

Systems Engineering for Autonomous Systems

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Electro Magnetic Remote Sensing

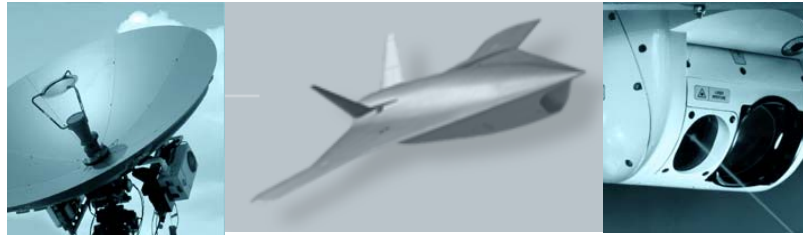
Defence Technology Centre

Conference 2009

Keynote Presentation

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Ministry Of Defence



Mission

Defence Technology:

- Wins wars
- Generates economic value
- Enhances international reputation

“Battle Winning Technology for the Armed Forces to Support Operations Today and in the Future”



“Seismic Shocks” - PEST

- Knowledge Systems:
 - Internet and surveillance.
 - Data bases and analysis techniques.
- Globalisation:
 - Role of nation state.
 - Global businesses, finance and SCs.
- Resources:
 - Oil, water, major commodities and global access.
 - People, skills, migration and control.
- Global Warming:
 - Rising sea levels and trade routes.
 - Global controls and community displacement.



Operational Imperative “CPE”

- *Challenge*
- *Pace*
- *Exploitation*



Direction of Travel

- Key inputs:
 - Pace of technology/threat - technology/threat timescales \ll planning.
 - Solutions exist - need to be open to pull-through the best quickly.
 - Core technologies - RF, cyber, C4I/STAR, protection.
- Key responses:
 - Open - with flexibility at all levels to respond to new solutions.
 - Connect users and technologists - operations and technology.
 - Architecture management - trials, experimenting, integrating, proving.



Context

- Asymmetric:
 - Pace and use of off-the-shelf commercial technology
 - Proliferation of portable accessible weapons and IEDs
 - Non-conventional engagements and urban contexts
 - Jamming and information corruption.
 - Innovative mobility and concealment.
- Global:
 - Conventional high performance weapons, CBN and WMD
 - Attacks on civil infrastructure communications/information
 - Attacks on space assets and extended supply chains
 - Major investments in new competitive technologies/capabilities
 - Resources – particularly cost/access to fossil fuels



