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Our first experiences with the Architecture Pulse Check

How to perform early assessments of an evolving architecture?

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Some context

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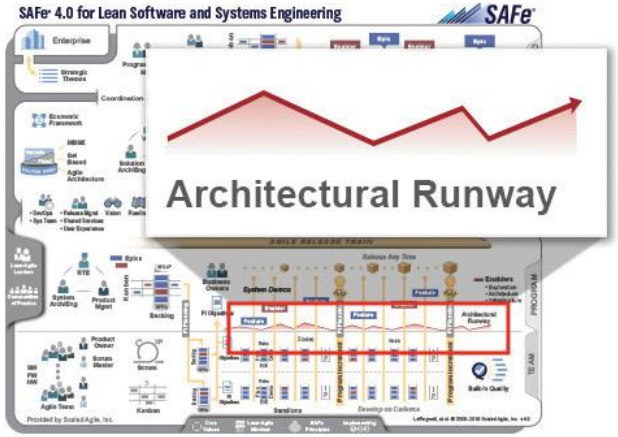
How did the pilot go?

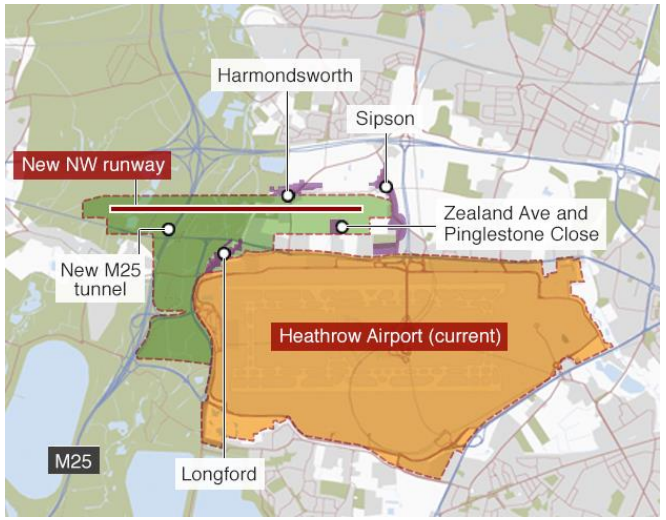
What did we learn?

Context

- **Dept: System Architecture & Strategy (SA&S)**
  - Company-wide improvements in architecture(s) and architecting

- **Concern: Agile tends to focus on features, late discovery of architecture problems**



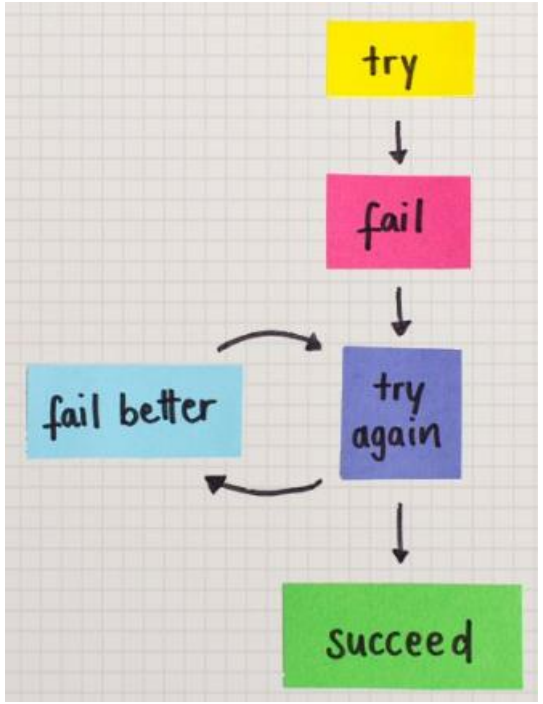


Challenge

› **What type of assessment method will discover potential problems early?**

- On an ‘immature’ architecture model / description

1. **What is already available?**
2. **What can be used for our goal?**
3. **‘Fail fast’ by piloting early**



