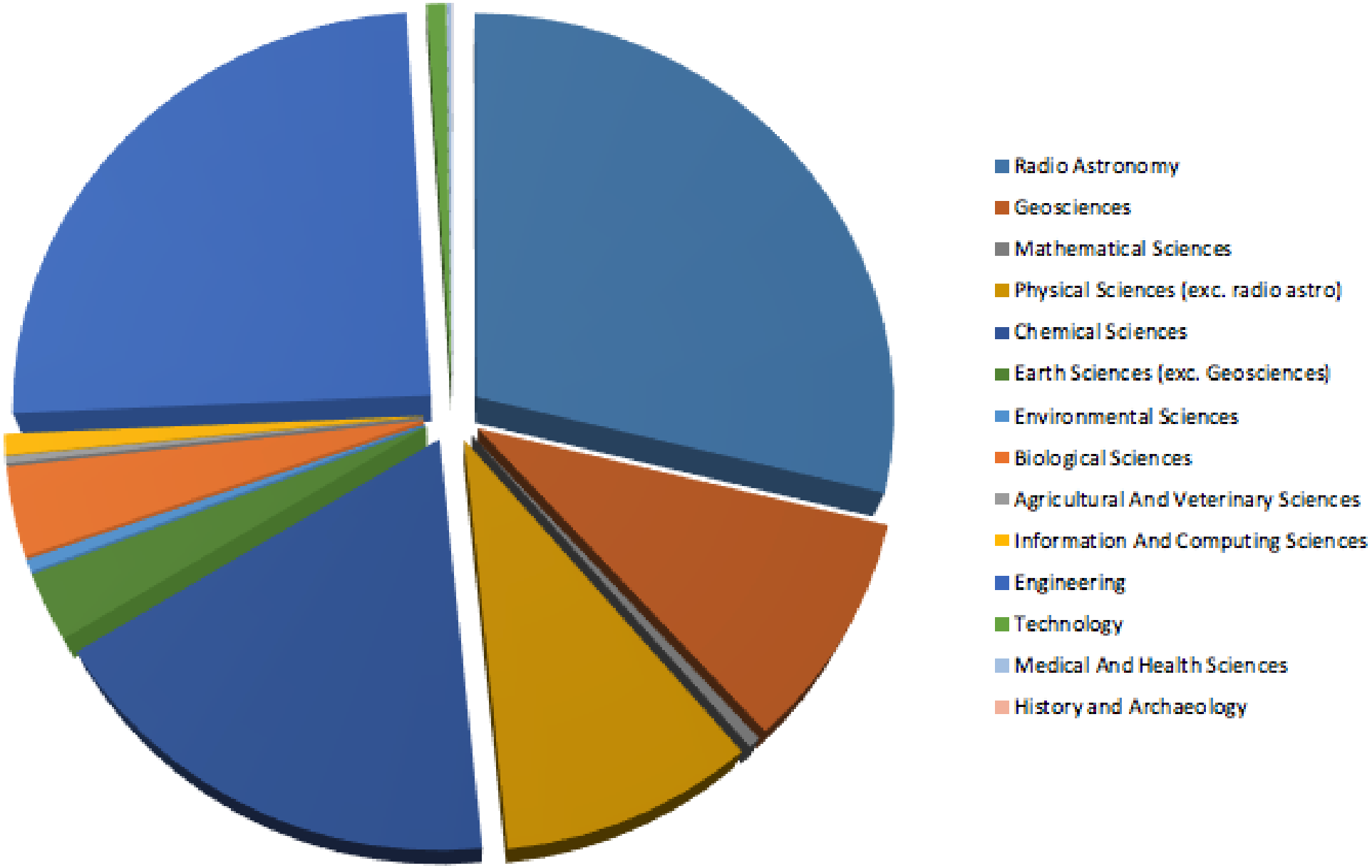
Usage by science domain 2019



