goto; conference aarhus

THE FRUSTRATED ARCHITECT

Simon Brown

@simonbrown

coding {the} architecture

INTERNATIONAL
SOFTWARE DEVELOPMENT
CONFERENCE

gotocon.com

Perceptions

Big up front design

and analysis paralysis

Waterfall

UML

I’m a

software architect

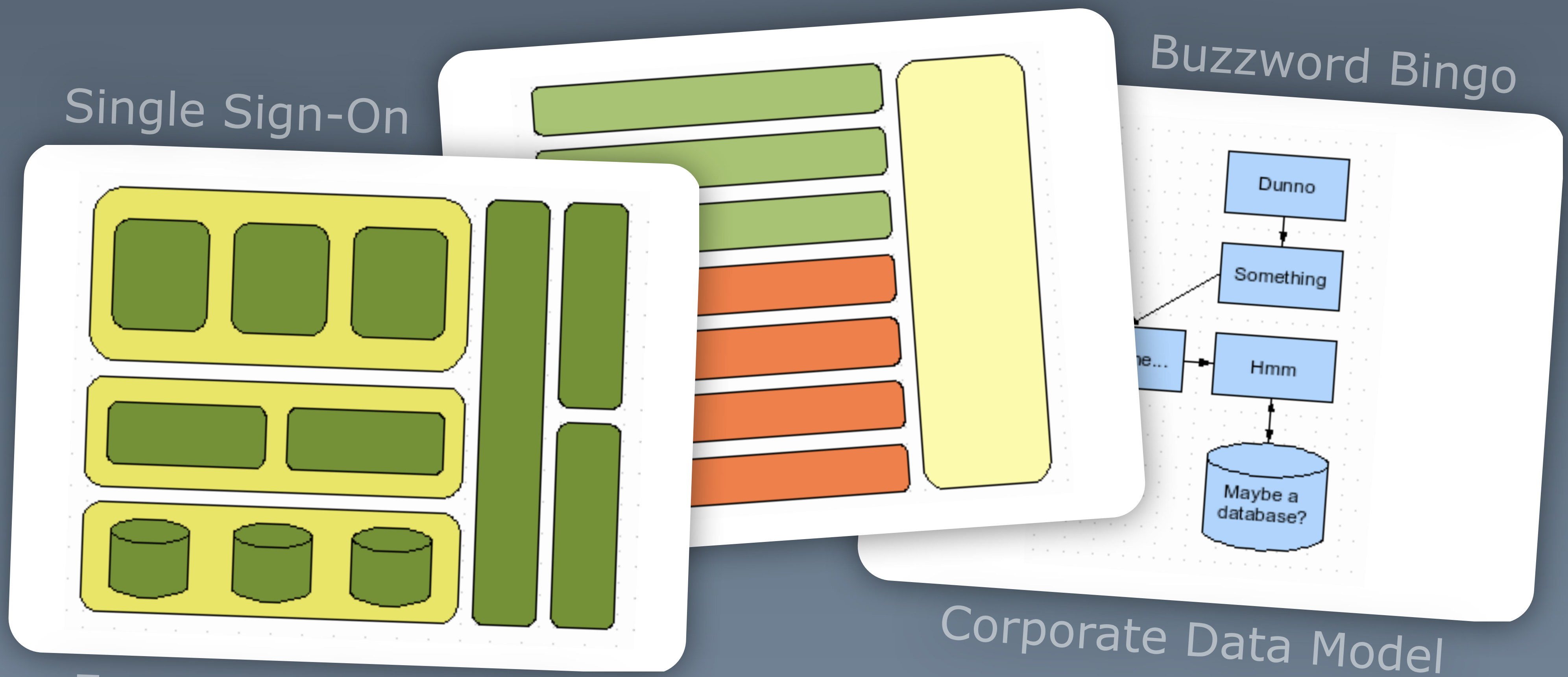
Ivory Tower

PowerPoint Architect

Architecture Astronaut

PowerPoint

Architecture



Single Sign-On

Buzzword Bingo

Enterprise Service Bus

Corporate Data Model

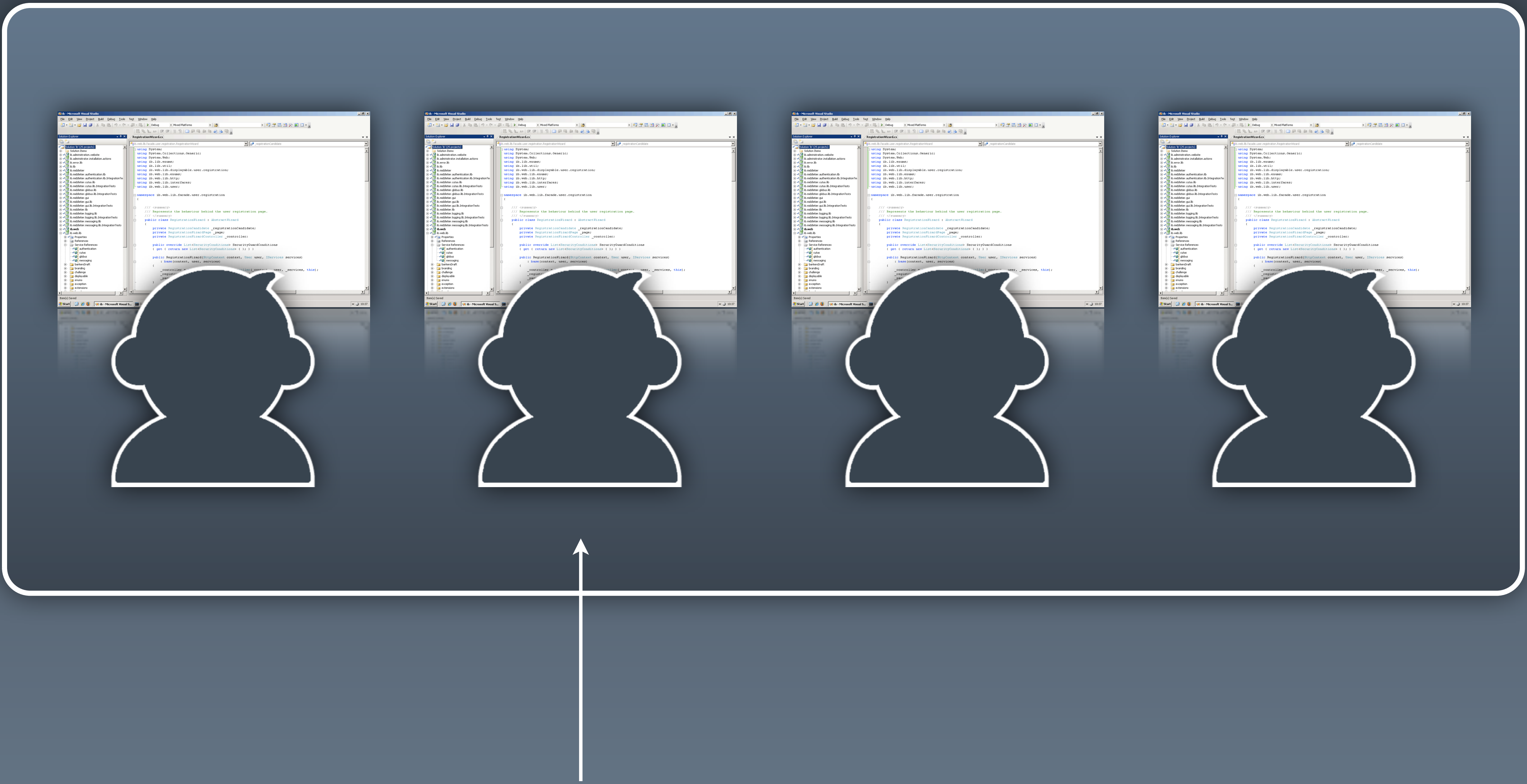
yes, I know ... but I'm not using PowerPoint :-P