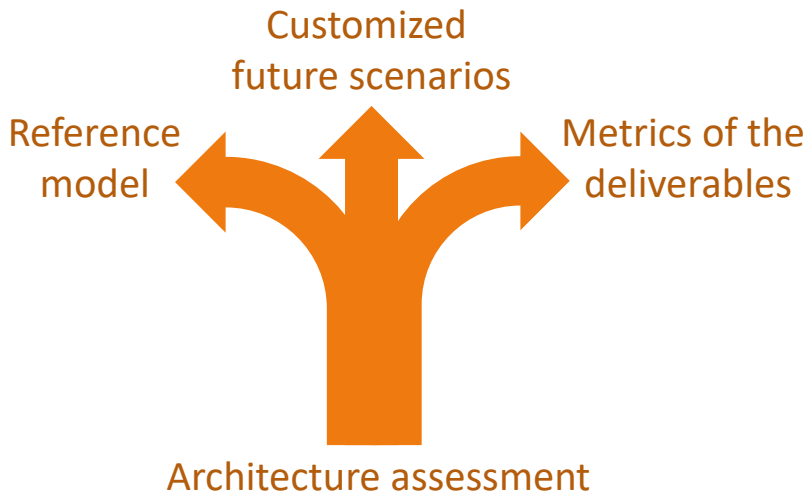
What is already available?

- **Three ‘directions’ to assess an architecture:**
  1. Metrics of the deliverables (e.g., source code metrics)
  2. Customized future scenarios (e.g., SAAM, ATAM)
  3. Reference model (e.g., checklists, CAFCR)

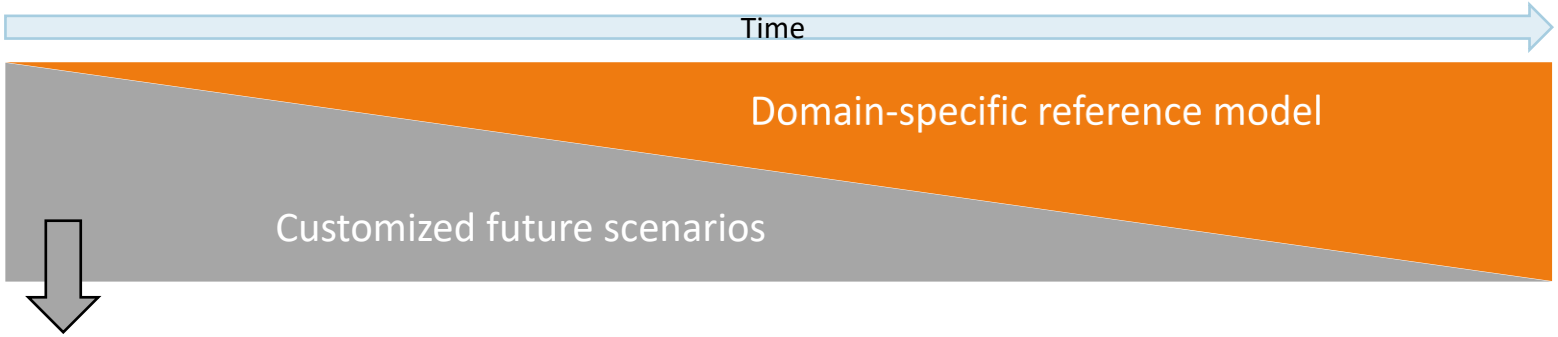
- **Metrics of the deliverables do not meet our goal**

- **Customized future scenarios can be a useful and are immediately accessible**

- **Reference models need tailoring and add most value if they are domain-specific**

