PRACTICES FOR EFFECTIVE CONTINUOUS ARCHITECTURE

EOIN WOODS

iSAQB Software Architecture Gathering

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Eoin Woods

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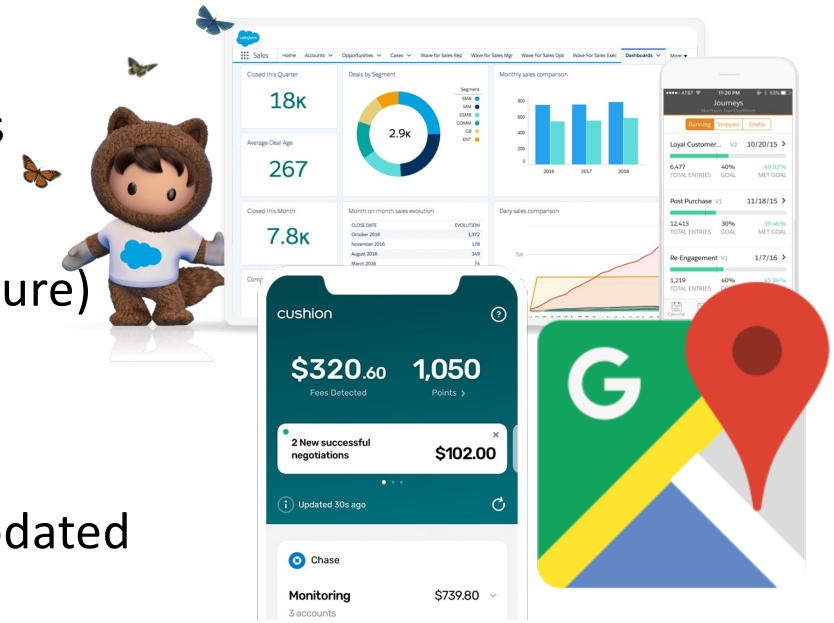
- 10+ years in products - Bull, Sybase, InterTrust
- 10 years in capital markets - UBS and BGI
- Software developer, architect, now CTO
- Author, editor, speaker, community guy

THE CHANGING FACE OF SOFTWARE DEVELOPMENT

Software Development in the age of Digital Platforms

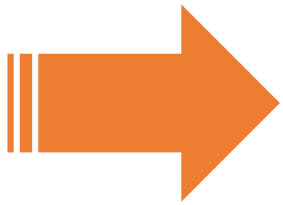
- Platforms are ”**always on**”
- Platforms are built to **evolve** in unpredictable ways
- Some **intelligent behaviour** is becoming expected
- **Continual updates** to the software (and infrastructure)
- **Parallel developments** occur on a platform
- Platforms are **highly connected**
- **Multiple interfaces and audiences** to be accommodated
- Platforms must be **extensible by design**



A multi-dimensional software engineering challenge!

So Software Practice Evolved

- DevOps (and SRE)
- Reusable Cloud Services
- Microservices and Serverless
- Cloud Infrastructure
- Agile Working



FLUID
EVOLVING
ARCHITECTURE

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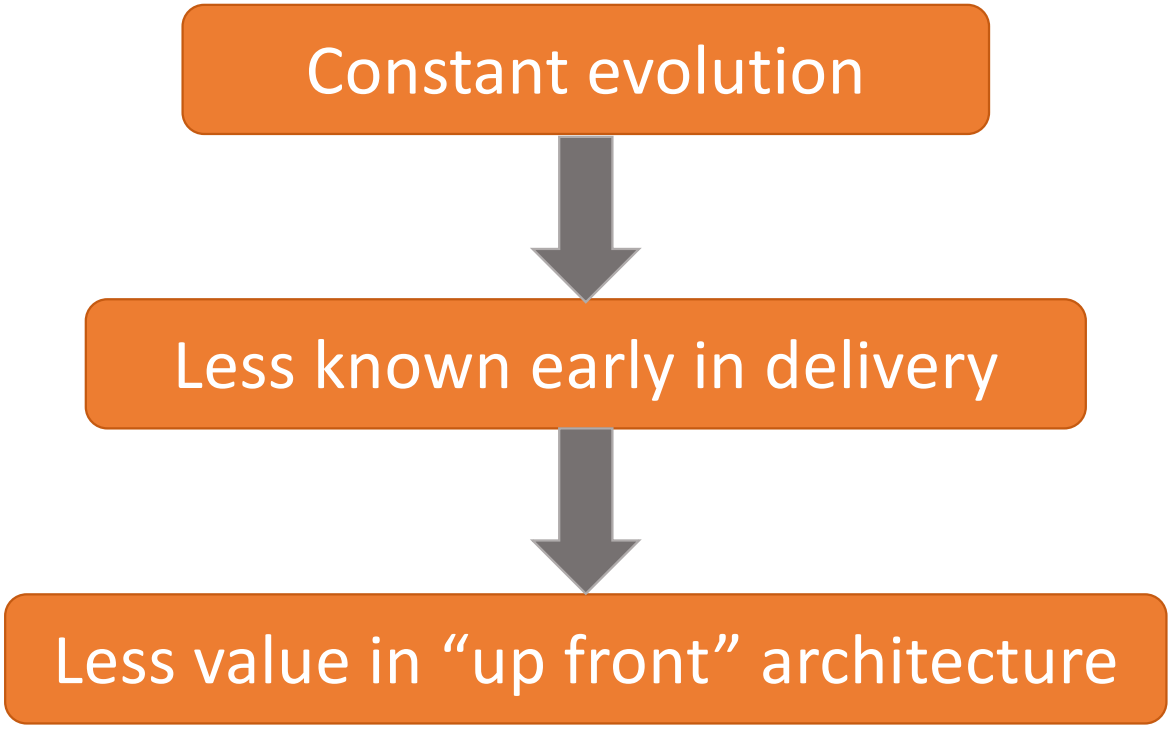
Traditional software architecture is of less value



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INTRODUCING CONTINUOUS ARCHITECTURE

