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Agile Systems Engineering is not Agile Systems Engineering

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Abstract

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Abstract

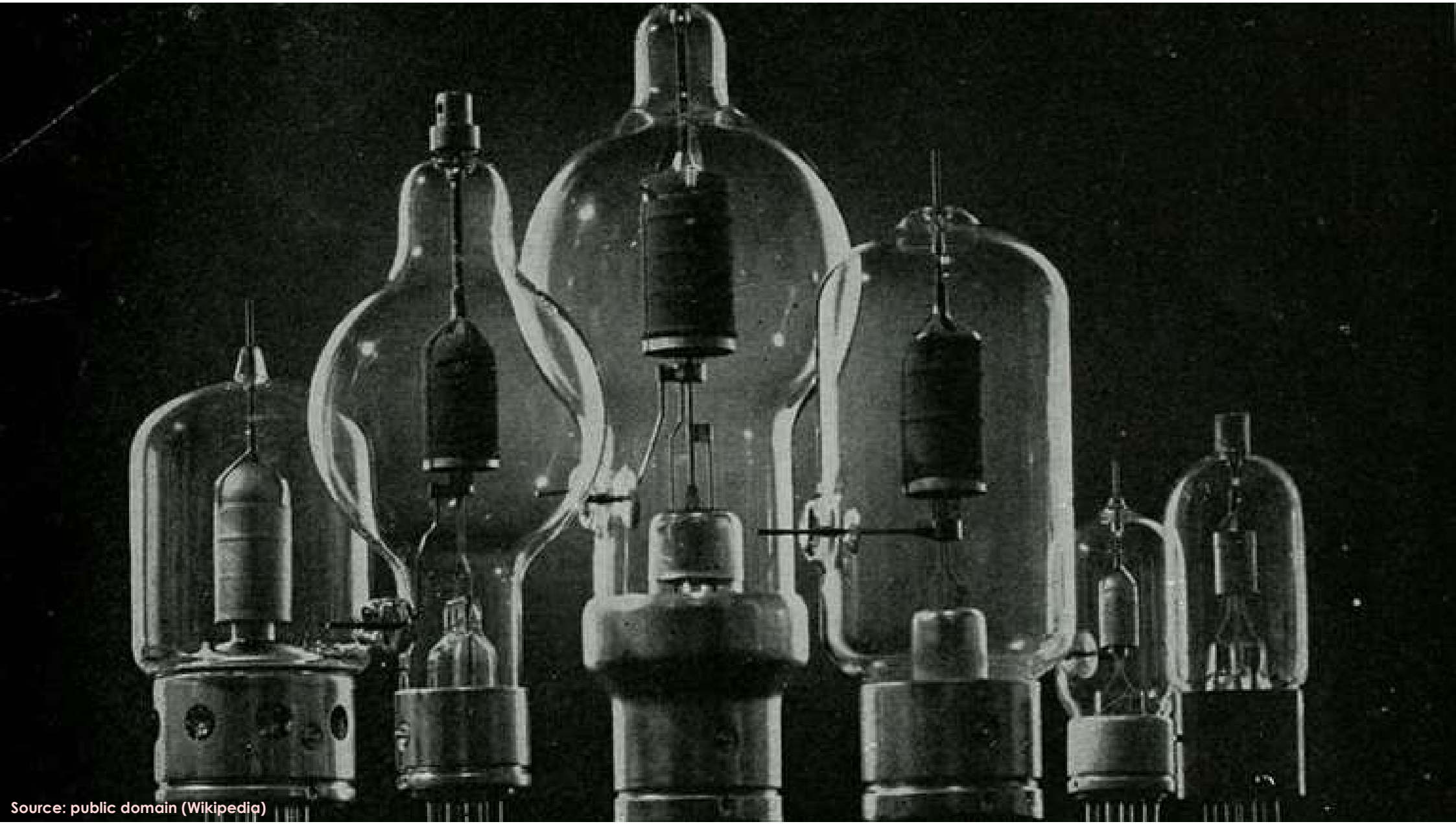
Agile Systems Engineering is not Agile Systems Engineering

The concept of agility was initially introduced as an organizational concept: an agile organization drives change and responds effectively to it. These abilities make it innovative and resilient. Thus, "agile systems engineering" is the agile engineering of systems.

