copenhagen goto; conference

A Team, A System, Some Legacy ... and you

Eoin Woods

www.eoinwoods.info

INTERNATIONAL SOFTWARE DEVELOPMENT CONFERENCE

gotocon.com

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Real Projects

- The books talk about building new systems
- Conferences are all about new technology
- How come you've got 2 million lines of Java 1.4 on WebLogic 8 with Oracle 9i?

That's what most of us have!

leg·a·cy sys·tem | ˈlegəsē sistəm |

noun

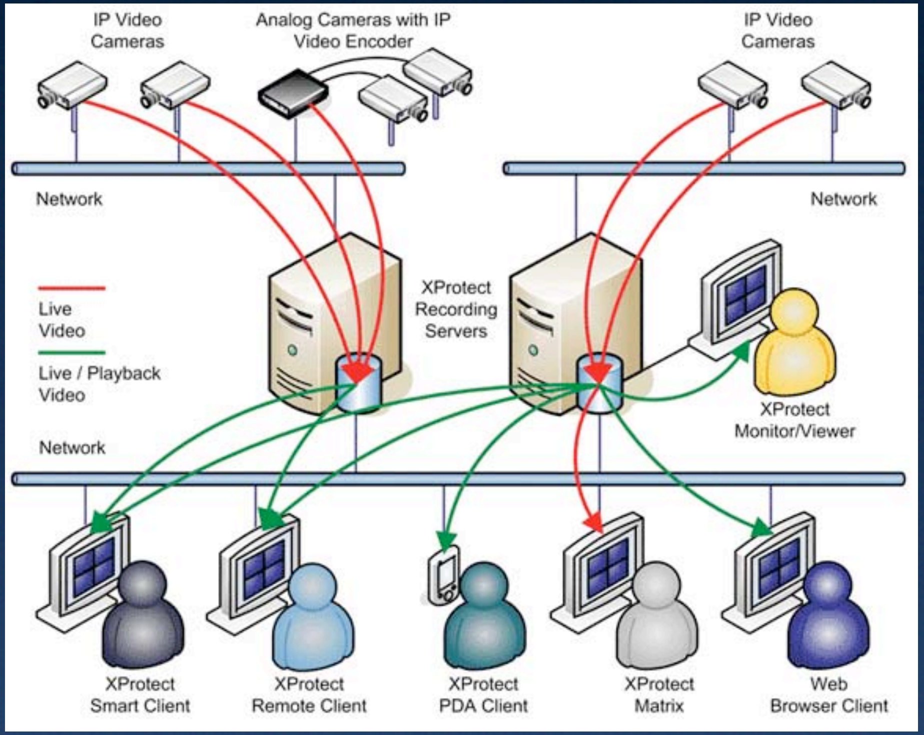
a system so valuable to the organisation that nobody **dares** to turn it off

Software Architecture with Real Teams

Being Late to the Party

- Software architecture often seems valuable only once things have gone wrong
- Architects often join existing projects to help improve difficult situations
- Always too much to do in the time available
- Often a real sense of urgency to “improve”

A Typical Situation



a system

and

a team

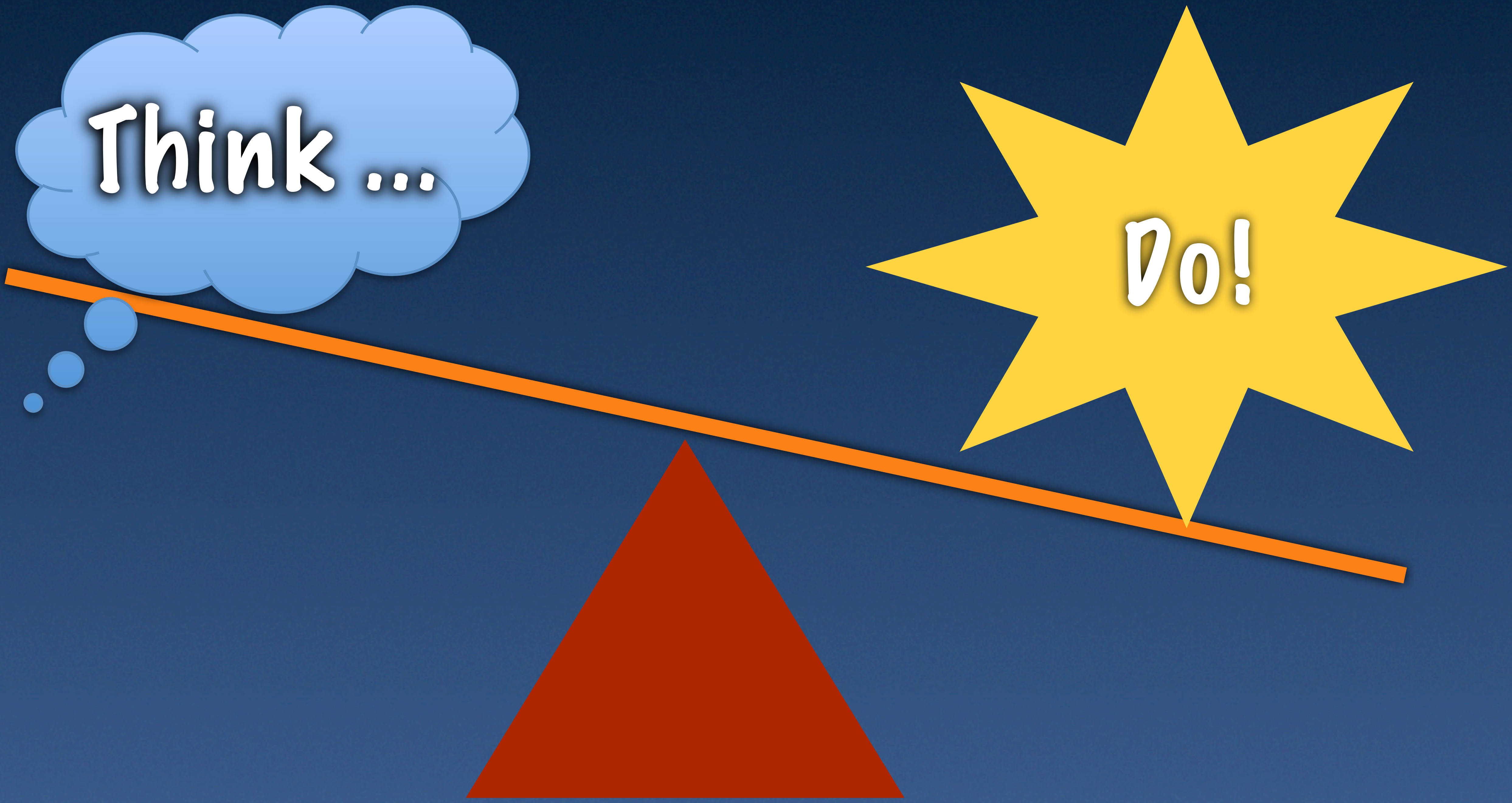
- All is not well with the system
- A new architect is told to "fix" "things"

What Could You Do?

- Create models
- Replace Difficult Technology
- Gap Analysis of Functions
- Automated Acceptance Tests
- HA/Resilience Improvements
- Monitoring and Alerting
- Security Assessment
- Implement AAA
- Continuous Deployment
- Meet 2 Year Scalability Goals
- Refactor to Patterns

All of this might make sense … but you won't have time!

Inherent Tension



The Excesses to Avoid

Our Inspiration:
The Master Builder

Who Were the Master Masons?

- The technical leads of their era
  - *… architect of the building, as administrative official of the building fabric, as building contractor, and finally, as technical supervisor of construction.*
    L.R. Shelby, The Role of the Master Mason, Speculum, Vol. XXXIX,1964.
- Expert technologists, accomplished builders, proven leaders
- Vitruvius: “irmitas, utilitas, venustas”
  - sturdy, useful, beautiful

[Architects] who have aimed at acquiring manual skill without scholarship have never been able to reach a position of authority to correspond to their pains, while those who relied only upon theories and scholarship were obviously hunting the shadow, not the substance. But those who have a thorough knowledge of both, like men armed at all points, have the sooner attained their object and carried authority with them.

