



'Mind the Gap'

Avoiding pitfalls in taking
the MSaaS concept from
research into everyday use.

MSG -159 Symposium Ottawa, Canada, October 2018

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Outline

Introduction

- Operational Context
- AIMS Programme and DMaSC
- Background to Modelling and Simulation as a Service (MSaaS)

Technical complexity and challenges

Business and other complexity challenges

Potential solutions

- Road mapping
- Further research
- Standards
- Incremental development & MVP

Conclusions

Operational context

Future Operations will consist of:

- Conventional physical warfare (kinetic)
- Predominantly Urban operations
- Increased use of advanced EM sensors and effectors
- Communications in a contested & complex EM spectrum
- Disrupted network and defensive & offensive cyber activities
- Constant influencing of human social dynamics and behaviours

Our current M&S systems do not handle most of these activities well on their own, let alone together



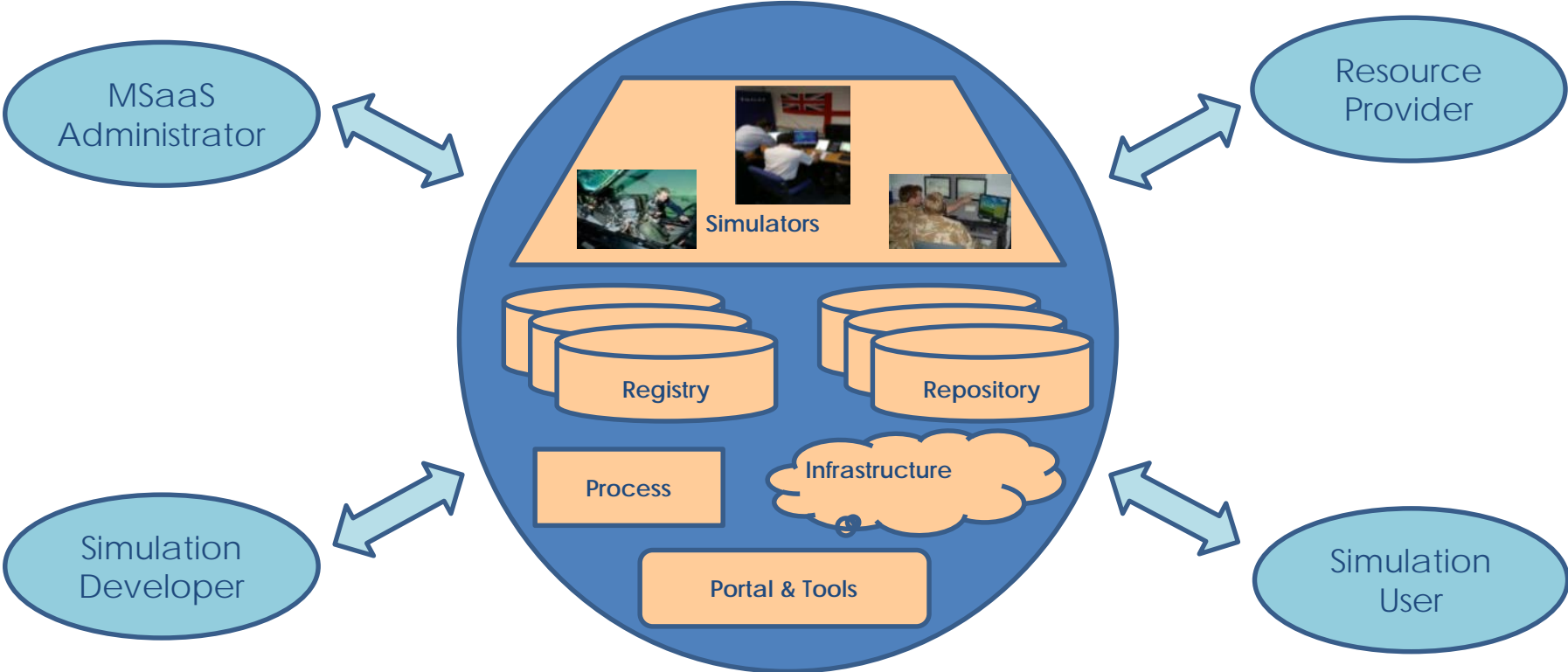
Research programme objectives and exploitation