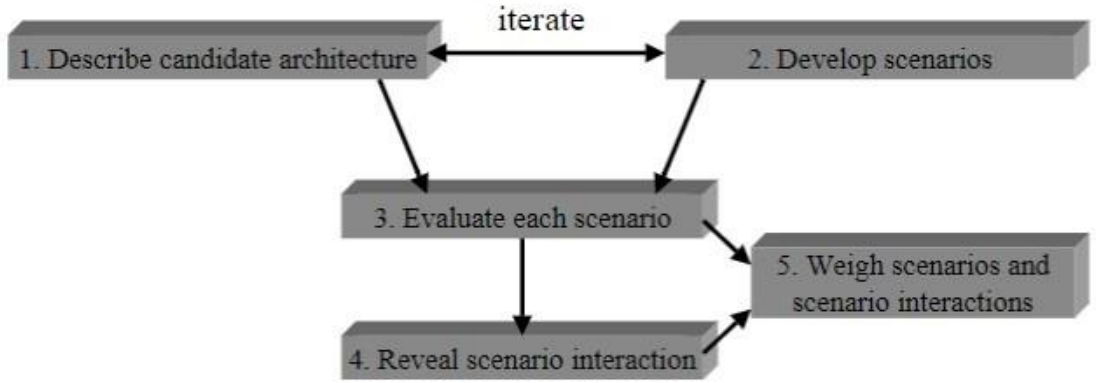


Chosen approach



Scenario–Based Analysis of Software Architecture

Article *in* IEEE Software · December 1996
DOI: 10.1109/52.542294 · Source: IEEE Xplore



ATAM: Method for Architecture Evaluation

Making Architecture Design Decisions: An Economic Approach

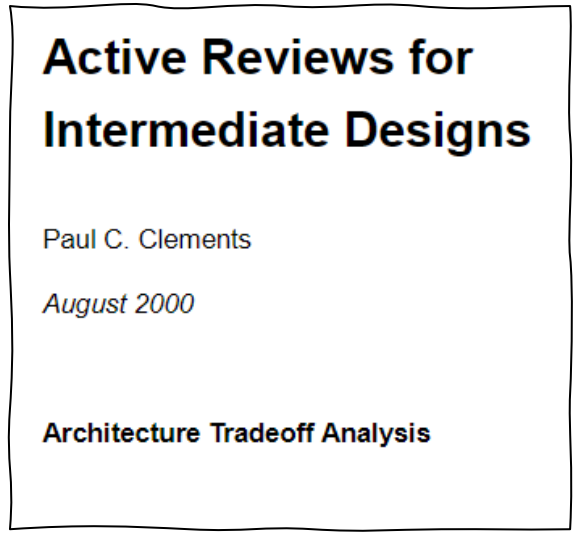
Architecture-level modifiability analysis (ALMA)

PASA℠: An Architectural Approach to Fixing Software Performance Problems

Architecture assessment of information-system families : a practical perspective

One paper caught our attention

- **ARID explicitly uses a design technique called Active Design Review, a review technique that forces reviewers to actively participate in a design review by giving them explicit exercises to do**
- **In ARID, the exercises are done by the reviewers as a group, with the architect/designer only participating if the group gets stuck or wanders off completely**
- **Examples of explicit exercises are:**
  - "Describe how the system will behave under the following exceptions."
  - "List the modules involved in accomplishing the following scenario."
  - "Describe how to use this API to accomplish the following scenario."
- **The idea is that the reviewers should be able to accomplish the task with the information they have available on the design/architecture (diagrams, models, documents, source code...).**
  - Any gaps in this information are captured during the review and turned into action points for the architects.
- **The benefits of this exercise-based approach are twofold:**
  - It fully engages the reviewers in the review
  - It reveals shortcomings in the available architecture information