Marcus Vitruvius Pollio
De Architectura ("The Ten Books on Architecture")

Master Masons in the Mud

- Easy to build an ivory tower in a green field
- Brown field projects need immediate help
- Long term thinking is good
  - but things need attention RIGHT NOW
- Need the broad skills of the master mason
  - not afraid of theory or practice

Architects on Brown-Field Projects

Finding Your Bearings

Minimal Modelling

Consider the Team

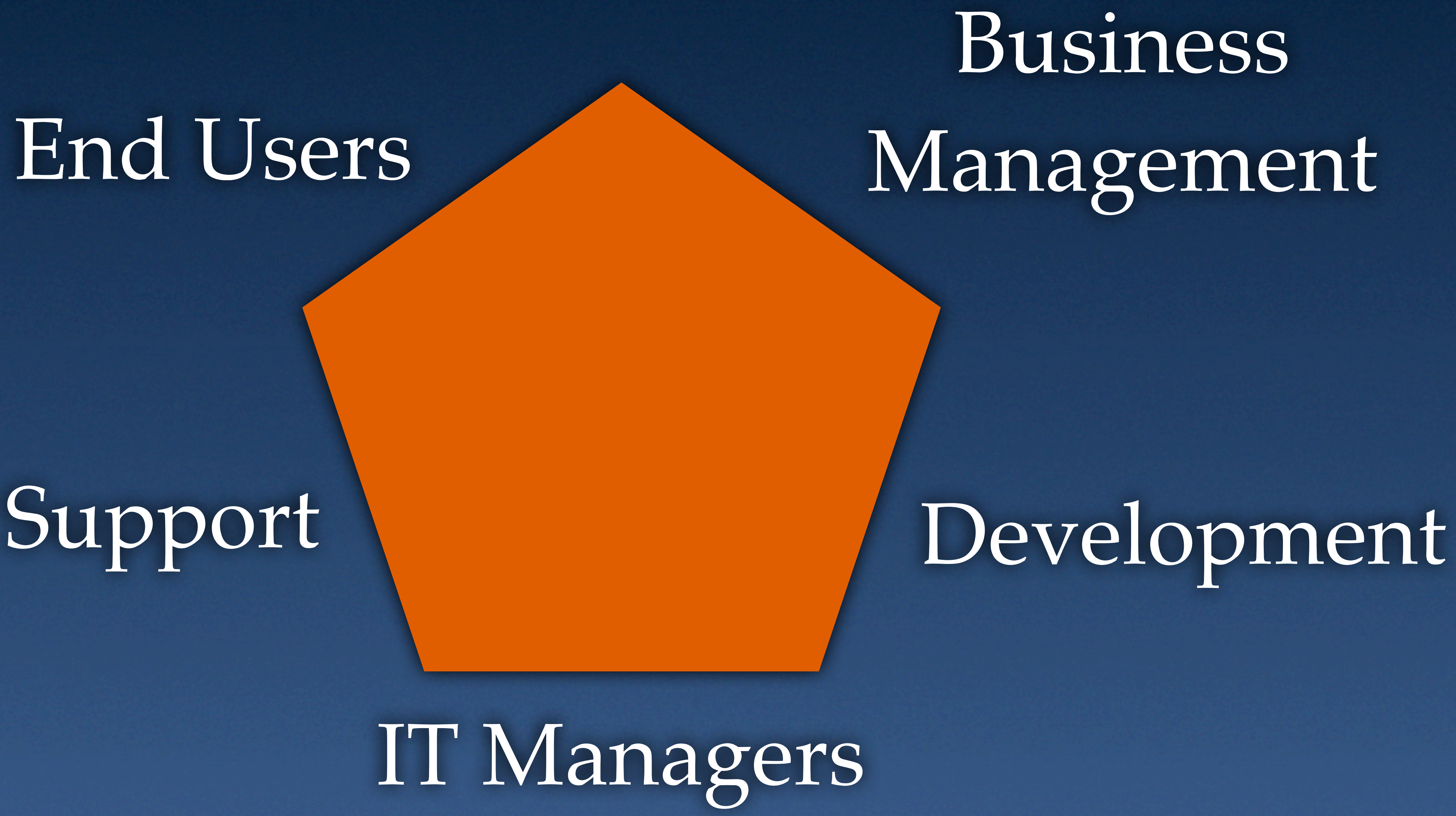
Assessment Techniques

Automated Analysis Tools

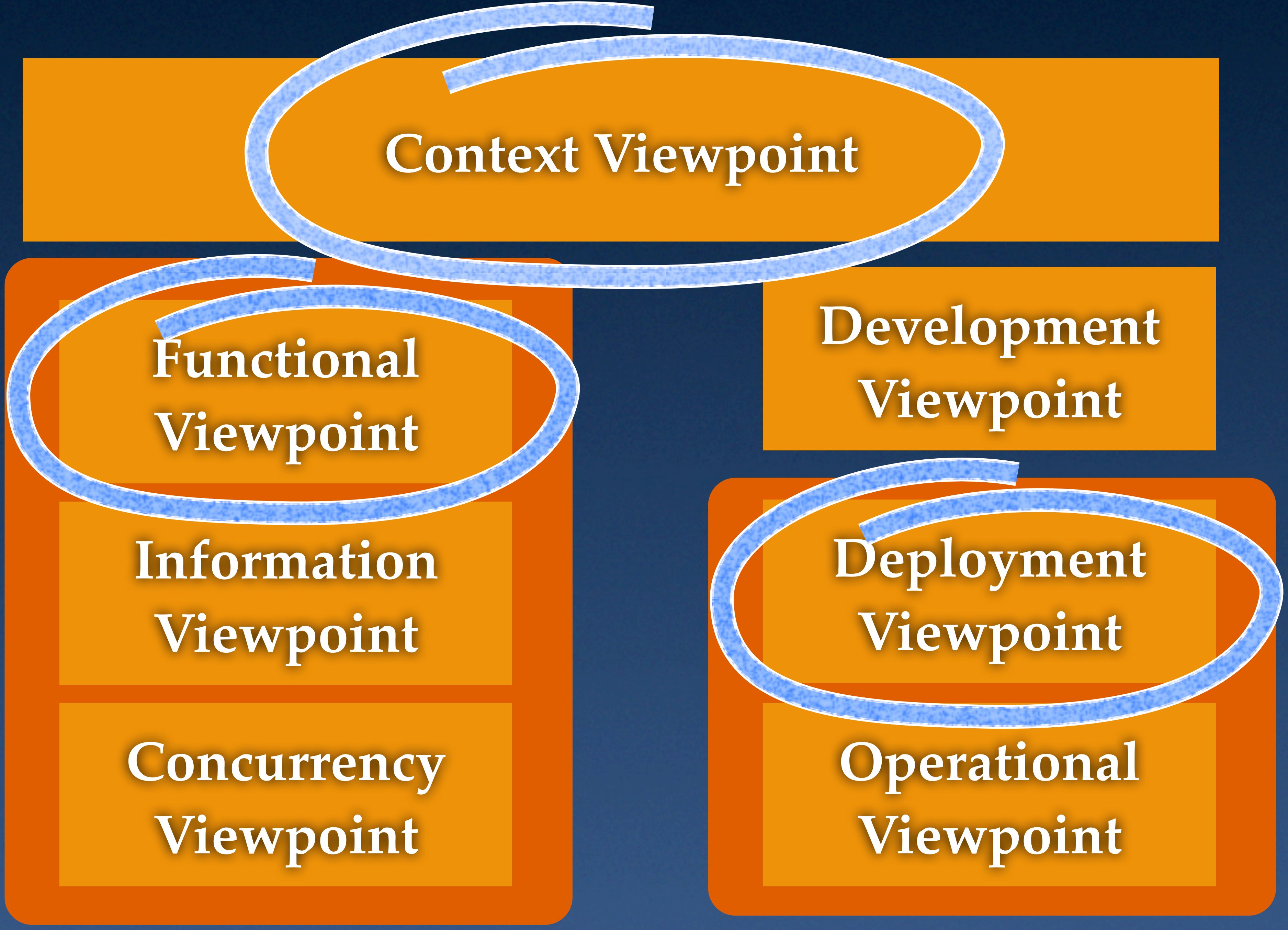
Monitor and Measure

"If you cannot measure it, you cannot improve it."
Lord Kelvin

Getting the Right Perspective

