



DATA CENTRE

RETRANSFORMATION



ALAN BERESFORD, MD ECOCOOLING

KEYNOTE 2

'FLIPPING THE COIN'

Keynote Speaker 10:30 – 11:00 Pier Room



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Alan Beresford, MD EcoCooling

Keynote 2

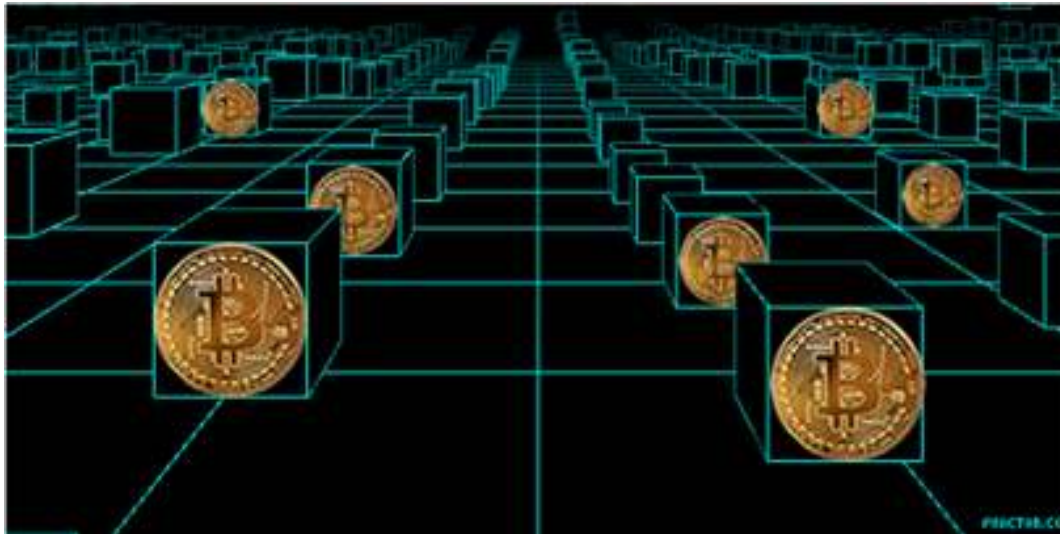
'Flipping the Coin'



What can we learn from cryptocurrency?



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- Focus on turning processing capacity into profit
- Speed of deployment
- Simplicity
- Geo-redundancy
- Total cost of ownership



Bitcoin mining



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Bitcoin to the Boden Type Data Centre



- To share the experience of 150MW of cryptocurrency installations in 2018
- How this has been applied to the Horizon 2020 funded Boden Type Data Centre
- The application of these techniques to emerging markets



Hydro66 – Phase 1



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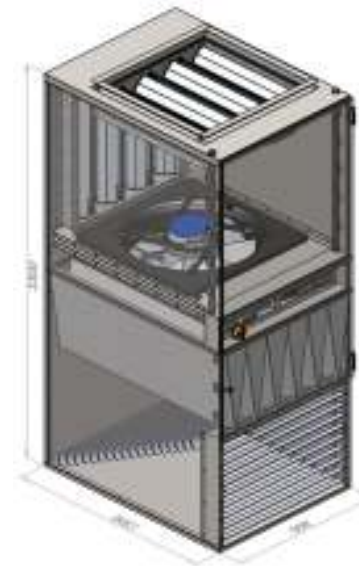
HYDRO66



Hydro66 – Phase 2



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- Flexible design to accommodate reconfiguration
- Fresh air – no cooling
 - Heat rejection....
- Data centre – not chicken shed!!