- UK activity has been undertaken by UK MOD Defence Science and Technology Laboratory (Dstl) under the Architectures and Interoperability of Simulations (AIMS) programme
- AIMS was led by SEA Ltd., with BAE Systems, QinetiQ and Thales UK as key partners, including co-ordinated activities in NATO MSG-136 and latterly MSG-164 task groups
- Exploitation of research activity helps inform the generation of MOD policy including Defence Modelling and Simulation Coherence (DMaSC) activities
- Modelling and simulation activities in the UK are governed by Joint Service Publication (JSP) 939 now endorsed at 4* level

<https://www.gov.uk/government/publications/defence-policy-for-modelling-and-simulation-jsp-939>

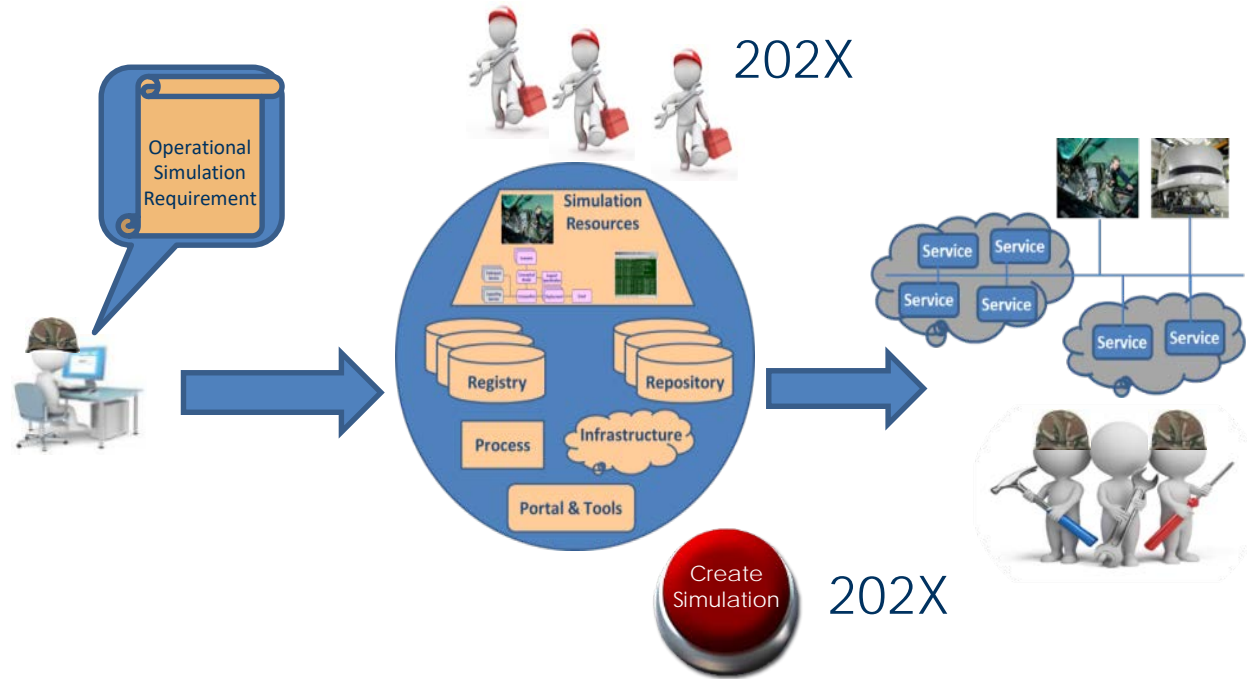


Background to MSaaS

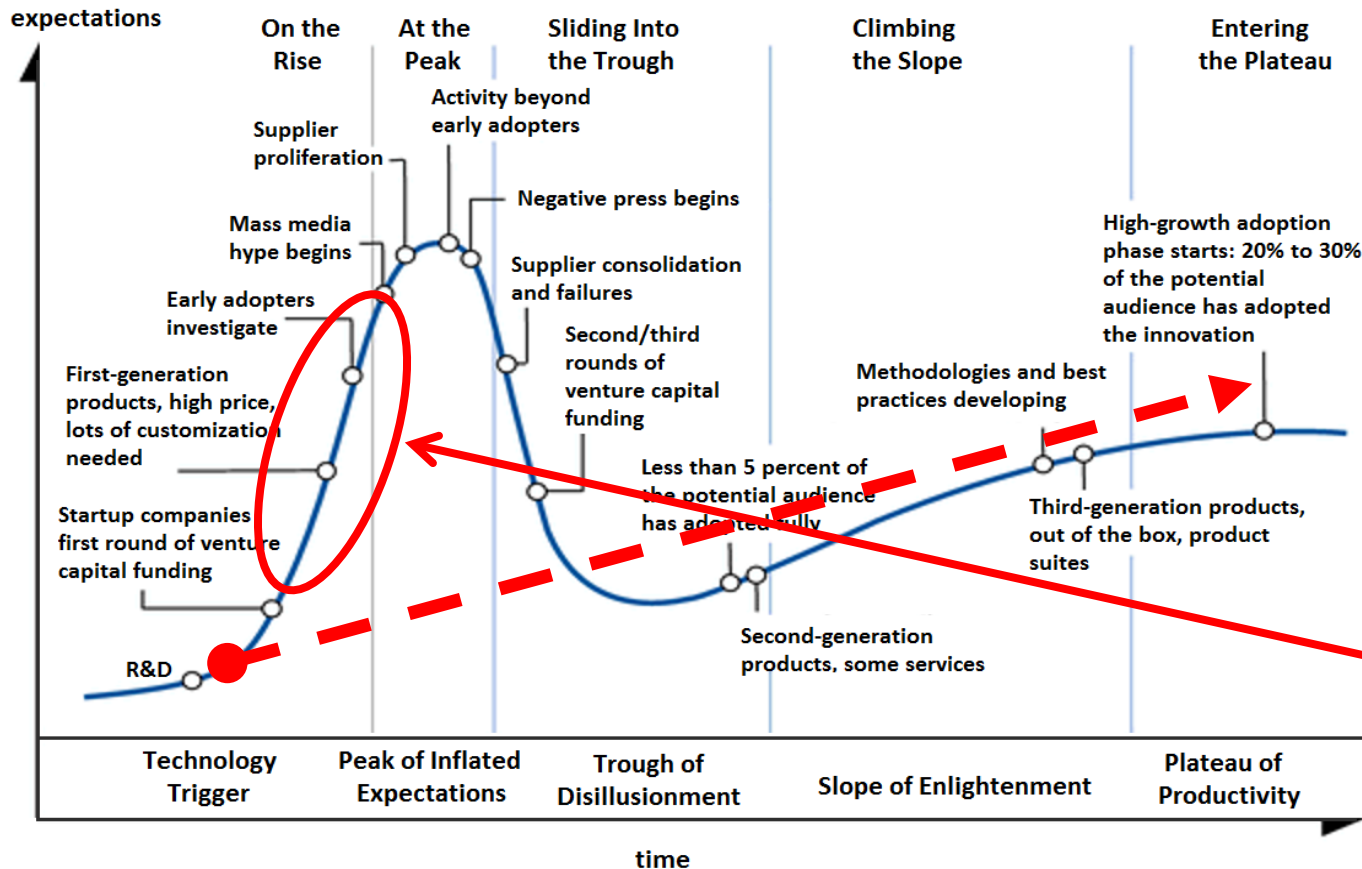


M&S service based approach and benefits

- Resolution of the long term problem of simulation interoperability through the reuse and composition of services that are already interoperable
- Technical maturity using a service based approach
- Aligned governance through a enterprise wide approach
- Improved cyber security due to the reuse of pre-tested components
- Modernisation of the procurement process to ensure defence can rapidly access the most relevant components
- Composable Services that are more easily reused



Peak and Trough of expectations for MSaaS



Preferred path for MSaaS

But perhaps we are here!

