

Agile Maturity in Systems Engineering

This guide is not intended as a general introduction to Agile. This is covered elsewhere by documents and concepts such as the Agile Manifesto [1] and earlier output from the Agile SE working group. Rather, this guide is intended to provide high-level advice on what the essence of 'agile' is, and to cover levels of agile maturity. It is not intended as a guide describing how agile might be adopted.

What is Agile Systems Engineering (SE)?

Agile Systems Engineering (applying an Agile approach to SE) should not be confused with Engineering Agile Systems (the development of a system that is itself agile). This guide is primarily concerned with Agile Systems Engineering (Agile SE). However, this means that the systems needs a degree of agility as well.

You cannot DO Agile – You must BE Agile

Not all approaches, rationales, or Systems of Interest (SOI) are suited to development using Agile SE. It is not a 'cure all', but the right tool for the right job in the right circumstances. For example, for systems where assurance, design, manufacture and installation rework costs are significant, Agile techniques are significantly less suited. However, where a rapid response is required to an evolving or emerging circumstance or threat, Agile can offer significant benefit.

Being Agile

Building the Capability to be Agile

Building a capability to develop systems using Agile approaches is not simple. You can't turn up to work one morning and suddenly decide to do Agile; it requires a mind shift or a cultural shift which may only come about if the conventional methods are not delivering the results you need.

Agile SE requires a set of principles and processes that will work for Agile development. This includes all the technical processes, but more importantly the wider enterprise and enabling processes. Furthermore, this must take place within an evolutionary lifecycle. Agile SE processes need to be much simpler and more lightweight than conventional SE processes. Implementation considerations of wider enterprise processes will also be important. Financial, commercial and regulatory processes are often based around a conventional SE approach.

To be Agile is to be transparent, adaptable, and collaborative

It is necessary to have an appropriate modular architecture that enables subsystems to be improved quickly and simply. The architecture should be based upon well understood and stable interfaces, preferably defined by standards.

The People

Ideally all the people involved in the project should have experience of Agile SE. This is unlikely to be the case with initial implementations. It is important to include people with experience of the technology used and operational environment as well as Agile delivery.

The organisation's governance arrangements need to drive the behaviours needed for Agile. Compared to conventional SE governance, Agile SE governance needs to focus on ensuring high quality operational feedback; an effective and balanced team; maintaining a high tempo; and, whether the project should continue beyond the next iterations. More importantly, controls associated with conventional processes need to be replaced by suitable Agile ones, as they will reduce the tempo of delivery.

The hardest element to introduce is the right culture. A good Agile team has a common set of beliefs about the project and how to deliver it. Building a high-performing team where these Agile beliefs are not universally shared is very difficult and requires strong and inspirational leadership.

[1] Agile Manifesto: <https://agilemanifesto.org>

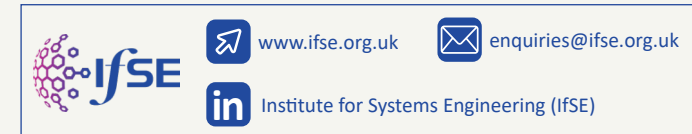
[2] INCOSE UK (2018) Agile Systems Engineering Guide

About this Z Guide

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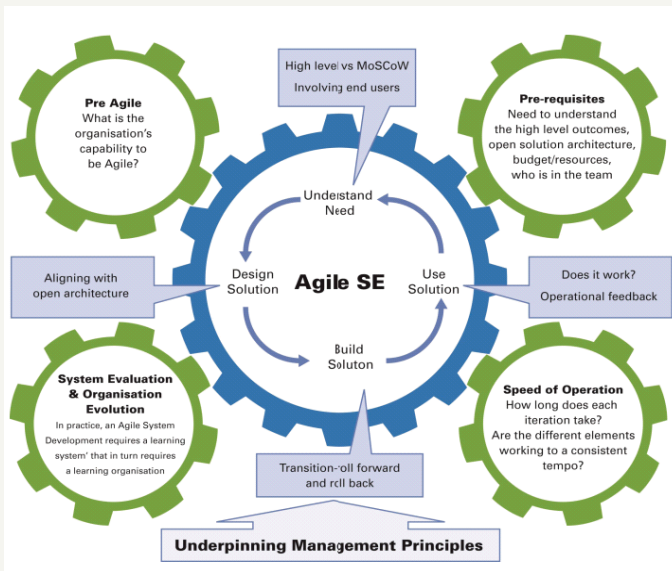
Lead author: Dr. Steve Barker