First ingredient: Methodology 0.1

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Phase	Activity	Owner	Goal
Check readiness	Identify main stakeholders, reviewers, and architects who need to participate. Note that the same person can be both stakeholder and reviewer. Stakeholders have a main role in prioritizing scenarios, while reviewers have a main role in performing active design reviews. It is convenient to combine these roles to keep the workshop manageable.	Facilitator	Ensure the right people are addressed in the activities to follow and ensure SA&S team members are involved to learn together with the assessed party.
	Check/ensure understanding of pulse check and define objectives for the pulse check	Facilitator	Manage expectations at sponsor, architects, and main stakeholders
	Check motivation to participate	Facilitator	Ensure the participants will feel safe and will be open
	Check opportunity to participate	Facilitator	Ensure the participants have enough time to participate, and will give this priority
	Check state of architecture models/documentation	Facilitator	Ensure the maturity of this material is sufficient for a pulse check
Delineate	Determine scope, in terms of requirements	Facilitator	Ensure focus during the pulse check
	Determine scope, in terms of the architecture	Facilitator	Ensure focus during the pulse check
	Allocate the review roles: Facilitator, Scribe, Lead Designer, and (optionally) Process Observer	Facilitator	Ensure the review process is staffed and people know their role
	Identify and approach the additional internal participants (if any) that are to be added to the main stakeholders and architects, and explain the pulse check and their role to them	Facilitator	Ensure that all (if any) additional participants are willing and prepared to participate
	Identify and approach external experts to participate, if applicable, and explain the pulse check and their role to them	Facilitator	Ensure that all (if any) external experts are willing and prepared to participate
Prepare	Plan the workshops and meetings	Facilitator	Ensure that everyone has their time slots reserved up front
	Prepare the architecture presentation	Lead Designer	Ensure enough material will be presented to perform active design reviews
	Pilot the architecture presentation	Lead Designer	Ensure the material is presented within the given time-slot, is understandable, and the presenter is well-prepared
	Prepare example scenarios ('seed scenarios') to kick-start the scenario brainstorm in the review meeting	Facilitator with Lead Designer	Ensure the review participants understand what a scenario is, and come prepared to the meeting for a productive scenario brainstorm
	Distribute architecture presentation and example scenarios, ask to prepare for scenario brainstorm	Facilitator	Ensure the participants have enough material and time to prepare for the meeting
Review meeting	Introduce participants	Facilitator	Ensure the participants know each other and know each other's role in the meeting
	Explain meeting agenda and pulse check process	Facilitator	Ensure everybody has process oversight
	Present architecture	Lead Designer	Ensure the meeting participants all have sufficient understanding of the architecture to perform the active design reviews later in the meeting
	Brainstorm and prioritize scenarios	Facilitator, with reviewers	Give the stakeholders ample opportunity to capture their needs in concrete scenarios and prioritize them
	Perform active design reviews, in priority order of the scenarios	Reviewers	Ensure active participation of all reviewers
	Scribe and (optionally) Process Observer present their observations	Scribe, Process Observer	Ensure the participants can correct the observations if needed
	Collect feedback of all participants	Facilitator	Ensure every participant can give their input
Consolidate	Collect all materials in a report	Facilitator	Ensure the materials are recorded for future use
	Summarize the findings	Facilitator	Ensure the review results can be conveyed to senior management
	Share the conclusions with all relevant participants and thank all participants for their contribution	Facilitator	Ensure the participants feel valued and can give their feedback on the conclusions
Follow-up	Define follow-up actions and owners for these actions	Lead Designer	Ensure the investment in the pulse check is not in vain

Second ingredient: Pilot

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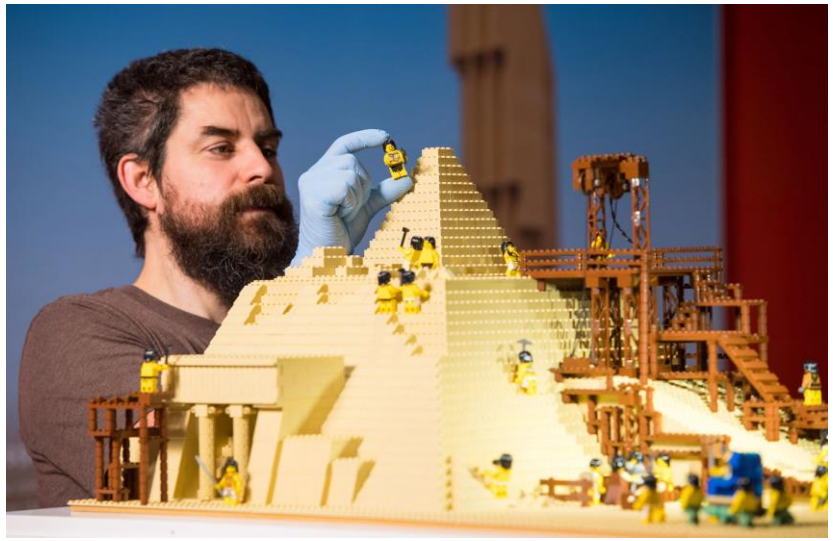
Pilot of Architecture Pulse Check

