HECToR Phase II

The Road Ahead

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Overview

- Current system – Original Upgrade Path;
- The need for change;
- Revised service upgrade path;
- Advantages and Disadvantages of the revised service upgrade path;
- How will this affect users;
- Research Council position;
- Questions

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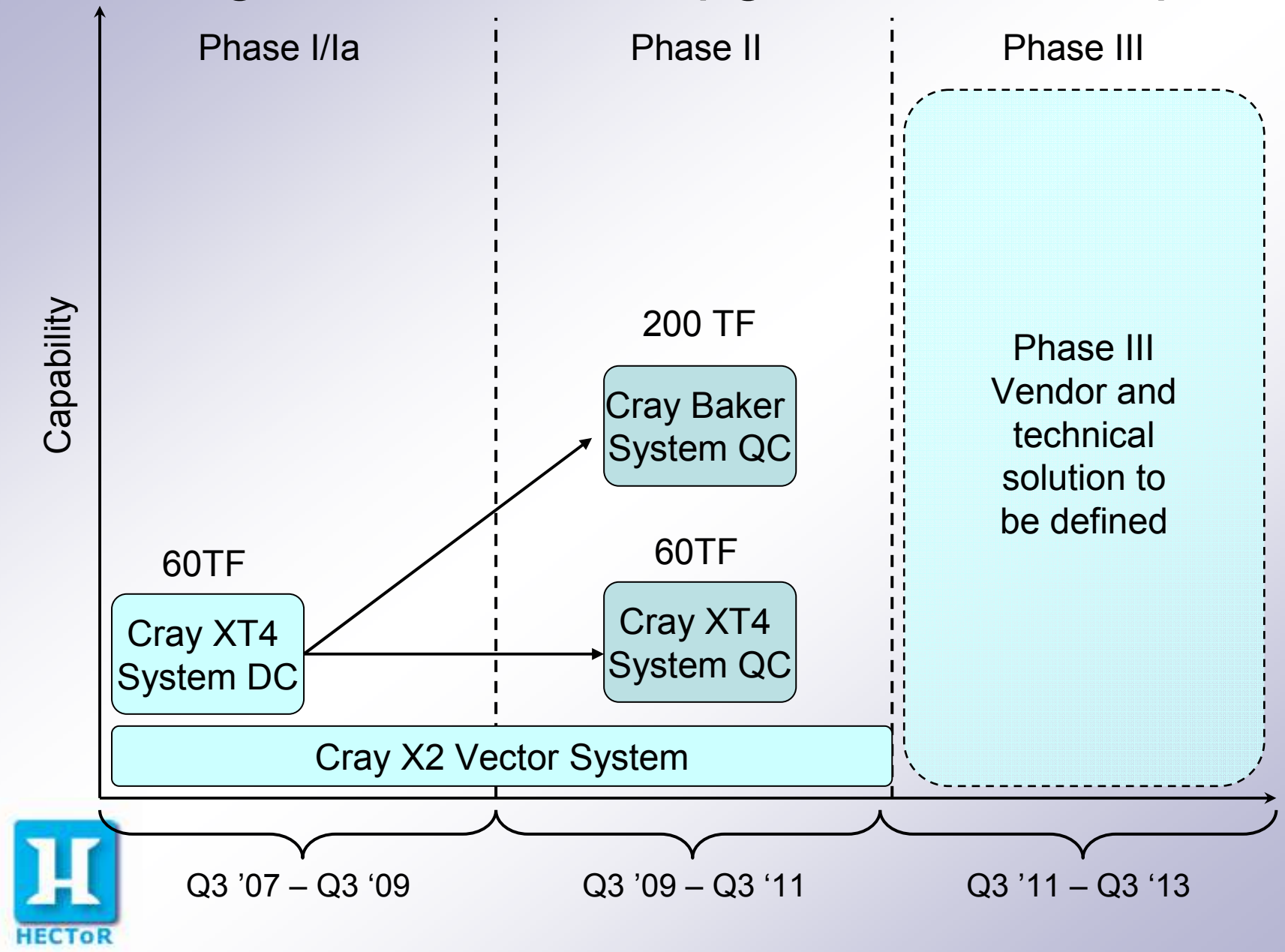
Original system and upgrade path