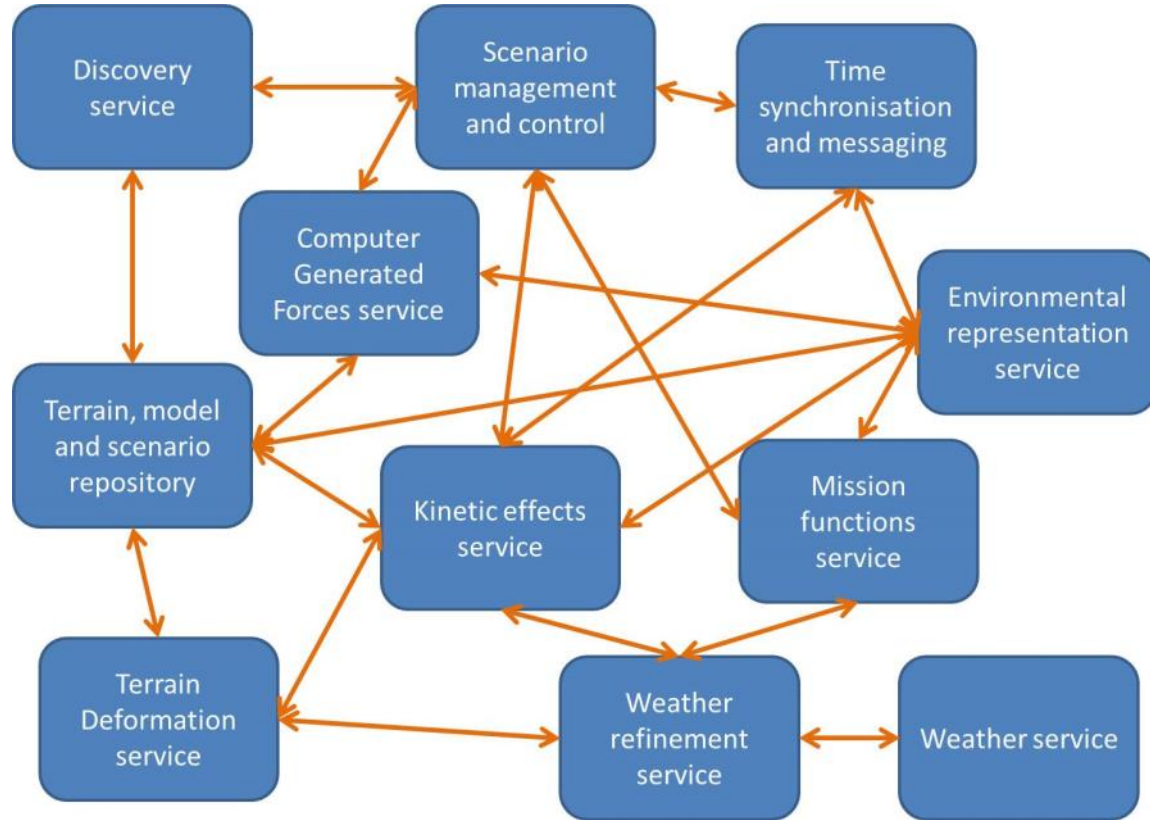
MSaaS technical complexity

Service based approach can be technically complex

Issues to be overcome include:

- Composable service definitions and interfaces
- Cloud latency for real time operation
- How do we integrate these systems ?

Dstl SCORE project looking at composition, aligned with MSG-156



Some other challenges for service based approaches

Cyber protection and security accreditation

- Ensuring the models and data are secure and appropriate

How do we apportion ownership of risk?

