Tangible Scrum

Fabian Schwartz | 21 June 2017
Born in 1979 in Berlin, attended software engineering and later Business Administration in Sydney. Working in different positions from developer to program manager.

Experience gathered allowed him to create his own companies: SBS and Casmena, delivering Agile training and consulting in South America.
City Center – Harmon Hotel (Las Vegas)
The Plan

- **Scope:** 49 stories luxury hotel
- **Cost:** US$ 4 billion
- **Time:** 2006 – 2008

Participants
- Norman Foster
- MGM Resorts
- Dubai World
- Perini
- Pacific Coast Steel
- Etc
The Result

- **Scope:** 28 stories
- **Cost:** US$8.5 Billion
- **Time:** 2006 – 2012
Why did this happen?

- Dr. Burçin Becerik, Harvard University
- Dr. Peter Love, Curtin University

- Inadequate communication and collaboration
- Missing precision and efficiency with critical information
1 Megatrends
2 Complexity & Uncertainty
3 Scrum in Construction
4 Scrum in Oil & Gas
5 Scrum in Manufacturing
6 Summary

“My concern is that decision makers are caught in traditional, linear thinking to think about the forces of disruption and innovation shaping the future.”
- Klaus Schwab
Megatrends

- Advanced Robotics
- Internet of Things
- 3D printing
- New materials
- Writing DNA
- Bio printing

Source: The Fourth Industrial Revolution, Klaus Schwab 2017
Agenda

1 Megatrends
2 **Complexity & Uncertainty**
3 Scrum in Construction
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Cost of Change vs Certainty of Scope

- High Cost of Change
  - Well known
  - Sequential phases with Quality Gates

- Low Cost of Change
  - New to the company
  - Fast tracking

- High Certainty of Scope
  - Front end loading

- Low Certainty of Scope
  - Iterative
Fail early

Analysis Specifications Development Test Roll-out

Cost of change

Uncertainty

Beginning time End

high low
Fail early

- Cost of change
- Uncertainty
The Scrum Framework

- **Product Backlog**
- **Sprint Planning**
- **Daily Scrum**
- **Sprint, max 30 días**
- **Sprint Review**
- **Sprint Retrospective**
- **Fully functional increment**
“Where is the uncertainty in your project?”
“My concern is that decision makers are caught in traditional, linear thinking to think about the forces of disruption and innovation shaping the future.”

- Klaus Schwab
15 stories in 6 days – Mag. 9 resistant
Integrating Project Delivery

Measurable Value
Product Owner defines the value he expects from the building in a measurable way. The design will then focus on that value.

Production Management
Production has to use INTEGRATED processes and systems. Key is to produce in small modules.

Collaboration and Co-location
Teams have to be co-located (at least per module) and multifunctional.

Visualization/Simulation
In order to communicate effectively and receive rapid feedback the team needs a technology that allows to visualize and simulate the design of the building.

Source: Integrating Project Delivery, Martin Fischer, Howard W. Ashcraft, Dean Reed, Atul Khanzode, 2017
Product
Backlog

Sprint
Backlog

Daily Scrum
24 h

Sprint Planning

Sprint, max 30 días

Sprint Review

Sprint Retrospective

Fully functional increment

Source: Integrating Project Delivery, Martin Fischer, Howard W. Ashcraft, Dean Reed, Atul Khanzode, 2017
ScrumColombia.Org

Product Backlog

Sprint Backlog

Sprint, max 30 días

Daily Scrum

Sprint Planning

Sprint Review

Sprint Retrospective

Fully functional increment

Source: Integrating Project Delivery, Martin Fischer, Howard W. Ashcraft, Dean Reed, Atul Khanzode, 2017
Product Backlog → Sprint Planning → Daily Scrum → Sprint Backlog → Sprint Review → Sprint Retrospective

24 h

Sprint, max 30 días

Fully functional increment

Source: Integrating Project Delivery, Martin Fischer, Howard W. Ashcraft, Dean Reed, Atul Khanzode, 2017
ScrumColombia.Org

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24 h

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Product
Backlog

Fully functional
increment

Source: Integrating Project Delivery, Martin Fischer, Howard W. Ashcraft, Dean Reed, Atul Khanzode, 2017
ScrumBacklog