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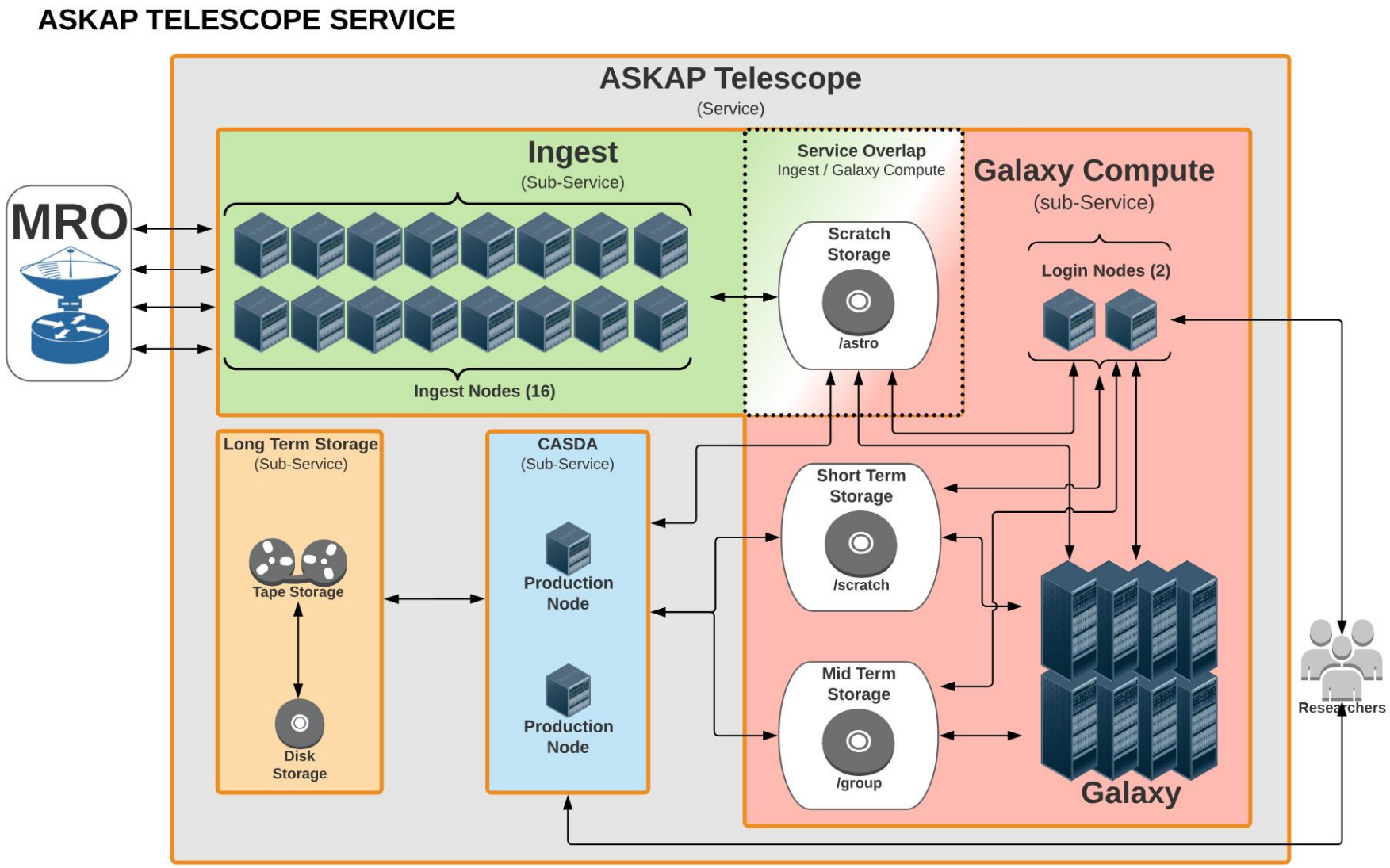
Real-time data ingest