- Use of models not designed for a particular purpose
- Who is responsible if it doesn't work ?
- Validation and verification

Payment models for services

- Buy outright
- Rent for a time
- Subscription models
- Separate supply of integration services

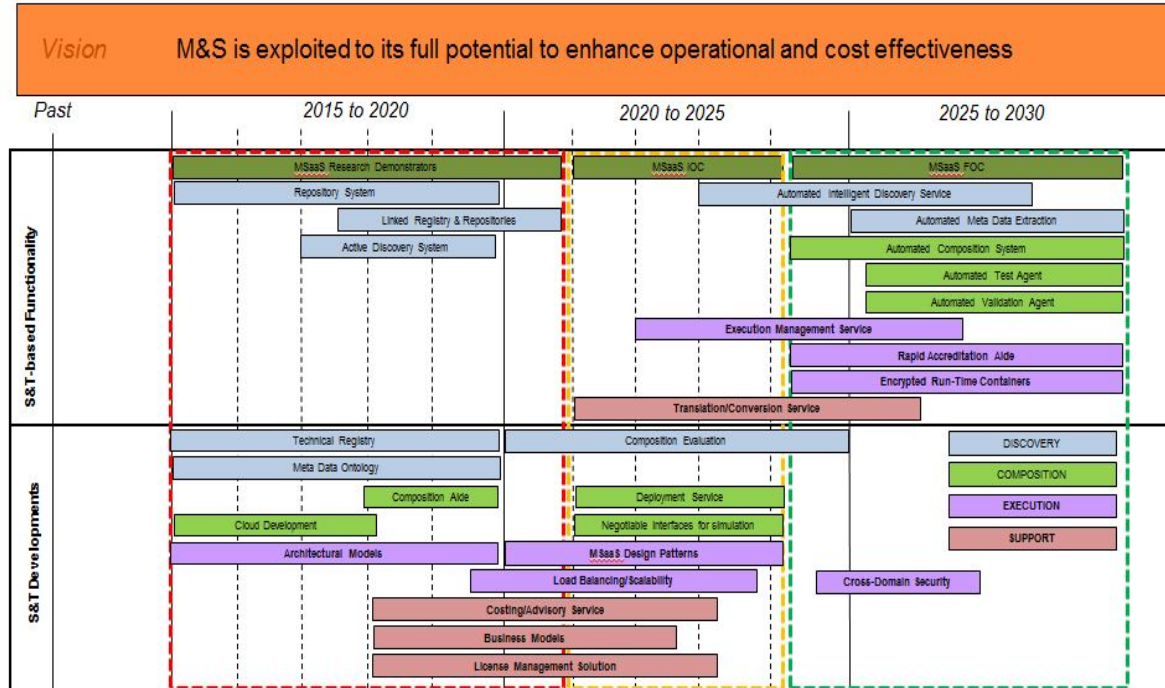
Industry investment appraisal

- Difficulty of assessing value in a new environment



AIMS MSaaS Capability Development & Exploitation Roadmap

- Ensures technological dependencies are clearly stated
- Maps exploitation of research onto future opportunities
- Provides a short and longer term plan for gradual implementation
- Ensures that all stakeholders have a clear view of the 'now' and the 'possible' to avoid hype and disappointment



Continued Research and Development

Continued R&D activities must be targeted to areas that are not yet clear e.g:

- Services to enable multi-domain, multi-level security
- Issues around 'Quality of Service' and performance
- Self-generating and self-annealing interface bridges
- Automatically scaled composition
- Payment and commercial agreements



Standards approach

Standards can be set at the wrong time:

- Too early – can stifle innovation and produce long term damage due to immaturity
- Too late – fragmentation occurs and the standard is sidelined or is out of date
- Just right – promotes innovation and adherence and interest is maintained

Initial small steps are important

- Start with things that matter for the rest of the ecosystem
- Ensuring terrain data repositories are in common readable formats (SISO RIEDP / OGC-CDB / CDB-S
- Good registry metadata standards to enable consistent discovery results

Now is a good time to work on this to secure the future

- E.g. in MSG-164, SISO Cloud based M&S, OGC, MSG-156



**Simulation Interoperability
Standards Organization**

"Simulation Interoperability & Reuse through Standards"



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Incremental development and exploitation

Minimum Viable Product (MVP)

“An MVP is defined as ‘a development technique in which a new product is developed with only those core features required to deploy the product and which are sufficient to satisfy early adopters.