Relay Sport

Architecture

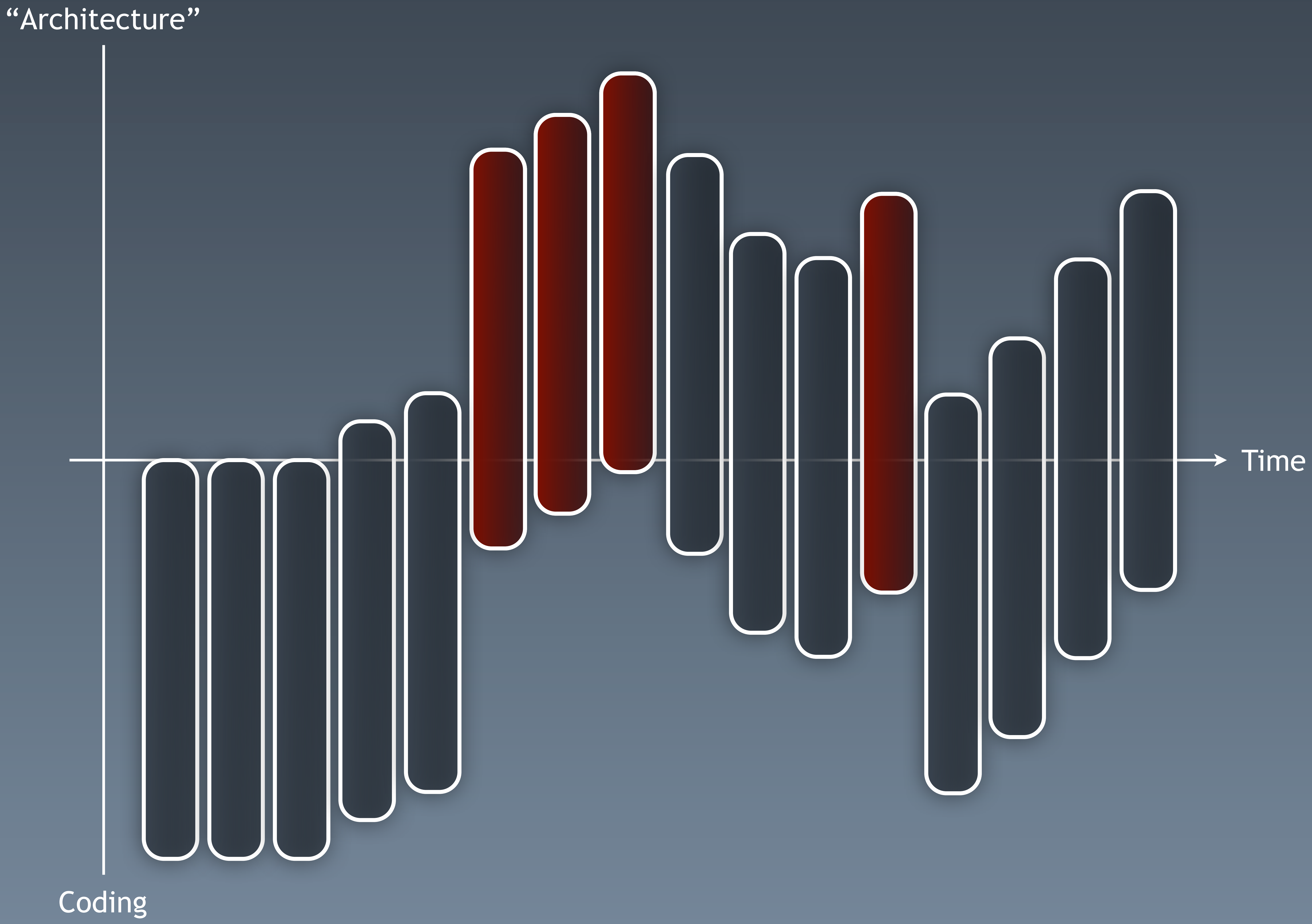
This is a big bunch of

AaaS

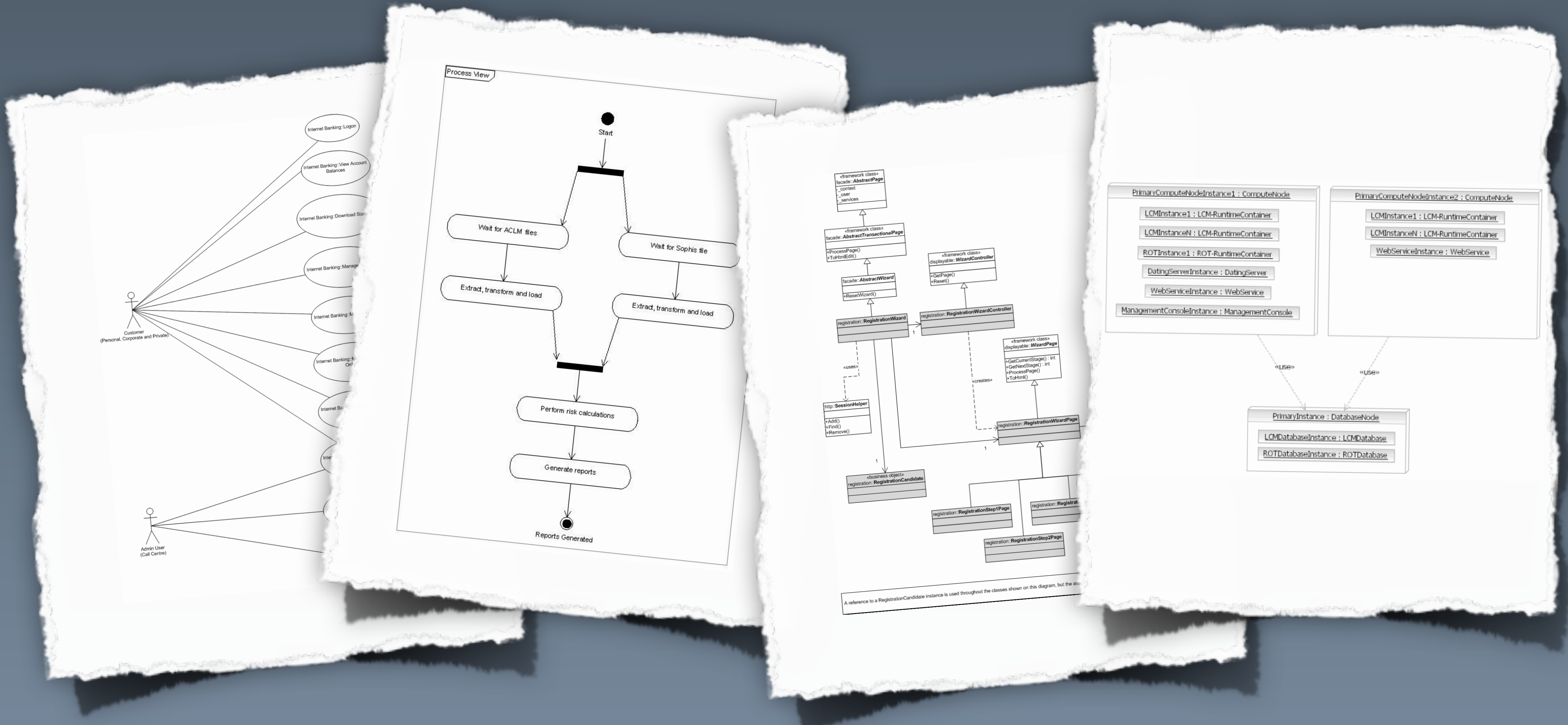


I’m another member of the team

(and I like writing code)


“Architecture”
Time
Coding

The UML phase


Internet Banking::Logon
Internet Banking::View Account Balances
Internet Banking::Download Sta
Internet Banking::Manage
Customer
(Personal, Corporate and Private)
Admin User
(Call Centre)
Process View
Start
Wait for ACLM files
Wait for Sophis file
Extract, transform and load
Extract, transform and load
Perform risk calculations
Generate reports
Reports Generated
«framework class»
facade::AbstractPage
facade::AbstractTransactionalPage
facade::AbstractWizard
registration::RegistrationWizard
displayable::WizardController
registration::RegistrationWizardController
displayable::WizardPage
http::SessionHelper
«uses»
«creates»
registration::RegistrationWizardPage
«business object»
registration::RegistrationCandidate
registration::RegistrationStep1Page
registration::RegistrationStep2Page
A reference to a RegistrationCandidate instance is used throughout the classes shown on this diagram, but the ass
PrimaryComputeNodeInstance1 : ComputeNode
LCMInstance1 : LCM-RuntimeContainer
LCMInstanceN : LCM-RuntimeContainer
ROTInstance1 : ROT-RuntimeContainer
DatingServerInstance : DatingServer
WebServiceInstance : WebService
ManagementConsoleInstance : ManagementConsole
PrimaryComputeNodeInstance2 : ComputeNode
LCMInstance1 : LCM-RuntimeContainer
LCMInstanceN : LCM-RuntimeContainer
WebServiceInstance : WebService
«use»
«use»
PrimaryInstance : DatabaseNode
LCMDatabaseInstance : LCMDatabase
ROTDatabaseInstance : ROTDatabase

The

Management Consulting

phase

The " corporate ladder "

Non-technical

Technical

Our tech lead and mentor
has been "promoted" ...

help!

Your management thinks

coding

is a

commodity?

Tell them to

offshore it all

coding

{the}
architecture

http://www.codingthearchitecture.com

"Software Architect"

is **not** an

organisational rank

It's a role that you

evolve *into*

We aspire to be *agile*

and *self-organising*

And that’s cool, but aren’t you

forgetting something?

Agile

Structure

Self-organising team

Non-functional requirements

Automated acceptance testing

Performance

Retrospectives

Moving fast, embracing change

Availability

Agile

Vision

Kanban

Scalability

Test-driven development

Security

Continuous delivery

Technical guidance

Emergent design

Technical quality

Lean

Agile _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

I don't position most of my content as agile, but...

What is an

agile architect

anyway?