Hydro66 – Phase 3 onwards



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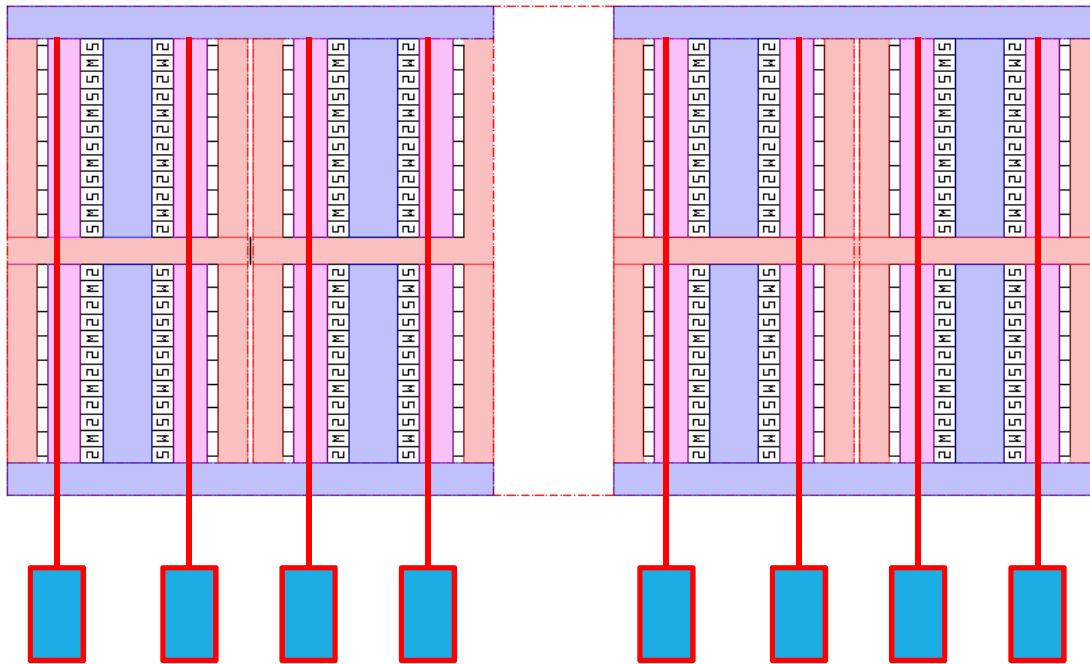


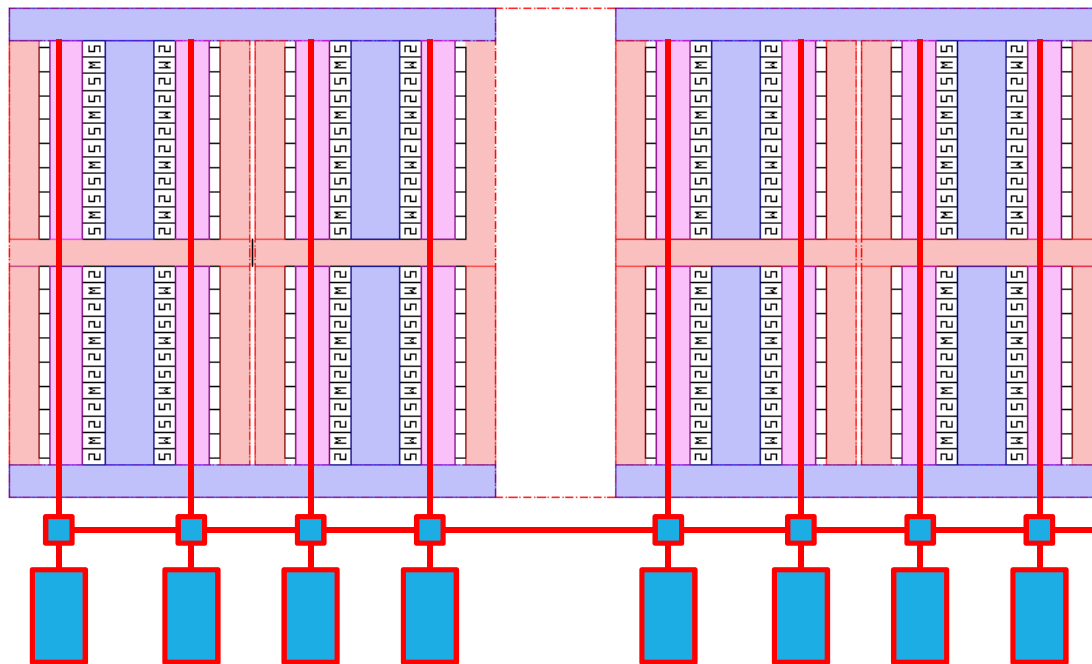


BLOCKBASE MINING-AS-A-SERVICE



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Concurrent
Maintainability Option

