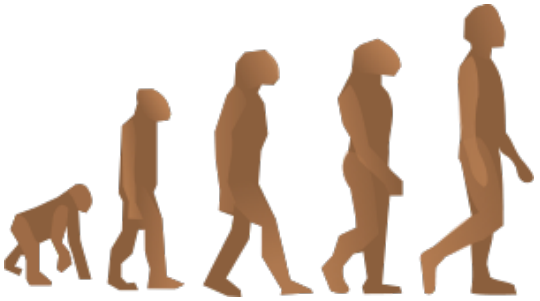
Software ändern, aber richtig

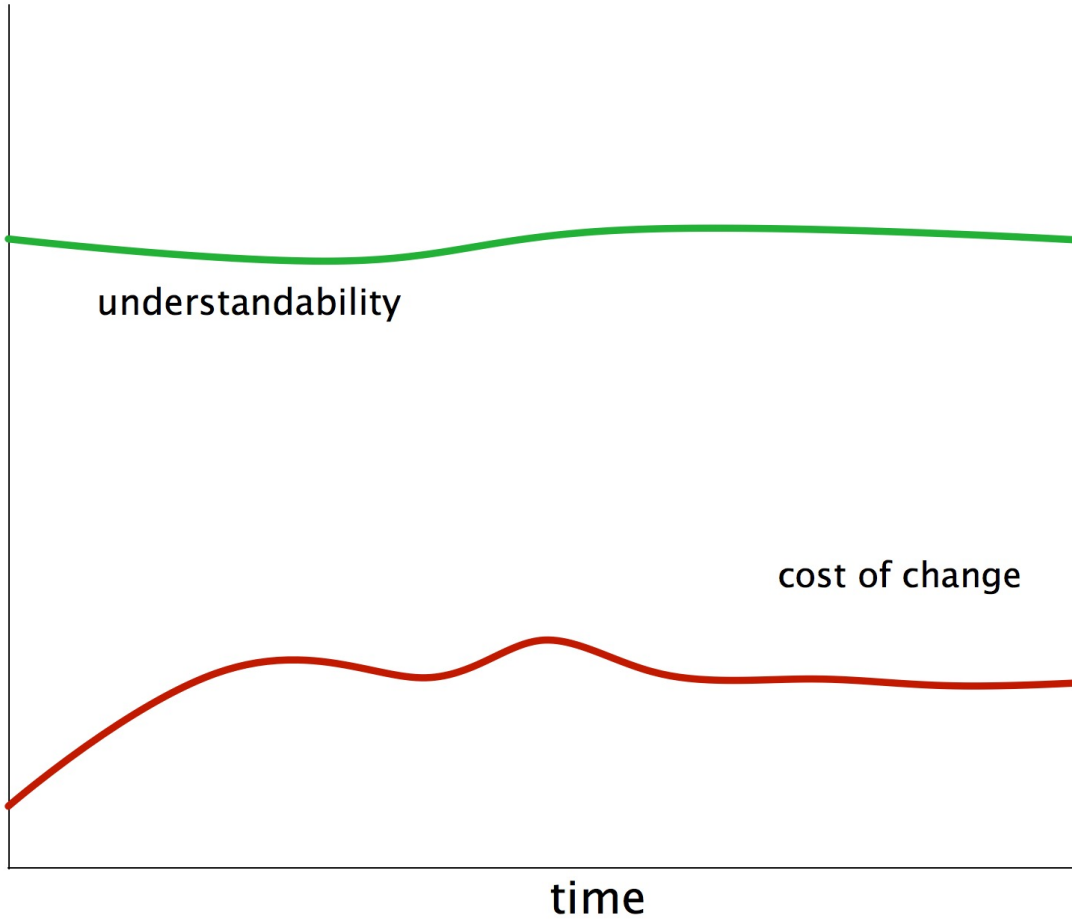


Alexander Heusingfeld

Senior Consultant, innoQ Deutschland GmbH

JUG Dortmund, 11. August 2014

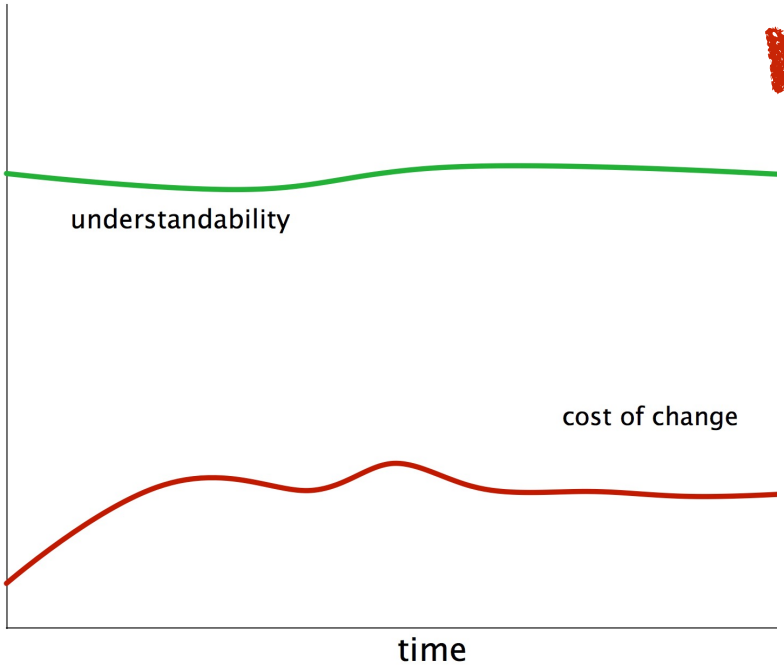
Der Wunsch...

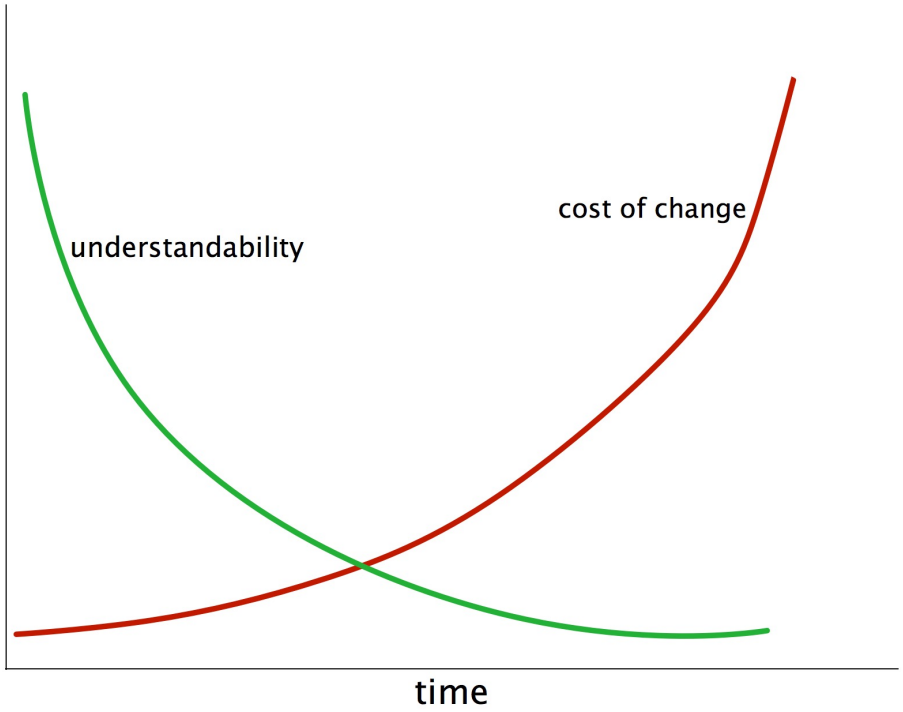


Das Problem...

Wunsch

Realität





These:

Informatik

Ausbildung fokussiert

von Systemen

auf Neubau

80 : 20 Regel

- 80% unserer Zeit ändern wir,
  20% bauen wir neu.

In der Ausbildung:

- 100% der Zeit lernen wir neu bauen.
- In der restlichen Zeit lernen wir ändern.

Wartbare Software benötigt „Ordnung“

- konzeptionelle Integrität
  - **Substantielles Investment**
    in „innere Ordnung“

- Verständlichen Code
- ”Überblicks”-Dokumentation

These:

Informatik

Praxis benötigt mehr Änderungskompetenz

an Systemen

These:

Änderungen an Systemen sind durch Geld motiviert

Gründe für Änderung an Software

- Neue / geänderte Anforderungen
- Änderungen im Kontext
  - Externe Schnittstellen, Datenformate
  - Technologie
  - Organisation
- Aufgetretene Probleme
  - Fehler
  - Verletzung von Qualitätsanforderungen
- Hohe Betriebs- oder Änderungskosten
- Intrinsische Motivation von Entwicklern

Geld!