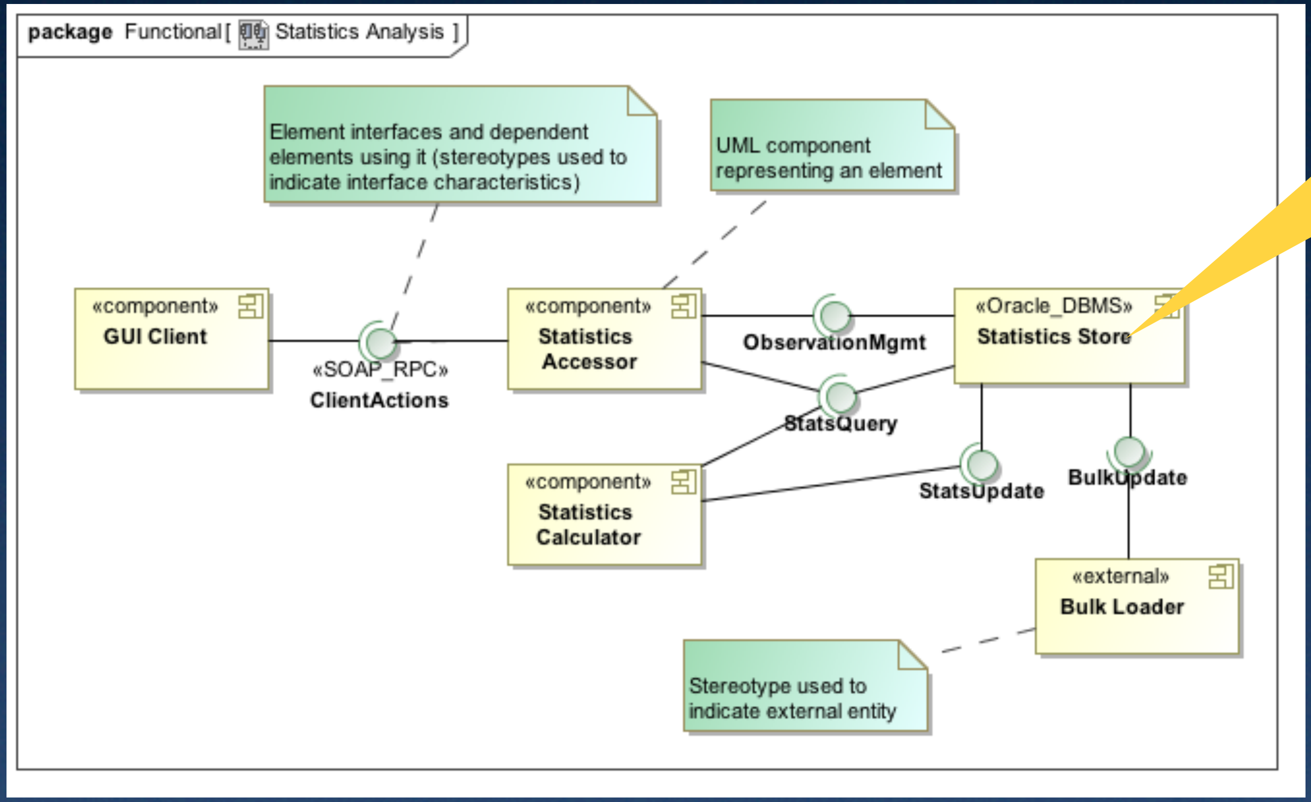


Minimal Modelling



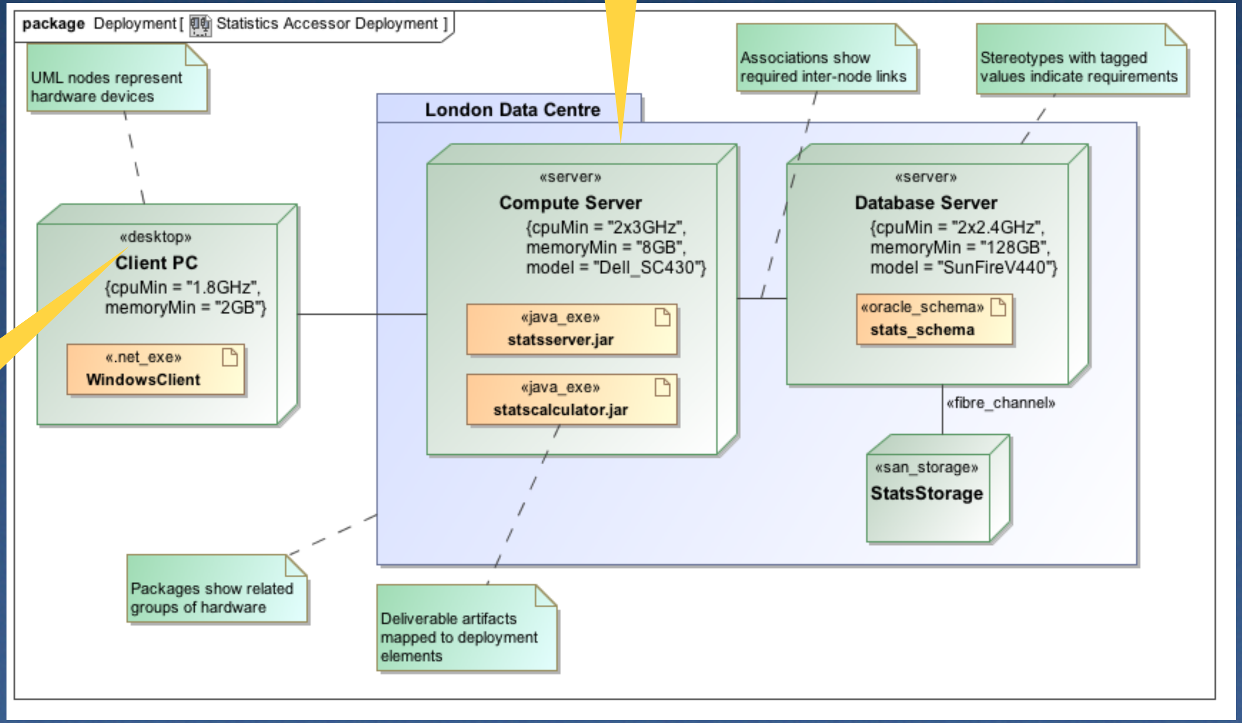
Capture what you can’t get from the code

Minimal Modelling


package Functional [Statistics Analysis]
Element interfaces and dependent elements using it (stereotypes used to indicate interface characteristics)
UML component representing an element
«component» GUI Client
«SOAP_RPC» ClientActions
«component» Statistics Accessor
ObservationMgmt
«Oracle_DBMS» Statistics Store
StatsQuery
«component» Statistics Calculator
StatsUpdate
BulkUpdate
«external» Bulk Loader
Stereotype used to indicate external entity

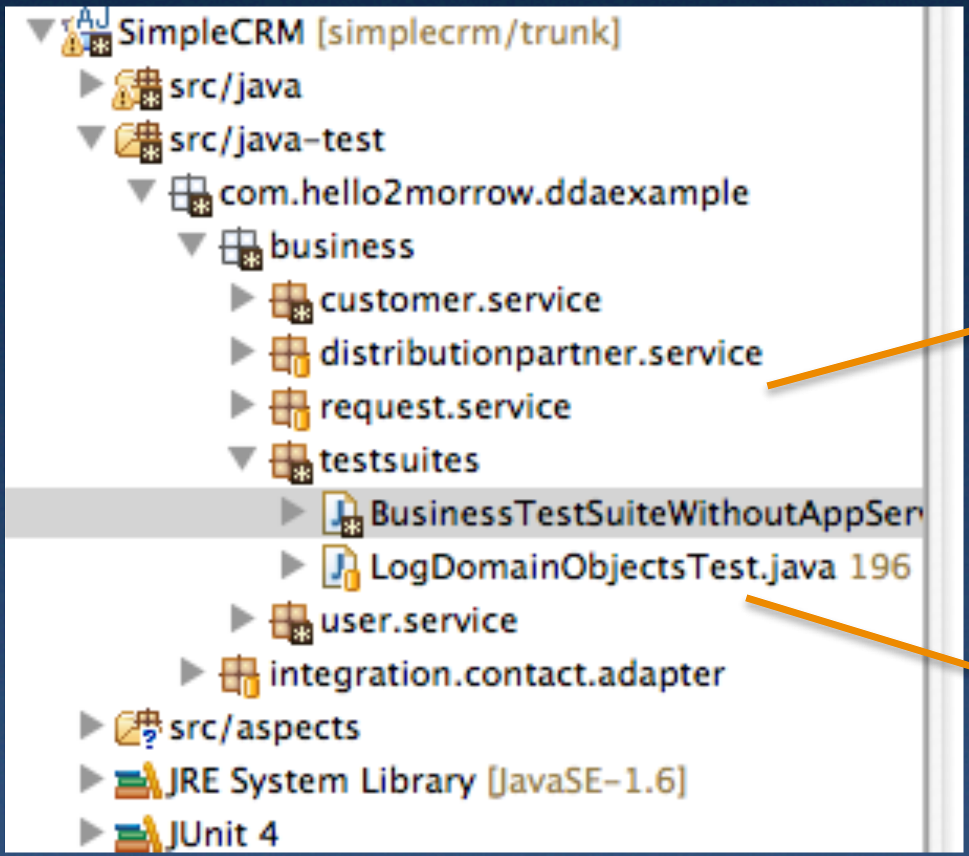
Small well annotated models

Define your notation!