Rapid Deployment



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Key Facts:

- 5MW per week deployed
- 75kW per rack
- 2hr build time per 200kW

Key Techniques

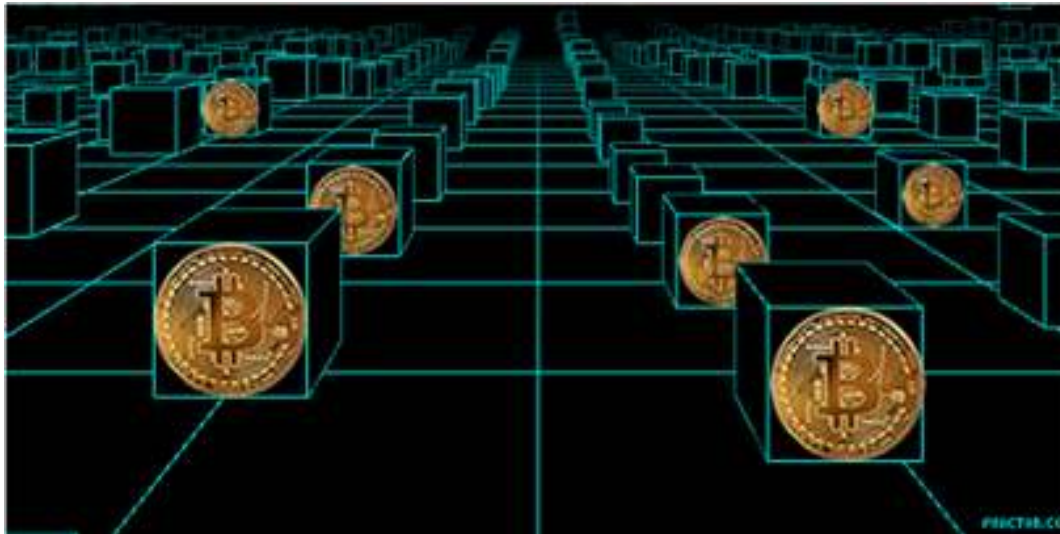
- Plug and Play
- Assume 'dark' operation
- Semi-skilled installation



What have we learnt from cryptocurrency?



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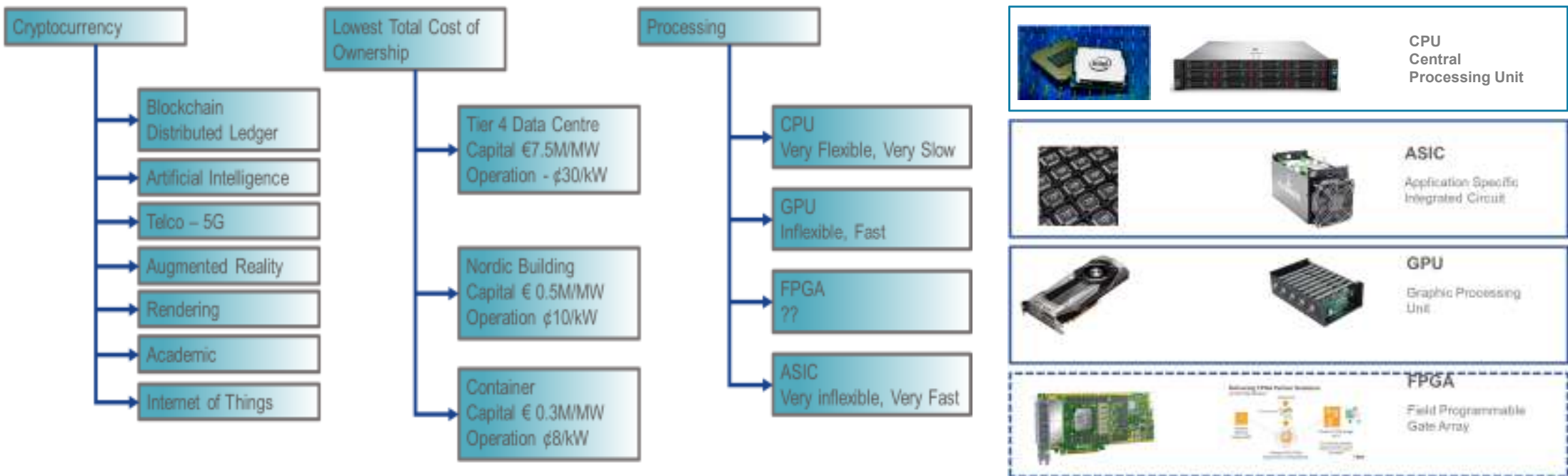
- Low, low, low cost!!!
 - OPEX
 - CAPEX (fast depreciation)
- \$/Hash – not PUE
- Speed of deployment
- Application specific devices
- No redundancy:
 - Is Bitcoin the largest geo-redundant system on the Earth?
- Simplicity!!



