New Process and Structure Thinking for Capability Development

9th ICCRTS

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Presentation Structure

- What does a ‘Capability System’ imply?
- What are the Architectural needs?
- Adequacy of Current System Engineering Processes and Lifecycle?
- An Implementation Model?
- Conclusions

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A Capability Concept?

- Capability is an ‘Effects’ based view of the world
- The solution systems provide a service to the user
- However, capability can be expressed in the same form and terms as a requirement
- Capability is hierarchical in nature
- But has very different definition between Customer (Requirer) and Supplier

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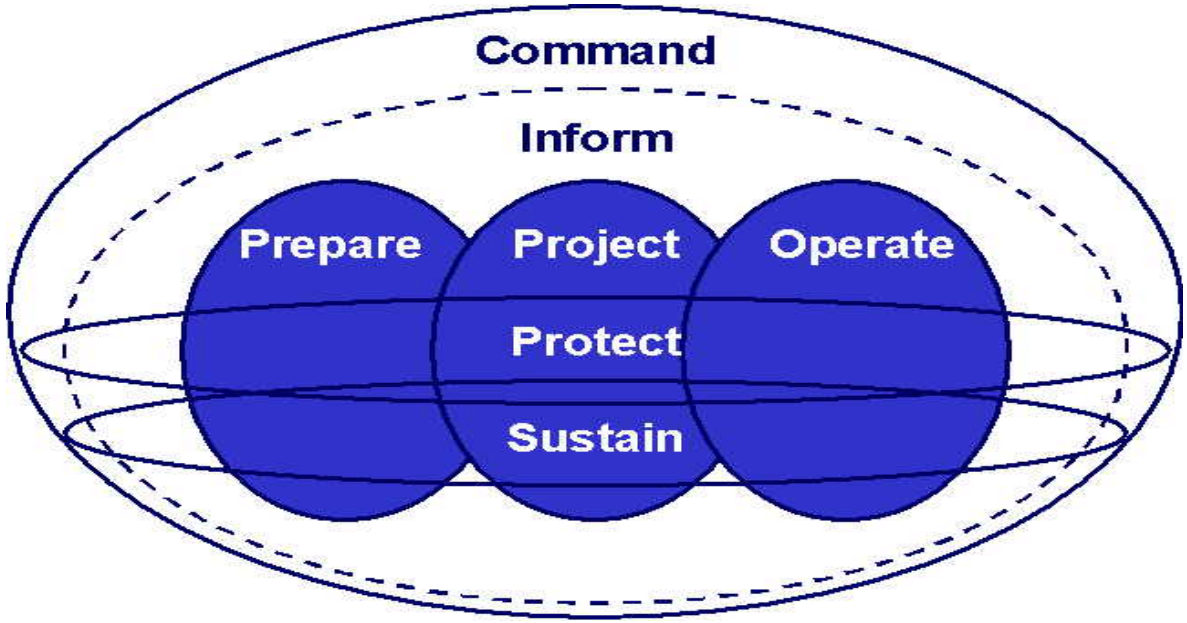
A Capability Concept?



- Ministry definition through JDCC
  - 7 primary Capability constructs
- However there are other Ministry Capability ‘taxonomies’ which are independent and not necessarily coherent