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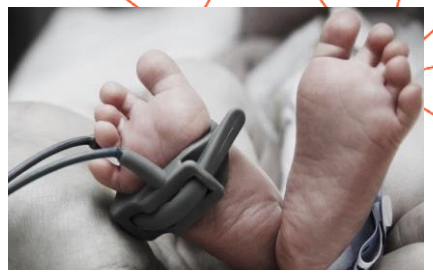
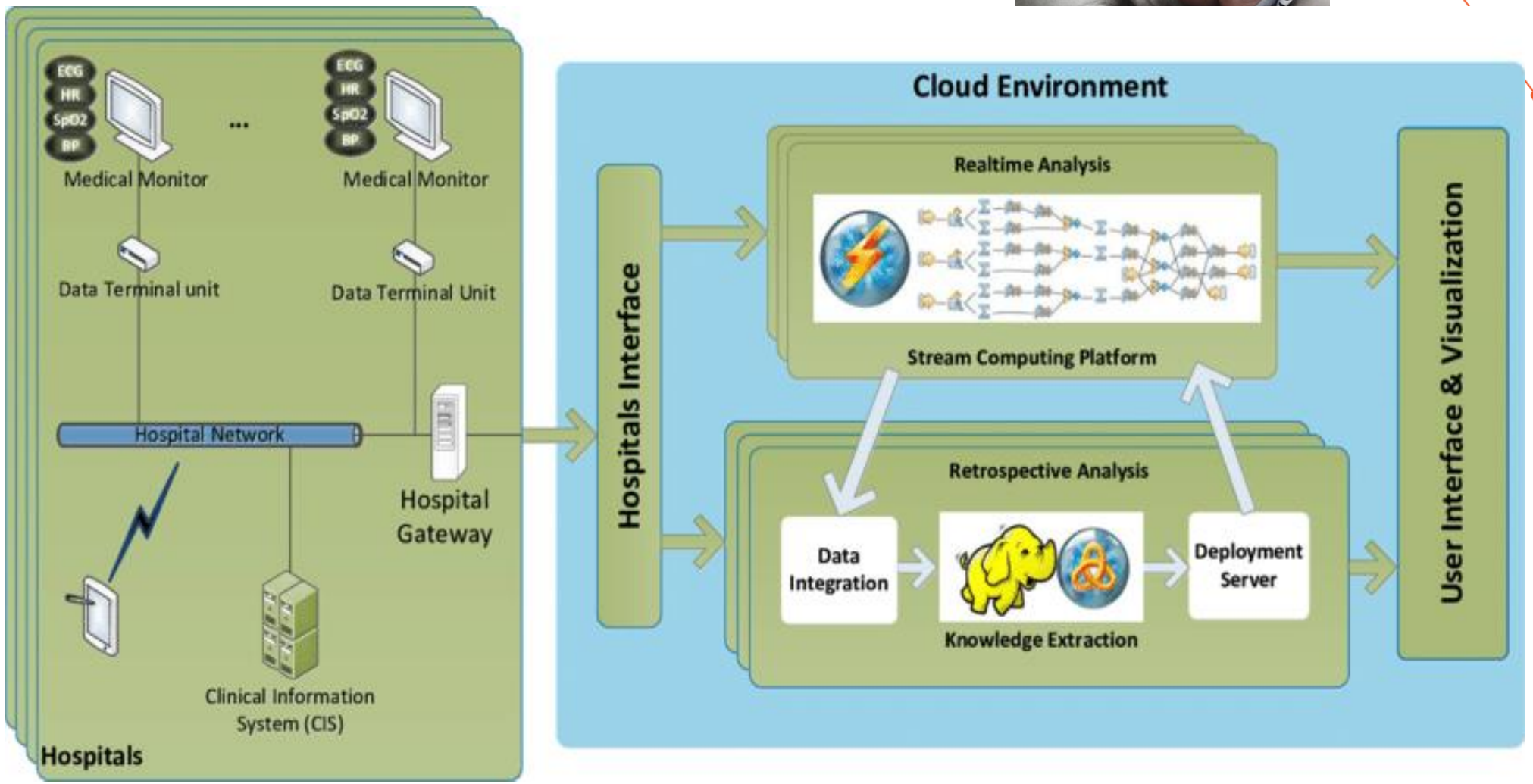
Real-time data ingest

ARTEMIS: A neonatal Internet of Things.