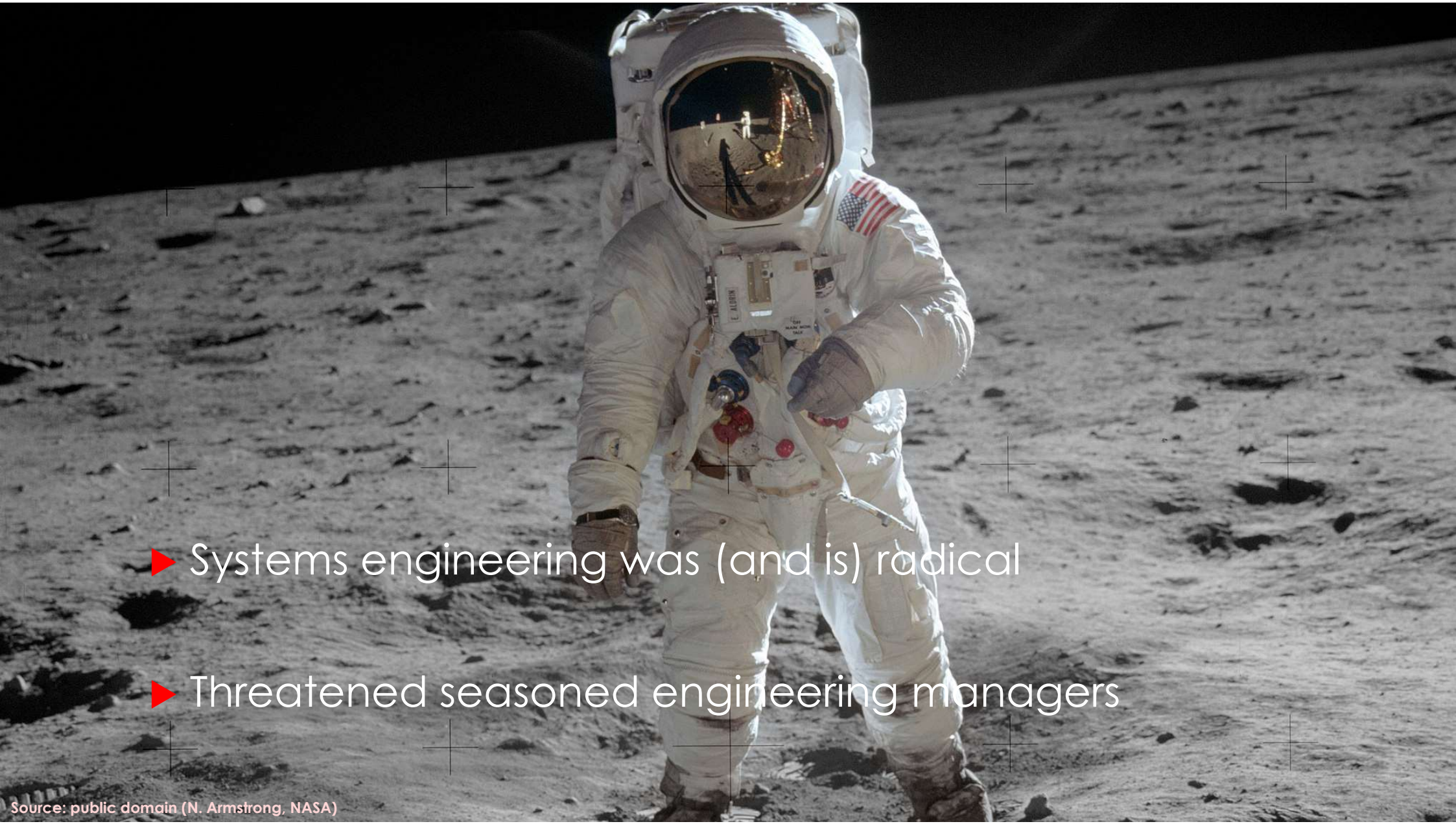
Historical evidence shows that systems too can be agile, in that they drive change and are resilient to change. Thus, "agile systems engineering" is the engineering of agile systems.

In this presentation, both contexts are addressed and discussed, identifying key elements to "agile systems engineering" today.