- **Preparation**
  - Collect scenarios (before the review meeting)
  - Dry run of architecture presentation (before the review meeting)
- **Review meeting (1 day)**
  - Present architecture
  - Prioritize scenarios
  - Confront architecture with a scenario
    - Repeat for the top X of scenarios
    - Result: Impact analysis per scenario and/or identification of missing architecture information

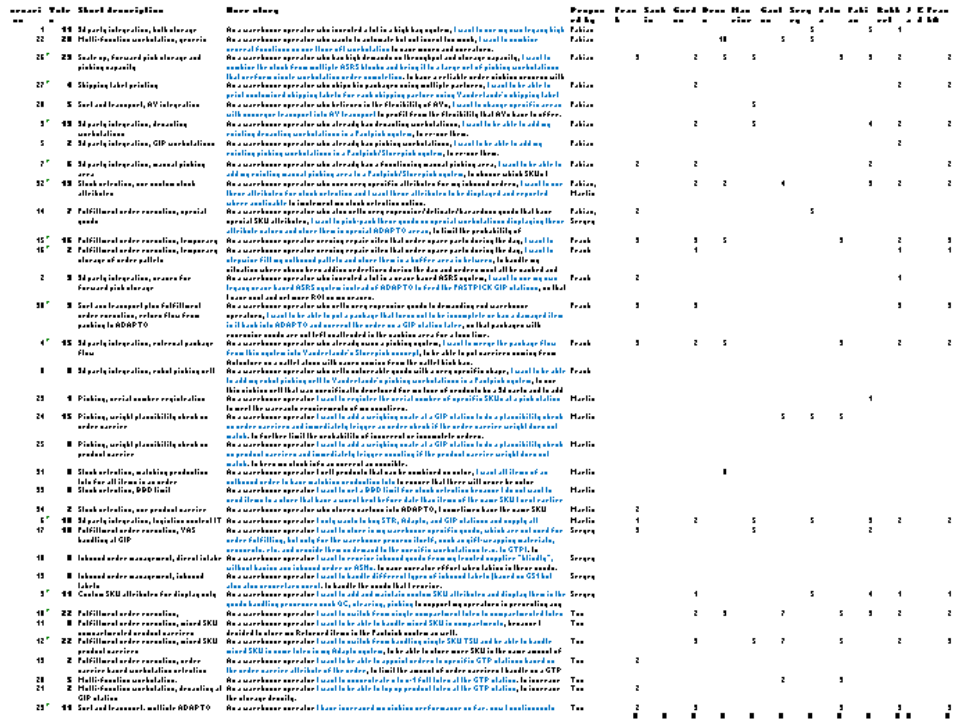
Confront architecture with scenario via Active Design Review

- **Reviewers, not the architecture owners, perform the impact assessment**
  - Based on available documentation/diagrams and ad-hoc support from the architecture owners
  - First in sub-teams of two persons each, then plenary feedback
  - Impact and/or missing information recorded via stickies on architecture diagrams in shared MIRO board
- **Reviewers try to assess which modules are impacted and how/how strong**
  - Including estimation of ripple effects
  - Missing information is identified during the process
- **The goal is to help the architecture owners move forward**