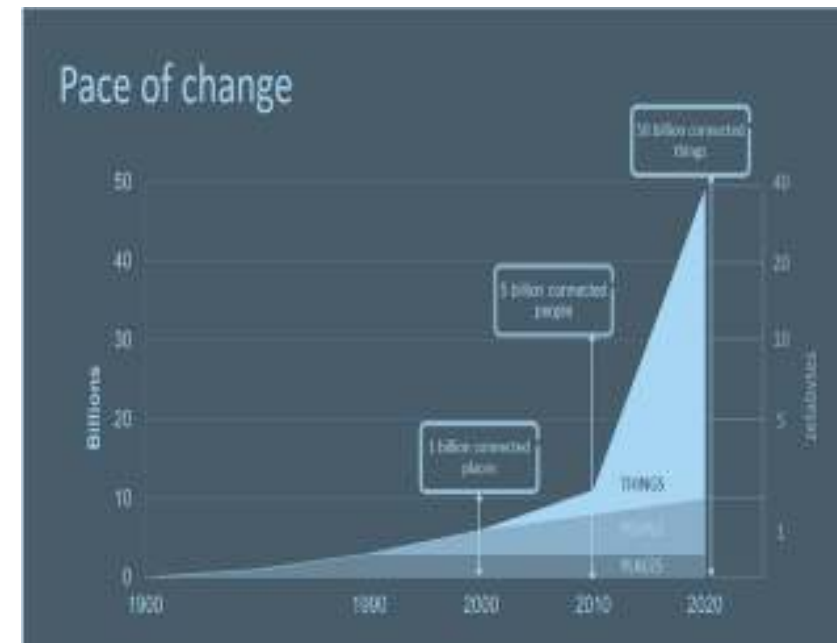
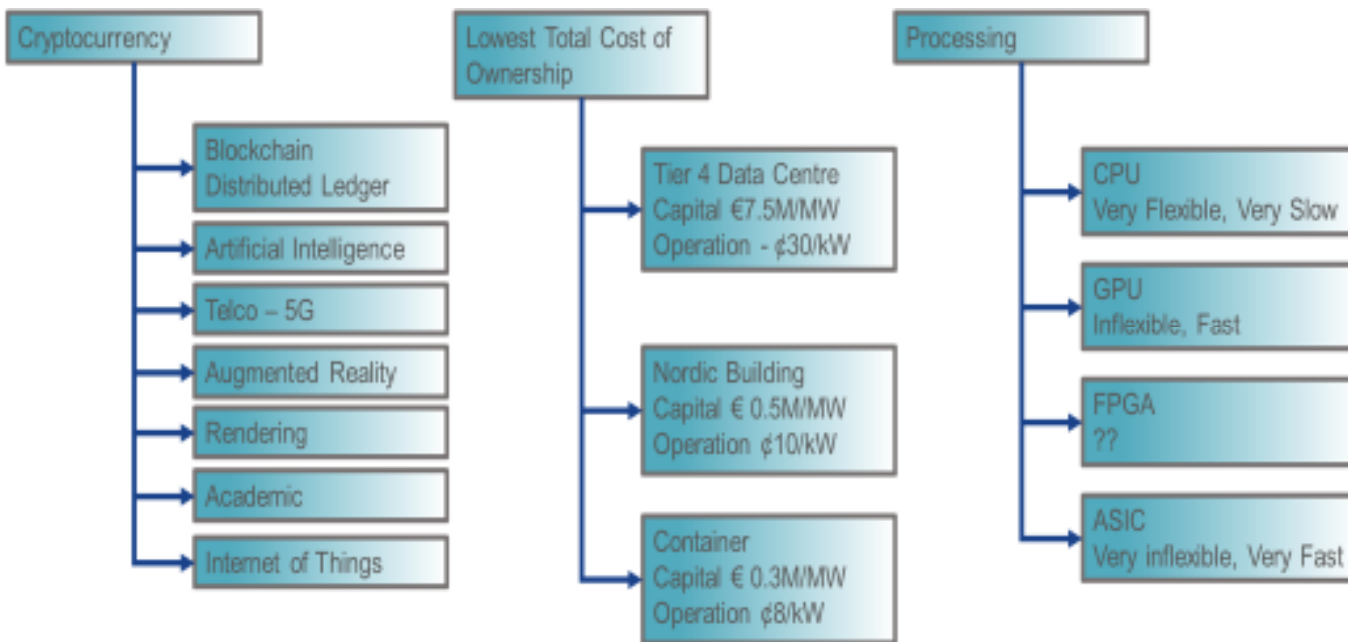
Emerging Markets