Critical Areas

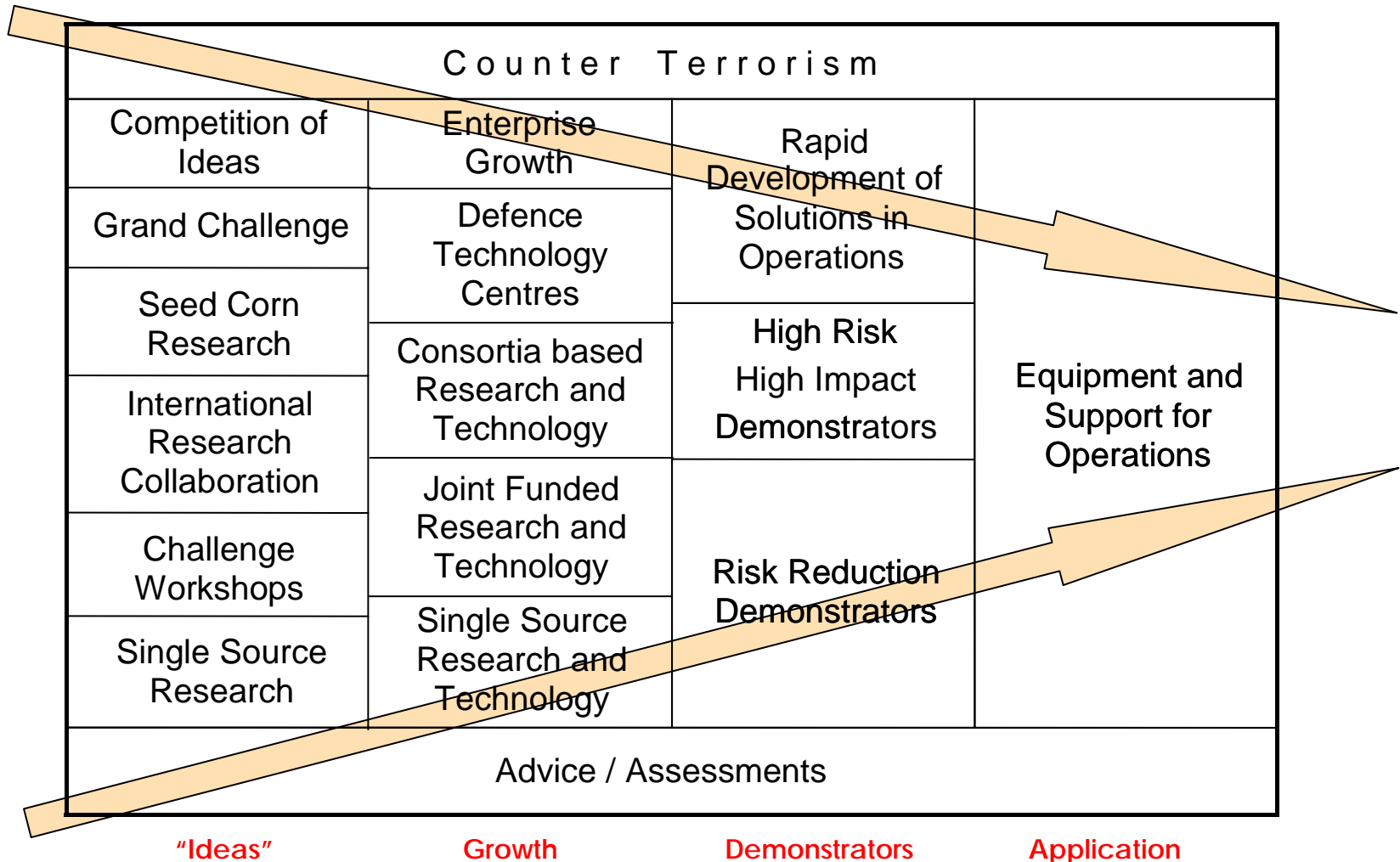
- Effectiveness:
 - Situation awareness and rapid decision making.
 - Enduring, coercive, low attrition, counter insurgency.
 - Long range detection – air/land/sea, swarm and fleeting targets.
 - Protection/survivability - armour and area/air defence.
 - Intelligent autonomy – land, sea, air, logistics
- Underlying critical technologies:
 - OTS IT, communications and network systems
 - EM - RF, IR, visible, UV cross spectrum effects.
 - Signal and image processing, pattern and behaviour recognition.
 - Deep/innovative applications of forefront physical sciences.
 - Novel materials including explosives and electronic materials.