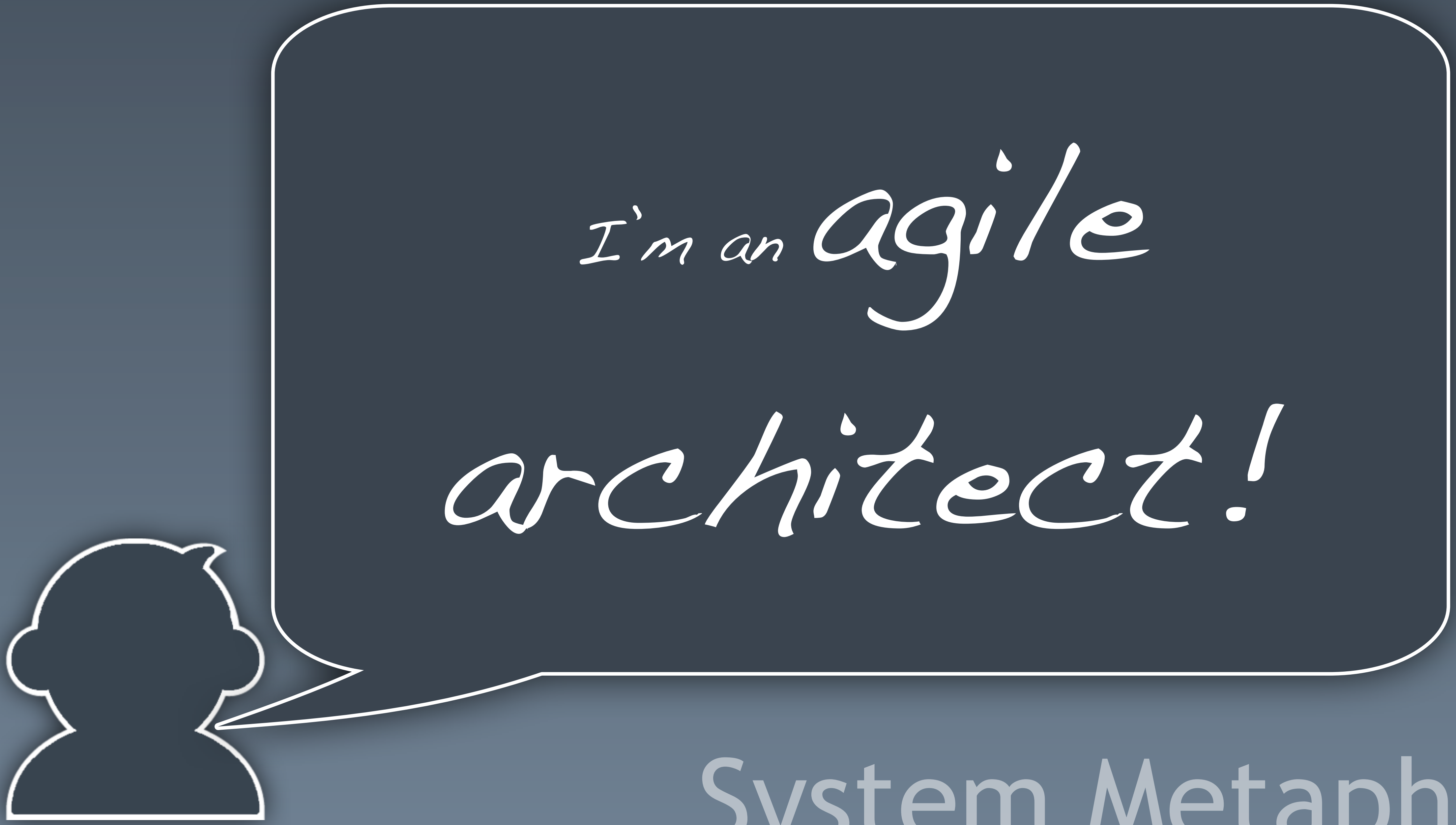
Evolutionary Architecture

and Emergent Design

YAGNI

Defer until the

last responsible moment



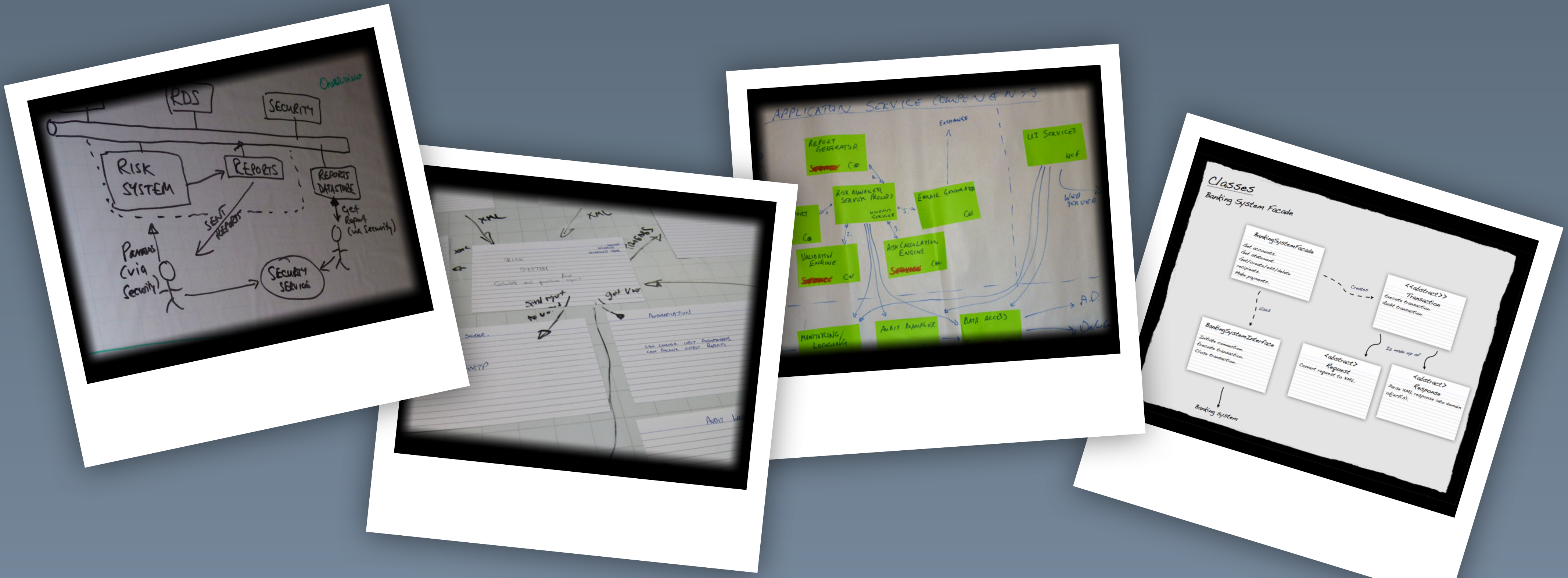
System Metaphor

Refactoring

Spikes, stripes and tracers

Agile

architecture?



Agile (e.g. Scrum)

Skills

Business Modelling

Requirements

Analysis & Design

Implementation

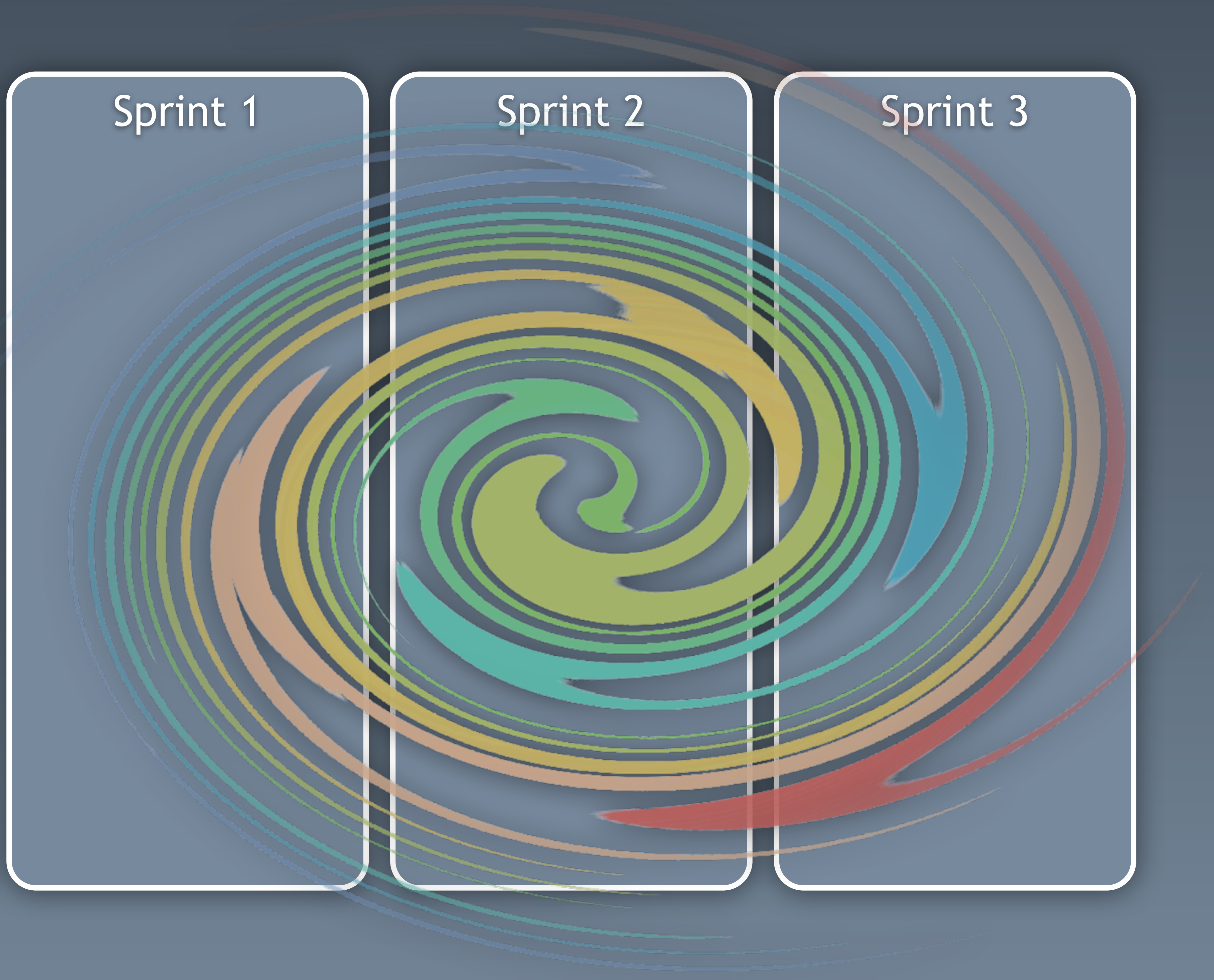
Test

Deployment

Configuration Management

Project Management

Environment



Sprint 1

Sprint 2

Sprint 3

Evolutionary architecture

Foolishly hoping for the best?

We don’t need
software architecture;

we do TDD

Agile software team

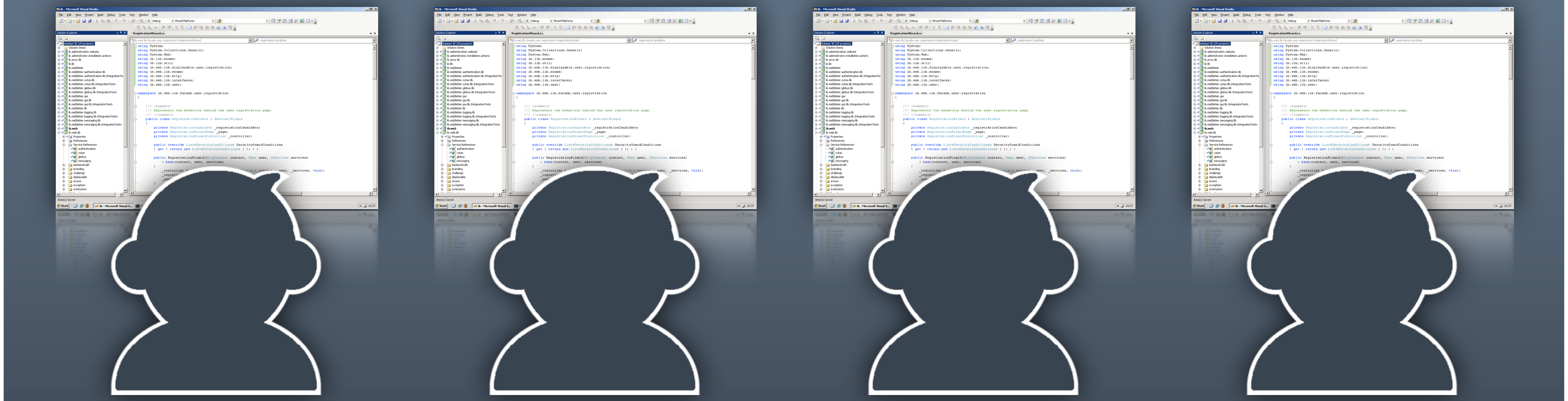
TDD is about code

… architecture isn’t

(well, it is, but it’s also about more than just the code)

Last responsible moment

Most people know roughly what they're building so just make some decisions!