Scenario collection and selection

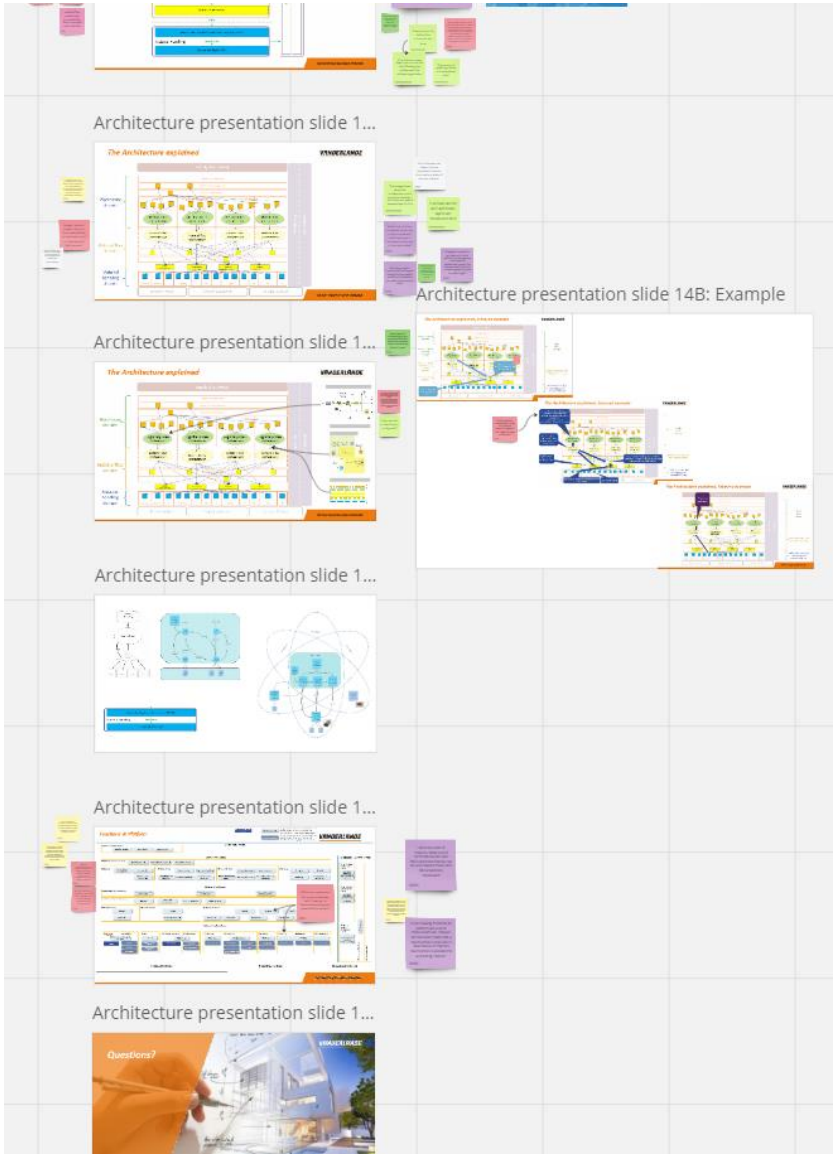
- **Scenarios collected up-front**
  - Delivered by 4 domain experts
  - Both in a dedicated meeting per domain expert and offline
- **Format: User story, put in Excel sheet**
- **Scenarios should be as specific as possible, and profile the NFR ‘Configurability’**
- **34 scenarios collected in total**
- **In the review meeting, each participant could distribute 30 points over the scenarios**



Architecture presentation

- **First did a dry run (recommended!)**
  - Alas, no time to process all feedback given
- **In review meeting: Immediately started collecting feedback on MIRO board**
  - This feedback was already valuable
- **Decided to use one overview slide as basis for the scenario reviews**
  - Was a bit ad-hoc, should have been prepared by the architects

