



Arke Ltd

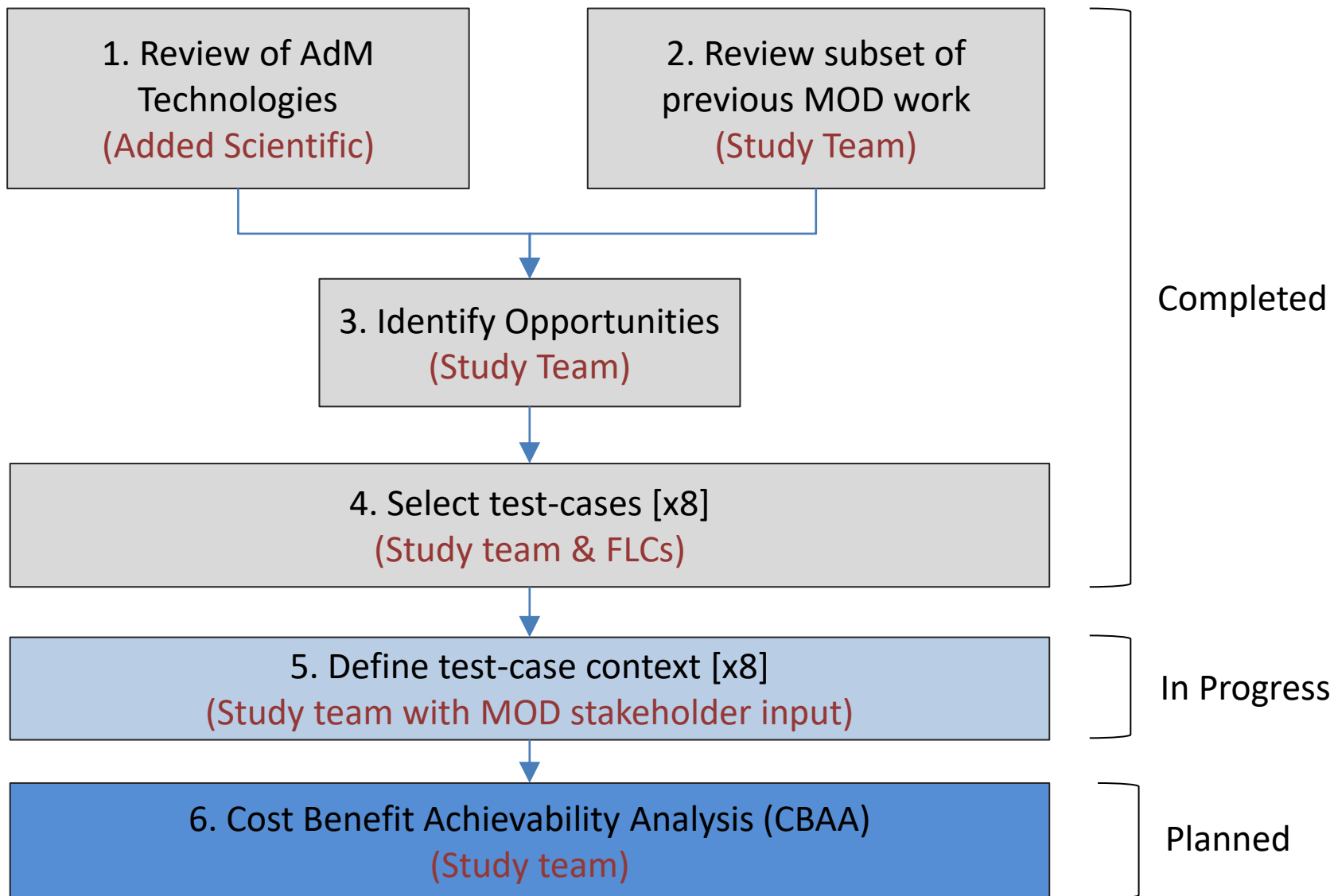
*“Innovative Technologies for reducing
Logistics Demand”*

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Study team contracted by Dstl to investigate *“Innovative technologies for reducing logistics demand”*

- Funded by Chief Scientific Advisor
- Pan-domain remit (Land, Air, Maritime, Joint)
- Study team:
 - Arke Ltd – Lead, Cost-Benefit Analysis
 - Added Scientific – AdM Technology Subject Matter Experts
 - Aspire Consulting – Logistics expertise
- Primary focus: AdM
- Other aspects: Automation/Autonomy and Data Science white papers