Right Approach for the Right Situation

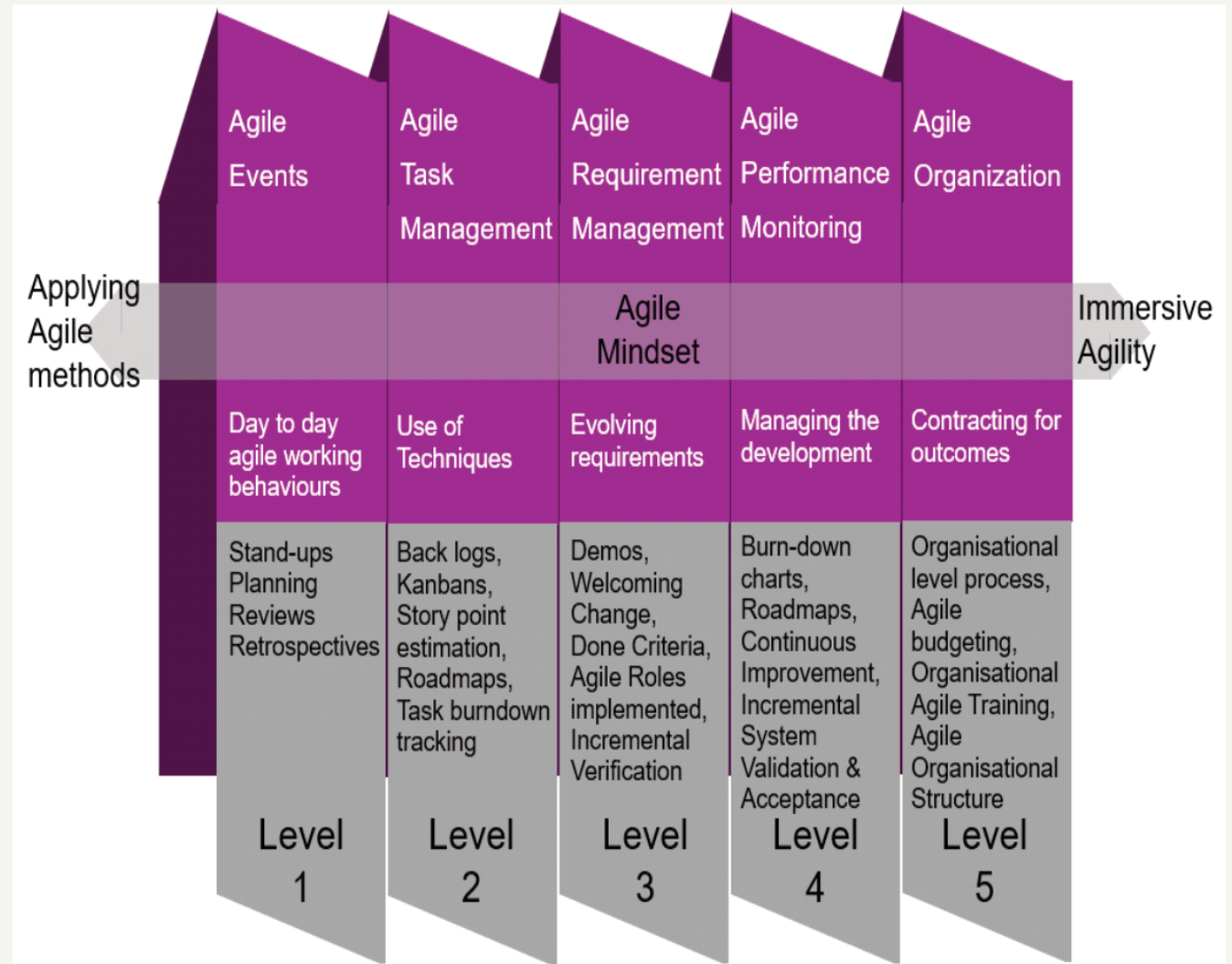
Understand the Need

Even if Agile SE is the right approach to take for the development type, it may be difficult to embed in your organisational culture. Agile SE requires a trade-off between Tempo, Scope and Rigour. For example, you can go much more quickly if you apply less rigour; and a larger scope will mean a longer development time. However, the size of the trade-offs that need to be made can be reduced by developing the right Organisational Capability.



INCOSE UK Agile Systems Engineering Guide (2018)

Unlike conventional SE, the iterations within an Agile development have a fixed time but variable scope. At each iteration the requirements for the next delivery must be understood. The requirements should be considerably more discrete than traditional requirements and may use the MoSCoW approach – Must have, Should have, Could have and Won't have.



Hierarchy of Agile Maturity

Adopting Agile behaviours can involve working within agile 'bubbles' within an organisation, project, or operational 'lifecycle', instituting good practices which facilitate agile principles and procedure. It is not necessary to adopt 'pure Agile', and finding the right place on the Agile spectrum will deliver the required benefit - depending on your customer base and organisational situation.

The levels above can also be used to indicate maturity of Agile adoption within an organisation.