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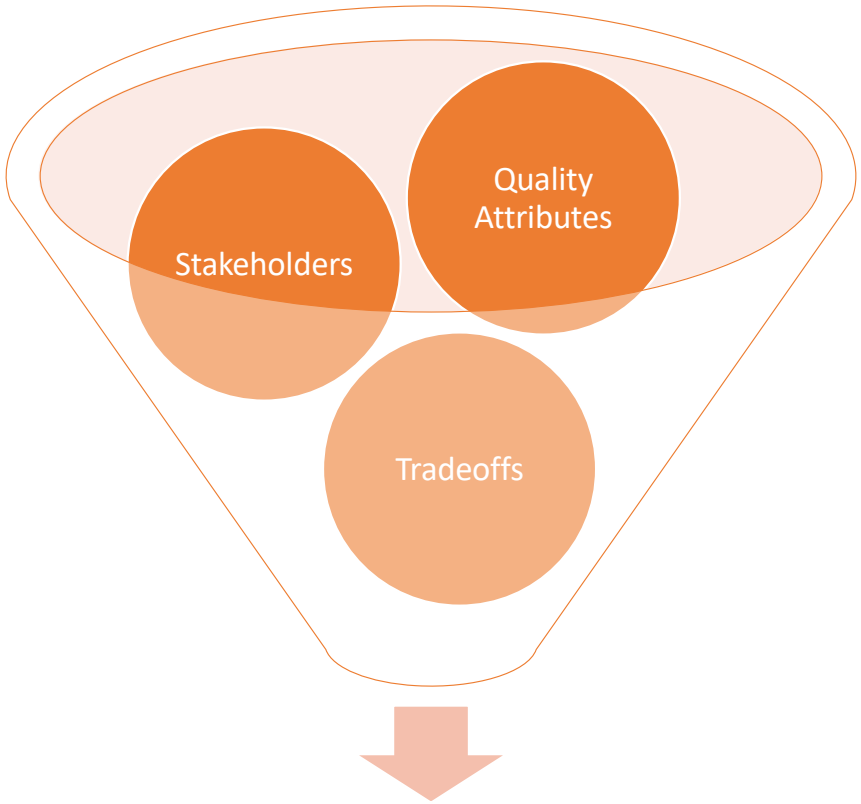
Is architecture still needed? Yes!

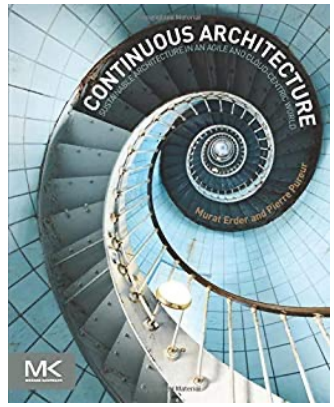


- Achieving **quality attributes**
- Balancing **stakeholder** concerns
- Making complex **tradeoffs**
- Achieving **cross cutting concerns** across many independent parts

But architecture is now a continual **flow of decisions**

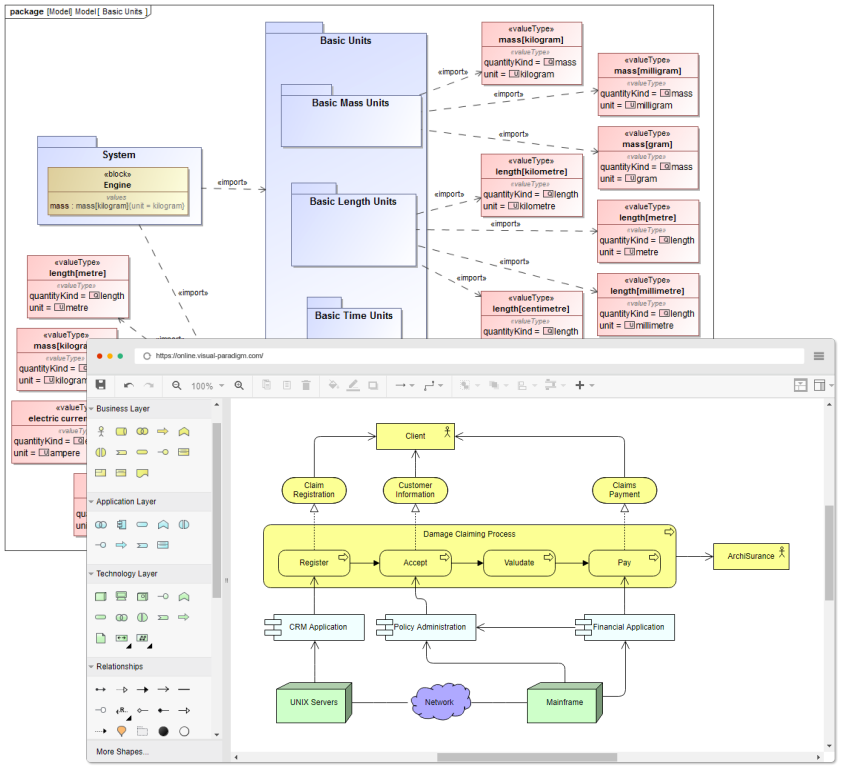
Continuous Architecture Principles

- **Principle 1**: Architect **products**: evolve from projects to products
- **Principle 2**: Focus on **quality attributes**, not functional requirements
- **Principle 3**: Delay **design decisions** until absolutely necessary
- **Principle 4**: Architect for **change** – leverage the "power of small"
- **Principle 5**: Architect for **build, test, deploy and operate**
- **Principle 6**: Model the **organisation** of your teams after the design of the system