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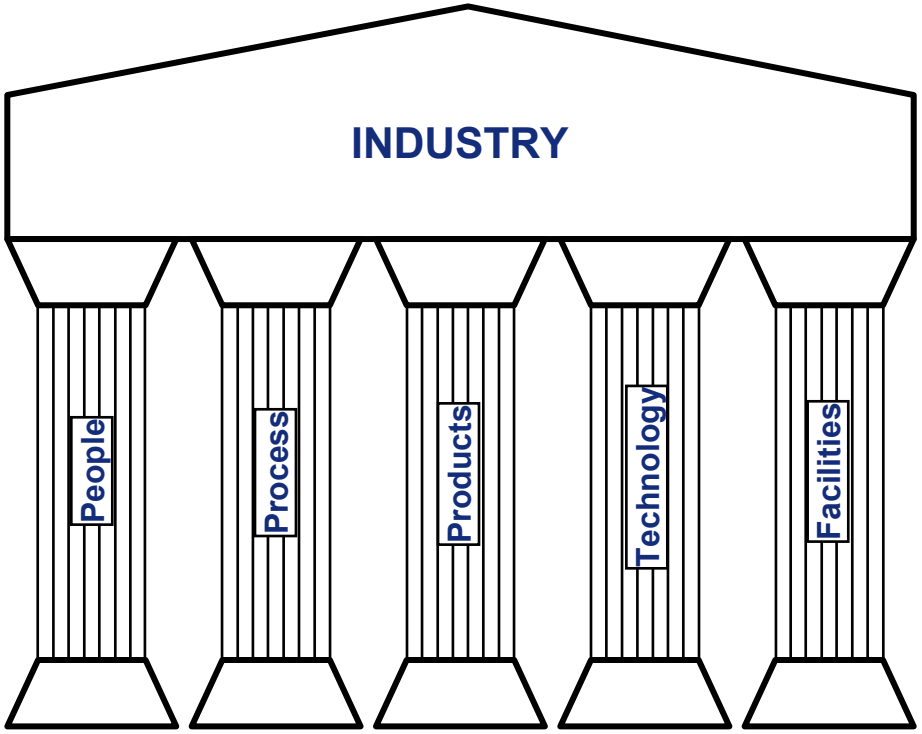
A Capability Concept?



- Industry definition offered through 5 attributes
- Question is how to reconcile the Requirer view with the Supplier view and achieve successful contract execution and procurement of capability

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A Capability Concept?

- A 3rd ‘interpretation’ of Capability is provided through ‘Lines of Development’:
  - Equipment
  - Manning
  - Training
  - Sustainment
  - Tactics and Doctrine
  - Force Structure and Infrastructure

- However these are not the ‘definition of capability’ they are more the implementation and delivery mechanisms
- Hence these are the components that have to be measured and integrated within the ‘system’ that is procured

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An Architectural View

Some Definitions;

'Architecting is the art and science of designing and building systems using solution-based, method-based, stakeholder-based and lessons learned methodologies preserving end users needs for performance within suppliers capability to perform.' AIAA Monthly Magazine March 03

In other documentation, the DoDAF defines an architecture as;

'the structure of components, their relationships, and the principles and guidelines governing their design and evolution over time'
DOD Architecture Framework V2.1 Apr 2000

How about:

'an organisation of resources'.

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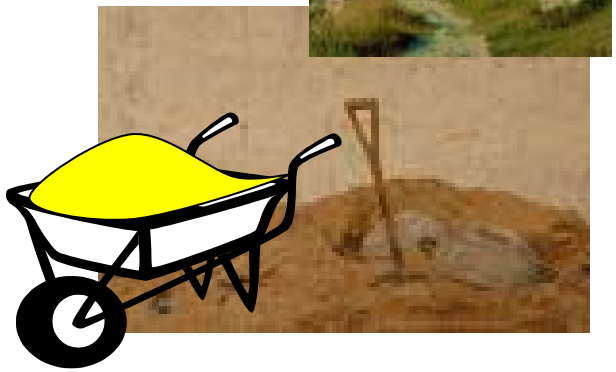
Architecture Examples



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Architecture Examples

Why do we build, create 'architectures'?

- to achieve something collectively that the individual assets cannot deliver by themselves
- to achieve the required performance, to enable timeliness and efficiency of resource usage
- to be compliant with rules and regulations - mandated to enable other activities to be accomplished or accredited - irrespective of the performance issues, the efficiencies of use etc.

An additional component to be considered is the:

- flexibility and adaptability of the architecture to organise and re-organise as appropriate to the need

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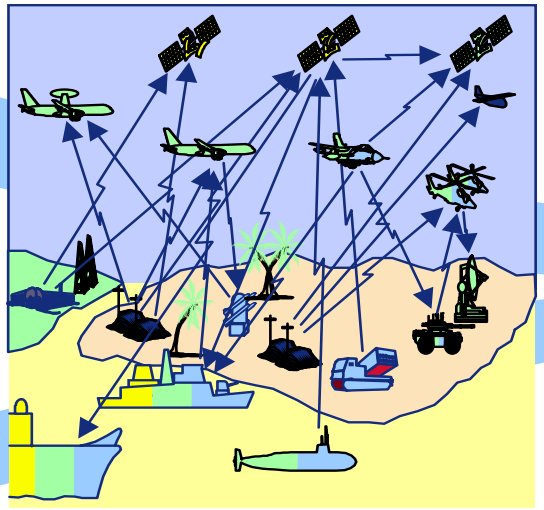
Architecture Migration