- **MIRO is a good medium to collaborate during the review meeting**

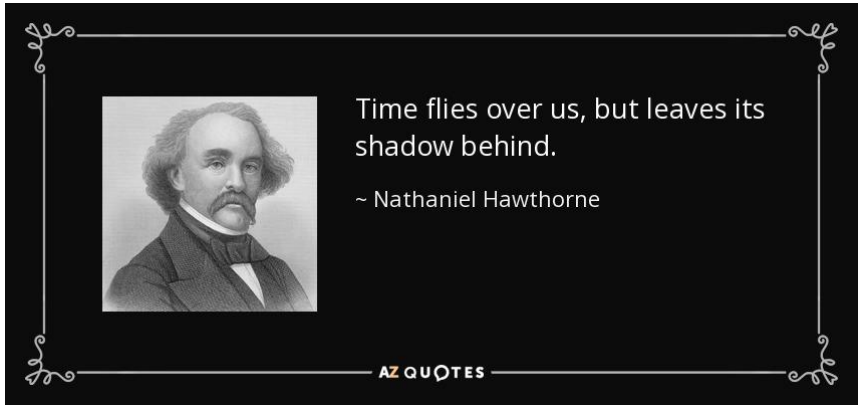


Timeline Active Design Review per scenario

- 5 min Plenary questions/assumptions about the scenario

- 10 min Discussion, thoughts in each of 3 sub-teams – including ripple effects
- 15 min Each sub-team puts their feedback on the shared MIRO board

- 20 min (3x7) Plenary explanation of feedback per sub-team
- 5 min Conclusion: Big impact / small impact / insufficient information



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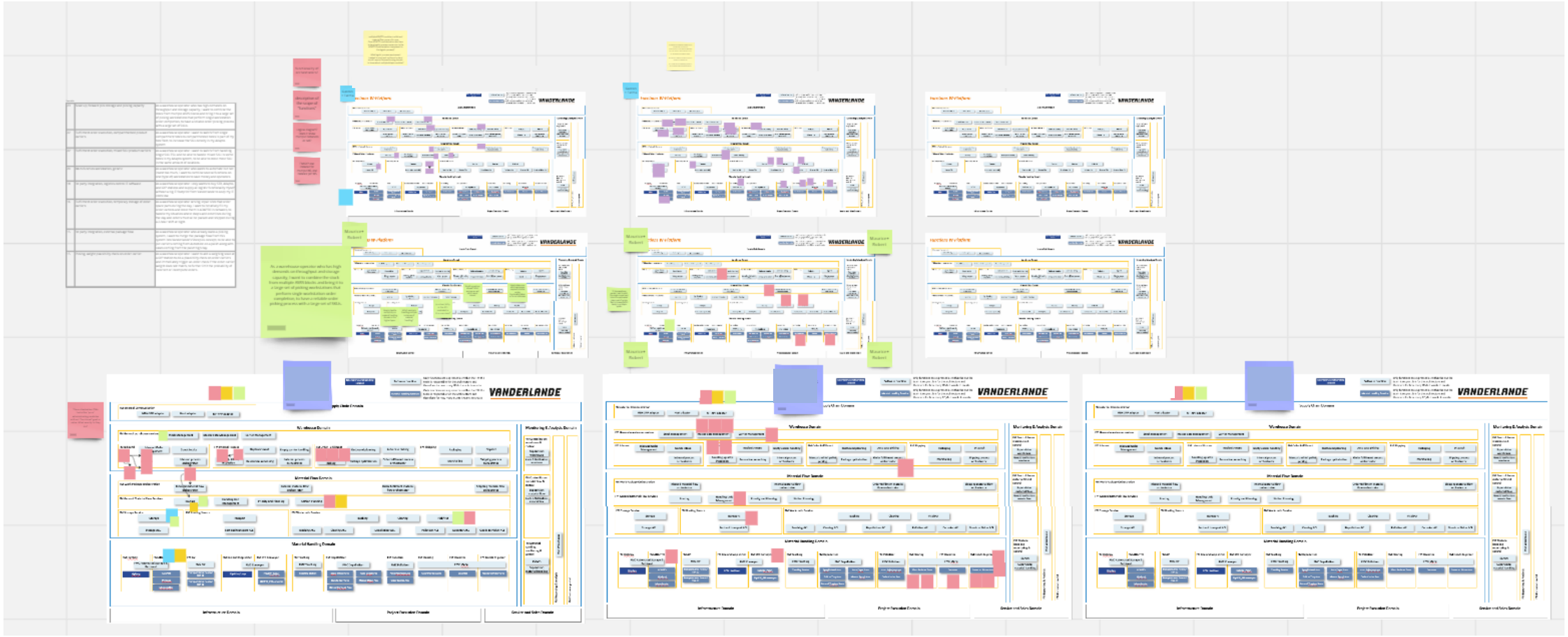
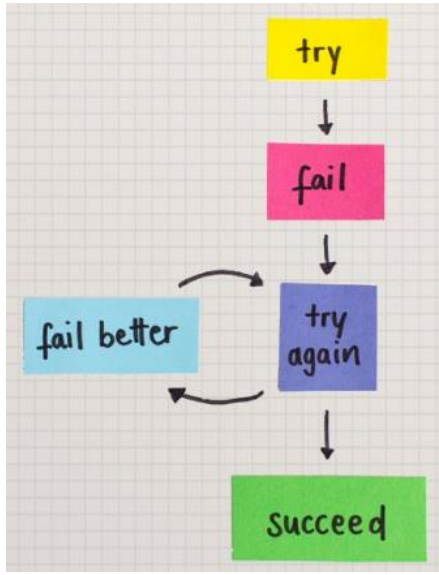
Impression of results scenario reviews