- **Phase I - Q3 2007**
  - 60 cabinet Cray XT4 system;
  - 60 TF peak system performance;
  - 33.2 TB system memory;
- **Phase Ia - Q1 2008**
  - 1 cabinet Cray X2 Vector system;
  - 2 TF peak system performance;
- **Phase II - Q3 2009**
  - Resize of XT4 system to 16 Cabinets 60 TF
  - 24 cabinet Cray “Baker” system 200 TF
  - Retain X2 Vector System at 2 TF

Original HECToR Upgrade Roadmap



Why change the upgrade path?

- **Technical:**
  - Delays in AMD processor roadmap and resulting in delays in Cray's own technical roadmap;
- **Contractual:**
  - Cray committed to provide a viable and agreed upgrade solution in Q3 2009;

Why change now?

- **User considerations:**
  - Increasing number of grants requesting HECToR in Phase II timeframe;
  - Probable lack of capacity if Phase I were significantly extended into Phase II timeframe;
  - High utilisation, high turnaround times detract from capability focus of the service

What did we consider?

- Continue to deliver increased opportunities for science;
- Cost effectiveness;
- Allowing “room for growth”;
- Strategic positioning

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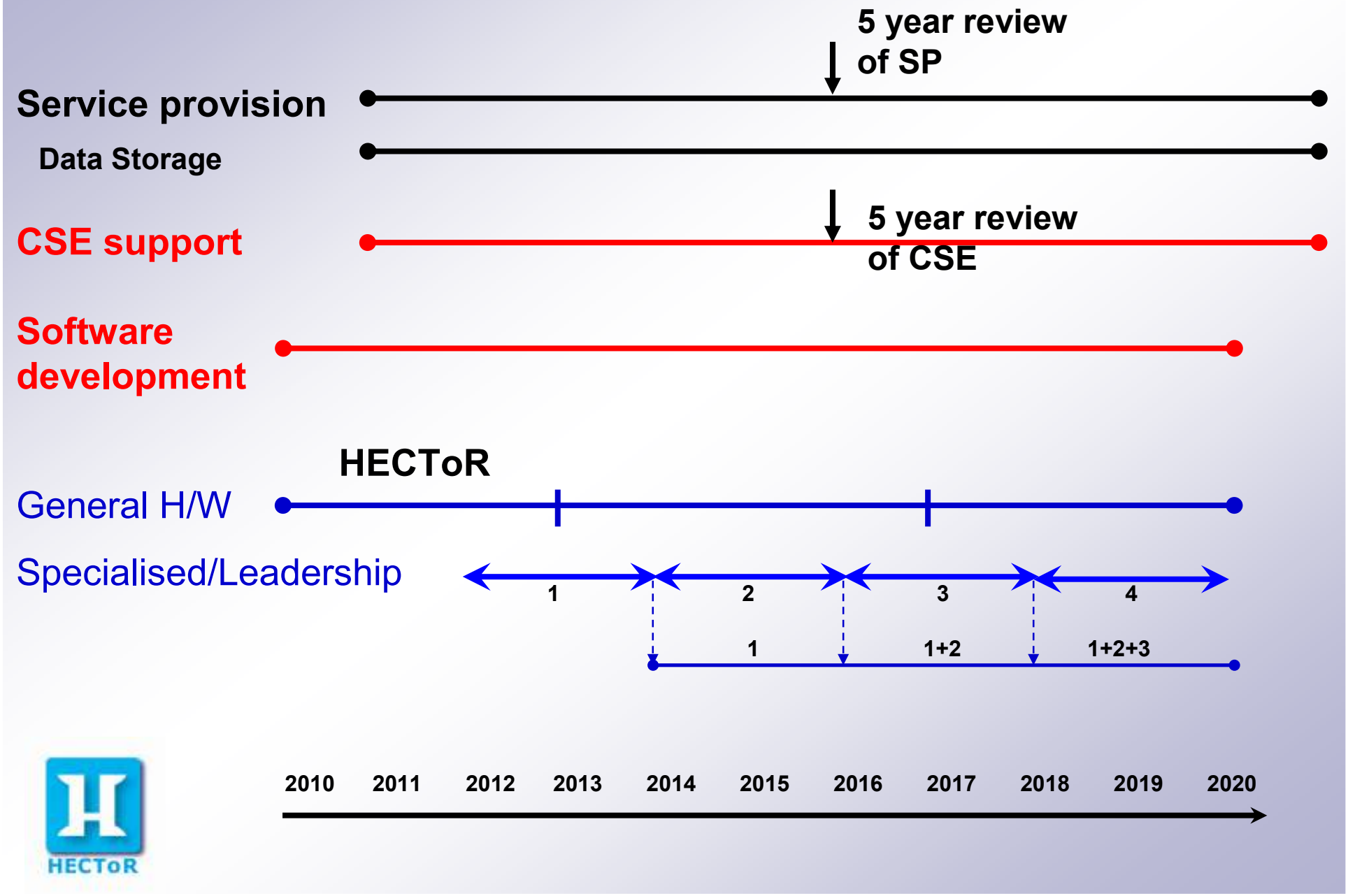
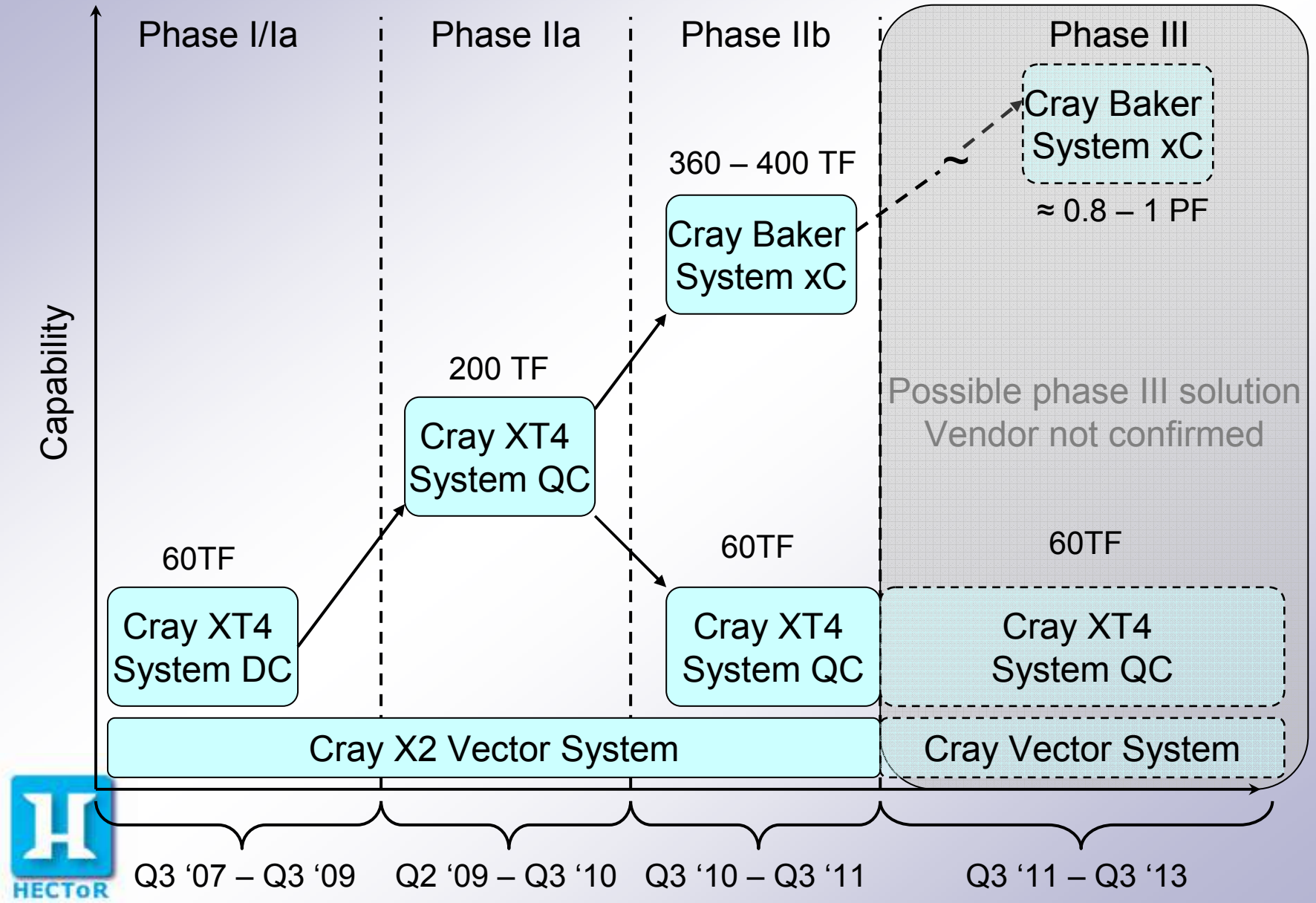
Proposal for future HPC strategy