Flat, self-organising teams are great but…

…they don’t always work

Let's

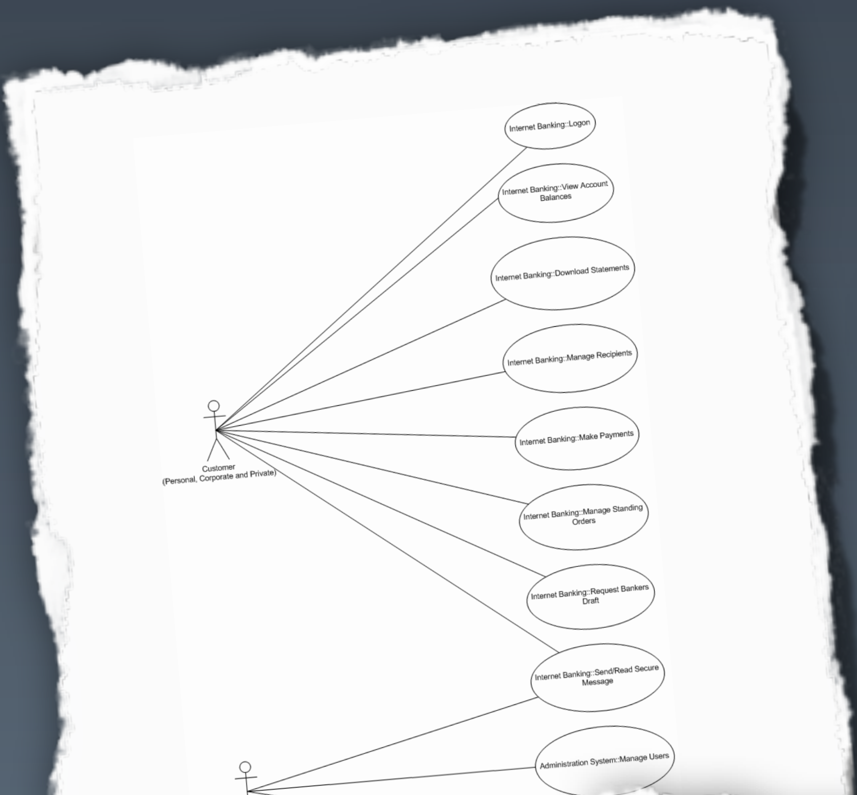
reinvent

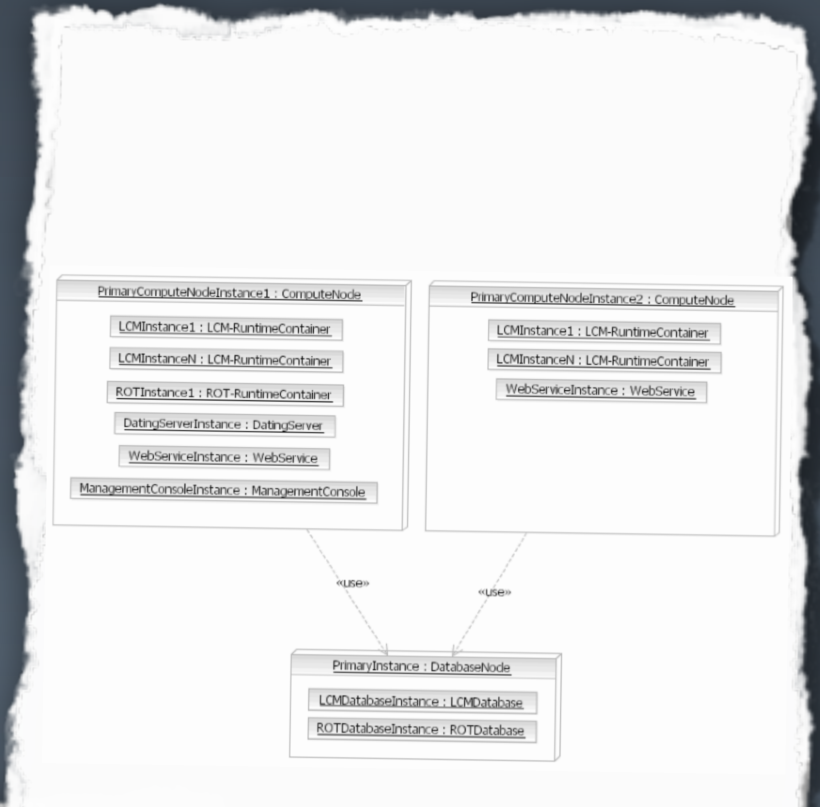
something shiny and new…

Retrospective

Have we forgotten more than we’ve learnt?