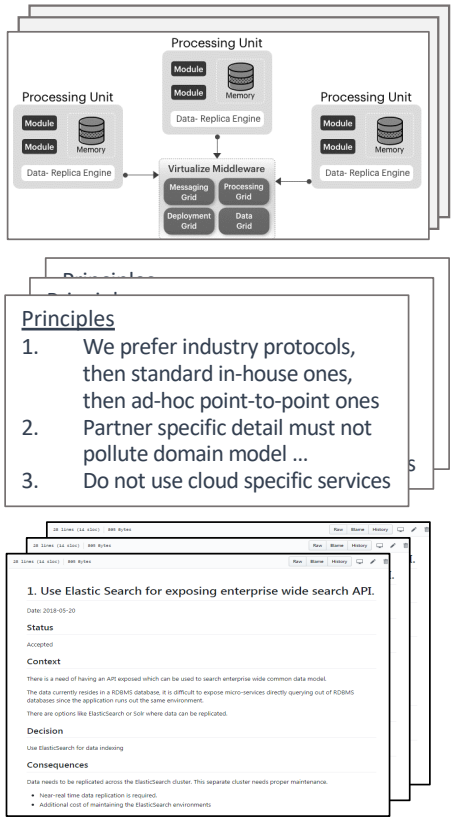


Murat Erder &
Pierre Pureur, 2015

Moving to Continuous Architecture



Top Down Prescriptive Design



Styles & Patterns

Principles

Decisions

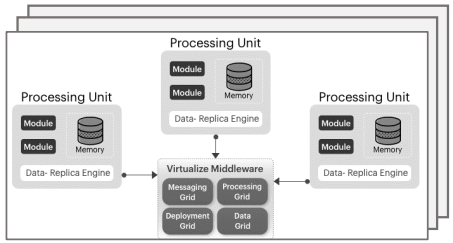
Evolving Shared Design

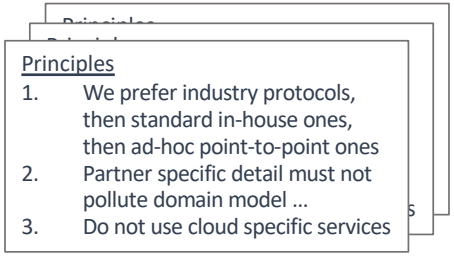
Artifacts of Continuous Architecture

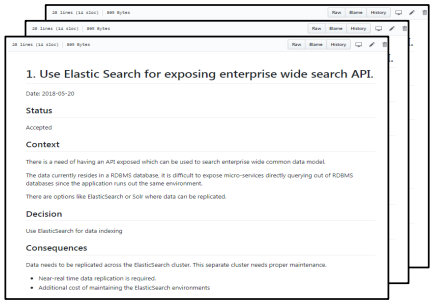
Styles & Patterns:
Common solutions to repeating problems

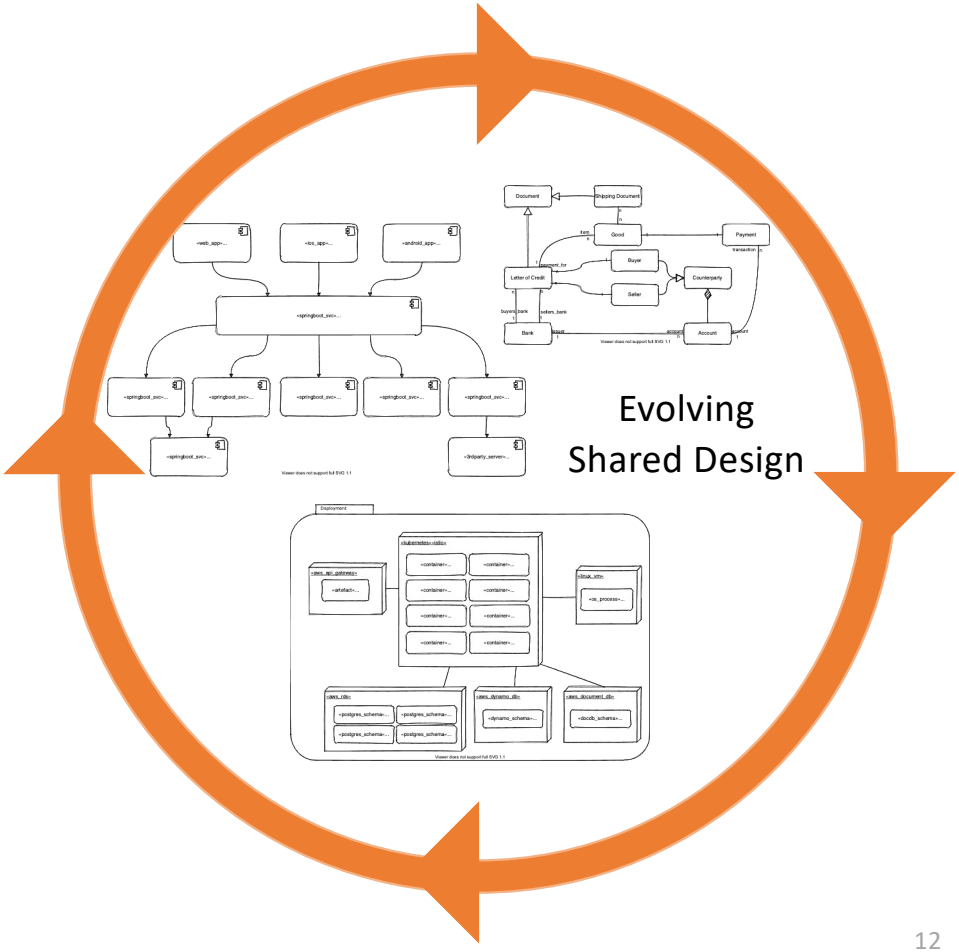
Principles:
Guidance to achieve aligned design decisions

Decisions:
Understanding what we did, when and why









THE ACTIVITIES OF CONTINUOUS ARCHITECTURE

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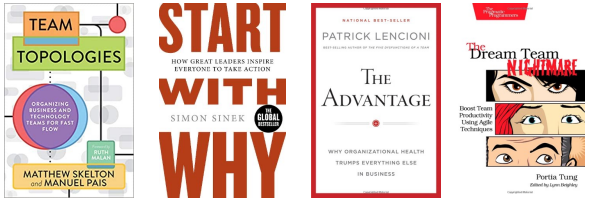
Essential Continuous Architecture Activities

Provide Leadership

- **Leading** rather than ”managing”
  - Get the team doing the architecture work
- Lead the **resolution** of technical concerns
  - What are the key architecture principles?
  - Which option to choose when none is perfect?
  - What can be deferred, what needs to be done now? (Tech debt)
  - What are the options when something ”impossible” is needed?
- Constant progress towards **technical excellence**
  - What are the right ways of working?
  - What are the long-term consequences of decisions?
  - ”the conscience of the team”
- Represent the **technical view** ”upwards”
  - “difficult conversations”

https://www.pexels.com/@fauxels



Leadership: a Technical Leadership Group

- **Form a team** to own the architecture & technical concerns
  - Technical Leadership Group, Tech Leads Group, …
- Spreads **knowledge** across the team
- **Empowers** others to take responsibilities with support
  - Topic champions for security, performance, resilience, …
- Provides technical **growth** opportunities
- Allows **multiple perspectives** for decision making
- Frees up **your** time
  - But there does need to be a decision making mechanism (usually you)

https://www.pexels.com/@fauxels

Focus on Quality Attributes

- Reminder probably unnecessary for quality attributes!
  - “the architect’s obsession”
  - Constant process of balancing tradeoffs
- **Cross-cutting concerns** that need system level attention
  - The question is how to get attention for them?
- Most **teams and product owners** are obsessed by **features**
  - ”how many stories in this sprint?” (meaning ”features”)
- Quality attributes often **not needed ”this sprint”**
  - Stores up potential problems for later
- How do we **integrate** them into Continuous Architecture?