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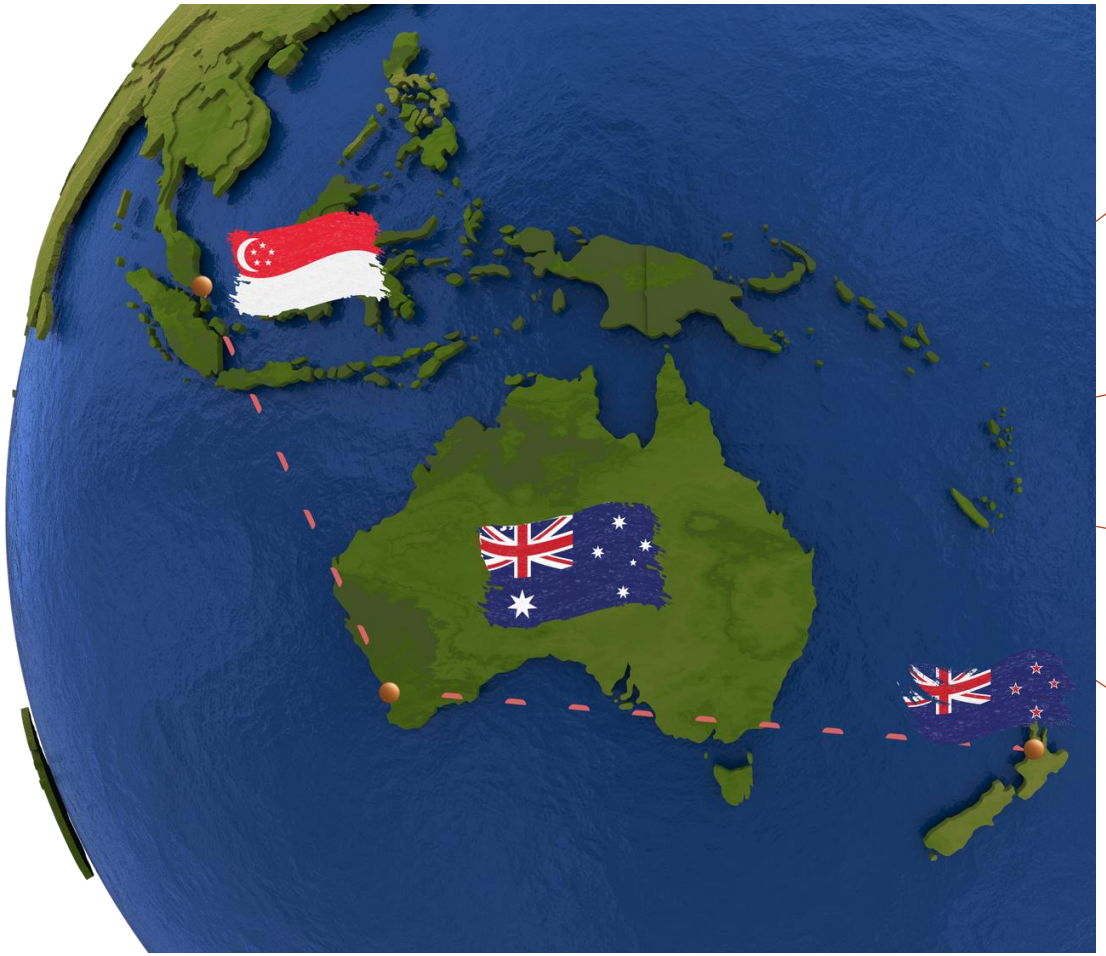
Future outlook - Capital Investment

- $70 million capital refresh
- ~ 2/3 for compute, 1/3 for storage and network
- Few small procurements - out to market (multiple areas)
- Collaborations commencing with institutions

Collaboration networks



Distance

8,300KMs between Sin-NZ

Small disparate pop'n

~34.5 Mil (Aus/NZ/Sin) vs 36 Mil in Tokyo (101KMs wide / 34KMs long)