Revised Upgrade Path

- **Phase – I and Ia systems**
  - No change to Vector capability;
- **Phase II system – delivered in two phases**:
  - ***Phase IIa Q2 2009***
    - All 60 XT4 cabinets upgraded to Quad Core processors;
    - Overall memory increase to provide 2GB/core;
    - 208 TF Peak
  - ***Phase IIb Q4 2010***
    - XT4 system re-sized to 16 cabinets (60 TF, 2 GB/core);
    - Cray Baker system installed 22 cabinets (360 TF)
- **X2 Vector system retained but not expanded**
- **Outline options for Phase III tabled**

Revised HECToR Upgrade Roadmap



Advantages of Revised Path

- **Increase in overall memory;**
  - Memory/socket increase from 6 to 8 GB;
- **Increase in peak performance for 2011-'12;**
  - 413 TF versus 260 TF in original roadmap, opportunity for more complex, larger simulations
- **Value for money;**
- **Significant energy savings during the lifetime of the phase;**
  - New cooling technology
- **Progressive transition from DC > QC > Multi/Many-core**;
- **Cost effective route to a possible Petascale machine in Phase III**

Disadvantages of proposed route

- **Memory per core physically limited to 8 GB/CPU, reduction per core from 3 GB to 2 GB;**
  - Possible need for node de-population in memory intensive applications;
  - This trend is not unique and is likely to continue as systems transition from multi-many core;
- **Quad core clock speed of Phase IIa less than that of Phase I system, 2.3 GHz versus 2.8 GHz;**
  - Higher scientific throughput but longer end to end completion times for individual jobs;
  - Again, likely to be an artifact of continuing move to higher core counts;
- **Current Interconnect system will be used in Phase IIa;**
  - No increased performance for communications intensive applications;
  - Current interconnect still efficient and will be replaced with Cray next generation interconnect in Phase IIb system;

Effects on Users of proposed upgrade

- **Decrease in memory per core;**
  - Users requiring more than 3 GB/core may need to hold more, whole CPUs per job;
- **Decrease in clock speed from 2.8 to 2.3 GHz**
  - End to end job time may take longer for some application codes
- **Continued use of XT4 interconnect;**
  - Any communications dependent performance delayed until Baker delivery in Phase IIb
- **Overall;**
  - Some job categories will require more compute time/Allocation Units to complete

Research Council Position

- **If you:**
  - **Already have a Class 1 account on HECToR;**
  - **Have a Class 1 application that is currently in peer review;**
    - review the allocation that you have requested, check that given the changes to Phase II, it is sufficient to complete the research proposed in consultation with NAG Ltd. If necessary a retrospective allocation will be made.
  - **Are currently writing a grant proposal;**
    - Contact NAG prior to submitting the proposal to determine compute resource and support requirements you will need to complete the research proposed.
  - **Have a Class 2 (pump priming) account;**
    - No additional resource will be made available; the class 2 upper limit will be reviewed.

Thank you for your attention