Army HQ

5 BTN REME – LAD & FS

Industry Vehicle
Manufacturer

Air Command

42 ESW

71 IR Sqn

MARCAP TMS

Support Division Engineering

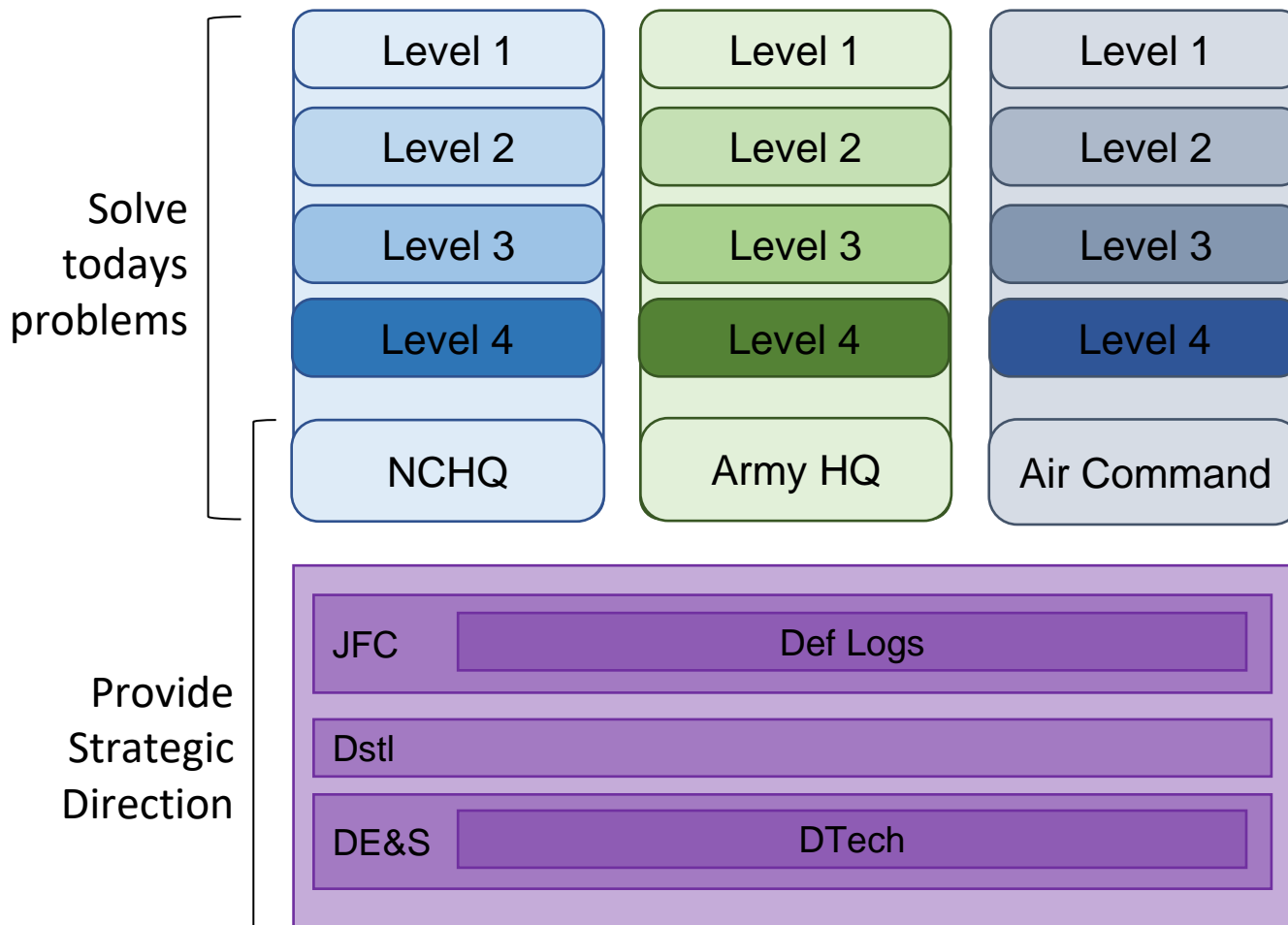
1710 NAS

Dstl including: military & science
advisors – land, air, maritime, joint

DE&S DTech

Def Log Strat CFD Science Gateway





Different at every level and organisation:

- Stakeholders
- Challenges
- Benefits
- Skills
- Interest
- Understanding
- Motivations
- Funding



Military AdM

Industry AdM

May invest in AdM if...