Did we meet the objectives of the architecture pulse check?

- *Increase stakeholder knowledge and awareness of the possibilities and constraints of the architecture*
  - Knowledge has increased, but a lot of information still unclear in the presented material
- *Acknowledge the accomplishments of the team(s) responsible for the architecture*
  - This could have gotten more emphasis, e.g., via very specific feedback round
- *Identify improvement opportunities and technical debt in the architecture*
  - Mainly identified in the architecture *documentation* (unclarities, gaps), not so much in the architecture *itself*
- *Identify internal inconsistencies and gaps in the architecture models and documentation that hinder a good understanding of the architecture and its constraints and possibilities*
  - This goal was certainly met

Feedback from the meeting participants



- **Good start**
  - *Value of feedback during presentation was high*
  - *Good to continue and learn how to improve the methodology*
  - *Scenarios are a catalyst to discover inconsistencies*
  - *Can we connect this methodology to our strategic architecture themes?*
  - *Which 'ilities' are relevant at what stage of architecture assessment?*
- **Architecture material and explanation lacked sufficient detail and lacked dynamic views**
  - *Explain base scenario first for each 'delta' scenario to explore, to get a more in-depth assessment*
  - *Also focus on architecture principles*
  - *Describe the responsibility/concerns covered by each 'box'*
  - *Feedback of different scenarios is similar without more in-depth understanding of the architecture*
  - *Need more presentation material*
- **Desire to dig deeper**
  - *It's more an impact analysis than a real architecture assessment*
  - *High level scenarios with a high-level architecture description has limited value – can the architecture be improved? Desire to dig deeper.*
  - *Good start, but we must find ways to dig more into the detail*
  - *Good initiative, incentive to spend more on ability to explain / understanding of the architecture and its principles, rationales, and interactions*
  - *Important workshop result is a set of issues to work out in more depth*
  - *Difficult to assess whether there can be less modules (less=more)*
  - *Scenarios can be elaborated more*
- **Tendency to start discussing alternatives**
  - *Prevent discussing 'other solutions' – focus on the architecture at hand*
  - *Listening to understand more effective than listening to react/uttering of opinions*
  - *Can we give the method an 'explore together' character in the early stages of architecture development?*

Dilemmas, questions

- **Are we reviewing the architecture, or the completeness / quality of its documentation?**
  - Is this good / bad / important?
  - Can you discover *any* problem in a very abstract architecture description?

- **Should we aim for breadth or depth when evaluating scenarios?**
  - Scenarios seem to act as ‘catalyst’ to find attention points in the architecture
  - How many do we need, and how deep should we work them out during the review to find these attention points?
  - How to keep the effort within acceptable boundaries?

- **How to ‘confront the architecture with a scenario’?**
  - Can we make the method stronger than reviewers `putting stickies on a picture’ ?
    - Without abandoning the active review approach

Ideas are welcome!