The final, complete set of features is only designed and developed after considering feedback from the product's initial users” - *Technopedia*

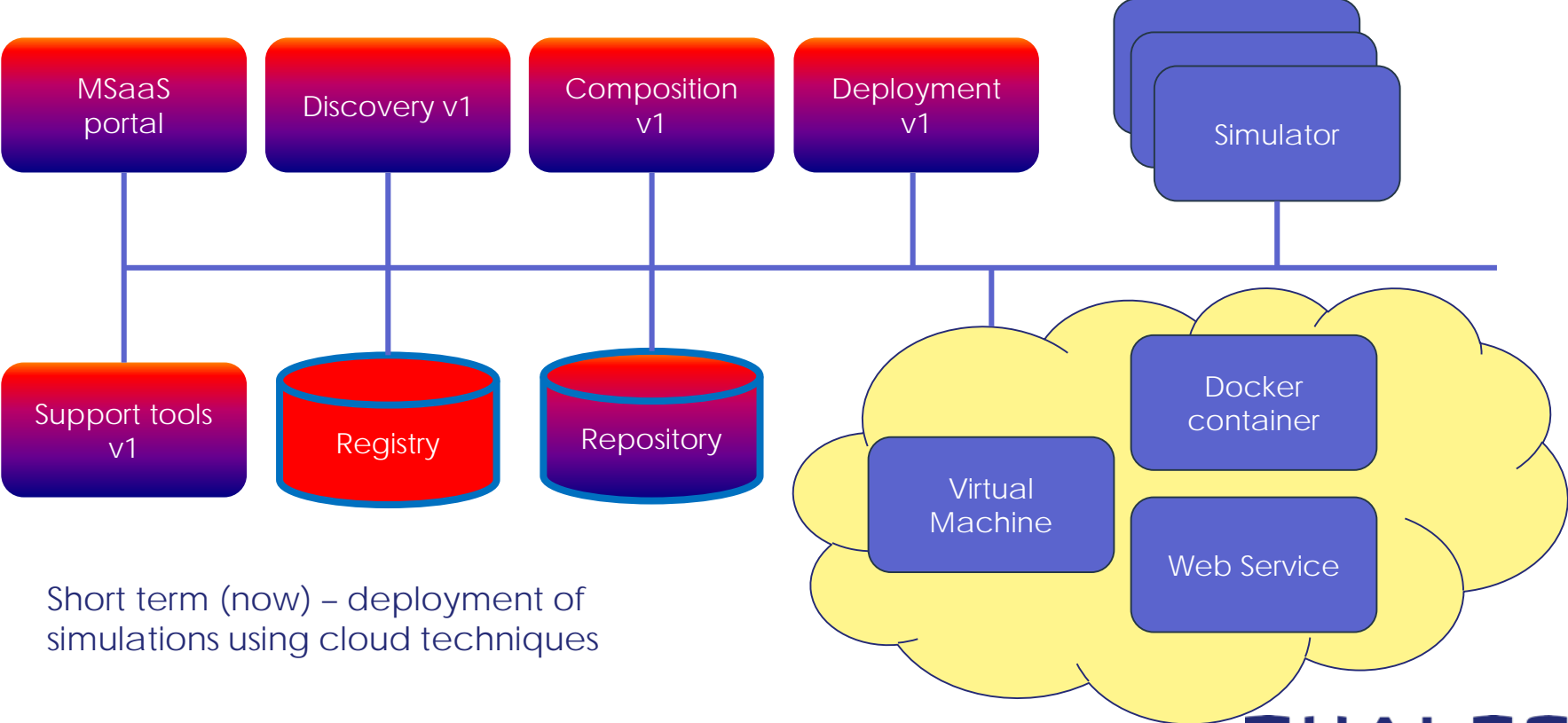
Good quality, quantitative customer feedback is key e.g.