Presentation

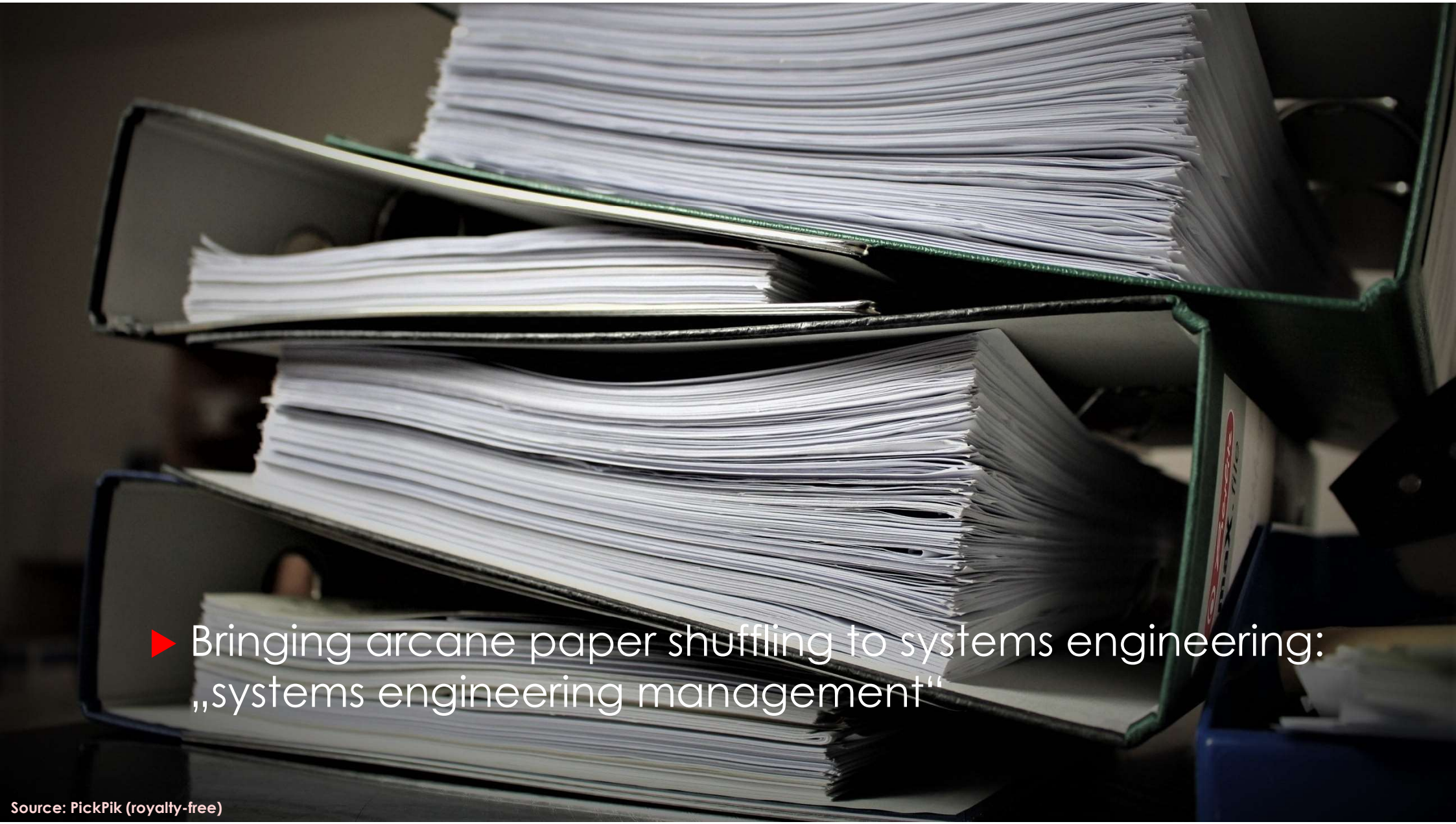


Source: public domain (Wikipedia)



- Systems engineering was (and is) radical
- Threatened seasoned engineering managers

Source: public domain (N. Armstrong, NASA)


Bringing arcane paper shuffling to systems engineering:
„systems engineering management“
Source: PickPik (royalty-free)

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The Advent of Agility

- Charles Kimsey (US DoD): insufficient to catch up to Japanese manufacturing practices, instead focus on what would be next – the Holonic Manufacturing Systems

- Companies need the ability to respond effectively and with competence to change. This ability was called agility.