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Emerging Markets



The Boden Type Data Centre



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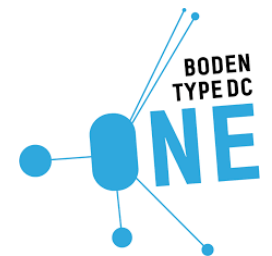


- Efficient
- Flexible
- Modular
- Simple

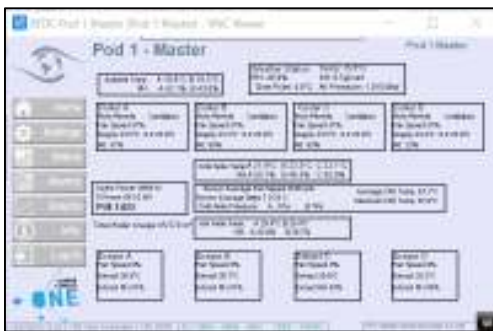
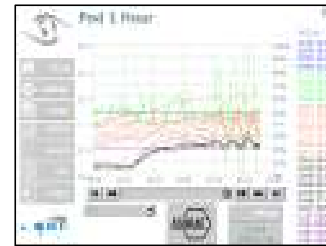
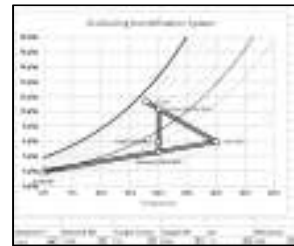
Pod 3
ASIC
1MW
Vent

Pod 2
HPC/GPU
220kW
Vent/Part Cool/Humidify

Pod 3
Open Compute
140kW
Vent/Cool/Humidify



Pod 1 Phase 1 – Open Compute



- Dynamic loading to reflect 'smart city' IoT demands
- Link the cooling system to the total power draw of the data centre
- Operate to ASHRAE Recommended standards
- First time or cooling system to read server information
 - Chip temperatures
 - Fan speeds
- **PUE 1.03 including humidification**



Pod 3 ASICS



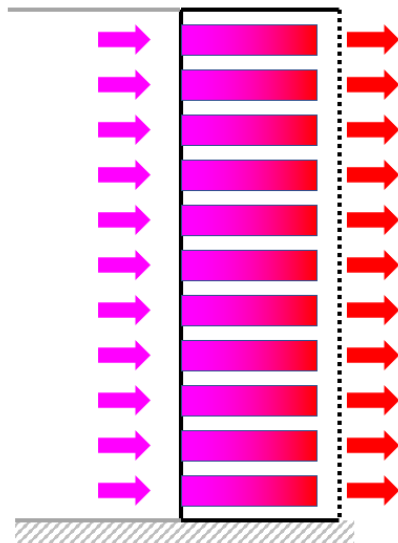
- Dynamic control of cooling fans to exactly match the ASIC fans
- Total containment of hot air
- Up to 40CΔT
 - **MCpΔT**
 - **Fan energy ∝ rpm³**
- Capacity for 100kW per rack
- **PUE 1.003**