Military benefits are sufficient

Revenue can be increased

Engineering Environment is...



Logistics are...

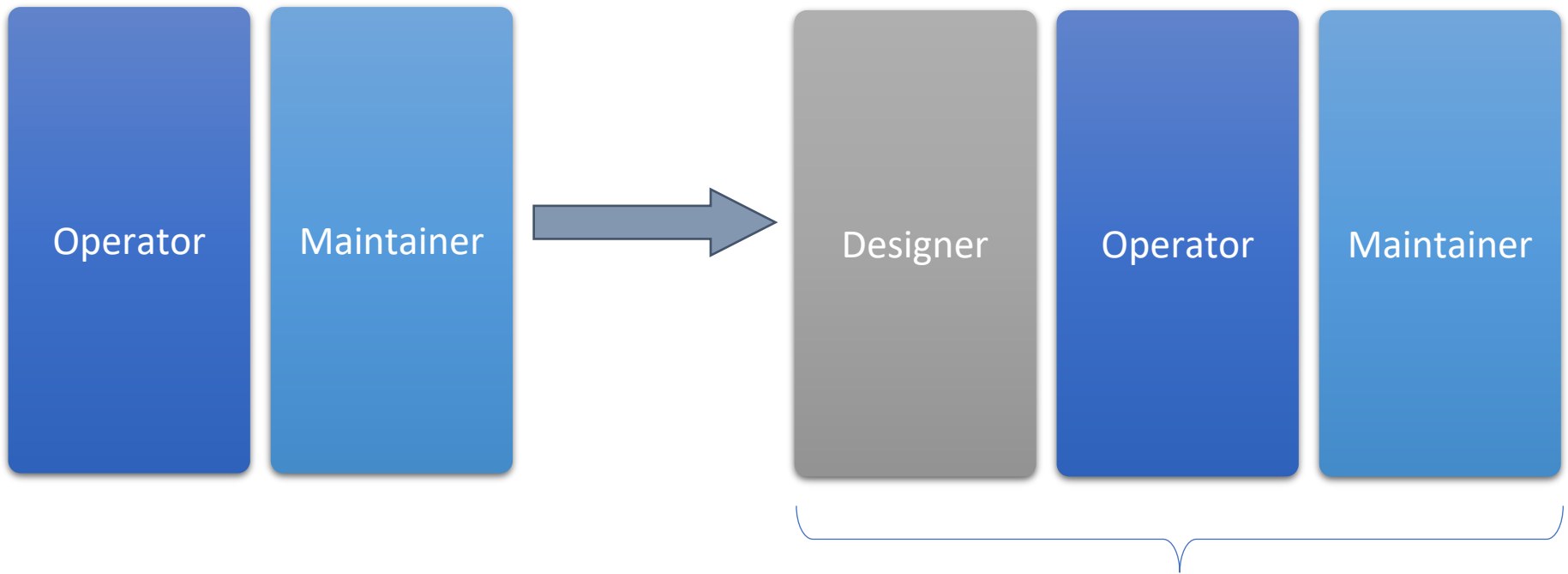




1. Operating environment
2. Requires compressed air?
3. 3-phase electrical power need to enable production?
4. Total Energy required to enable production (excluding optional heat treatment)
5. Flat & Level sensitivity
6. Vibration/motion
7. Stop/Start sensitivity
8. Operating temperature °C
9. Material Strength
10. Operator Skills
11. Prepare Build File (skills needed to)
12. Set-to-Work Time (Deploy)
13. Changeover Time
14. Other wait time
15. Available in a hybrid format with integral CNC machining?
16. Build time for an iPhone sized object (41 cc)
17. Built time for a 200mm diameter x 20mm thick gear (630 cc)
18. Minimum amount of material feedstock required
19. Materials used as feedstock
20. Maximum dimensions of part (mm)
21. Machine footprint (mm)
22. Ancillary equipment footprint (mm)
23. Weight of machine & ancillary equipment (Kg)
24. Feedstock £ per kg (price includes any binders or agent required)
25. Feedstock flexibility
26. Machine cost
27. Gas consumption
28. Other key consumables

- AdM is one of many manufacture/repair methods
- Start thinking of AdM as a potential tool in the toolbox
- Remember: AdM covers a range of processes with different characteristics which are suitable for different tasks
- Some times a hammer is needed, sometimes a screwdriver
- If you take both you can do more complex tasks
- Mastering a tool takes training and experience of the right tasks





Digital Engineering Future – new model?