- Fundamentals of Agile Systems Engineering, R. Dove et al 2014.

The Advent of Agility

Scholars quickly created the term “agile systems engineering” and found two meanings:

- Agile engineering of systems
- Engineering of agile systems

- Fundamentals of Agile Systems Engineering, R. Dove et al 2014.

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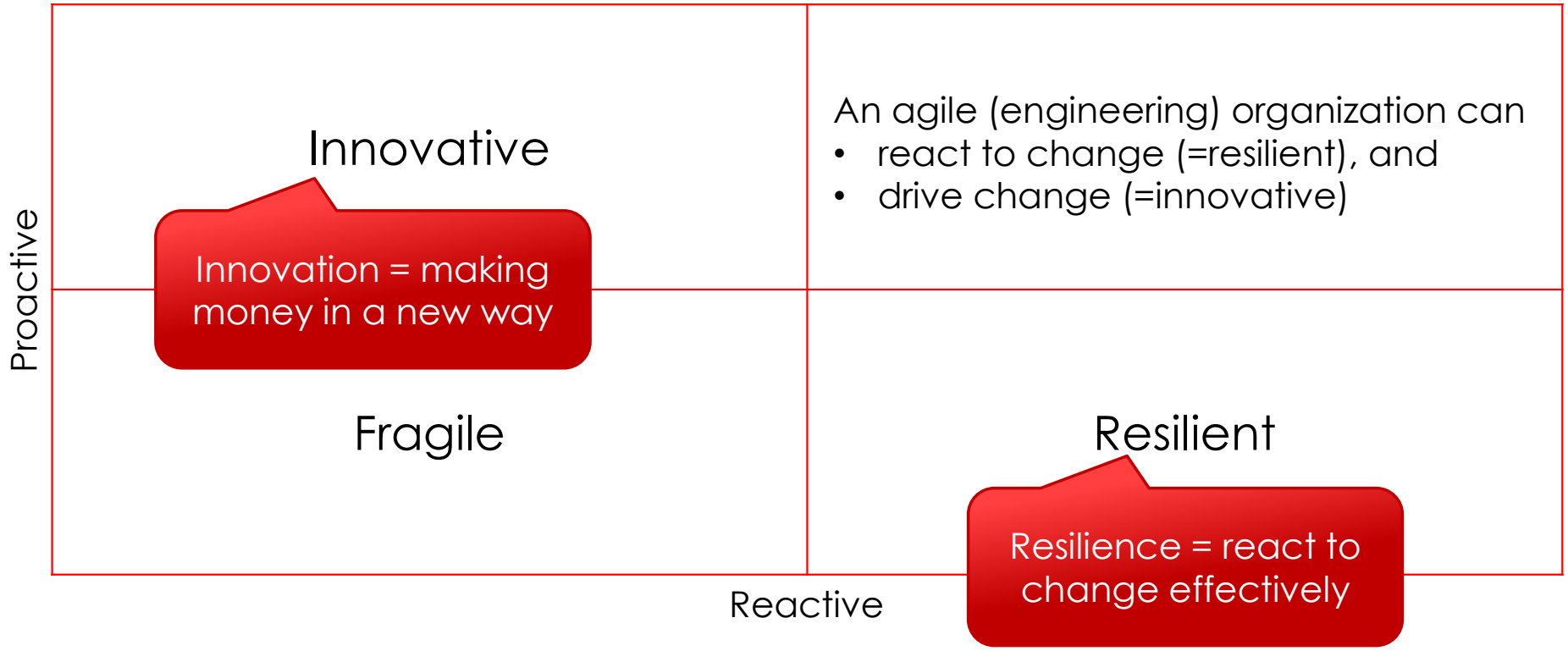
Agile Engineering of Systems



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Agile Engineering of Systems

- Agility is an organizational pattern
  - Innovative = make money in a new way
  - Resilient = able to respond to change effectively
- Agile engineering supports agile company

Agile Engineering of Systems

- Scholars considered Scrum as the solution
  - Associated with agile software development
  - Time-boxed sprints (1 month or less) to address uncertainty and change

- However: „Scrum‘s roles, artifacts, events and rules are immutable“ (The Scrum Guide, Schwaber and Sutherland, 2013)

  … and the paper shufflers were back as Scrum masters

- Not every Scrum master is a paper shuffler using a ticketing tool, but many paper shufflers hide behind Scrum and agile processes