- Net Promoter Score (NPS)
- Data gathered using beta testing by users
- “Willingness to pay”

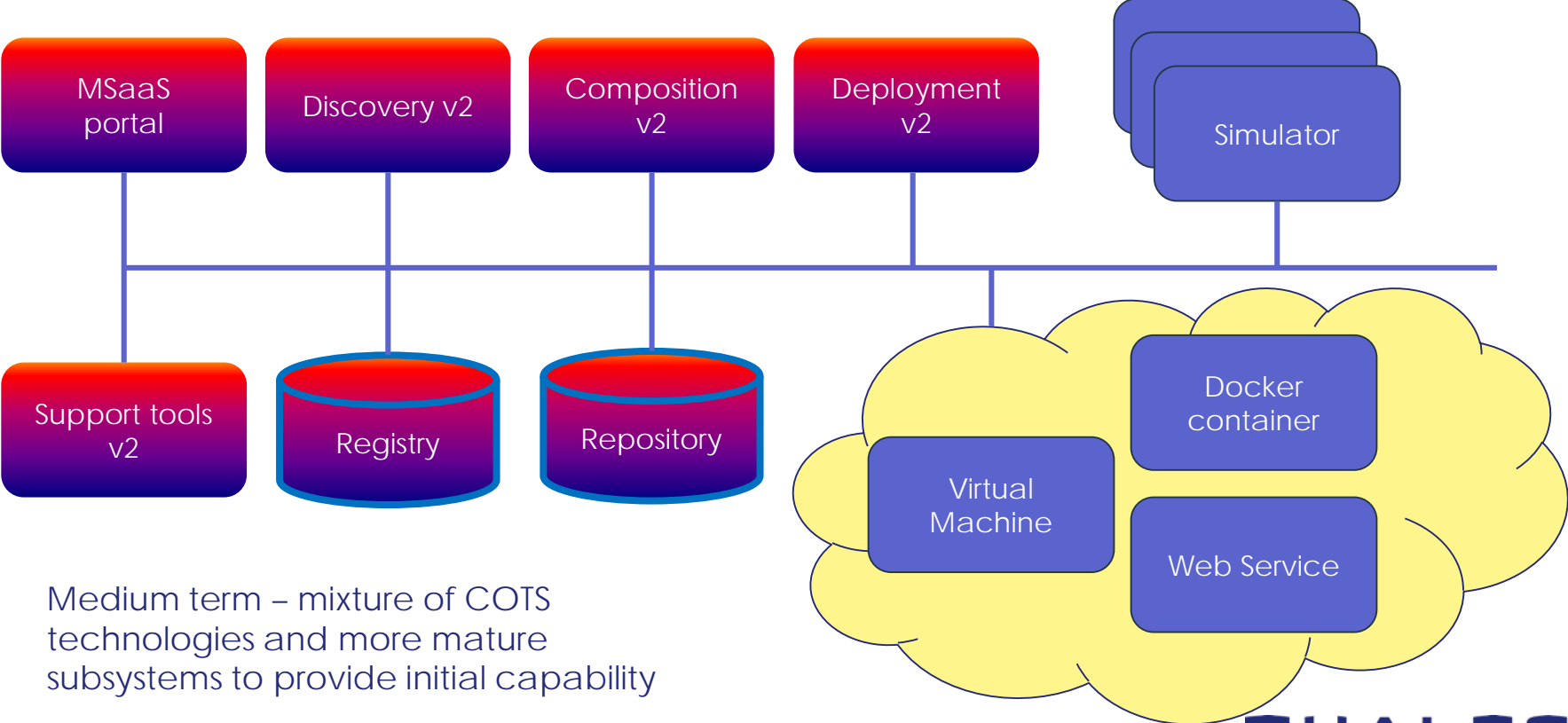
Final product / service developed using this feedback