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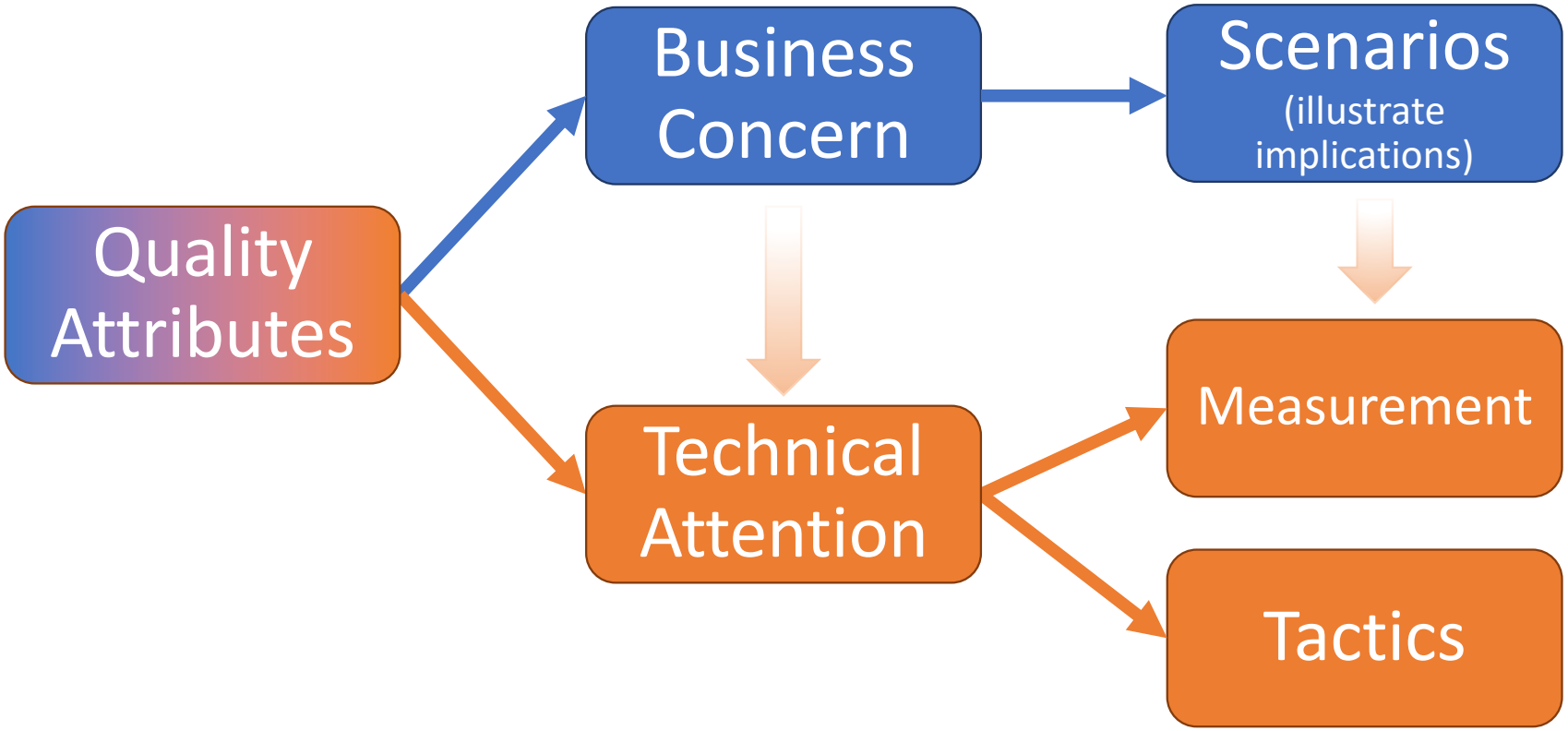
Focus on Quality Attributes



Quality Attributes Architectural Approach

- Get attention using **scenarios** – make the need clear
  - Stimulus + Response + Measurement (+ implications if needed)
  - Consider using a Quality Attribute Tree to organise them
- **Prioritisation** is key and an important architectural activity
  - Working across stakeholder groups to find an **acceptable balance**
  - **Security**, **performance**, **scalability**, **resilience** are normally important
  - Evolution (maintainability, flexibility) is normally assumed
- Help the team to break down these huge **goals into stories**
  - Implementation of architectural **tactics, styles & patterns**
- Make sure the stories get **into the backlog** – PO conversations
- **Own** some of the **difficult** ones (e.g. resilience & BCP)
  - Find people to be "**champions**" for the others

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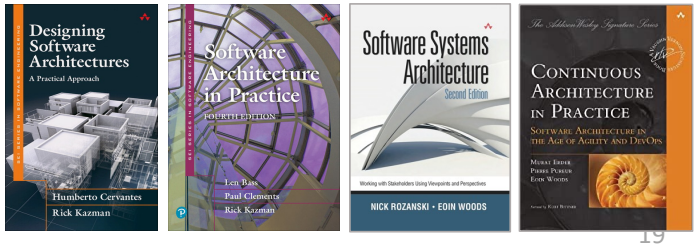

Drive Architectural Decisions

- Less detailed models means **decisions and principles** become more important – new **first-class artefacts** of architecture
- Architectural decisions are how we …
  - achieve **quality properties** (via tactics)
  - make **tradeoffs**
  - manage **technical debt**
  - achieve **sustainable delivery**
  - maximise **value**

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Actually they always were …
we used to just hide them in our models!

Drive Architectural Decisions

- **Making**, **validating**, **managing** and **implementing** decisions is core to doing architecture continuously
- We must ensure that **good decisions** are made
  - Practical, logical, balanced, well-argued, well-communicated
- Ensure decisions **align with our architecture principles**
  - Or cause the principles to evolve
- Decisions must be **captured**, **understood**, **implemented** and **curated**

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Drive Architectural Decisions

- Use the technical leadership group to:
  - **Make** decisions
  - **Validate** decisions
  - **Communicate** decisions
  - **Implement** decisions
- **Capture** decisions in an **accessible** way
  - ADRs in Git appear to have become something of a standard
    - https://adr.github.io/ and https://github.com/npryce/adr-tools
  - Simple wiki pages with a well defined format also work well
- **Curating** decisions over time is important
  - Control the number & organise the catalogue
  - Revalidate and remove obsolete decisions
  - Feedback into the architecture principles

Remember: you need to make sure good decisions are made, not make all the decisions!