Containment

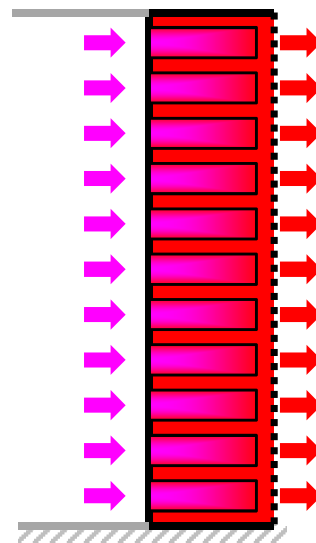


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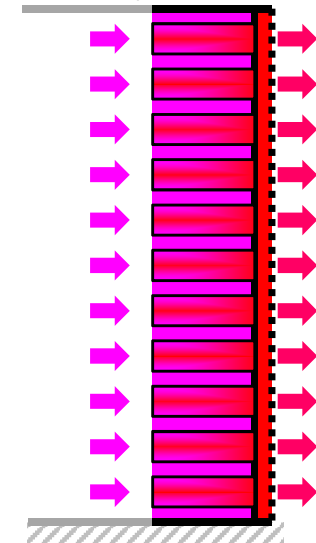
Cold Aisle Containment



What really happens



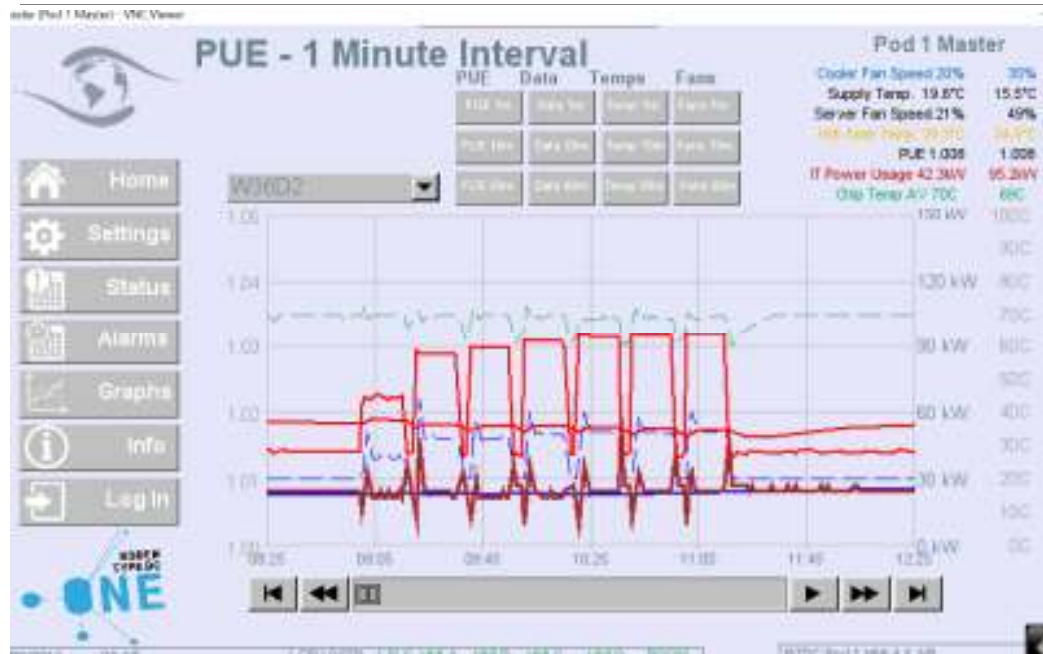
The most efficient way!!