UML


Internet Banking::Logon
Internet Banking::View Account Balances
Internet Banking::Download Statements
Internet Banking::Manage Recipients
Internet Banking::Make Payments
Internet Banking::Manage Standing Orders
Internet Banking::Request Bankers Draft
Internet Banking::Send/Read Secure Message
Administration System::Manage Users
Administration
Customer (Personal, Corporate and Private)
Admin User (Call Centre)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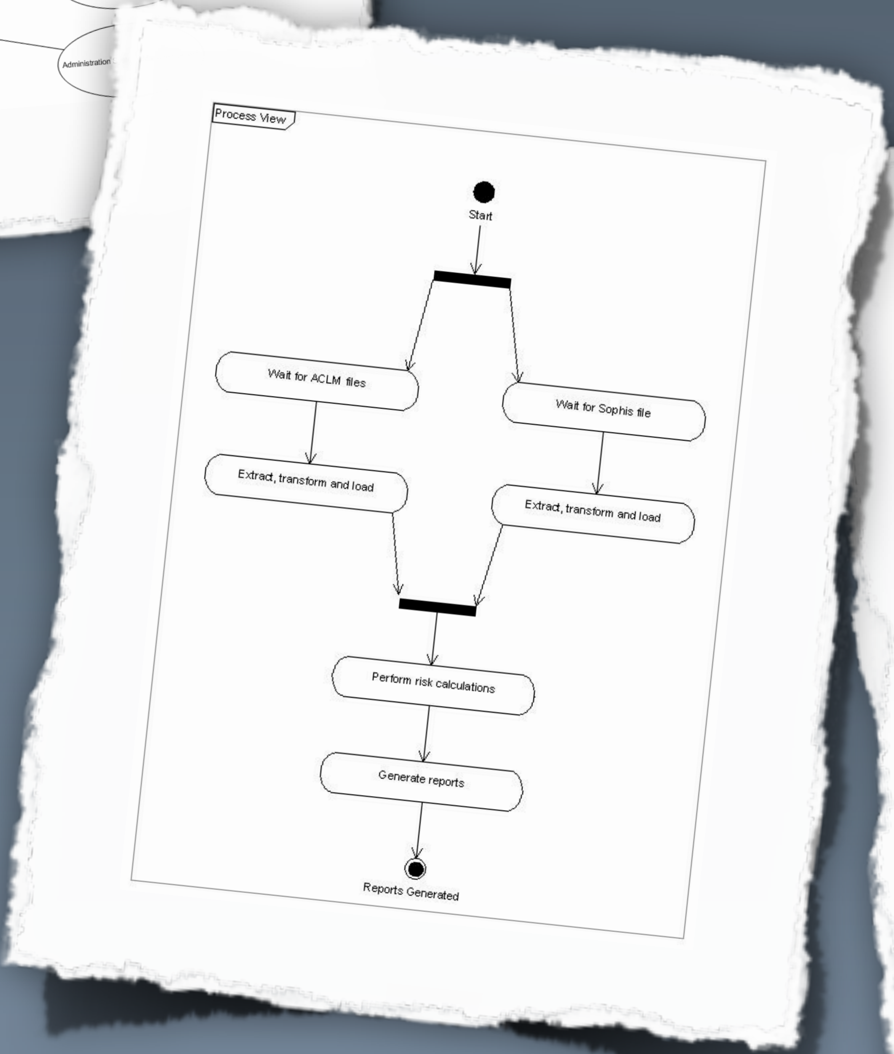
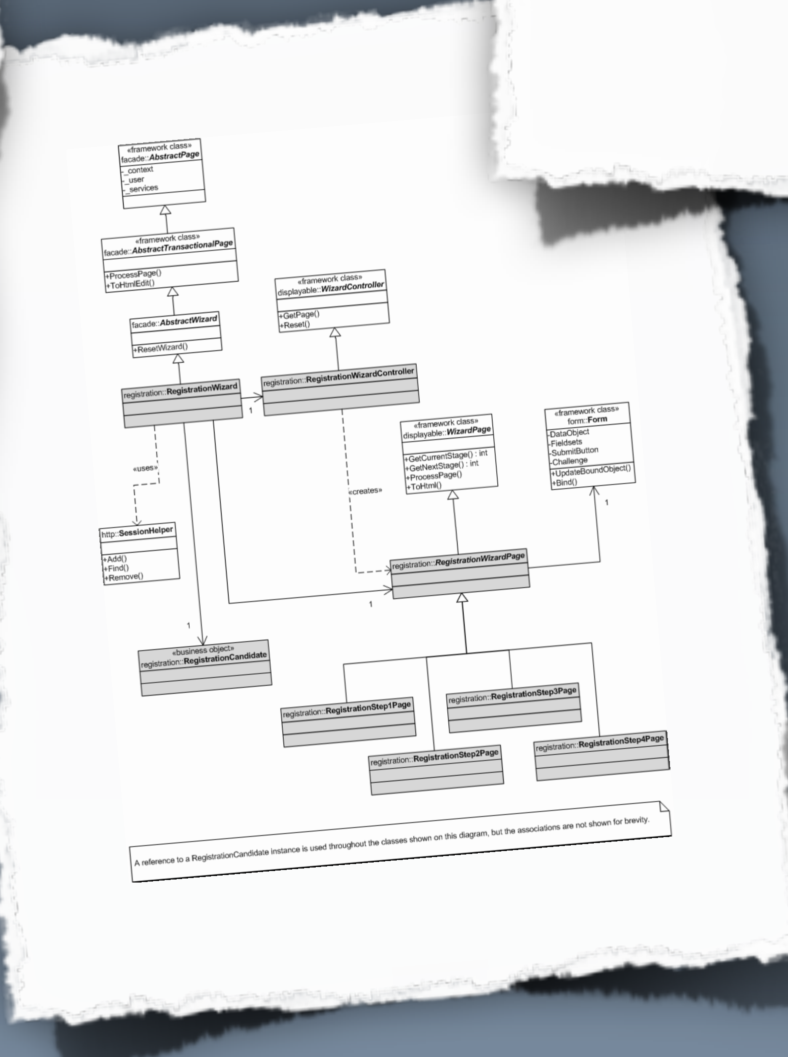
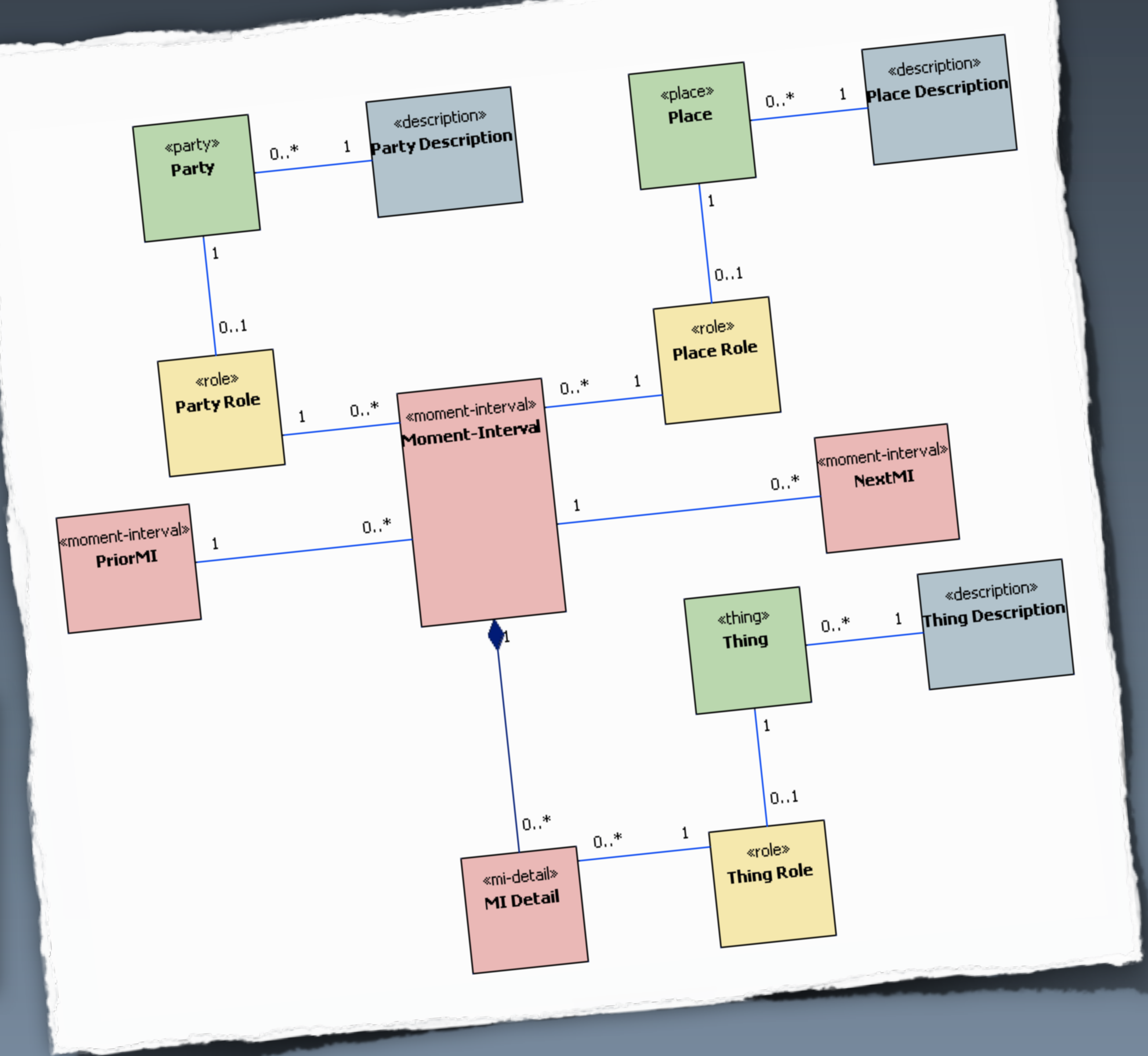
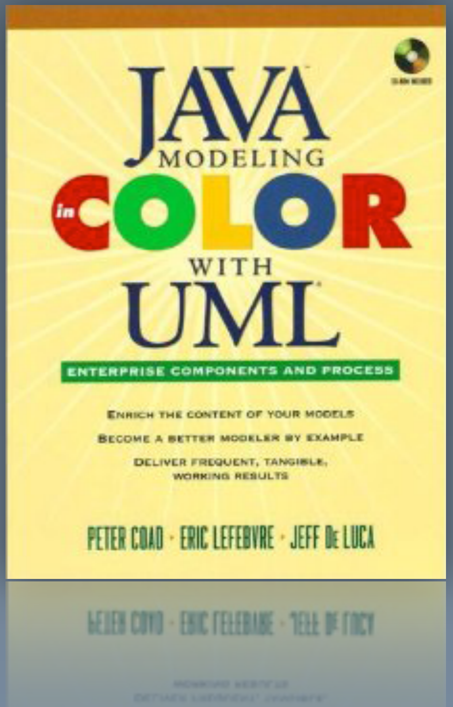
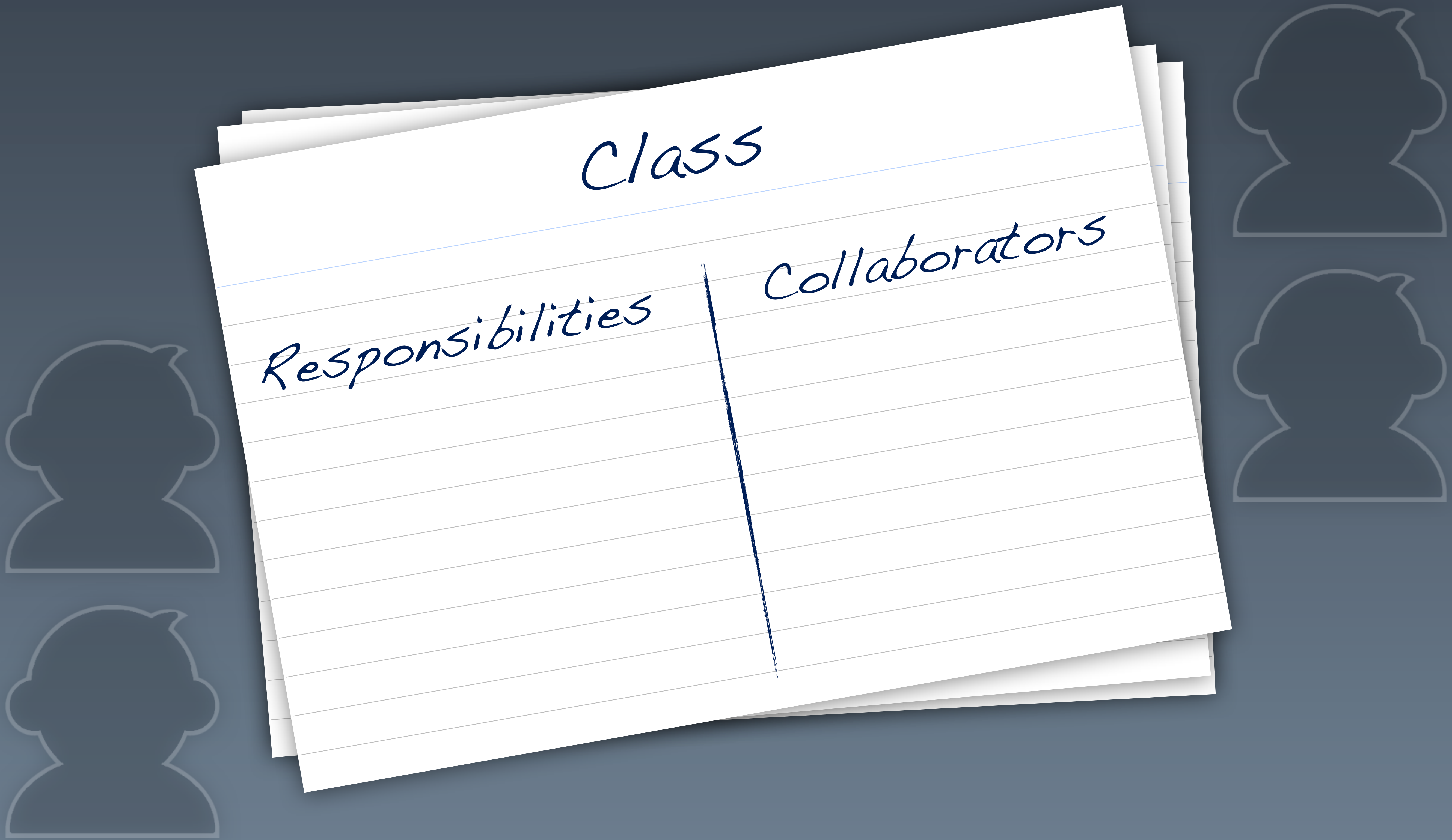



«framework class» facade::AbstractPage
-_context
-_user
-_services
«framework class» facade::AbstractTransactionalPage
+ProcessPage()
+ToHtmlEdit()
facade::AbstractWizard
+ResetWizard()
«framework class» displayable::WizardController
+GetPage()
+Reset()
registration::RegistrationWizard
registration::RegistrationWizardController
1
«uses»
«creates»
«framework class» displayable::WizardPage
+GetCurrentStage() : int
+GetNextStage() : int
+ProcessPage()
+ToHtml()
«framework class» form::Form
-DataObject
-Fieldsets
-SubmitButton
-Challenge
+UpdateBoundObject()
+Bind()
1
http::SessionHelper
+Add()
+Find()
+Remove()
registration::RegistrationWizardPage
1
1
«business object» registration::RegistrationCandidate
registration::RegistrationStep1Page
registration::RegistrationStep3Page
registration::RegistrationStep2Page
registration::RegistrationStep4Page

A reference to a RegistrationCandidate instance is used throughout the classes shown on this diagram, but the associations are not shown for brevity.