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Manage Technical Debt

Technical debt is a well established yet nebulous concept …

… very context specific

One person's "debt" is another person's "simplest thing possible"

Hard coded validation rather than a chain-of-responsibility of validators.
Debt? Or simple and effective?

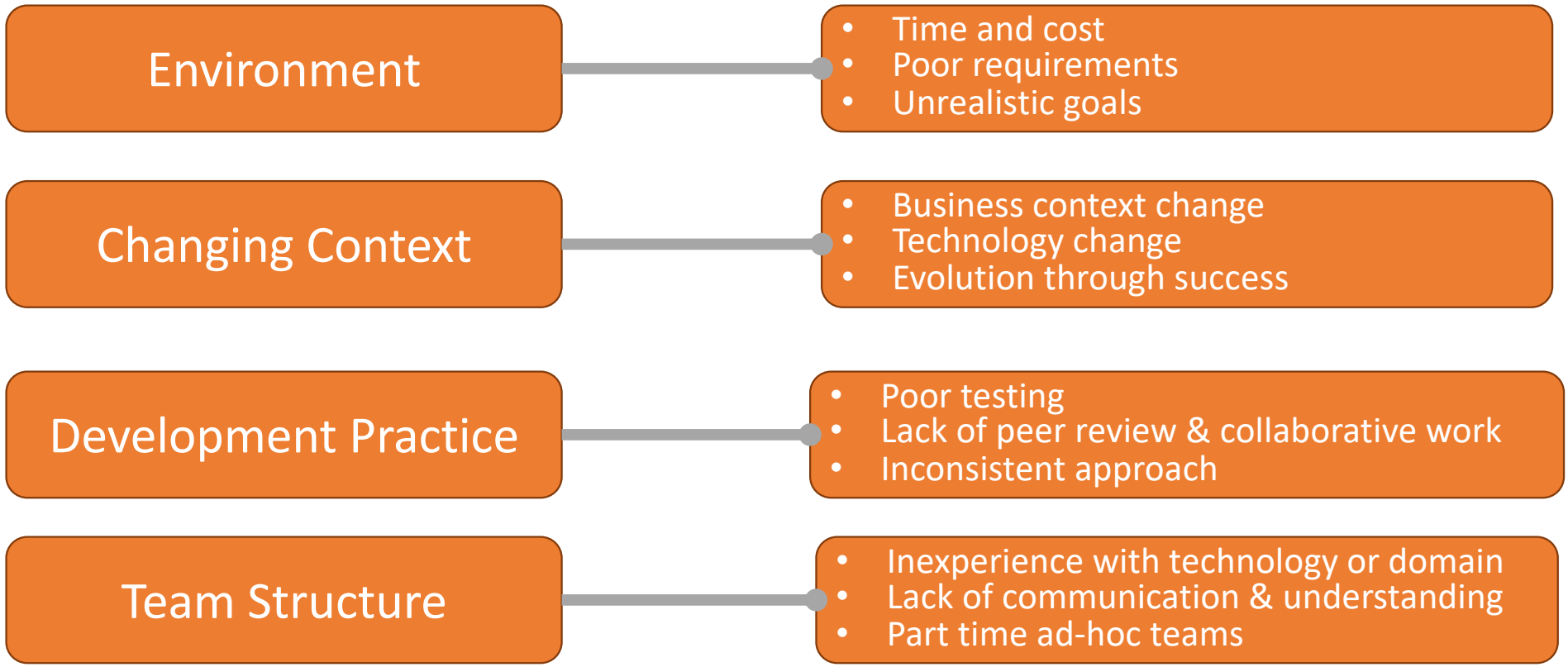
Does Technical Debt Matter?

Technical debt matters when it stops us doing something …

… it is now too expensive to make a change
… we are too slow to react to a need
… our team is too inefficient to be valuable
… it is too risky to update our technology

It is these situations that the architect needs to be looking ahead for, to predict and avoid