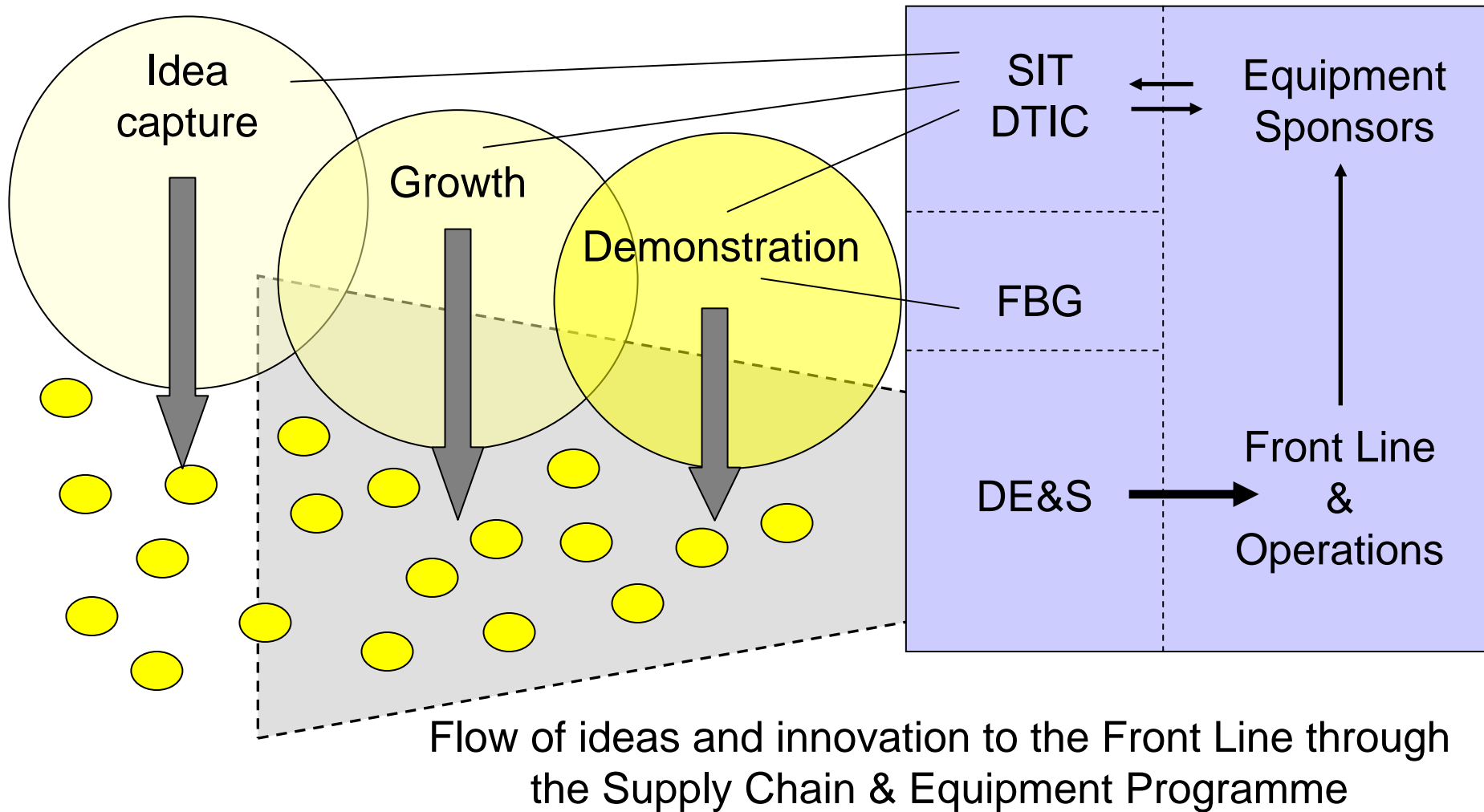
Equipment & Support Supply Chain



S&T Operations Delivery Model



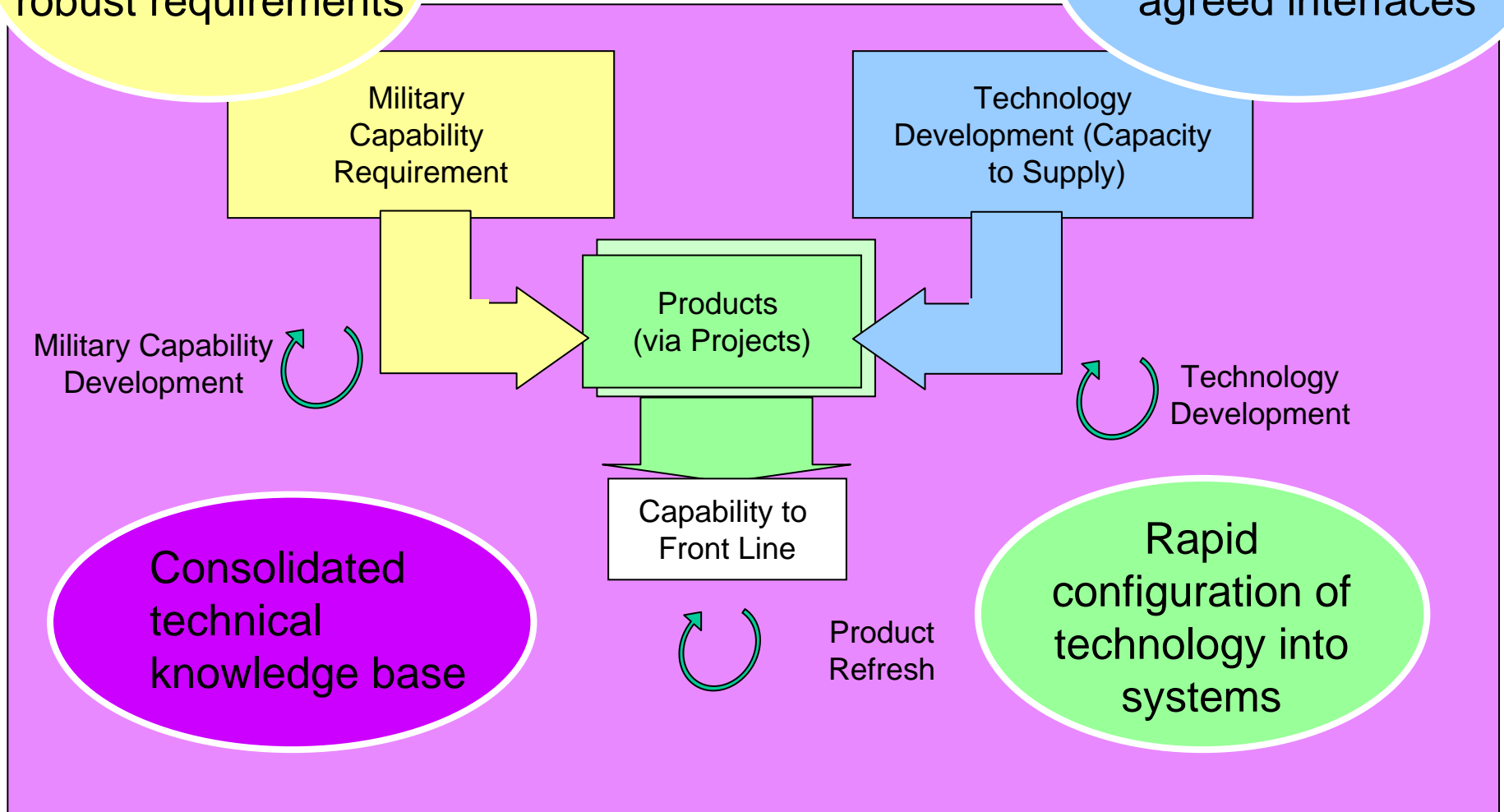
Supply Chain Framework



Defence S&T

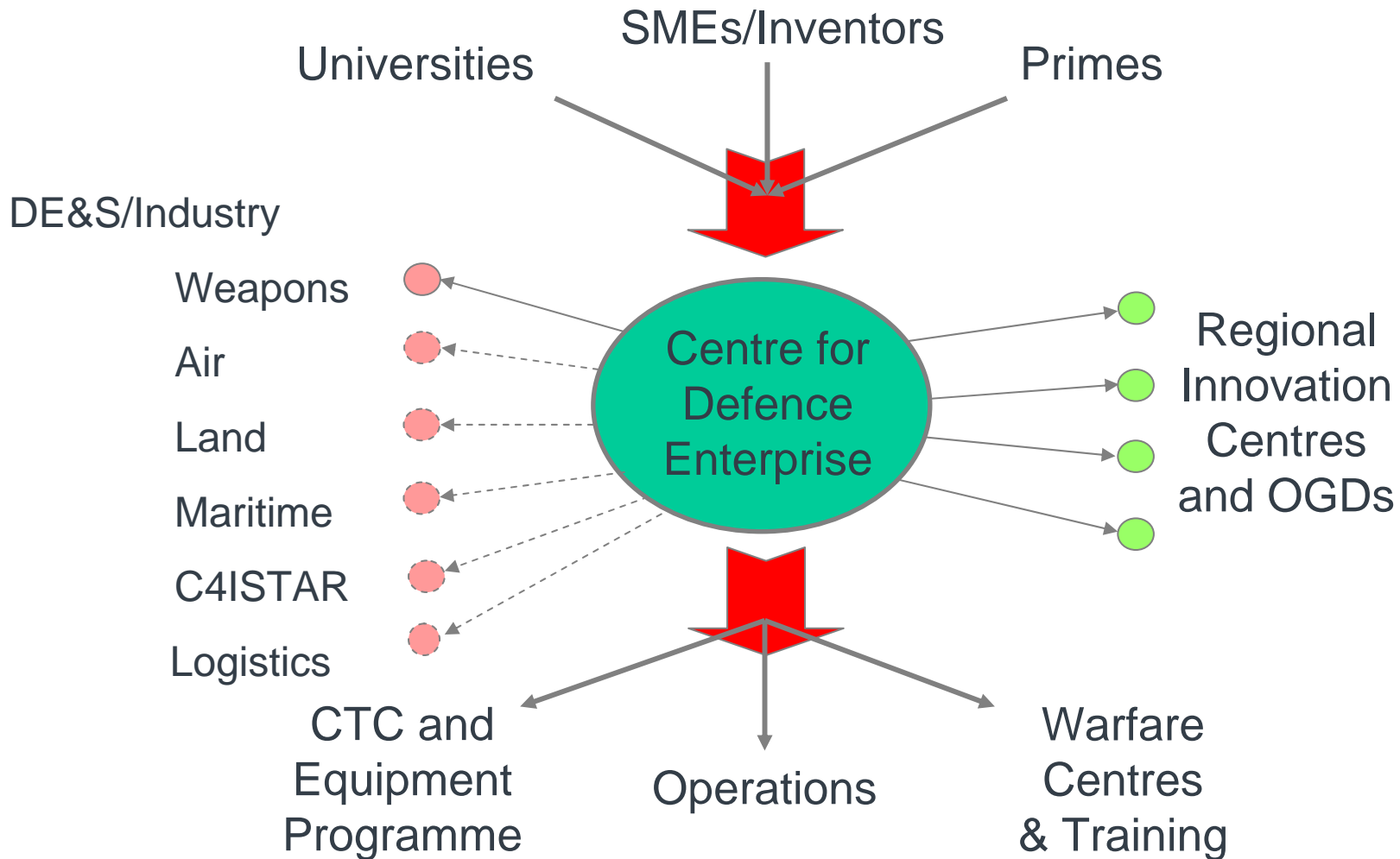
Analysis and assessment for robust requirements

Innovative technology with agreed interfaces



Centre for Defence Enterprise

“First Point of Contact for all new ideas”



Centres for Defence Technology

The Vision

- A network of Virtual Technology Centres
- Centres with SMEs, universities, users, primes major equipment suppliers and technology innovators.
- Working at forefronts, constantly adapting and responding to new ideas/opportunities
- Working together – interactively, challenging, adapting and celebrating.
- Experimenting with users, adapting in response and demonstrating integration/fusion.
- Developing enduring critical skills for UK plc.
- Centres will lead and decide what S&T is done based on the collective needs/priorities of investing participants.
- Realising volume non-defence applications and exploitation.
“Leading edge, agile and relevant”



The “Innovation Stack”

- Research:
 - New research opportunities
 - New technologies.
 - Exploratory new applications of research and technologies
 - Proof of principle
- Innovation:
 - Application of technologies in systems, doctrine, training
 - Apply to in-service and new capabilities
 - Proof of concept
 - System based demonstration of new concept/technology
- “Operationalisation”:
 - System architecture/integration.
 - Manufacturability
 - Reliability and maintainability
 - Military/operational ruggedness.



Key Issues

- Open R&D innovation with industry/universities.
- Define the system architectures
- Connect technology and users
- Test and integrate the best
- Challenge Pace and Exploitation
“100 Day mindset”.



Cross Sector Engagement

- Increase the challenge
- Accelerate the pace
- Expand the exploitation
- Widen the connectivity
- Transform agility

Operational effectiveness
Wealth creation



*Logic will get you from A to B.
Imagination will take you
everywhere.*

Albert Einstein