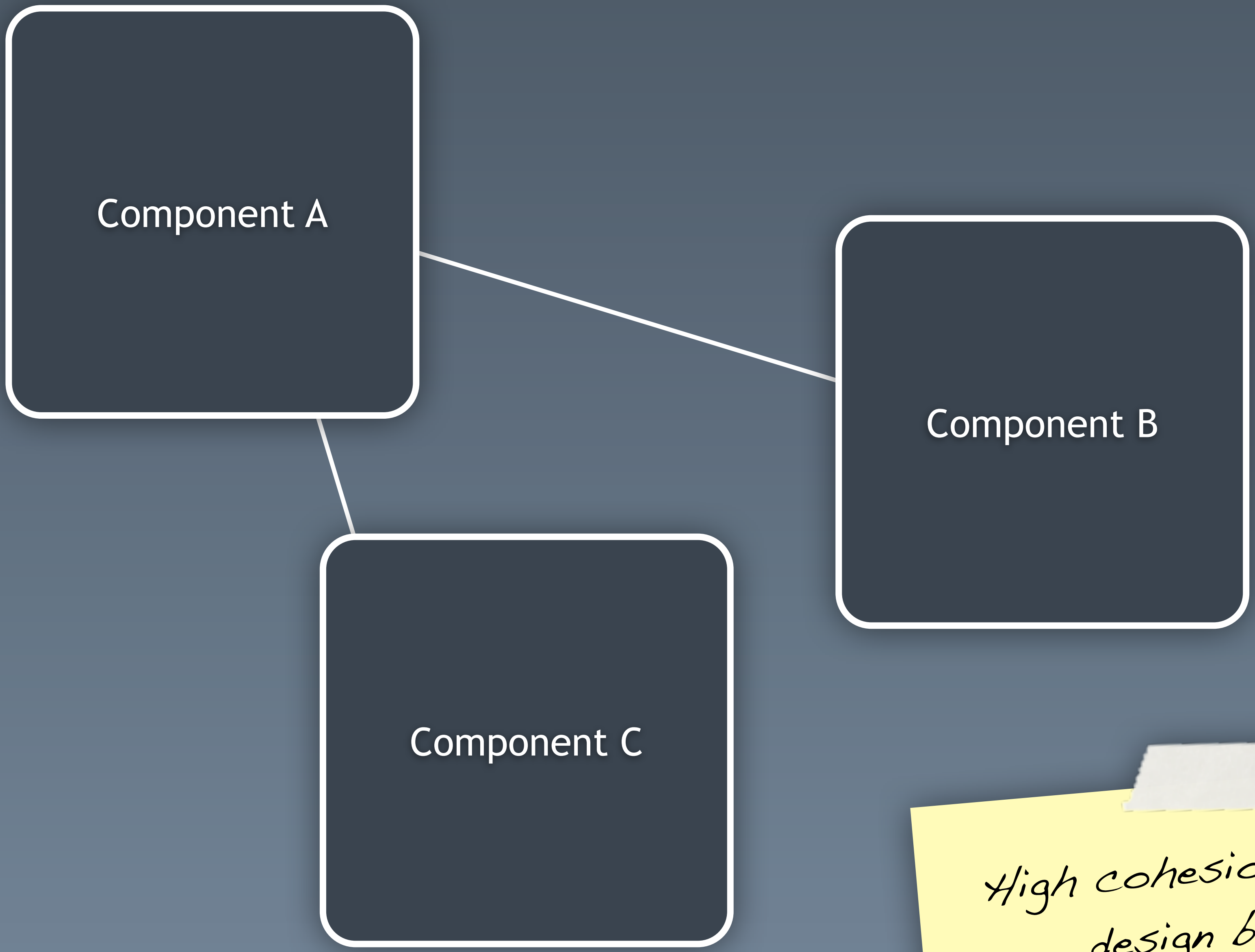

«party»
Party
0..*
1
«description»
Party Description
«place»
Place
0..*
1
«description»
Place Description
1
0..1
1
0..1
«role»
Party Role
«role»
Place Role
1
0..*
«moment-interval»
Moment-Interval
0..*
1
«moment-interval»
NextMI
1
0..*
«moment-interval»
PriorMI
1
0..*
1
«thing»
Thing
0..*
1
«description»
Thing Description
1
0..1
0..*
«mi-detail»
MI Detail
0..*
1
«role»
Thing Role


JAVA
MODELING
in COLOR
WITH
UML
ENTERPRISE COMPONENTS AND PROCESS
Enrich the content of your models
Become a better modeler by example
Deliver frequent, tangible, working results
PETER COAD · ERIC LEFEBVRE · JEFF De LUCA