SprintBacklog

Sprint, max 30 días

24 h

Sprint Planning

Daily Scrum

Sprint Review

Sprint Retrospective

Product Backlog

Sprint Backlog

Fully functional increment

Source: Integrating Project Delivery, Martin Fischer, Howard W. Ashcraft, Dean Reed, Atul Khanzode, 2017
Takeaway for Scrum in Hardware

- Prototypes
- Modularize
- Co-located team

Source: http://wikispeed.org/2017/06/scrum-in-hardware-guide-draft/
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Cash Flow in Oil&Gas projects

Source: A typical E&P cash-flow project based upon the Brazil Fiscal System (Suslick, 2005)
Cash Flow in Oil & Gas projects

Source: A typical E&P cash-flow project based upon the Brazil Fiscal System (Suslick, 2005)
Case Study – Building a Pipeline

Cut PNID into chunks:
Slice the process flow into modules eg. engineering, civil, electrical.

Do the modelling:
In one Sprint, advance the modelling until you reach around 30%.

Discuss the model:
Sprint Review: Discuss the model with all engineers and as well with the client.

Continue modelling:
Use the results to do the next Sprint.

Source: Hernan D. Perez, Toyo Engineering
**Modelling/Prototyping - 3D Printing**

Testing hydraulic fracturing fluids for complex networks of shale rock
- 3D printing shale rock pore networks
- Could also create perfect, replicas of rock samples with identical porosities

Testing sample parts in engineering
- Printing sample parts
- E.g. to review design options for hydrogen lines (hydrogen lines inspection is very complex)
GE Oil and Gas has started experimenting with plastic and metal 3D printers → reduced time for prototyping from 12 weeks to 12 hours.

Halliburton is using 3D printing across different business lines:
- completion tools
- wire lines
- perforation tools
- testing & subsea, drill bits

Oil&Gas company (anonymous client McKinsey) used a “scrum” approach to simplify drilling standards from 1,000 pages to fewer than 100 → cut drilling cost by 30 percent.
Takeaway for Scrum in Hardware

Prototypes → Modularize

Test & Data driven development

Source: http://wikispeed.org/2017/06/scrum-in-hardware-guide-draft/
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Boeing Dreamliner - Innovation

Materials used in 787 body
- Fiberglass
- Carbon laminate composite
- Carbon sandwich composite
- Aluminum/steel/titanium

Total materials used by weight:
- Composites 50%
- Titanium 15%
- Aluminum 20%
- Other 5%
- Steel 10%

By comparison, the 777 uses 12 percent composites and 50 percent aluminum.

Source: Boeing
Boeing Dreamliner – Modular/Outsourcing

Source: Boeing
The Dreamliner 787 Launch

| 1/2003 | 12/16 | 12/31 | 12/31 | 0.3 in gap found between fuselage and nose. Prototype displayed | Five Delays: |
| Design Team Setup | Board approval Order entry started | 56 orders | 288 orders | | - Missing bolts |
| | | | | | - Software |
| | | | | | - Fasteners |
| | | | | | - Strikes |
| | | | | | - Supply chain |

| 1st Test | Fire in control panel, 6-mth delay in test flights | 10/26 | First ANA flight |
| Flight | | | |

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<td>6/15/2003</td>
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<td>June Assembly start in Everett, WA</td>
<td>59 order cancelled Acquisition of Vought plants</td>
<td>Supply Chain delay</td>
<td>8/26 Plane certified in US and EU</td>
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<td>ANA launch customer, 50 planes</td>
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Source: Boeing
Extreme Manufacturing - Wikispeed
Extreme Manufacturing - Wikispeed

Scrum Organization
- Roles & Responsibilities
- Iterative Design/Sprints
- Make Work Visible
- Measure Velocity
- Continuous Improvement

XP Engineering Principles
- User Stories
- Pairing and Swarming
- Test Driven Development

Object Orientated Architecture
- Modular Components
- Contract-First Design
- Design Patterns
- Re-use and Inheritance
Slicing (Each module should test a PO hipotesis)
Takeaway for Scrum in Hardware

- Modularize
- Interface Design
- Test & Data driven development
- Continuously Integrate

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The Scrum in Hardware Guide

Start where uncertainty is high

Prototypes → Modularize
Continuously Integrate → Interface Design
Co-located team → Test & Data driven development

Have a working product at the end of each Sprint!

Source: http://wikispeed.org/2017/06/scrum-in-hardware-guide-draft/
Thank you for attending

Fabian Schwartz | 21st of June 2017