These:

Budgetverantwortliche ignorieren Architekturprinzipien

These:

Verbesserung an Systemen

ist mehr als Refactoring einzelner Klassen

Architecture Improvement Method

http://aim42.org

Darum aim42

Methodischer Rahmen für Optimierungs- und Veränderungsprojekte

Darum aim42

Adressiert Business und Technik

Darum aim42

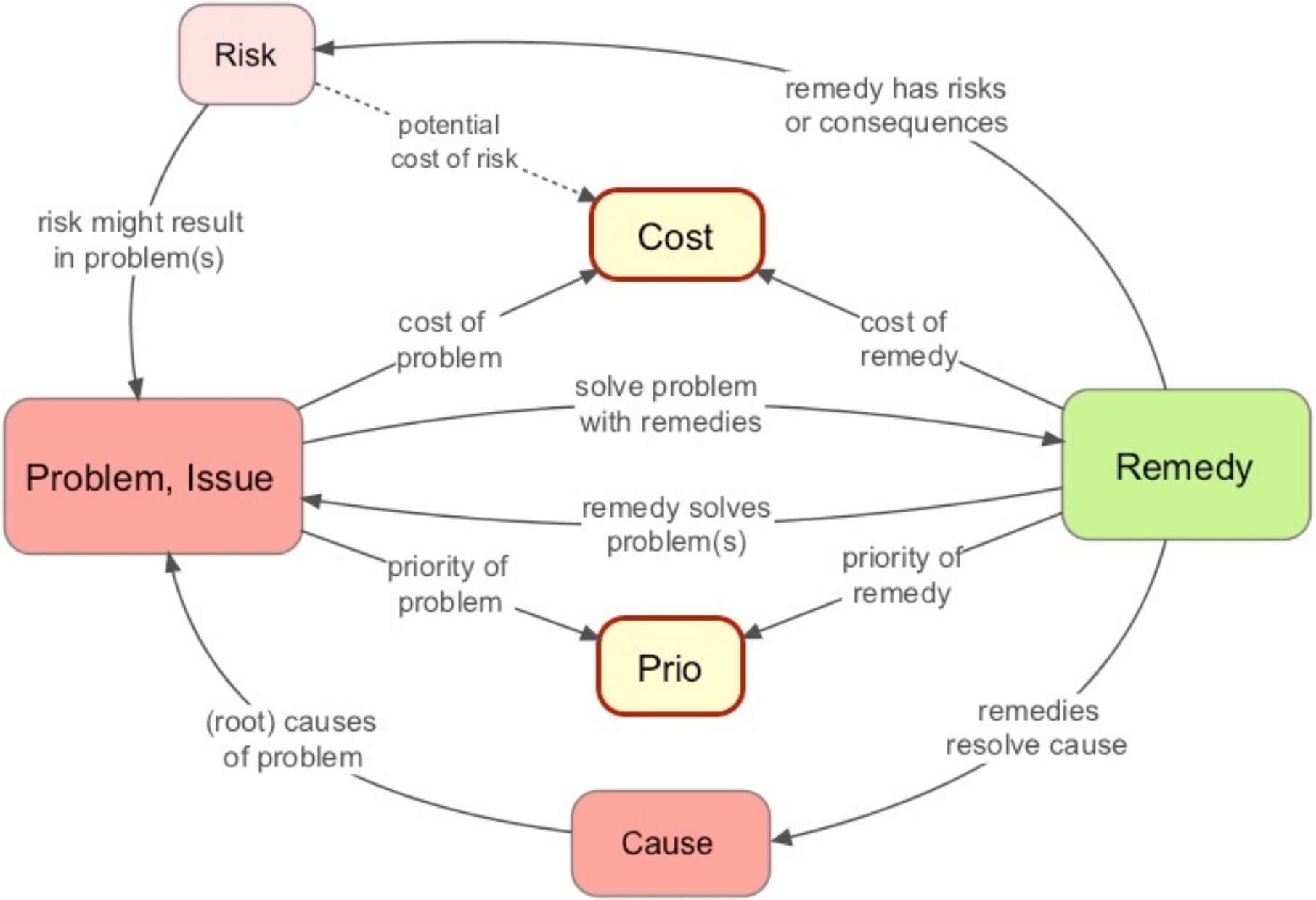
Gibt Sicherheit bei Änderungen

Darum aim42

frei, flexibel, open-source

Methodik

Gemeinsamer Wortschatz

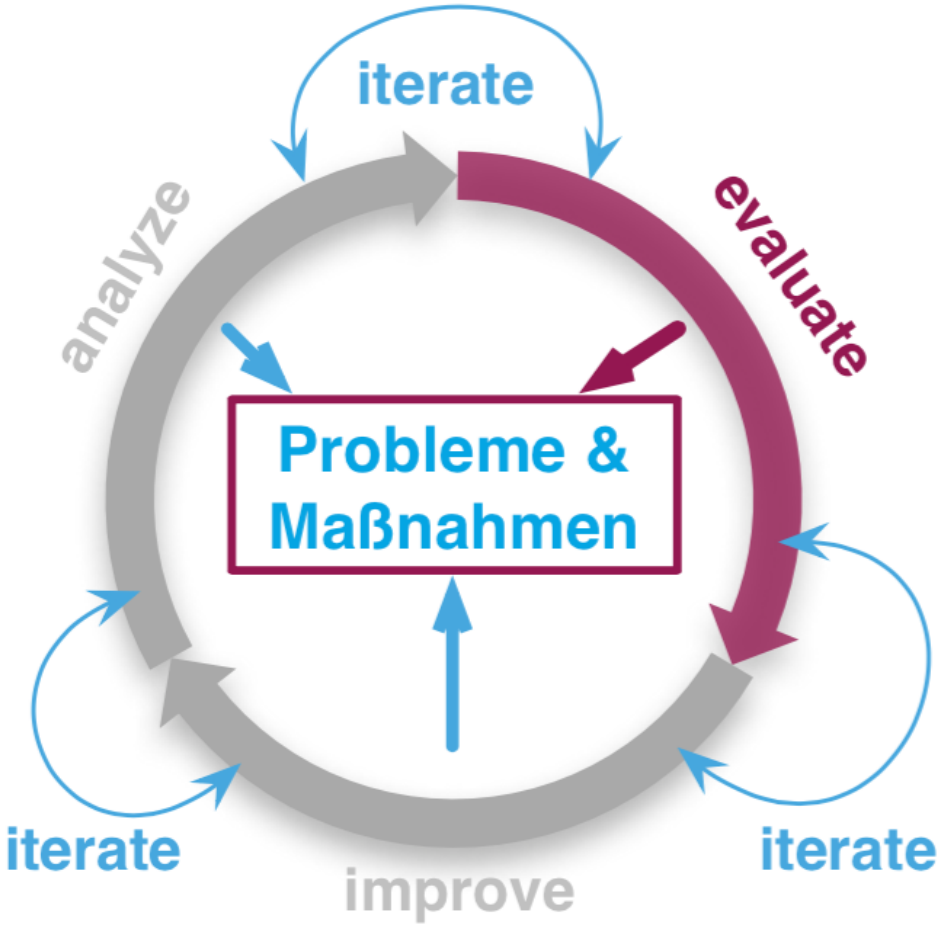


Iterative Phased Improvement

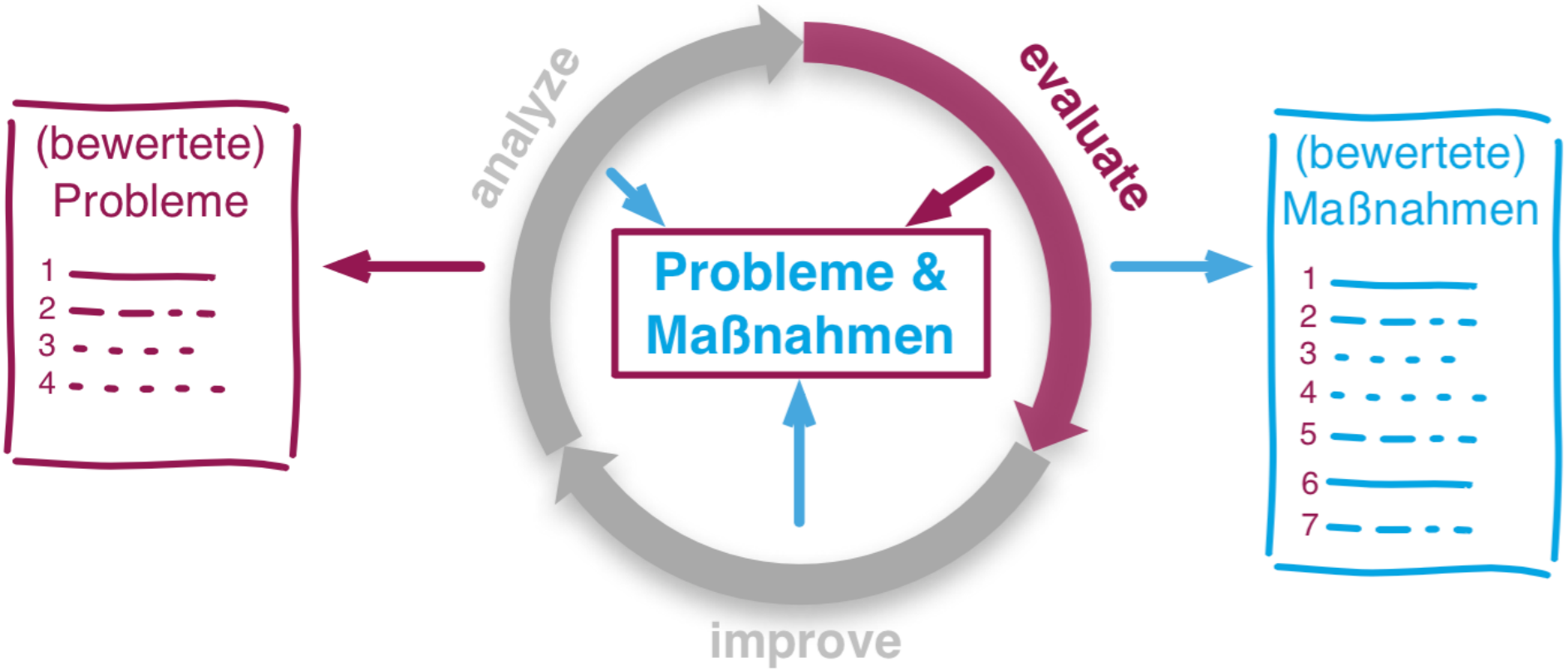
- architecture
- code
- runtime
- organization

Estimate „value“ of problems / risks / issues and their remedies

Crosscutting-Activities (1)



Crosscutting-Activities (2)



Practices and Patterns

Analyze Practices and Patterns

- ATAM