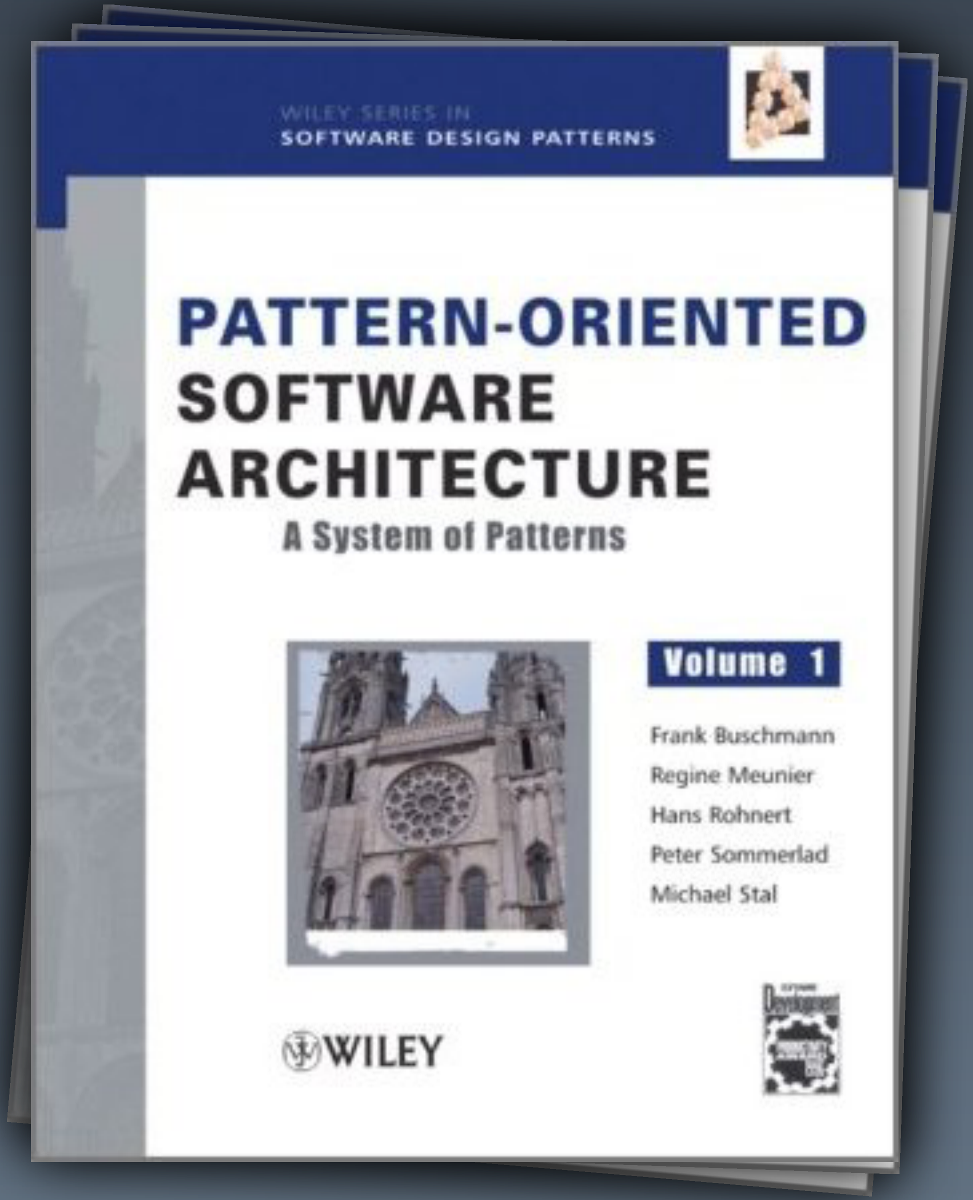


Class-Responsibility-Collaboration

Component-based development



High cohesion, low coupling
design by contract,
Liskov substitution principle



WILEY SERIES IN
SOFTWARE DESIGN PATTERNS

PATTERN-ORIENTED
SOFTWARE
ARCHITECTURE
A System of Patterns

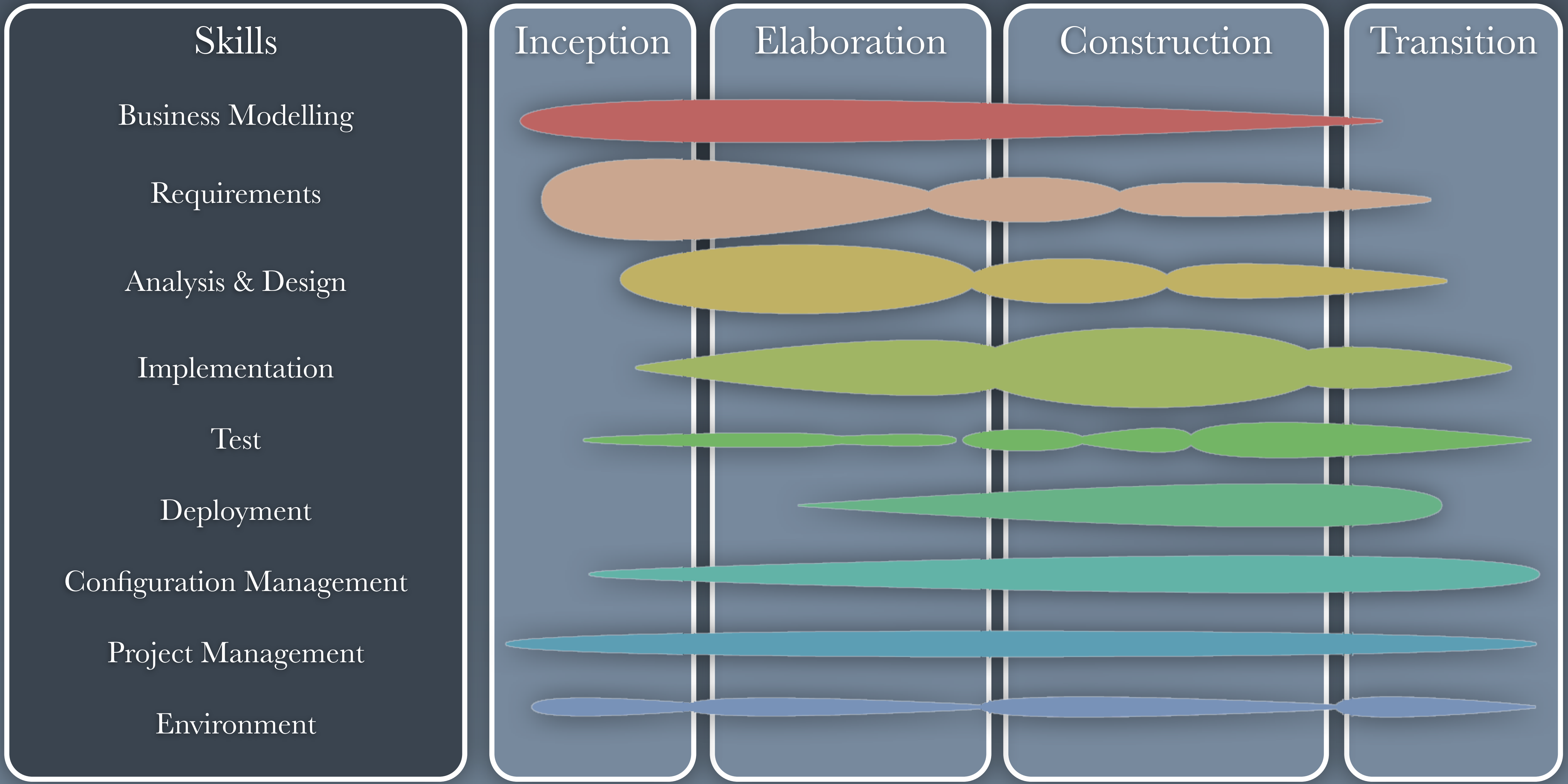
Volume 1

Frank Buschmann
Regine Meunier
Hans Rohnert
Peter Sommerlad
Michael Stal

WILEY

Pattern-Oriented Software Architecture

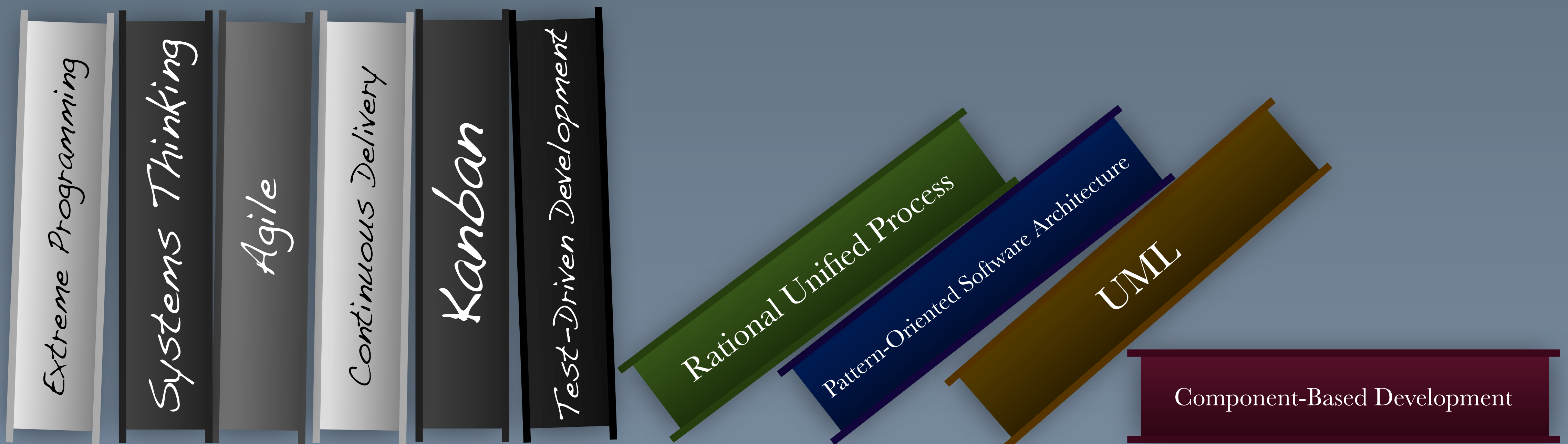
Rational Unified Process (RUP)



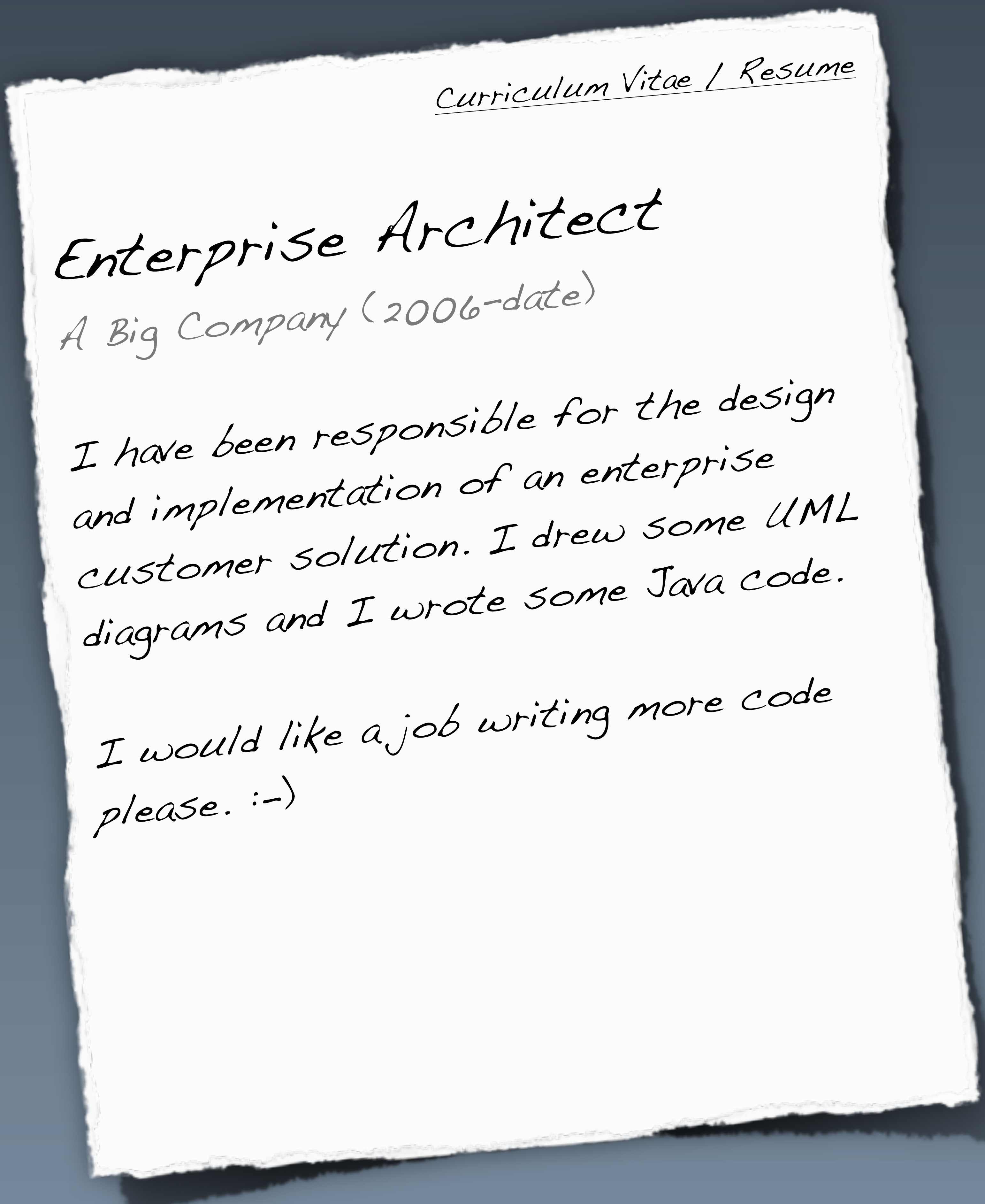
Be **pragmatic**
with this stuff

(if you know it exists, of course)

Who is teaching the classics of the pre-*agile* era?



So you think you're an architect



Curriculum Vitae / Resume

Enterprise Architect

A Big Company (2006-date)

I have been responsible for the design and implementation of an enterprise customer solution. I drew some UML diagrams and I wrote some Java code.