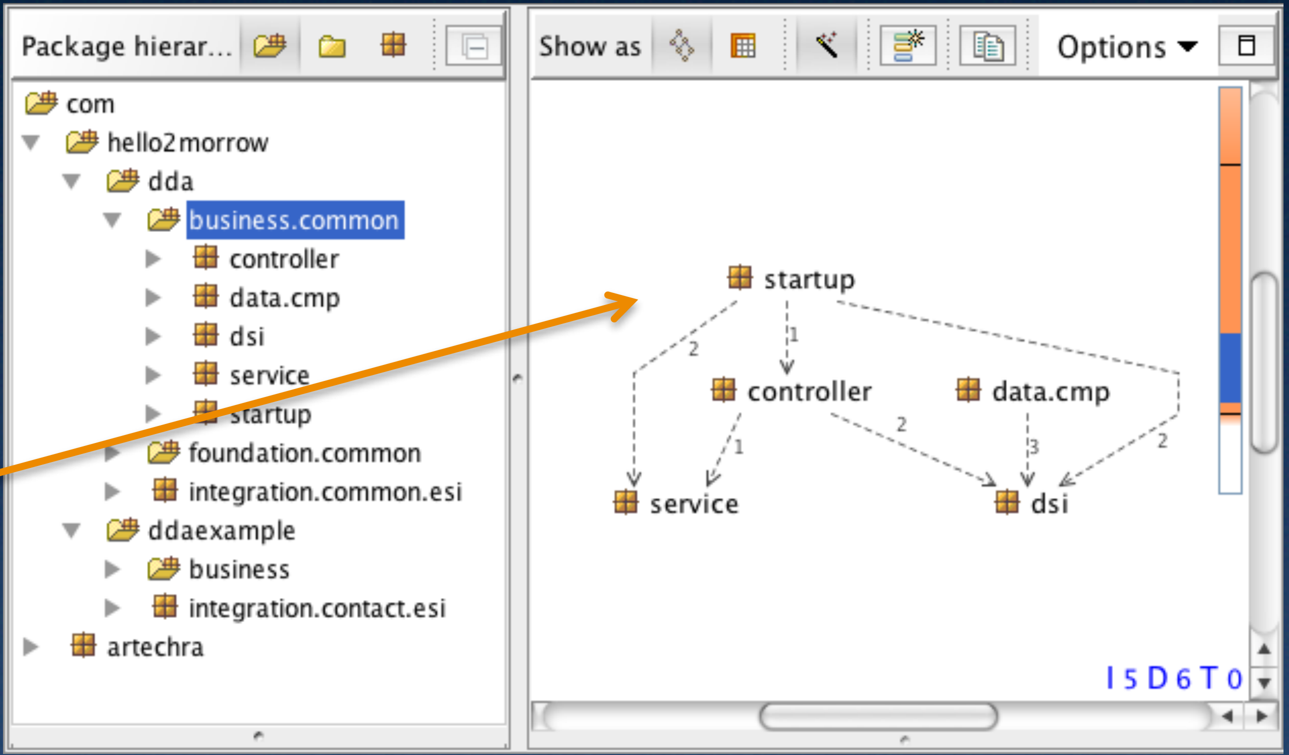

package Deployment [Statistics Accessor Deployment]
UML nodes represent hardware devices
Associations show required inter-node links
Stereotypes with tagged values indicate requirements
London Data Centre
«desktop» Client PC {cpuMin = "1.8GHz", memoryMin = "2GB"}
«.net_exe» WindowsClient
«server» Compute Server {cpuMin = "2x3GHz", memoryMin = "8GB", model = "Dell_SC430"}
«java_exe» statsserver.jar
«java_exe» statscalculator.jar
«server» Database Server {cpuMin = "2x2.4GHz", memoryMin = "128GB", model = "SunFireV440"}
«oracle_schema» stats_schema
«fibre_channel»
«san_storage» StatsStorage
Packages show related groups of hardware
Deliverable artifacts mapped to deployment elements

Focus on essentials that someone needs to know

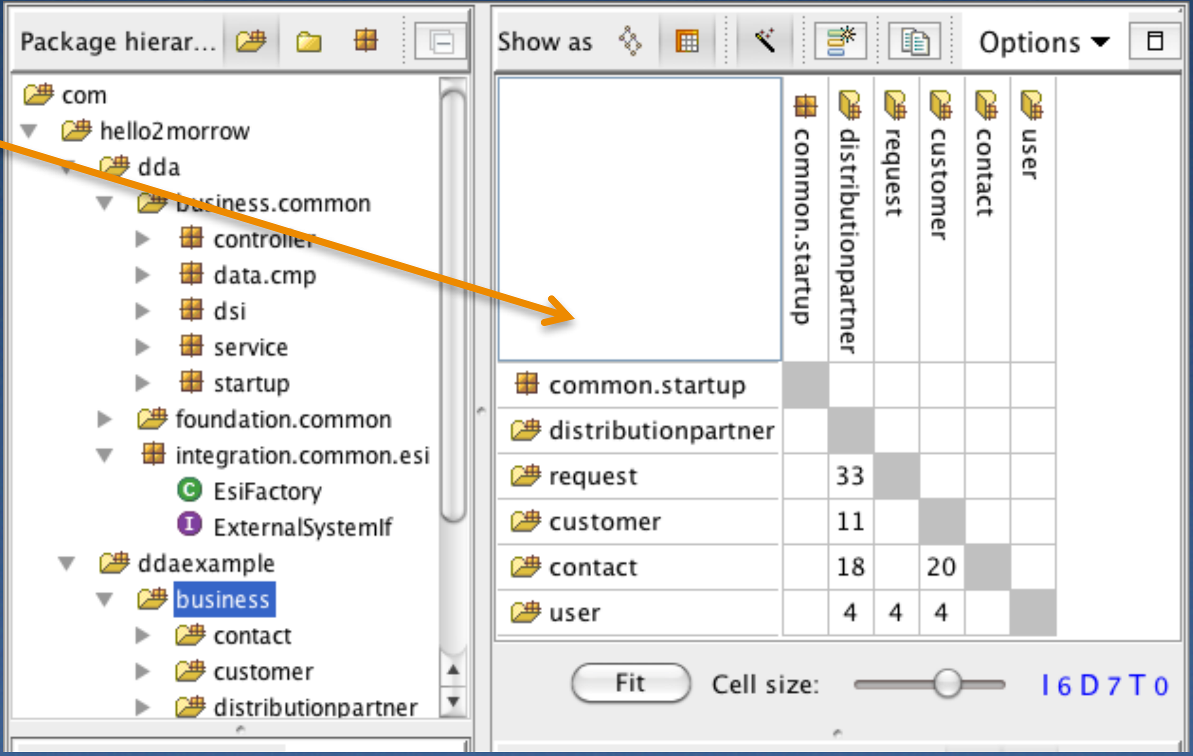
Automated Analysis



- SimpleCRM [simplecrm/trunk]
  - src/java
  - src/java-test
    - com.hello2morrow.ddaexample
      - business
        - customer.service
        - distributionpartner.service
        - request.service
        - testsuites
          - BusinessTestSuiteWithoutAppSer
          - LogDomainObjectsTest.java 196
        - user.service
      - integration.contact.adapter
  - src/aspects
  - JRE System Library [JavaSE-1.6]
  - JUnit 4



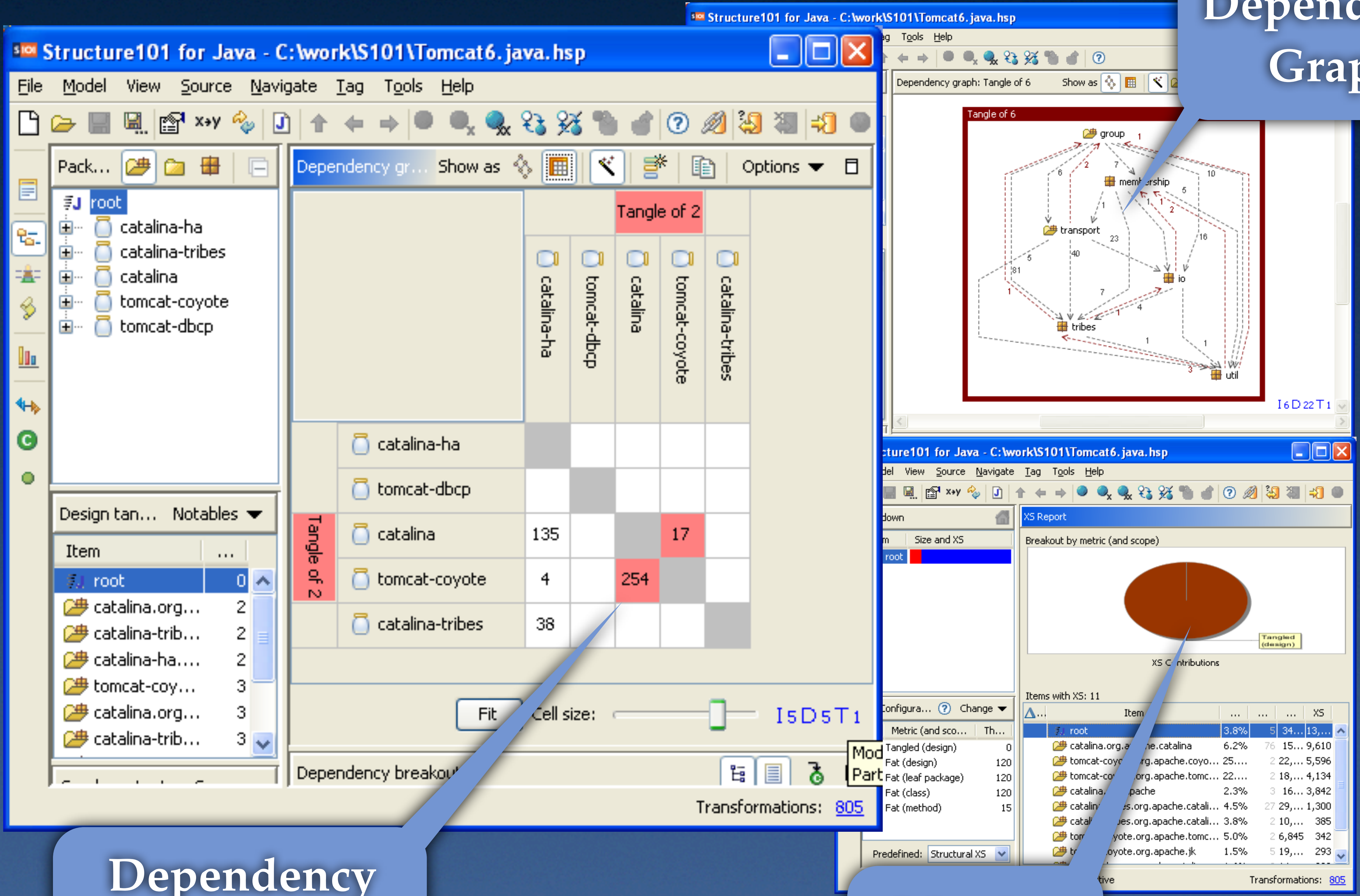
- com
  - hello2morrow
    - dda
      - business.common
        - controller
        - data.cmp
        - dsi
        - service
        - startup
      - foundation.common
      - integration.common.esi
    - ddaexample
      - business
      - integration.contact.esi
  - artechra