- Capture Quality Requirements
- Context-Analysis
- Data-Analysis
- Development-Process-Analysis
- Documentation-Analysis
- Issue-Tracker-Analysis
- Pre-Interview Questionnaire
- Profiling
- Qualitative Analysis
- Questionnaire
- Root Cause Analysis
- Runtime-Artifact-Analysis
- Software Archeology
- Stakeholder-Analysis
- Stakeholder-Interview
- Static Code Analysis
- Use-Case-Cluster

Sample Practices from ANALYZE

- ATAM: Architecture Tradeoff Analysis Method. Systematic approach to find architectural risks and tradeoffs (compromises) .
- DATA ANALYSIS: Analyse and inspect the data created and manipulated by the system for its content, structure, quantity and size.
- PRE-INTERVIEW-QUESTIONNAIRE: Prior to interviewing stakeholders, present them with a written questionnaire, so they can reflect in advance.
- STATIC CODE ANALYSIS: Analyse source code to identify building blocks and their dependencies, determine complexity, coupling, cohesion and other structural properties.

Evaluate Practices and Patterns

- Estimate in Intervall
- Estimate Problem Cost
- Estimate Remedy Cost
- Failure Mode and Effect Analysis
- Impact Analysis

Improvement Practices and Patterns

- Anticorruption-Layer
- Assertions
- Automated-Tests
- Branch-For-Improvement
- Extract-Reusable-Component
- Group-Improvement-Actions
- Improve-Code-Layout
- Introduce Boy Scout Rule
- Interface Segregation Principle
- Isolate Changes
- Keep-Data-Toss-Code
- Never-Change-Running-System
- Quality-Driven-Software-Architecture
- Refactoring
- Refactoring-Plan
- Remove-Nested-Control-Structures
- Sample-For-Improvement
- Schedule-Work
- Untangle-Code
- Use Invariants To Kill Zombies