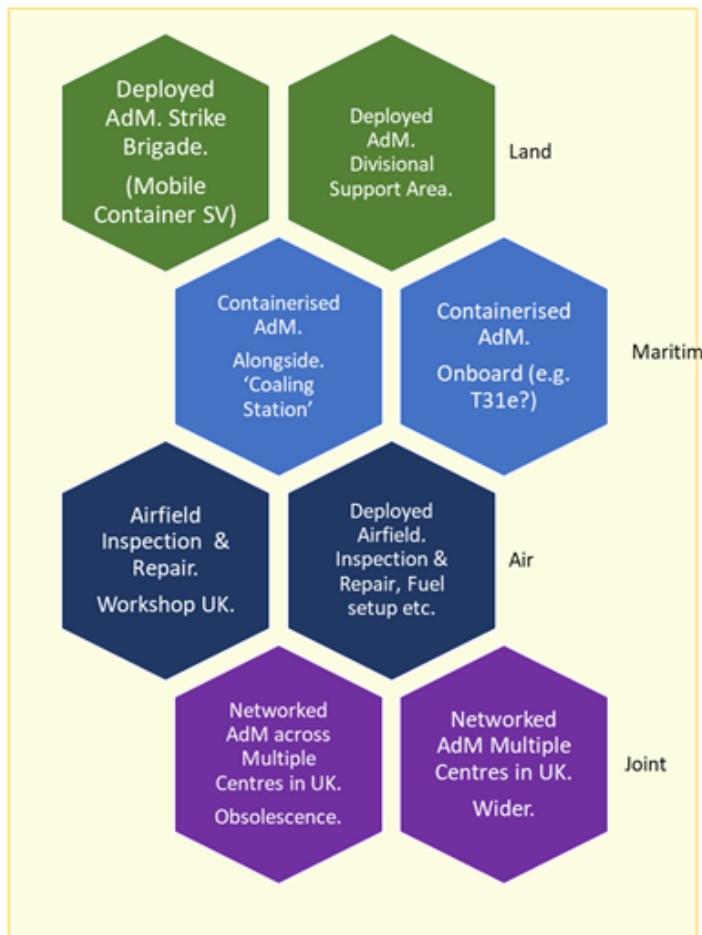
8 Test Cases (Exemplars, Context)



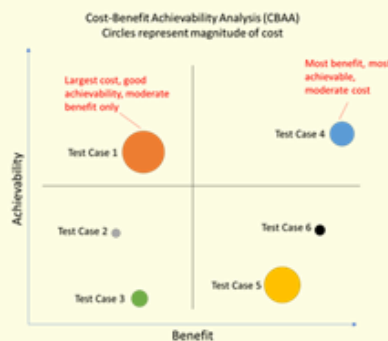
Recommendations for Defence Strategy



Def Logs Benefits Themes



Cost/Benefit from Test Case Examples



- *Conclusions on building MOD capability*
- *What would drive towards desired Def Logs attributes & benefits? Which processes?*
- *What Next?*
 - *Experiments, Metals*
 - *Enabling skills e.g. digital engineering*

- **Logistics Velocity**
- **Reduced Cost**
- **Reduced Footprint**
- **Resilience**
- **Sustainability**
- **Wider Benefits**





What might help?

- Resourcing (time and funding)
- Digital engineering support strategy addressing:
 - How can engineering support capability be restored and enhanced?
 - How will MOD seek to build a holistic set of repair and production capabilities that are agile and effective?
 - What is the role of digital engineering (CAD, CNC, AdM, etc) in enabling military benefit and to *“flatten the factory to foxhole supply chain”*?
 - How will the DLoD enablers to this be realised?