Resource limited

Training
Staff
Infrastructure

Economic

Need for global competitiveness

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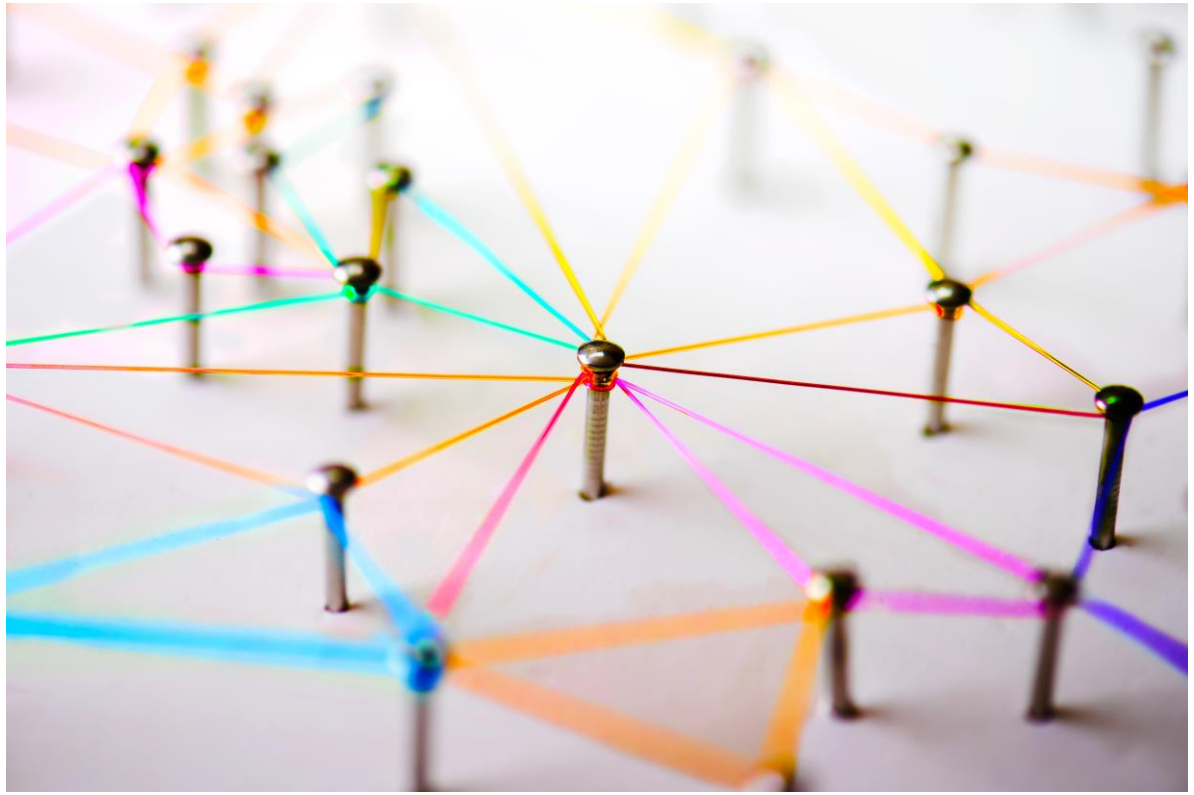
Collaborative networks - Easy?