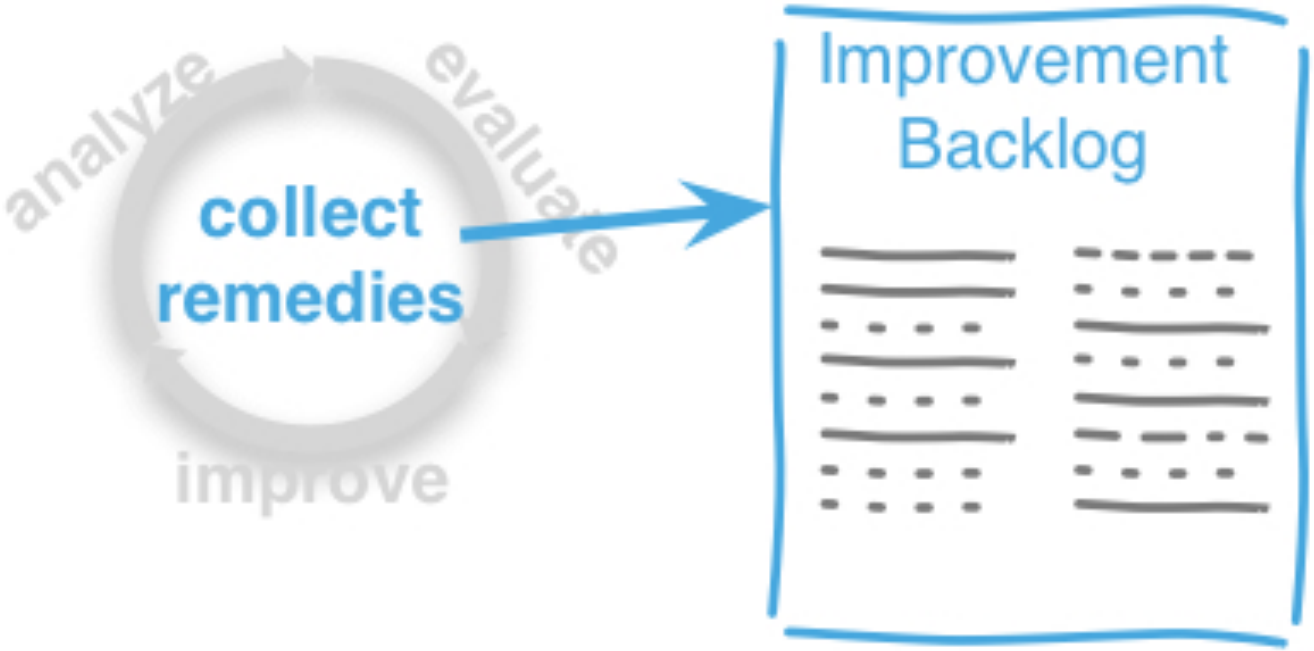
Crosscutting Practices and Patterns

- Explicit Assumption
- Fast Feedback
- Collect Problems
- Collect Opportunities for Improvement
- Improvement Backlog

Sample Crosscutting Practices and Patterns

- COLLECT PROBLEMS: Maintain a central list or overview of known problems, together with their cost/effort evaluation.
- COLLECT OPPORTUNITIES FOR IMPROVEMENT: In all AIM42 phases, one should identify remedies for the currently known problems or their causes.
- IMPROVEMENT BACKLOG: A list or collection of remedies and their cost/effort/risk estimation.
- In the sense of lean and agile, teams shall try to FAST FEEDBACK: The later a lack of quality is identified the higher are the costs to fix it.

Improvement Backlog



Improvement Backlog (kompakte Fassung)

- Probleme mit Maßnahmen zur Behebung
- Inklusive Kosten
  - Probleme: Kosten pro Zeit/Auftreten
  - Maßnahmen
- Risiken der Behebung

Prio	Problem	Maßnahmen	Kosten	Kosten	Risiken
1					
2		....			
3		.....			

Management überzeugen

You need to talk business!

(Martin Fowler, OOP 2014)

Management überzeugen...

- Problem Cost ermitteln
  - Technische Probleme haben einen Preis
  - Schätzen mit expliziten Annahmen

Beispiel: Mehraufwand „Heterogenität“

- Technologiezoo: System aus ›20 Subsystemen in 8 Technologien
- Techniker: „aufwändig, komplex“
- Management: was kostet das?