Source: Granny Enchanted, public domain (CC0-10)

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Agile Engineering of Systems

- Consider the change frequency
  - Agility has a cost, which is only justified by innovation and resilience
- Every agile process must provide a clear increase in innovation and resilience
  - Scrum may or may not be the solution – it needs to be justified in each case
  - Paper shuffling is never the solution – at best, it's a means to ends

Take-away

Agile engineering of systems

- Organizational pattern
  - Innovative = make money in a new way
  - Resilient = able to respond to change effectively
- Every agile process must provide a clear increase in innovation and resilience
  - Scrum may or may not be the solution
  - Paper shuffling is never the solution

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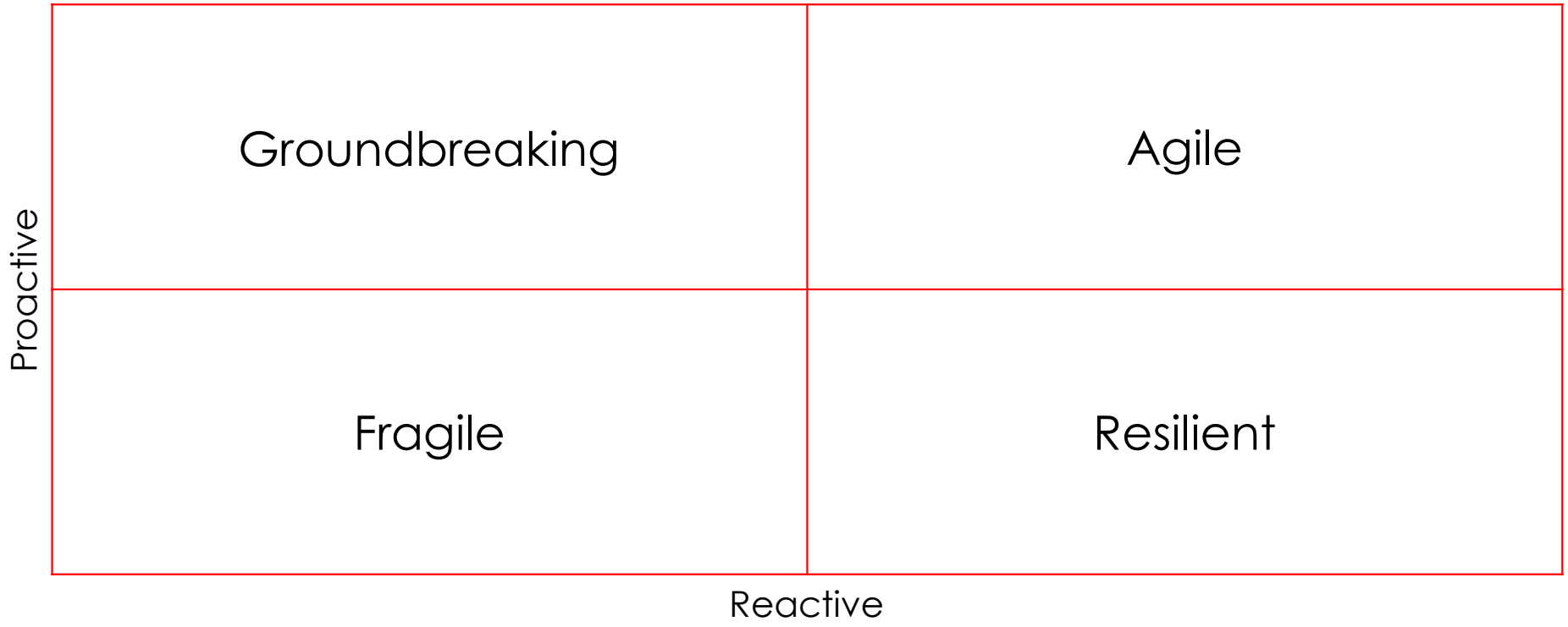
Engineering of Agile Systems