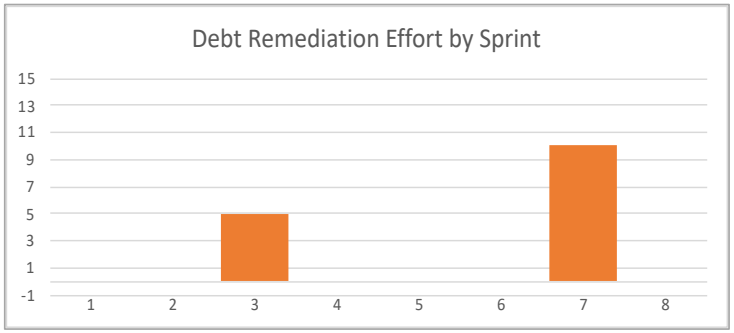
Sources of Technical Debt

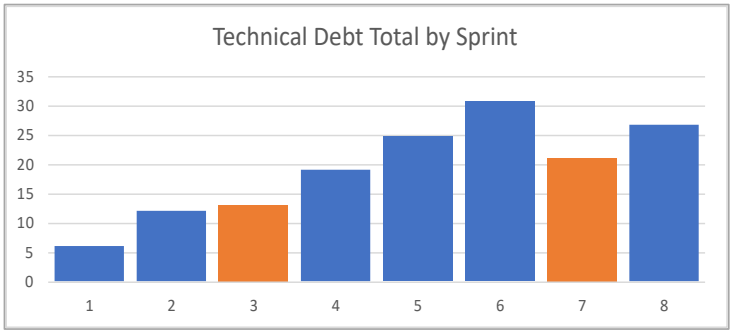


Source: Managing Technical Debt, Kruchten, Nord, Ozkaya

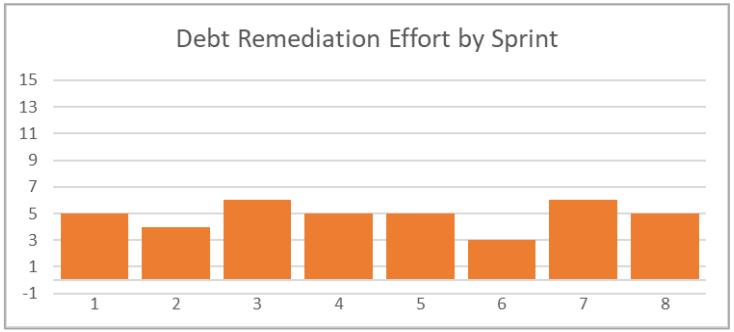
Dealing With Technical Debt

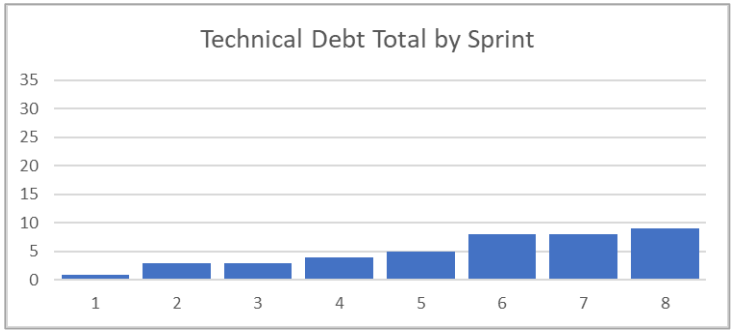
Just-in-Time



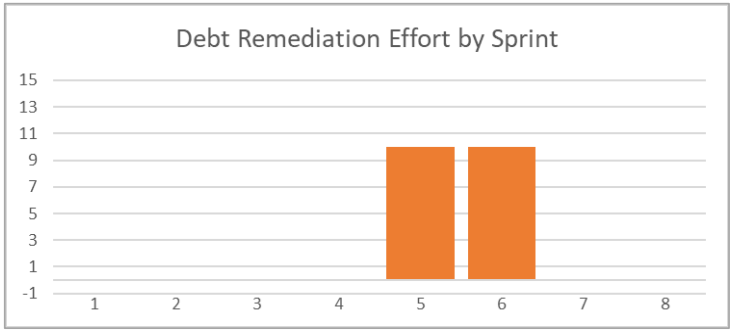


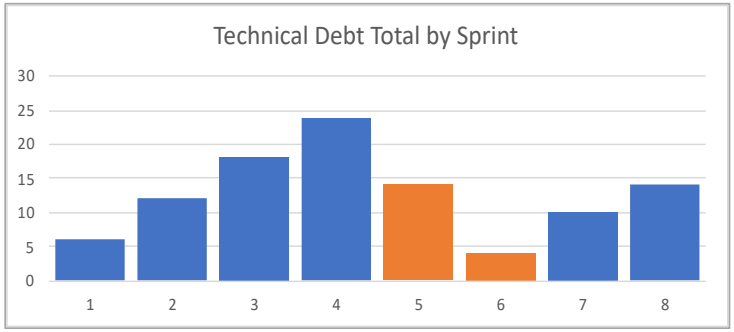
Little and Often





Cleanup





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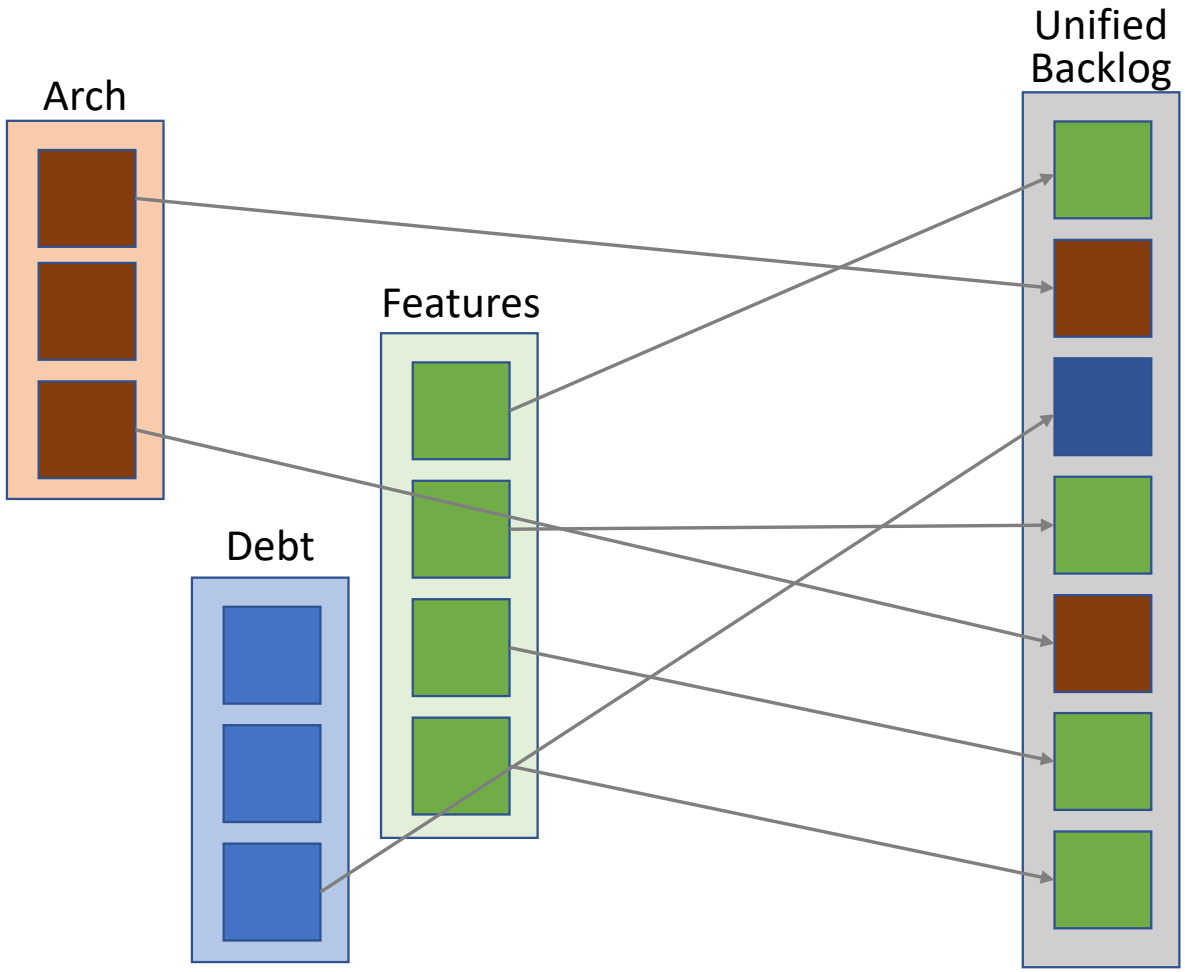
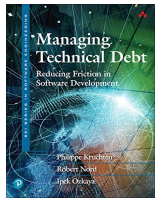