- com
  - hello2morrow
    - dda
      - business.common
        - controller
        - data.cmp
        - dsi
        - service
        - startup
      - foundation.common
      - integration.common.esi
        - EsiFactory
        - ExternalSystemIf
    - ddaexample
      - business
        - contact
        - customer
        - distributionpartner

	common.startup	distributionpartner	request	customer	contact	user
common.startup	▨					
distributionpartner		▨				
request		33	▨			
customer		11		▨		
contact		18		20	▨	
user		4	4	4		▨

Tooling: S101, Lattix, Sonar, ...



	catalina-ha	tomcat-dbcp	catalina	tomcat-coyote	catalina-tribes
catalina-ha					
tomcat-dbcp					
catalina	135			17	
tomcat-coyote	4		254		
catalina-tribes	38				

Item	...
root	0
catalina.org...	2
catalina-trib...	2
catalina-ha....	2
tomcat-coy...	3
catalina.org...	3
catalina-trib...	3

Metric (and sco...	Th...
Tangled (design)	0
Fat (design)	120
Fat (leaf package)	120
Fat (class)	120
Fat (method)	15

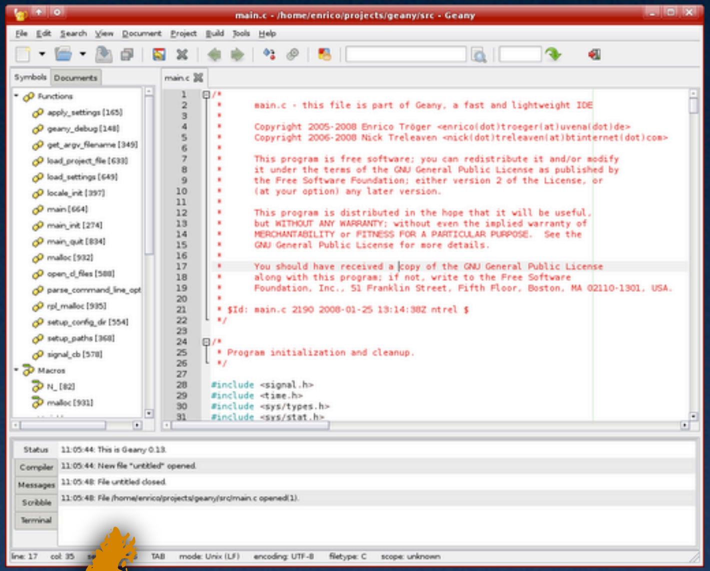
Dependency Graph

Dependency Matrix

Metrics

Monitor and Measure

Production Metrics

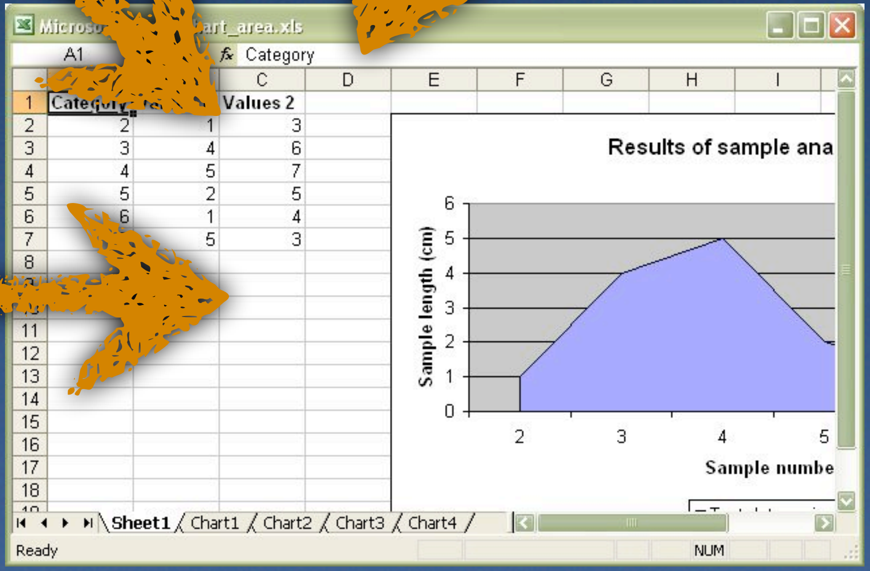


```
/*
 *      main.c - this file is part of Geany, a fast and lightweight IDE
 *
 *      Copyright 2005-2008 Enrico Tröger <enrico(dot)troeger(at)uvena(dot)de>
 *      Copyright 2006-2008 Nick Treleaven <nick(dot)treleaven(at)btinternet(dot)com>
 *
 *      This program is free software; you can redistribute it and/or modify
 *      it under the terms of the GNU General Public License as published by
 *      the Free Software Foundation; either version 2 of the License, or
 *      (at your option) any later version.
 *
 *      This program is distributed in the hope that it will be useful,
 *      but WITHOUT ANY WARRANTY; without even the implied warranty of
 *      MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
 *      GNU General Public License for more details.
 *
 *      You should have received a copy of the GNU General Public License
 *      along with this program; if not, write to the Free Software
 *      Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA.
 *
 * $Id: main.c 2190 2008-01-25 13:14:38Z ntrel $
 */

/*
 * Program initialization and cleanup.
 */

#include <signal.h>
#include <time.h>
#include <sys/types.h>
#include <sys/stat.h>
```

```
Status    11:05:44: This is Geany 0.13.
Compiler  11:05:44: New file "untitled" opened.
Messages  11:05:48: File untitled closed.
Scribble  11:05:48: File /home/enrico/projects/geany/src/main.c opened(1).
Terminal
line: 17   col: 35   TAB   mode: Unix (LF)   encoding: UTF-8   filetype: C   scope: unknown
```