Kosten der (übertriebenen) Heterogenität

- Mehraufwände in Lebenszyklus-Phasen schätzen
  - Analyse, Architektur, Implementierung, Test, Betrieb
  - Unterstützt durch reale Aufwandsmessungen

Mehrkosten „Heterogenität“ [20%..2%]

		Anteil	Mehraufwand min	Mehraufwand max	1.000 € min	1.000 € max
					1.017,78 €	1.204,56 €
Requirements		**7%**			70 €	70,00 €	70,00 €
Design/Architektur		**6%**			60 €	60,42 €	61,20 €
10%	Zusatzaufwand Schnittstellen		5%	15%		0,30	0,90
10%	übergreifende Entscheidungen		2%	5%		0,12	0,30
80%	Sonstiges						
Programmierung		**12%**			120 €	122,40 €	145,68 €
2%	Setup, Updates-Umgebung		5%	100%		0,12	2,40
2%	Einarbeitung, Recherche		5%	20%		0,12	0,48
10%	Fehlersuche, Testing		3%	100%		0,36	12,00
5%	Effiziente Lösung von Detailproblem		-10%	-40%		-0,60	-2,40
10%	Lösung von Standardproblemen		10%	50%		1,20	6,00
20%	Team-interne Abstimmung		5%	30%		1,20	7,20
51%	Sonstiges						
Integration / Test		**8%**			80 €	83,40 €	113,80 €
5%	Komponenten integrieren		5%	100%		0,20	4,00
30%	Integrationstests durchführen		5%	50%		1,20	12,00
20%	Integrationstests auswerten		10%	50%		1,60	8,00
10%	Testumgebung bereitstellen/erhalten		5%	80%		0,40	6,40
35%	Sonstiges						
Maintenance / Operations		**67%**			670 €	681,56 €	813,88 €
3%	Vorhalten von Entwicklerkapazität		5%	20%		1,01	4,02
5%	Entwickler finden/einarbeiten		10%	30%		3,35	10,05
1%	Versions- und Security-Updates		3%	10%		0,20	0,67
1%	Auswahl / Beschaffung Laufzeitumgebungen		10%	100%		0,67	6,70
3%	Konfiguration, Installation		5%	70%		1,01	14,07
0,50%	Monitoring, Logging		5%	10%		0,17	0,34
5%	Fehlersuche und -Behebung		1%	100%		0,34	33,50
2%	Skalierung/Clustering		5%	15%		0,67	2,01
1%	Paketierung, Deployment-Vorbereitung		2%	10%		0,13	0,67
30%	Erweiterungen/Änderungen vornehmen		2%	30%		4,02	60,30
49%	Sonstiges						

Das Projekt

Praktisch eingesetzt...

- Automotive:
  „Multimedia-Framework“
- Rail-Service
  „Infrastruktur“
- Mobilfunk
  „Billing“
- Airport-Operations
  „Luggage Handling“
- Systemsoftware für
- 2014:
  - Europäische Bahn
    (Audit OnlineTicket)
  - ERP-Hersteller
    (Audit und Rebuild
    Kernsystem)

Contributors...

Graph | Members

Members of the aim42 Network

aim42 created aim42 and everyone else forked it. This is the family tree.

- aim42 / aim42
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  - gbeine / aim42
  - httpPrincess / aim42
  - MichaelMahlberg / aim42
  - otigges / aim42
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  - vanto / aim42

Contributions welcome

- Homepage: http://aim42.org
- Method Guide: **http://aim42.github.io**
  - Source: https://github.com/aim42/aim42
  - Suggestions: https://github.com/aim42/aim42/issues
  - https://www.innoq.com/de/articles/2014/07/software-systematisch-verbessern/
- Twitter: **@arc_improve42**
- Mailing list: aim42@lists.innoq.com

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European Conference on Software Architecture

Banner © by ECSA Conference

ECSA 2014

The European Conference on Software Architecture (ECSA) is the premier European software architecture conference, providing researchers, practitioners, and educators with a platform to present and discuss the most recent, innovative and significant findings and experiences in the field of software architecture research and practice. In 2014, the conference will feature keynotes, research track, industrial track, workshops, tutorials, doctoral symposium, and tool demonstrations and poster presentations.

ECSA 2014 will take place at the University of Vienna, Austria, from August 25 to 29, 2014.

Thanks for your attention

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