Unified backlog for visibility and prioritisation



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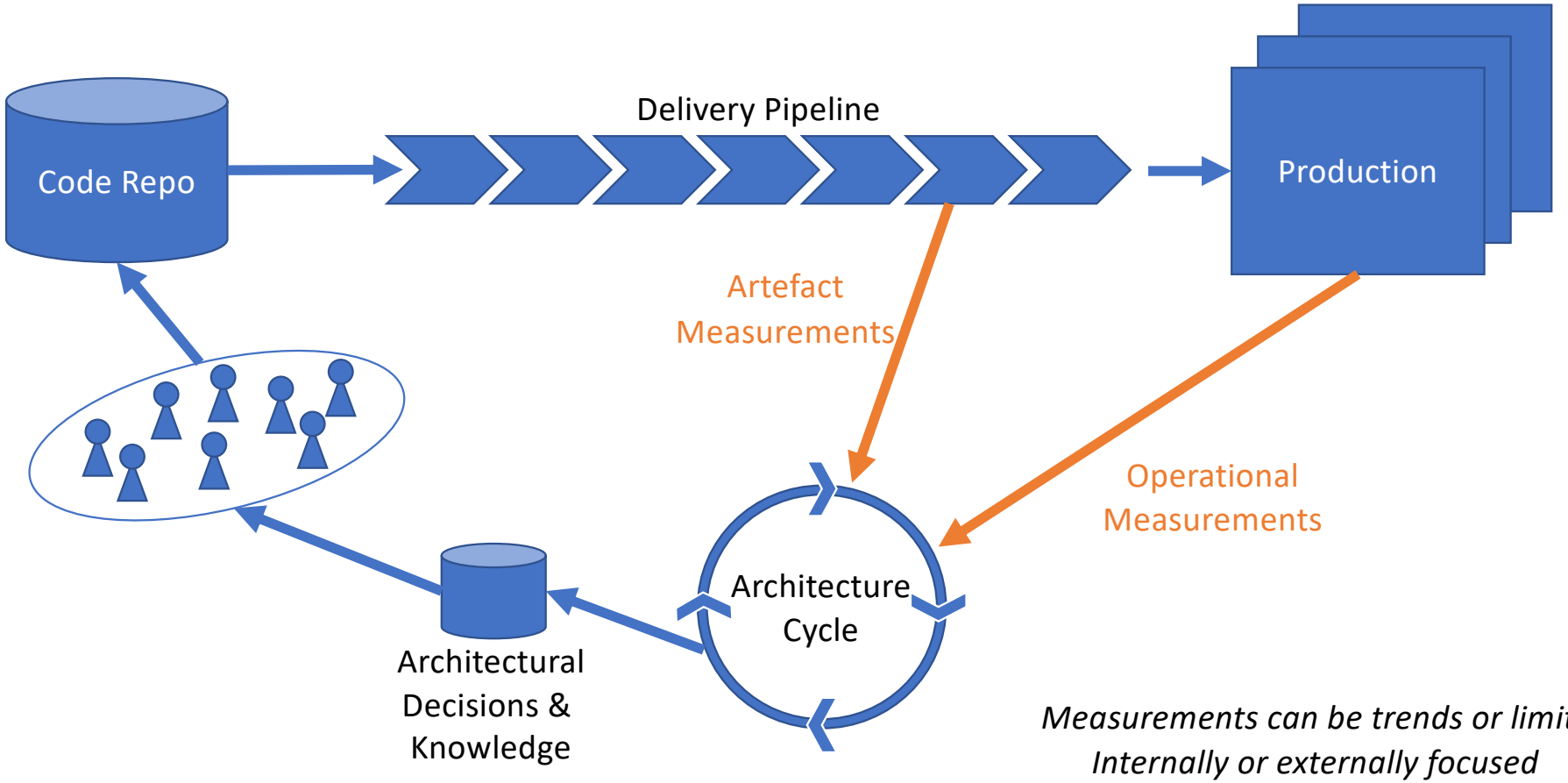
Implement Feedback Loops



Measurements can be trends or limits
Internally or externally focused
Good ones provide architectural "reality checks"

Implement Feedback Loops

- Feedback loops are your ”**architectural reality check**”
- **Automated**, **semi-automated** and **manual** all have their place
- Typically measure **quality attributes** but can be functional
- **Internal** (e.g. code complexity) and **external** (e.g. API response time) are both important
- Start **small and simple**, targeting biggest risks or concerns
- Over time the implementation can become **complex**
  - Don’t fall in love with your feedback loop implementation!