Implementation Metrics

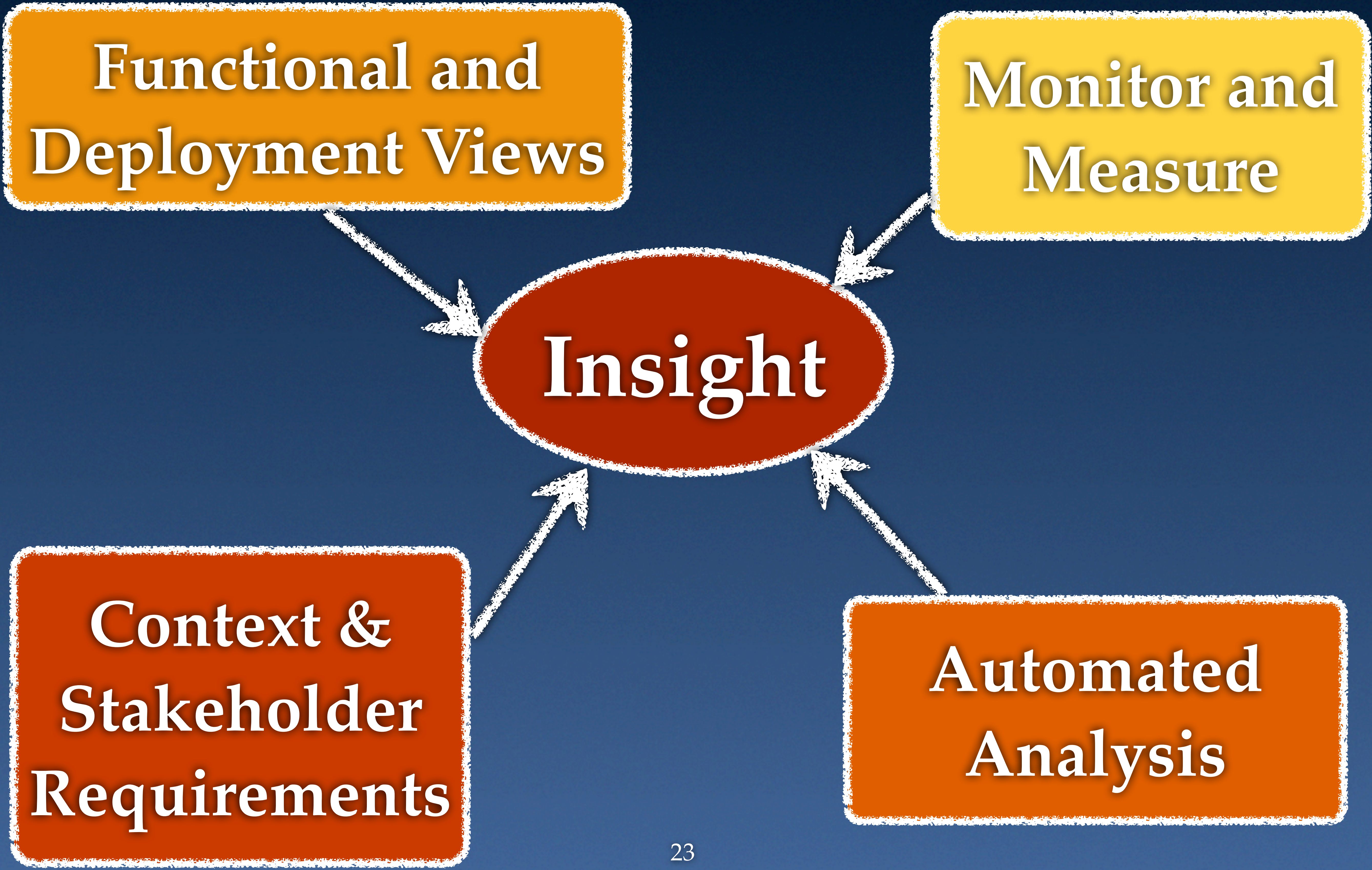
Stakeholder Opinions



	Category		Values 2
2	2	1	3
3	3	4	6
4	4	5	7
5	5	2	5
6	6	1	4
7		5	3

System Qualities Assessment

Assessment



Functional and Deployment Views
Monitor and Measure
Insight
Context & Stakeholder Requirements
Automated Analysis

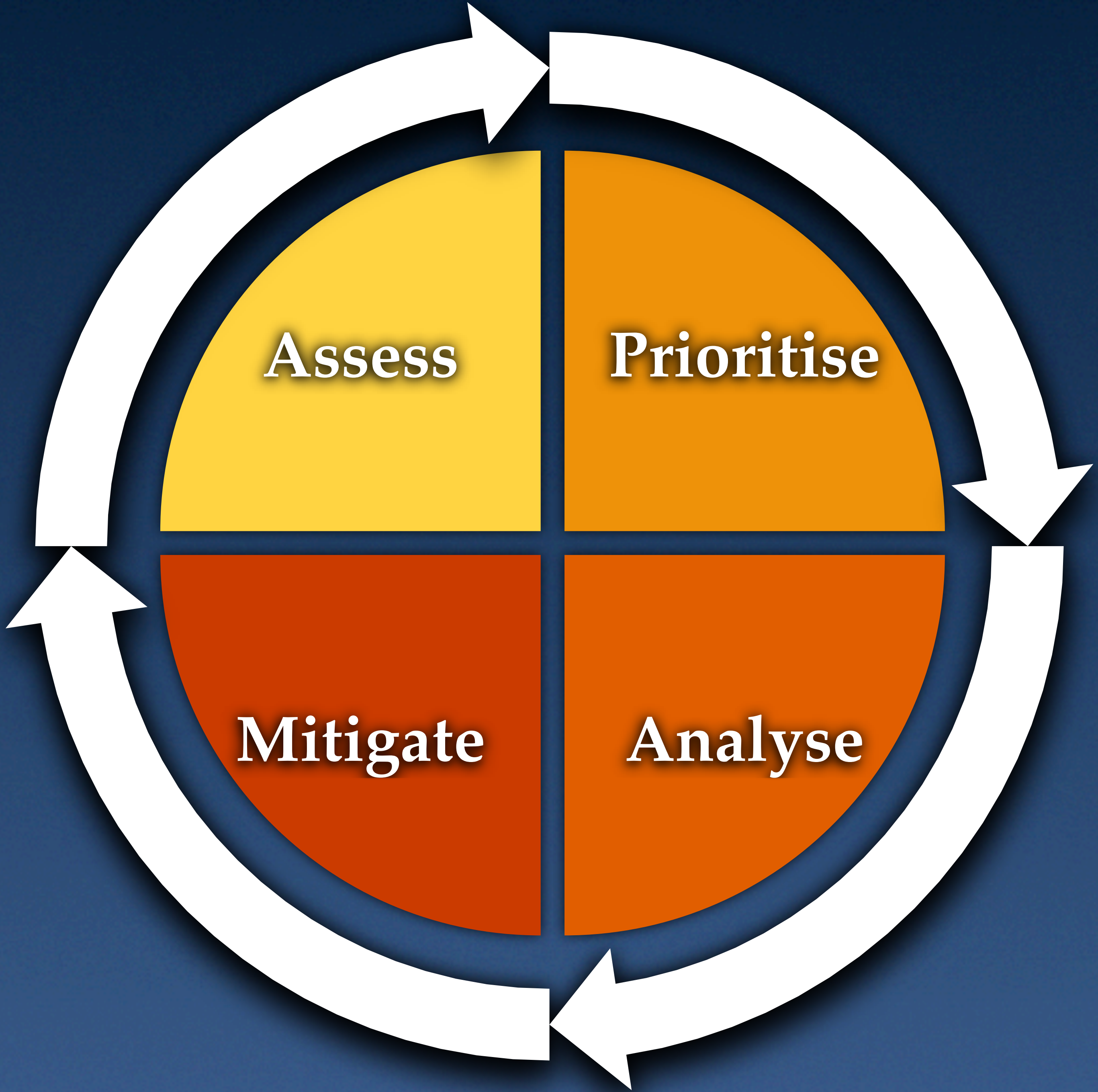
Architectural Assessment - Pointers

- ATAM
  - Architectural Tradeoff Analysis Method
  - SEI method - search "ATAM"
- LAAAM
  - Lightweight Architectural Assessment Method
  - Jeromy Carriere - search "LAAAM"
- TARA
  - Tiny Architectural Review Approach
  - Eoin Woods - http://tiny.cc/tara-approach

Consider the Team

- Easy to focus on the technology and system
- The team probably need attention too
  - Morale?
  - Dynamics?
  - Confidence?
  - Competence?
- The team must shape your whole approach
  - otherwise risk goes sky high

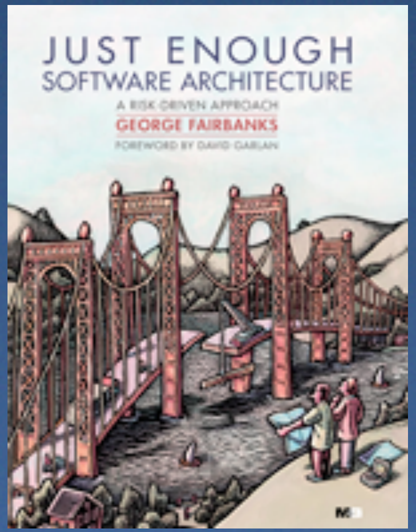
Making Choices Based On Risks



How?