Platform Centric



Network Centric

System of Services

Capability Centric

Architecture Characteristics

- Flexibility
- Inclusivity in Design
- Balanced in Performance
- Through Life Development Opportunities

System Constraints

- Safety
- Security

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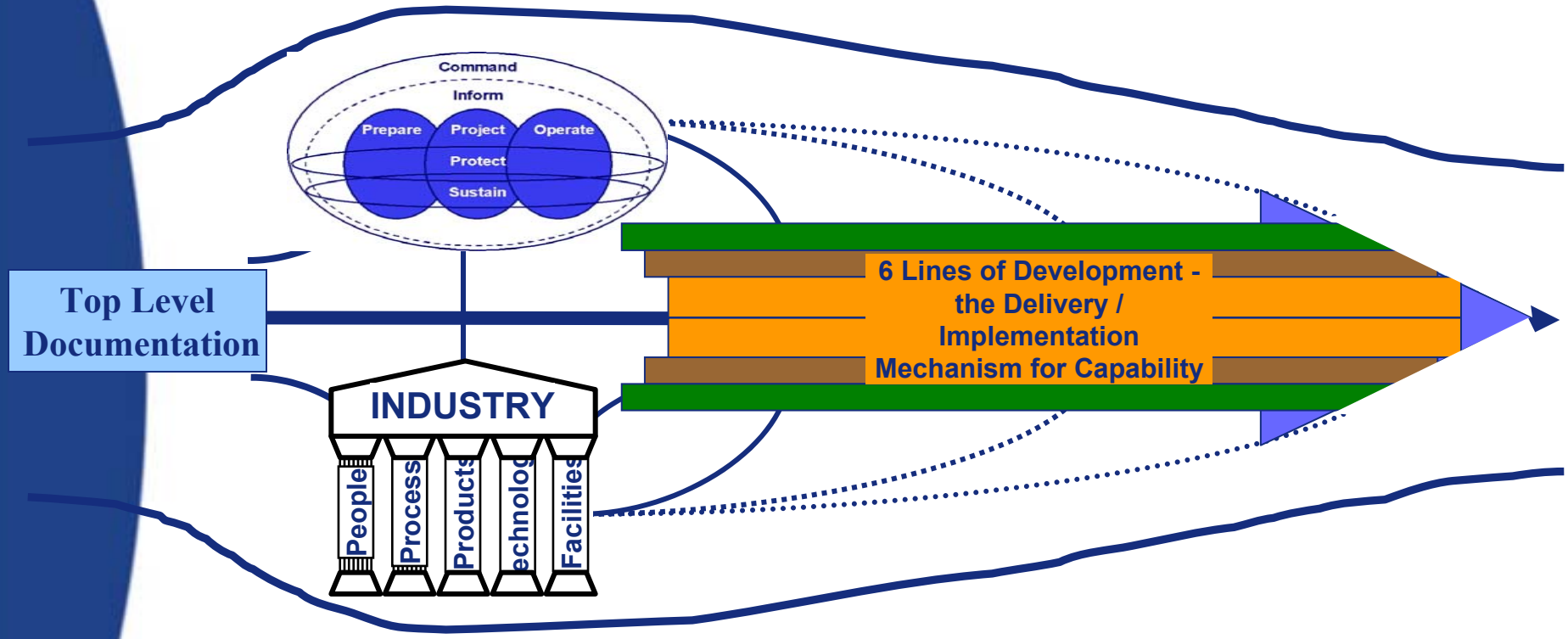
An 'Revised' Systems Engineering Model



The Systems Engineering 'Reaction Chamber'

With full acknowledgement to Prof Phil John

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Process Implications

- System Measurement and Integration across the Lines of Development is essential
- Open and Visible prioritisation of need and ‘value’ of capability required is essential contribution from customer
- Management of change through life must be integral to the overall through life planning (capability requirements go up and down)
- Overall Capability Through Life Management can be established