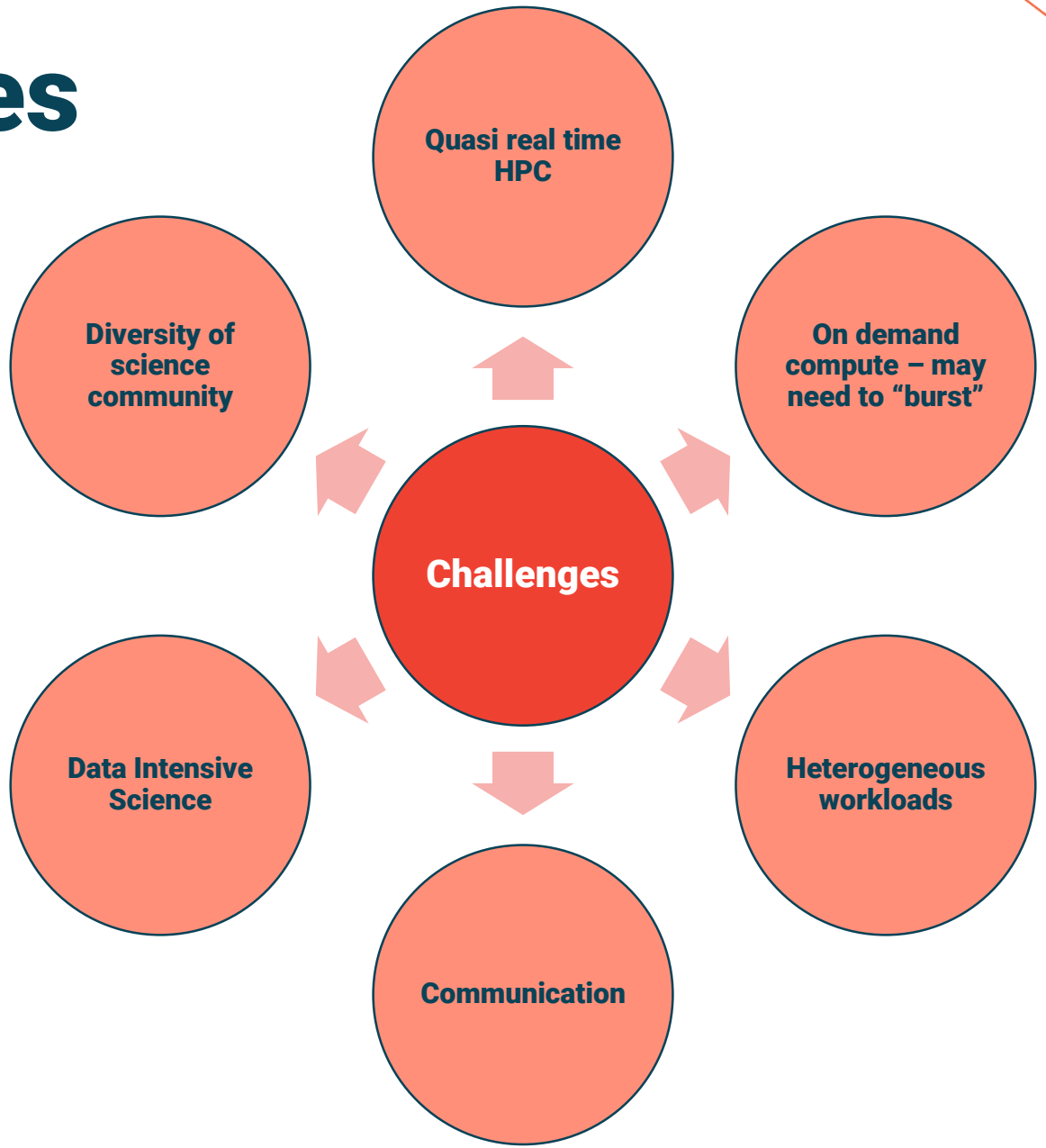
- Hard to achieve
- Even harder to sustain
- Often multiple challenges
- Many diverse stakeholders
- Complex financial models
- Benefits - diverse

Should we still *try*? Future HPC dictates it

Future of HPC

- Unified model: Converged architecture
- Software defined infrastructure
- Machine learning & AI
- Integrated workflows
- New scientific domains
- Dynamic, real-time scheduling
- Safely handling sensitive data
- Synergies: solve large scale science problems (SKA, LHC)

Challenges



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Challenges cont

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Solutions (?)

- Storage
- Heterogeneous workflows
- Data Management
- Development workloads
- Security
- Quality of Service

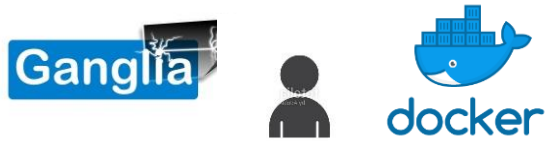
- Hybrid cloud
- Federation

- Workflow mgmt.
- Interactive Vis.

- RUCIO
- Meerkat

- SchedMD/Elastic workloads

- Smart contracts/blockchain



- Re-frame
- Ganglia
- Containers
- Secondment

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Questions?

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