"Just Enough Software Architecture"

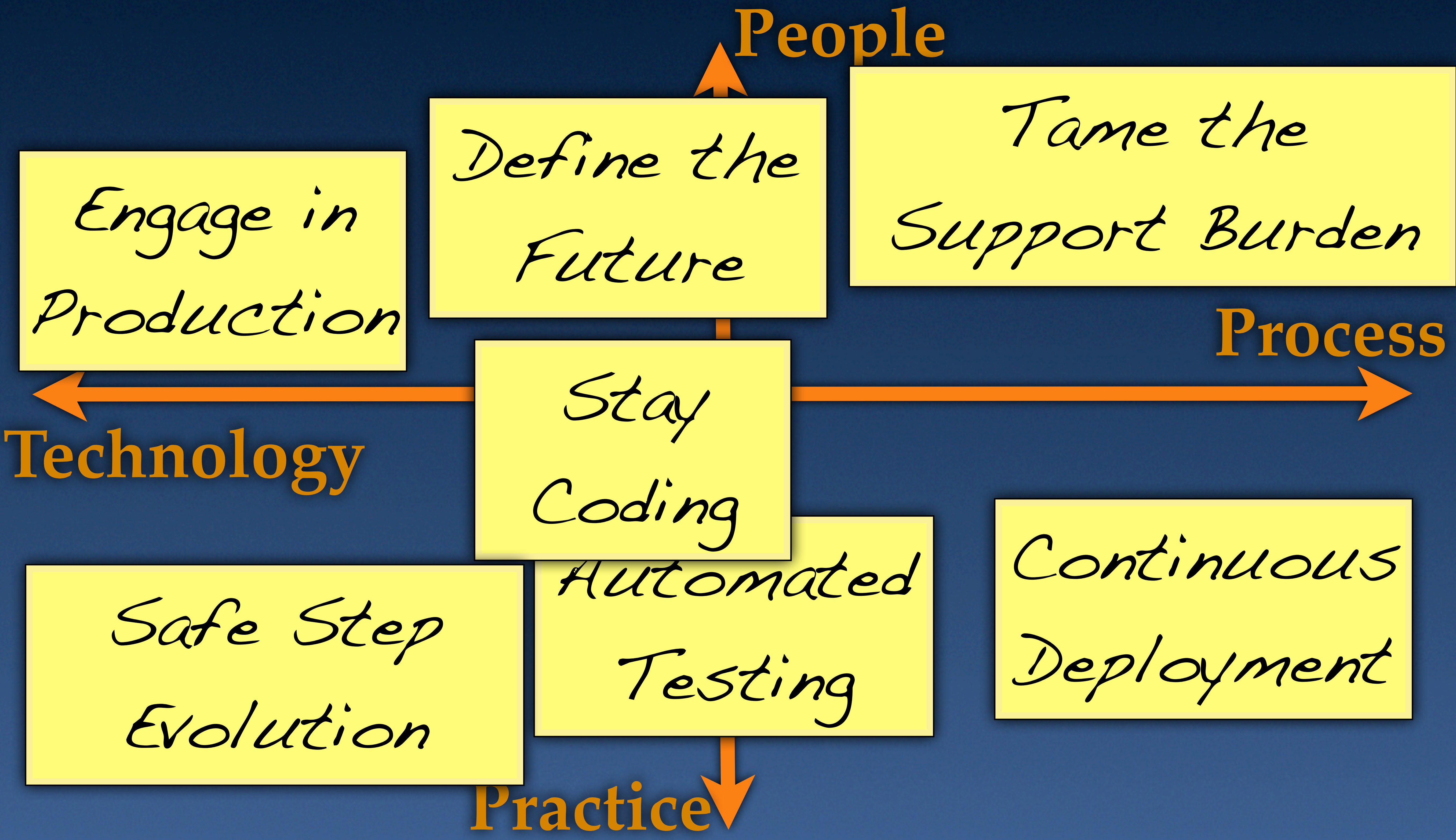
George Fairbanks



Tactics for Existing Projects

… or "What would Vitruvius have done?"

Tactics for Existing Projects



Engage in Production

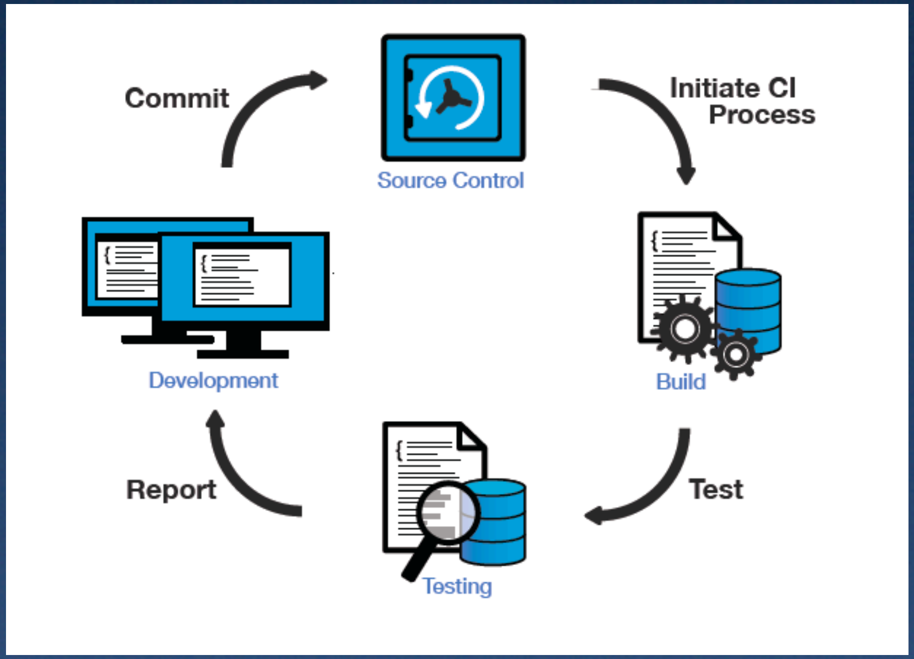
- Why?
  - reality check - rich information source
- How?
  - monitoring + stats + incident management
- For Who?
  - support, end-users, business management
- Pitfalls?
  - this is not your main job!

Tame the Support Burden

- Why?
  - support will sap the team of energy
- How?
  - stability first, then “BAU” effort (L2 team?)
- For Who?
  - end users, dev team, IT management
- Pitfalls?
  - but avoid “over the wall” mentality

Continuous Integration and Deploy

- Why?
  - efficiency and reliability
- How?
  - start simple, don’t rush
- For Who?
  - development & support teams
- Pitfalls?
  - running before you can walk, underestimation



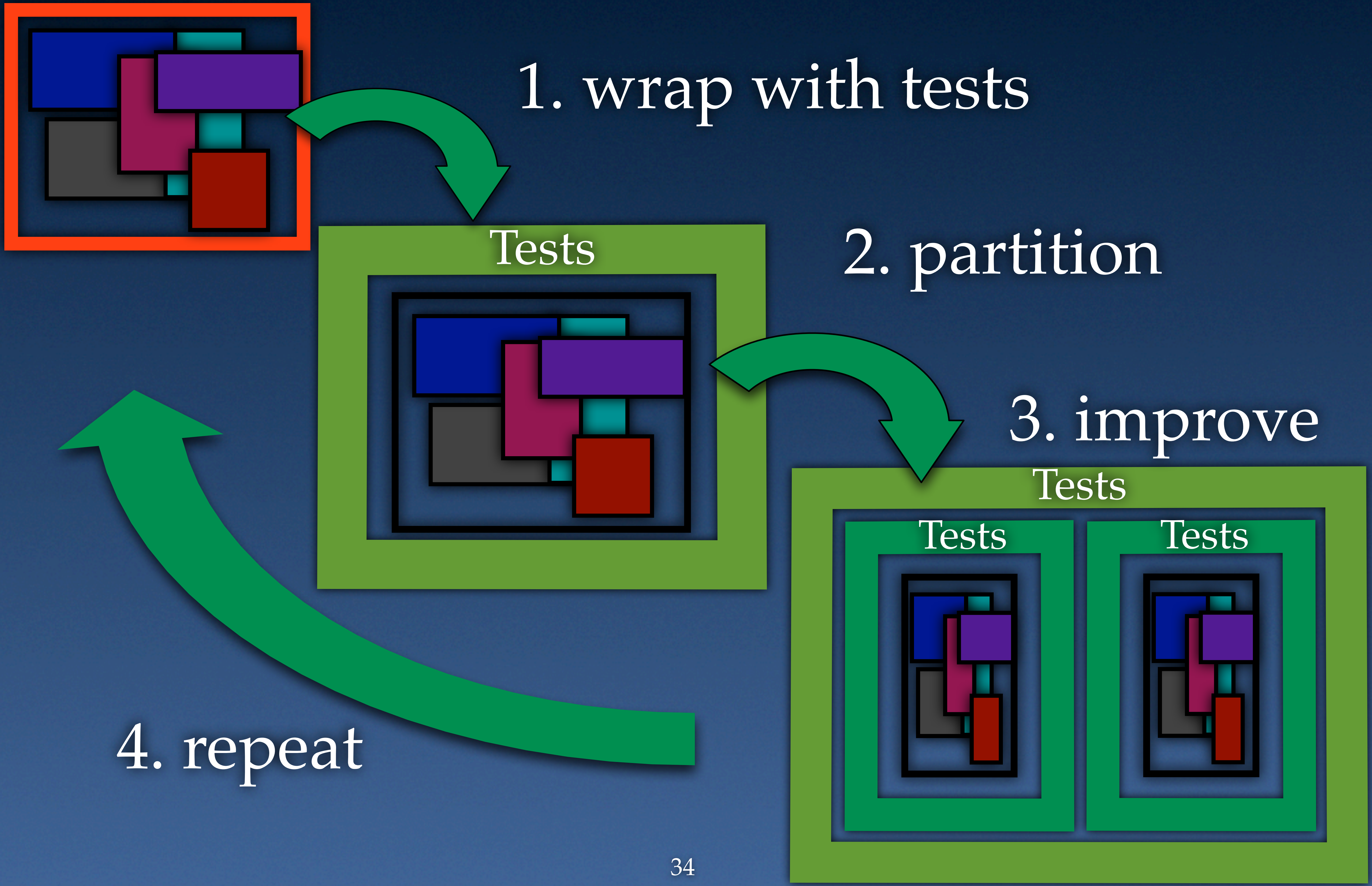
Automated Testing

- Why?
  - confidence, efficiency + reveal problems
- How?
  - unit test + coverage, regression tests
- For Who?
  - everyone!
- Pitfalls?
  - tar pit of legacy (cost)