Pod 1 Phase 2 – Open Compute



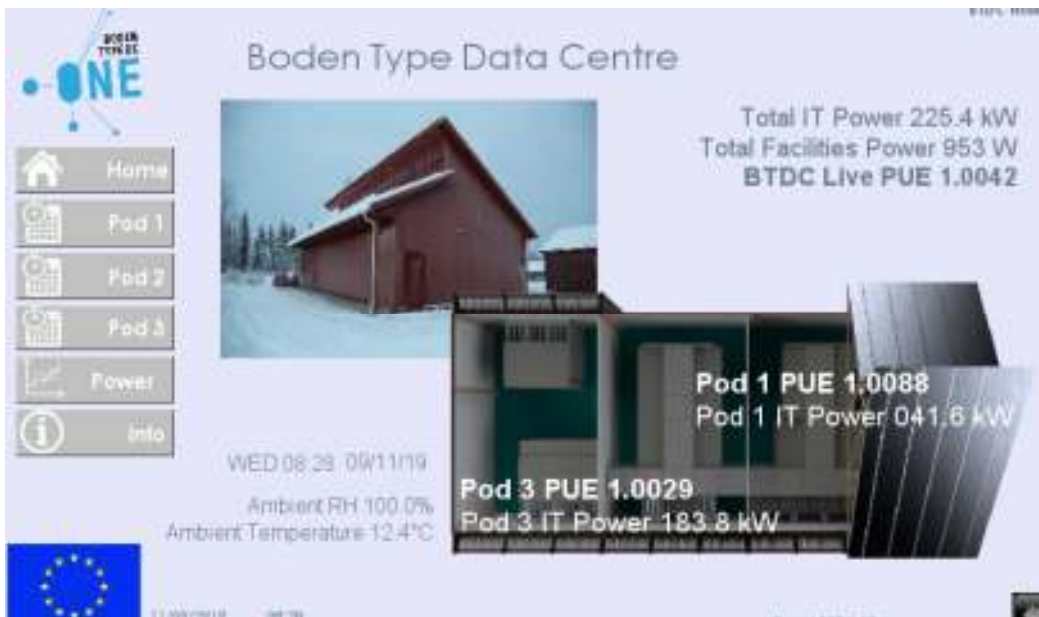
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- Reprogramming of server fan control algorithm
- Maintain chip temperature at 75C using a PID control loop
- Synchronise cooling fans with aggregate of server fans
- Lower the supply temp!
- Reflect real work loads
- **PUE <1.01**



Boden Type Data Centre



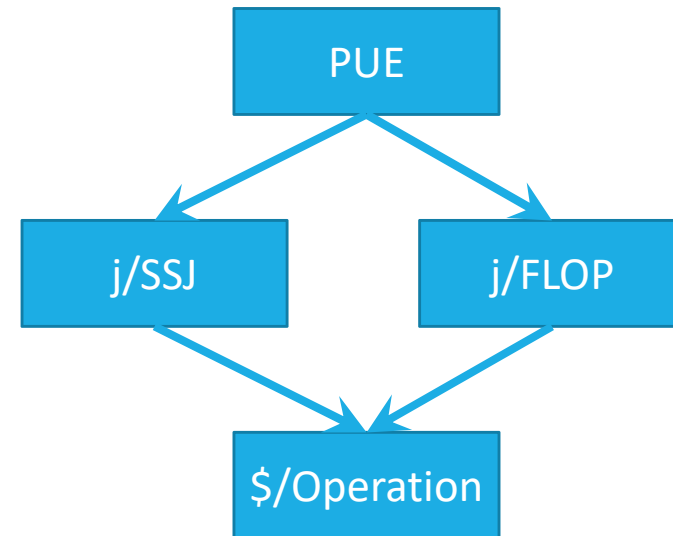
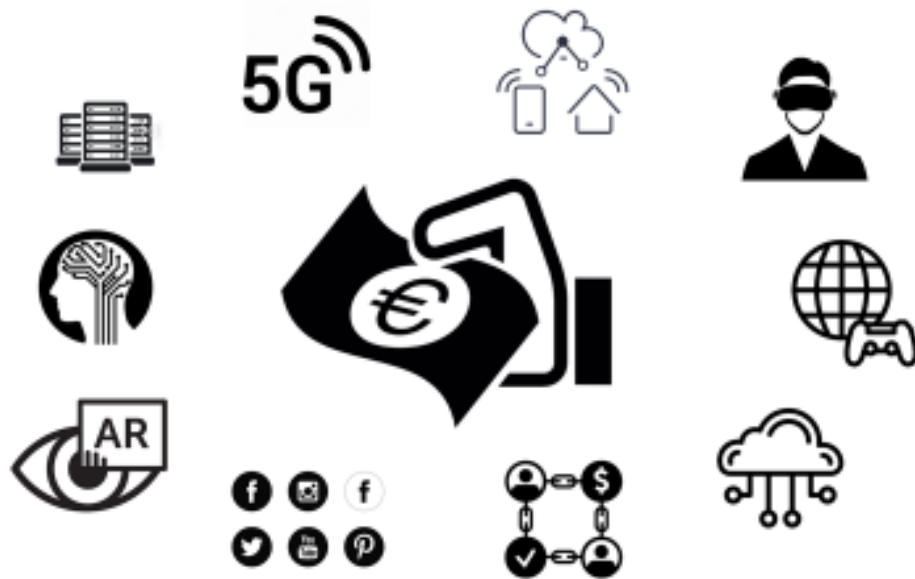
- Intermediate conclusions
- Holistic control can produce significant increases in efficiency
- Many improvements can be made just using software/process changes – almost zero cost options
- Accommodate fluctuating loads
- **Maximise ΔT**
- **Minimise fan speed**