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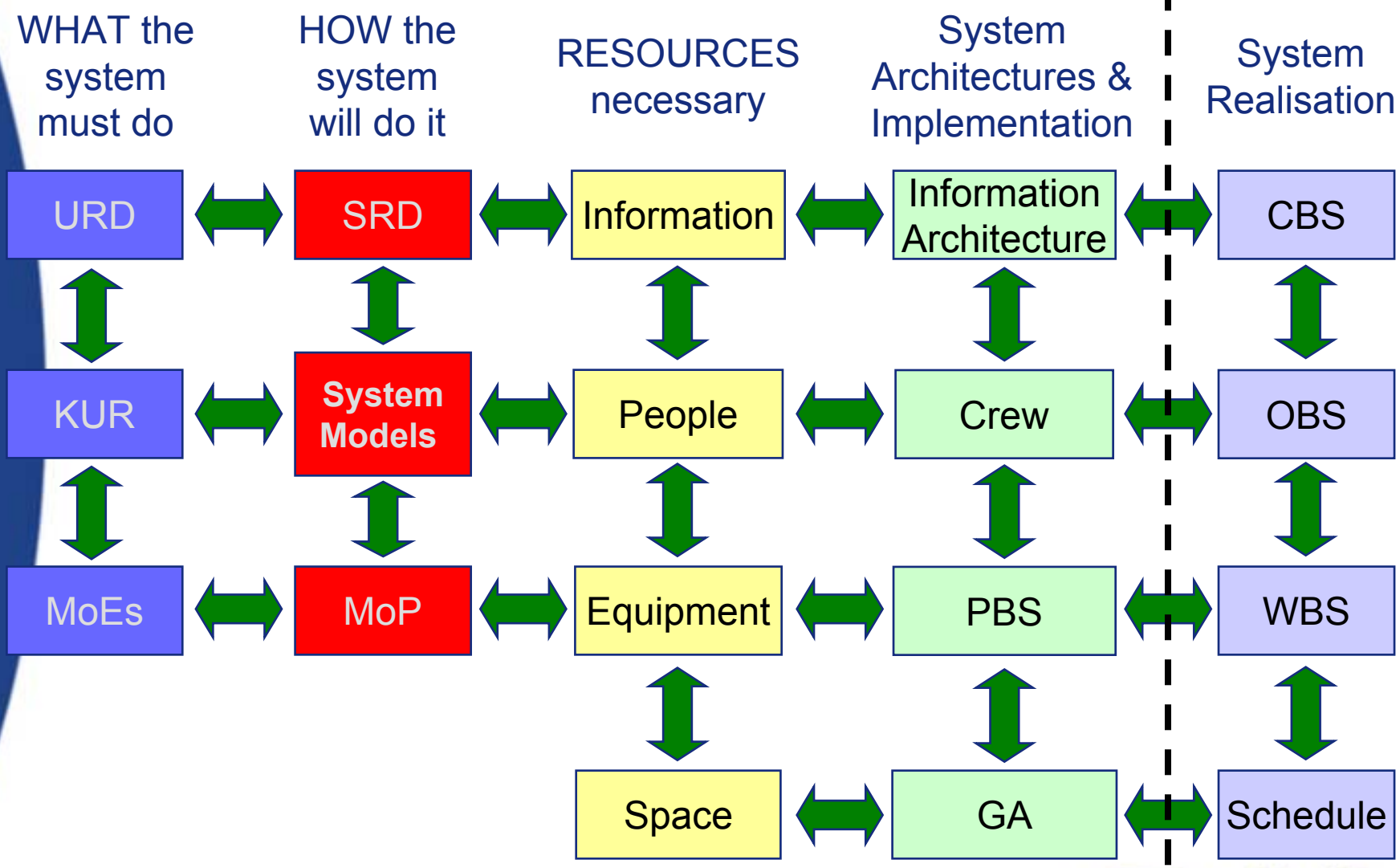
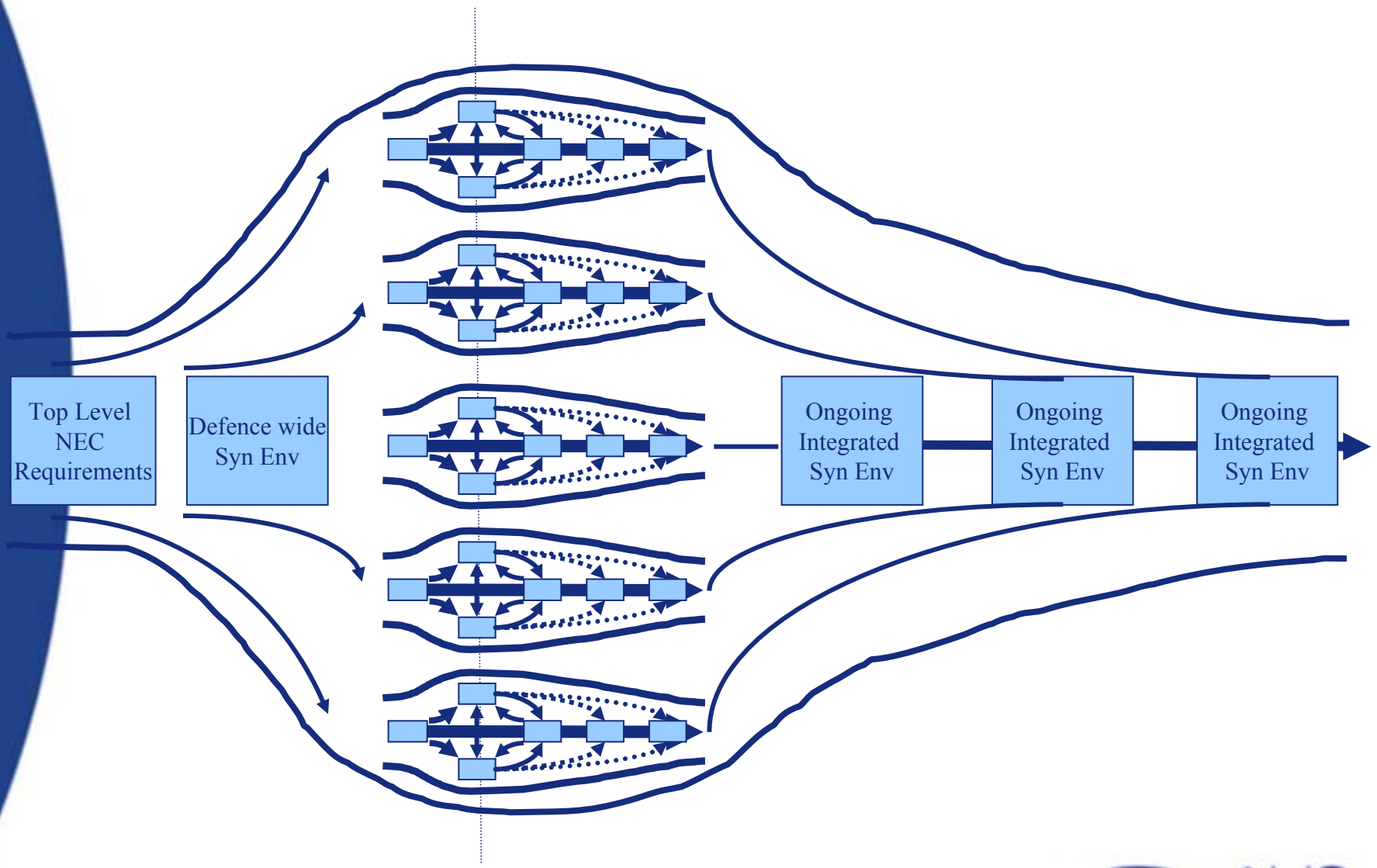
Delivery through a '5 Column Model'



An Expanded Model



Conclusions

- To deliver Capability, new views are required of
  - process relationships
  - techniques for integration and measurement of development activities
  - more open visibility of the problem and constraining issues
- If the Systems View of Capability delivery is accepted, the Lines of Development are a Partnering opportunity
- The Reaction Chamber model demands detailed Systems Analysis techniques and system representations through life.

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Conclusions

- Issues of Incremental Development and Acquisition become viable with measured and understood changes to the delivered system pertinent to the changing requirement or technology of the solution

- Through Life Management and comprehensive measurement
  - of hard technical equipment performance issues
  - of softer subjective human related activity and performance
  - of baselines and the value of increments
  - of the overall effect that is achieved in context by the solution

  is essential

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Conclusions

- Overarching system views (as expressed within the 5 Column Model) should be developed, offering opportunities for
  - detailed traceability and design justification
  - visibility of trade off opportunities across all areas of the solution provision space
  - underpinning and traceable information for consistent and coherent capability development
  - coherent requirement - design - acceptance information for all activities within the life cycle.

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Q & A