Safe Step Evolution

- Why?
  - control risk while improving
- How?
  - wrap with tests, partition, improve, ... repeat
- For Who?
  - everyone
- Pitfalls?
  - assumptions, knowledge gaps

Safe Step Evolution



Improvement Tactics

replace

partition

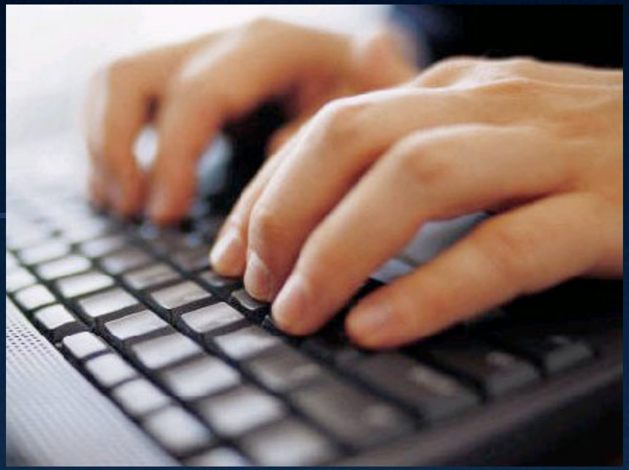
simplify

extract

generalise

encapsulate

Stay Coding



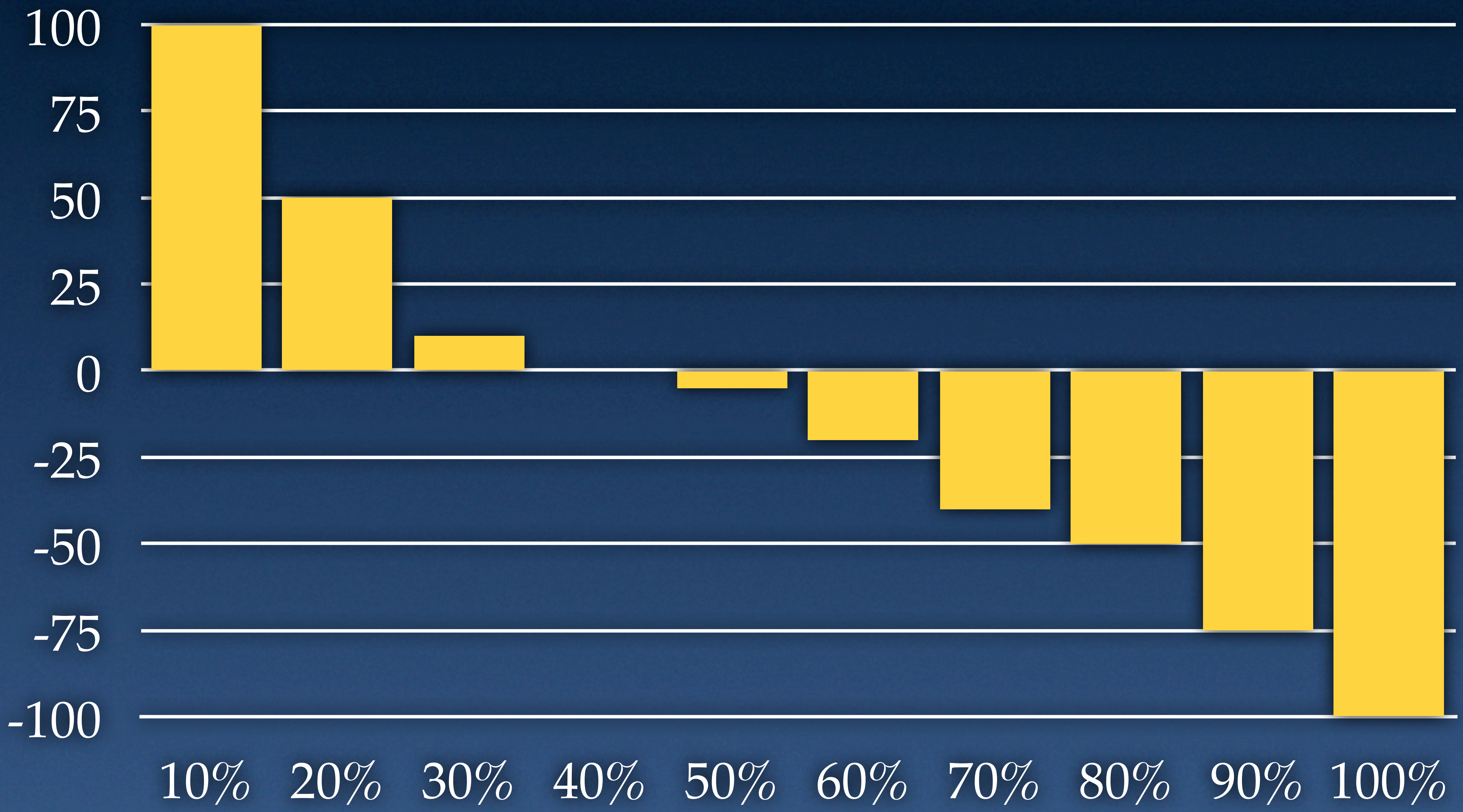
- Why?
  - see dev reality, stay current and credible
- How?
  - fix bugs, write tests, refactor, ... <u>off</u> critical path
- For Who?
  - you mainly!
- Pitfalls?
  - huge time sink - potentially low ROI

Code, Model ... Model, Code

- Coding time always gets squeezed (rightly)

- Code to build credibility
- Code to set an example
- Code when you're <u>genuinely</u> best for a task
- Code occasionally for sanity!

Notional ROI for Architect Coding



Where is your break-even point?

Define the Future

- Why?
    - in the trenches it's good to know there's a future
- How?
    - clear, simple, credible future state architecture
- For Who?
    - dev team, IT & business management
- Pitfalls?
    - timing, predicting the future

Summary

Architecture with Real Teams

- Software architecture is not just for green field projects
- Huge value in architecture techniques and principles for older or troubled projects
- Specific focus required
  - architecture techniques to find where you are
  - specific tactics for working with existing teams
- Be a master builder not in an ivory tower!

Useful Books

Software Systems Architecture
Second
Working with Stakeholders Using Viewpoints and P
NICK ROZANSKI • EOIN WO
Managing Software Debt
Building for Inevitable Change
Chris Sterling
Foreword by Ear
Robert C. Martin Series
WORKING EFFECTIVELY WITH LEGACY CODE
Michael C. Feathers
The Addison-Wesley Signature Series
GROWING OBJECT-ORIENTED SOFTWARE, GUIDED BY TESTS
STEVE FREEMAN
NAT PRYCE
The Addison-Wesley Signature Series
CONTINUOUS DELIVERY
RELIABLE SOFTWARE RELEASES THROUGH BUILD, TEST, AND DEPLOYMENT AUTOMATION
JEZ HUMBLE,
DAVID FARLEY
A MARTIN FOWLER SIGNATURE BOOK
JUST ENOUGH SOFTWARE ARCHITECTURE
A RISK-DRIVEN APPROACH
GEORGE FAIRBANKS
FOREWORD BY DAVID GARLAN
SEI SERIES IN SOFTWARE ENGINEERING
Modernizing Legacy Systems
Software Technologies, Engineering Processes, and Business Practices
Robert C. Seacord
Daniel Plakosh
Grace A. Lewis
REFACTORING TO PATTERNS
JOSHUA KERIEVSKY
Forewords by Ral
Afterword b
12 ESSENTIAL SKILLS FOR SOFTWARE ARCHITECTS
Dave Hendricksen

Questions?

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