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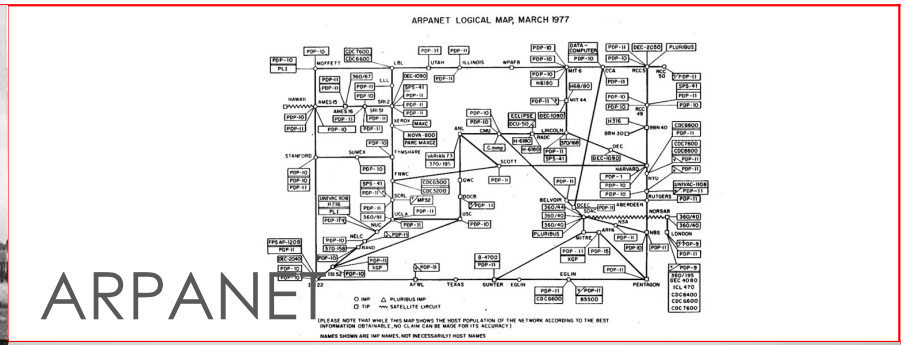
Engineering of Agile Systems



Proactive

Reactive

Sources: HMS Dreadnought – public domain; USS New Jersey – public domain (Sh. Brennan, US Navy); Wasa - Karolina Kristensson (cc-by-4.0); U2 – Ronnie Macdonald (cc-by-2.0)

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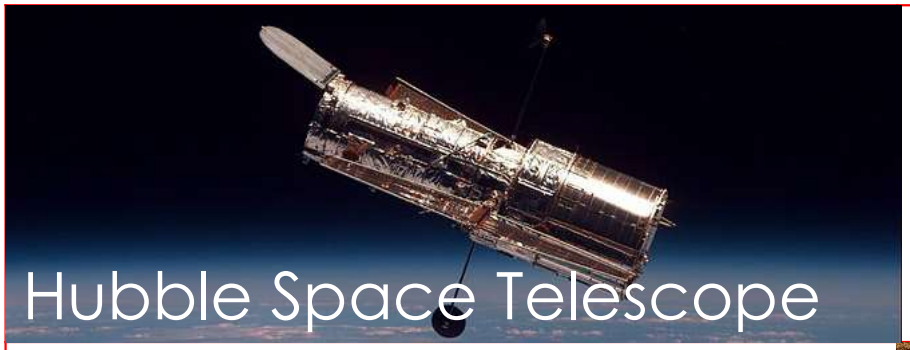
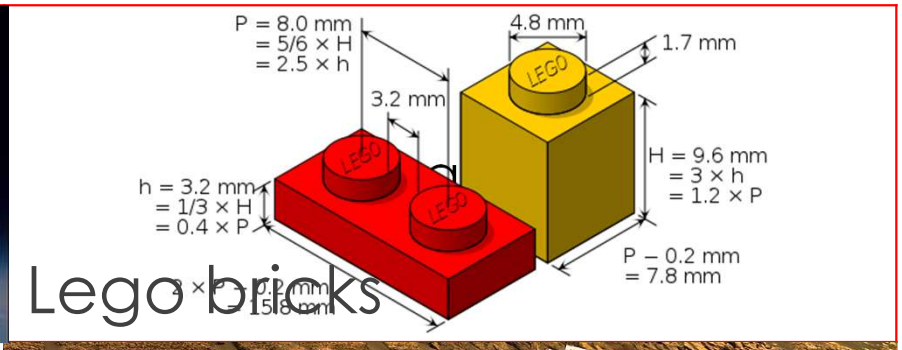
Engineering of Agile Systems





Fragile

Proactive

Reactive

Sources: Hubble space telescope – public domain (NASA); Lego – Cmglee (cc-by-sa-3.0); Opportunity rover – public domain (NASA)

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Engineering of Agile Systems

- Build systems that are „groundbreaking“ and resilient

- Typical practices
  - Focus on changing needs
  - Design as an open system
  - Keep it simple
  - Modularize
  - Learn fast, and improve from mistakes
  - Reduce uncertainty and adapt to change

This is

Systems Engineering

done well

Take-away

Engineering of agile systems

- Agile systems are
  - Groundbreaking = drive change
  - Resilient = able to respond to change effectively
- Using systems engineering best practices yields agile systems

Thank you for your attention

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Agile systems engineering manifesto

Multifunctional teams	over	engineering silos
Focus on purpose	over	focus on requirements
Empowered teams	over	tasked individuals
Early learning	over	late failures
Individuals and interactions	over	processes and tools
Working solutions	over	comprehensive documentation
Customer collaboration	over	contract negotiation
Responding to change	over	following a plan