The processing business



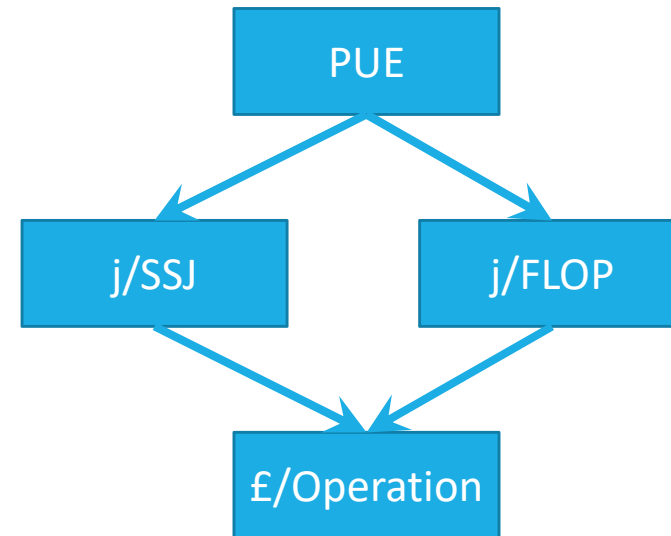
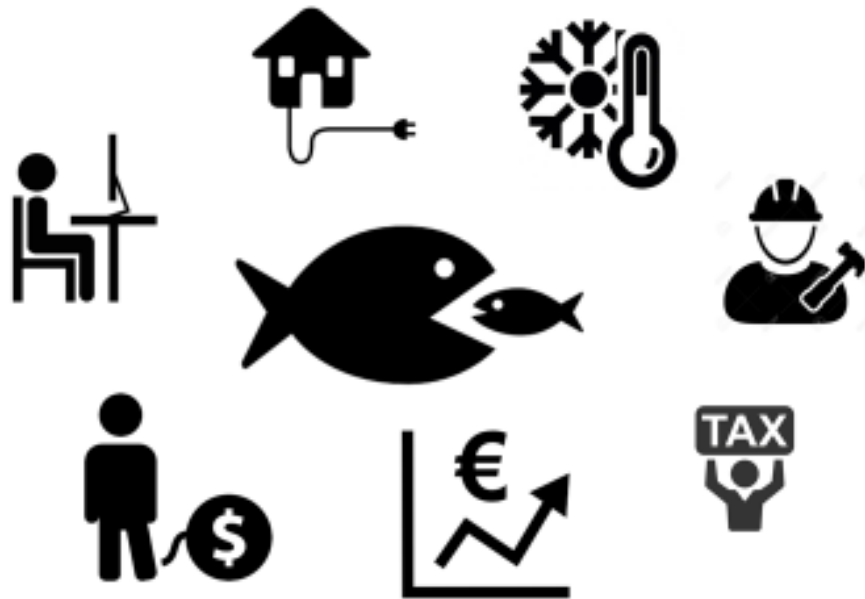
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Emerging market opportunity



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Flipping the coin



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Time for refreshments – 11.00 – 11.30



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We will resume with the Workshop sessions at 11.30 so decide now which session you would like to attend

Workshop 1 in Studio 2 –
It's people not just technology that will decide the future. -
Chaired by Steve Bowes Phipps from PTS Consulting

Workshop 2 in Studio 3 –
How fluid is our future – Chaired by Dr Jon Summers from RI.SE

Or in the Pier Room –
The Catalyst Green Data Centre Project – Presented by Julie Chanadec from Green IT and John Booth from Carbon 3IT