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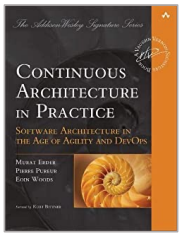
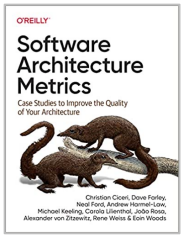
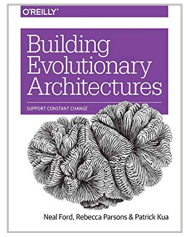
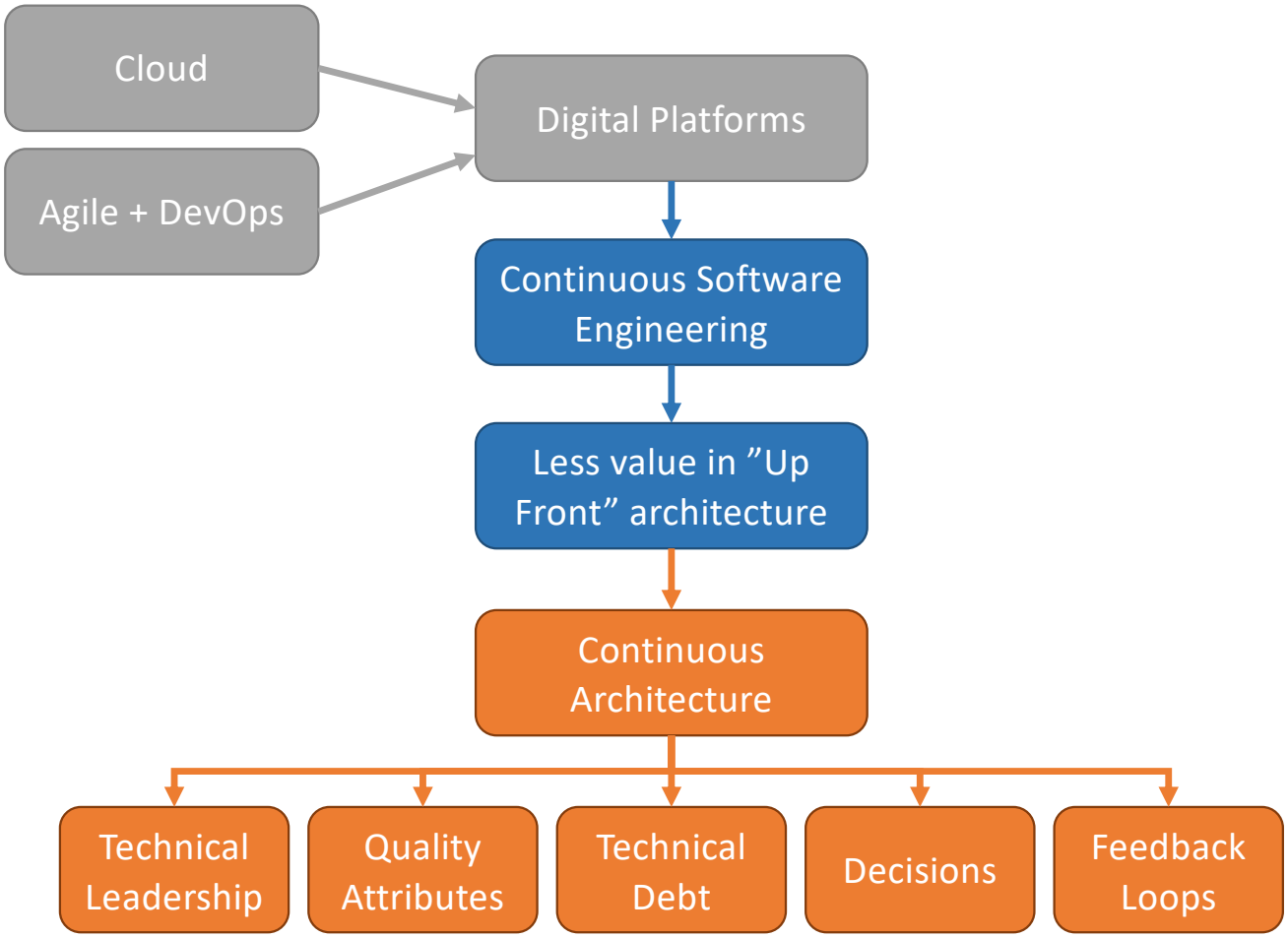






TO CONCLUDE

In Conclusion



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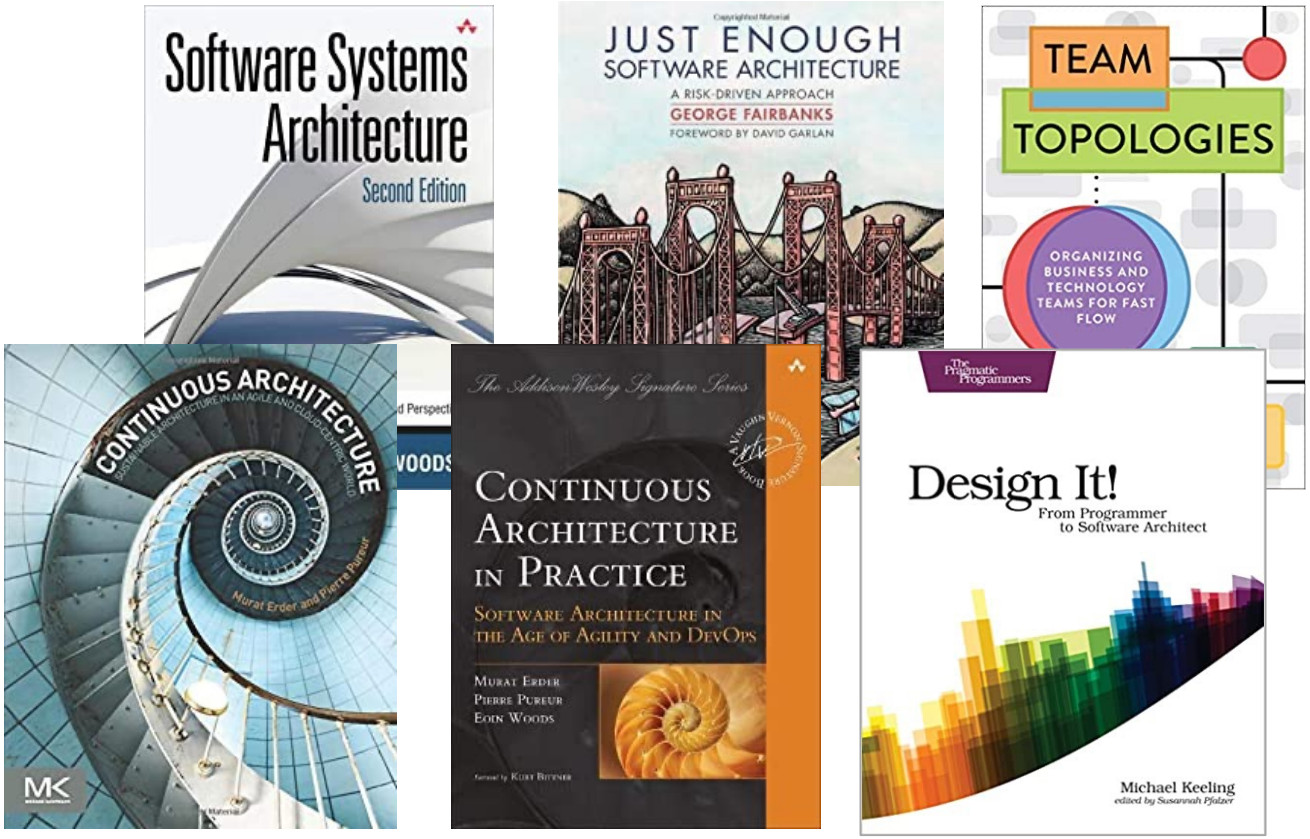
To Find Out More



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THANK YOU … QUESTIONS?

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