- But this is a continual process that should never stop

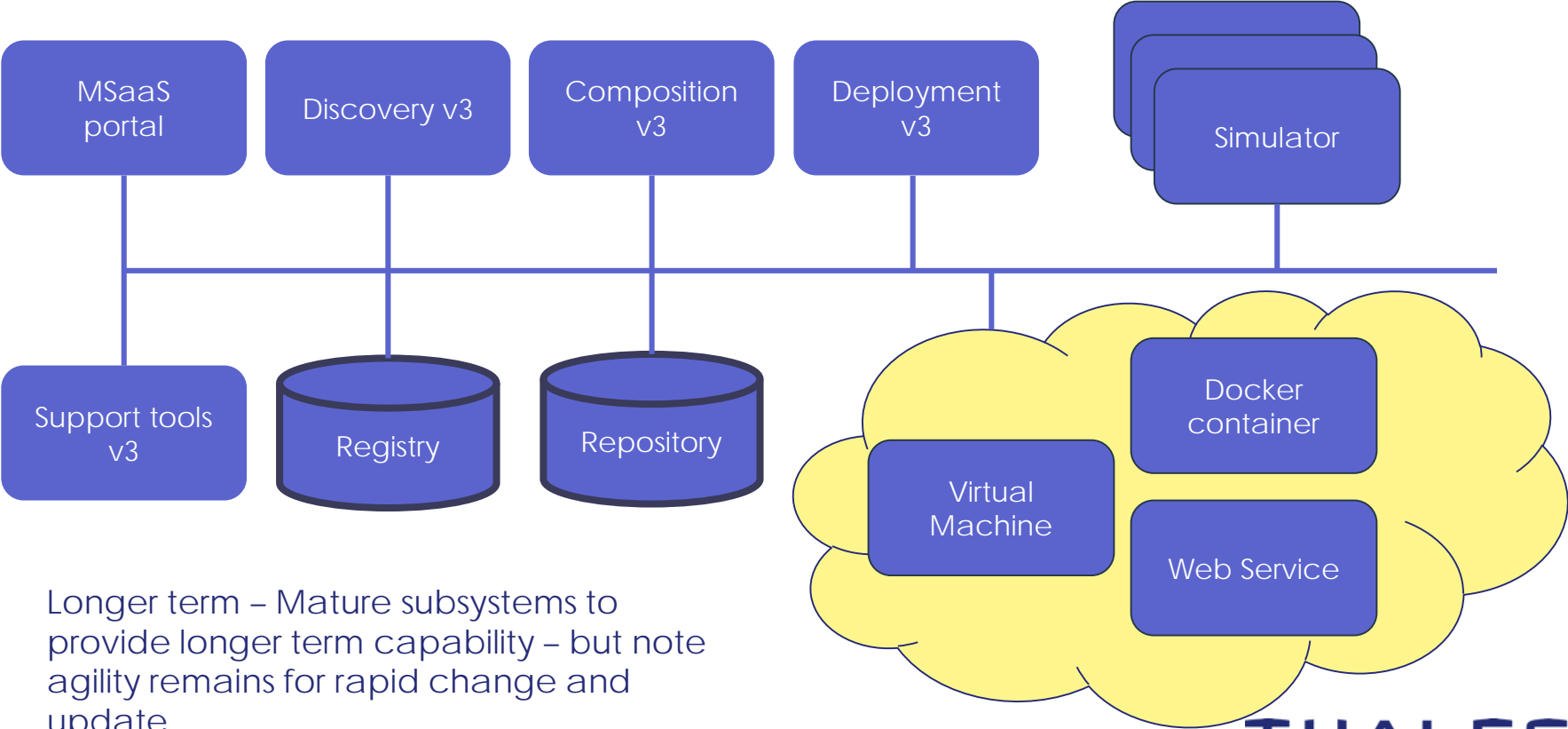
MVP techniques applied to MSaaS – stage 1



MVP techniques applied to MSaaS – stage 2



MVP techniques applied to MSaaS – stage 3



Longer term – Mature subsystems to provide longer term capability – but note agility remains for rapid change and update

Summary

- We need to avoid over-promising and under-delivering on MSaaS and bring potential customers / stakeholders along with us on the journey
- Technology is complex and will not deliver 100% capability immediately
- Business related issues are just as complicated – customer base and supplier base need to work through disruption to existing business models
- Some ideas:
 - Roadmapping – ensure everyone is clear what can be delivered by when and what the technical and other dependencies are to enable effective planning
 - Continued focussed R&D – make sure technological improvements defined in the road map for both short term and long term objectives can be delivered
 - Standards – Appropriately timed to ensure international cohesion in MSaaS and an open architecture which will not be dominated by a single supplier
 - MVP – Gradual implementation using experimentation and customer feedback

Questions ?

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