I would like a job writing more code please. :-)

Err, no; you're a software architect who just happens to work in a large organisation

(in fact, you're barely a "software architect" either)

Software development is not a

relay sport

Software
Architecture
Document

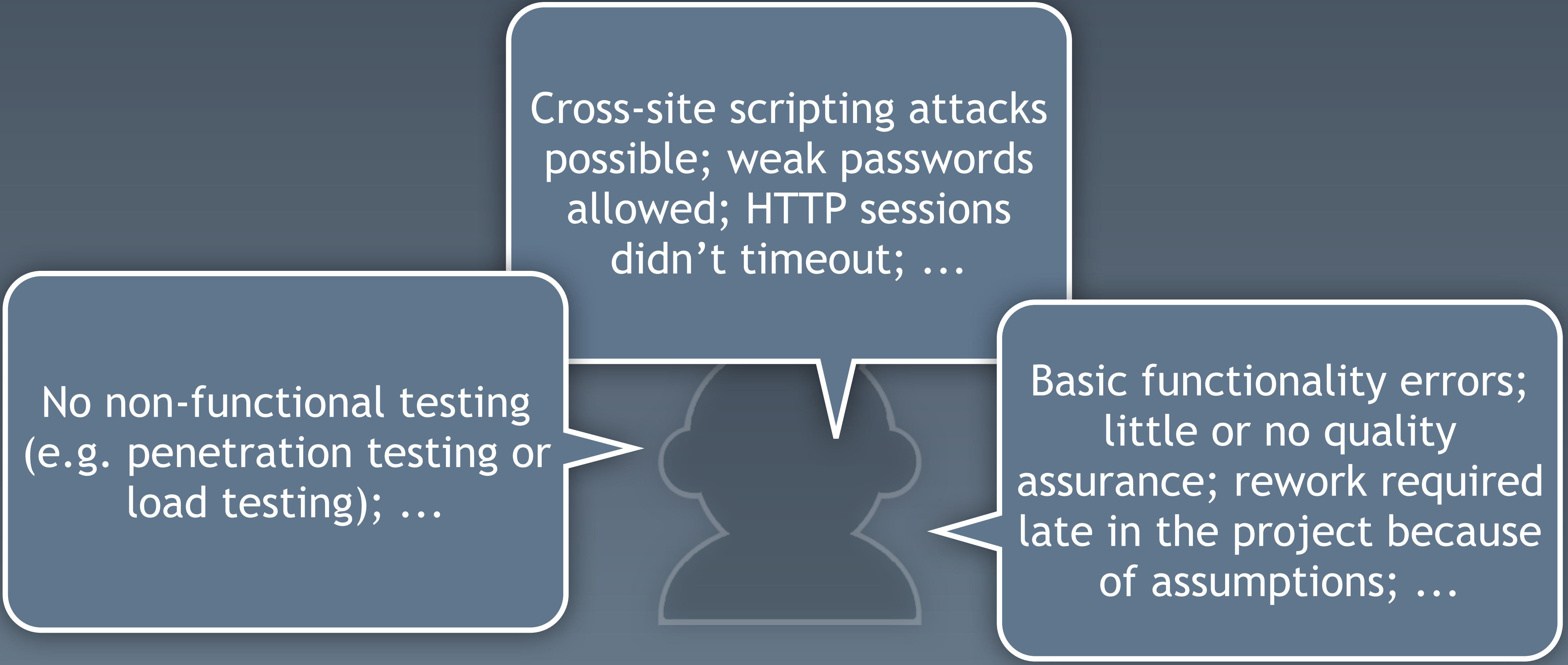
Successful software delivery

is **not** an

implementation

detail!

The irresponsible architect



Cross-site scripting attacks possible; weak passwords allowed; HTTP sessions didn’t timeout; …

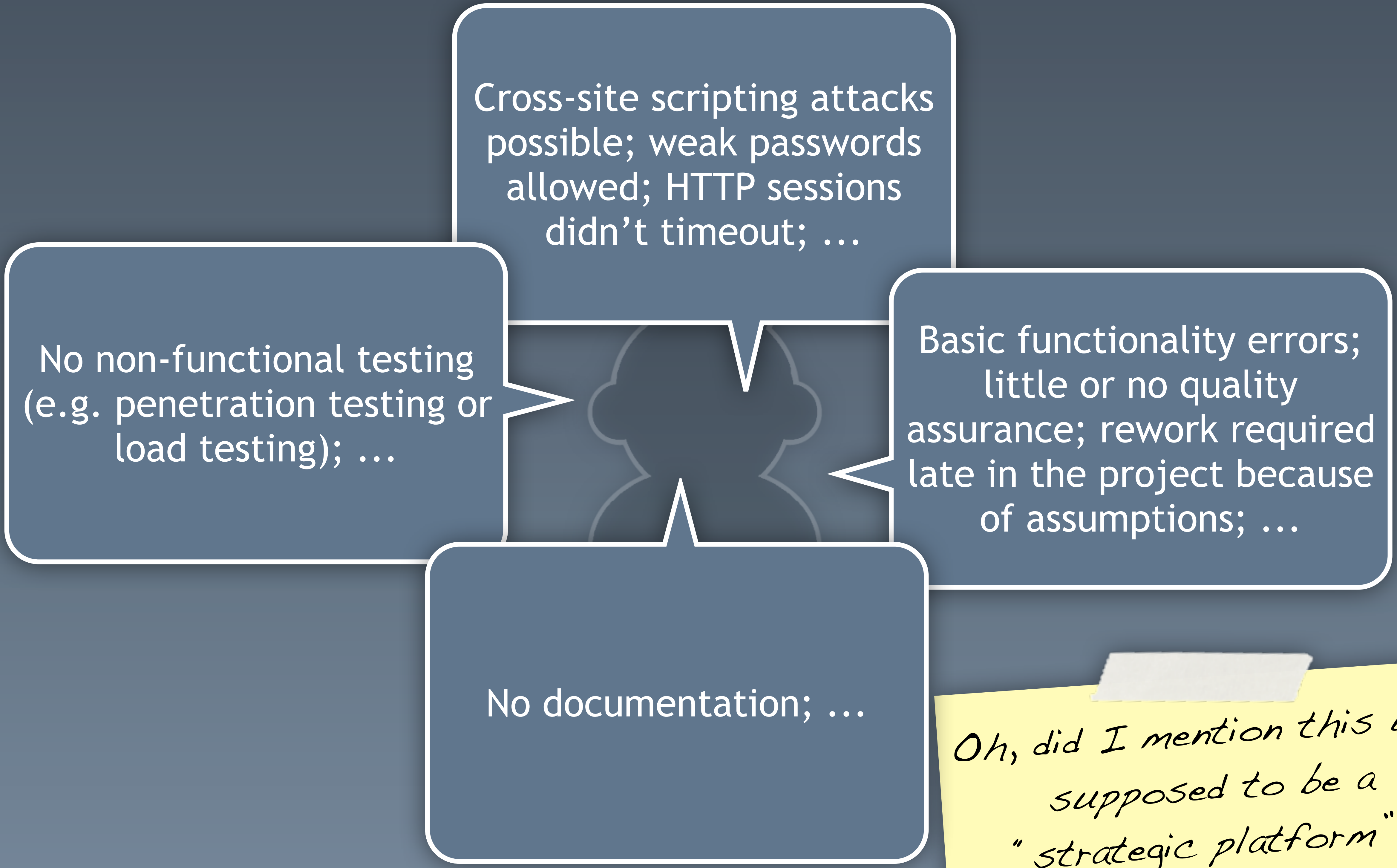
No non-functional testing (e.g. penetration testing or load testing); …

Basic functionality errors; little or no quality assurance; rework required late in the project because of assumptions; …

«interface» RuntimeContainerMBean
start ( )
stop ( )
isRunning ( )
getName ( )
shutdown ( )
getStartedDate ( )
getVersion ( )
getTotalMemory ( )
getFreeMemory ( )
getMaxMemory ( )
RuntimeContainer
runtimecontainer
«interface» RuntimeComponentMBean
start ( )
stop ( )
getName ( )
getInstance ( )
Sophis
ACLM
Trade details
Static data
Risk Monitoring System (Java/Apache Tomcat)
Poller
Orchestrator
Counterparty File Processor
Limit File Processor
Link File Processor
Trade Details File Processor
Static Data Service
Trade Details Service
Calculation Service
Exception Service
Report Service
Risk Factor Service
User Interface
Maintenance requests/res and Reports
Maintenance GUI and Reports (Web Browser)
Database (Sybase)
Customers (Web Browser)
HTTPS
ISA Server (Microsoft Windows Server 2003)
Brand 1
Brand 2
Brand 3
Brand 4
Web Tier/Presentation Logic (ib.web.lib)
Internet Information Services (IIS)
Web Tier (Microsoft Windows Server 2003)
SOAP/HTTPS
Internal Us
Middle-tier Services (ib.middletier)
Administ (ib.admini
Globus Services (ib.middletier.globus.lib)
Authentication and Audit Services (ib.middletier.authentication.lib)
Secure Messaging Services (ib.middletier.messaging.lib)
Internet Information Services (IIS)
Temenos Application Gateway
Middle Tier (Microsoft Windows Server 2003)
OFS/Telnet
Banking/Business Data
Globus Server (UNIX)
Web User Data
Audit Logs
Secure Messages
Site Commentary
Funds Data (from Cutas)
Scheduled Services (e.g. letter generation) (ib.middletier.scheduler)
SQL Server 2005
Database Tier (Microsoft Windows Server 2003)
4. Reset Results Notification
Early Termination Notification
Maturity Notification
5. Extend Window Request
3. Reset Results
Trade Event Schedule
LCM
Trade Event Schedule Message Handler
IRisk Results Message Handler
LCM Database
Event Batcher
FRO Observation Notification Message Handler
Batch Poller and Batch Handler
FRO Configuration Notification Message Handler
LCM Web Services
Problem Poller
LCM/ROT Management Console
2. Reset Request
MindAlign
12. Problem summary
14. Errors and warnings
Micromuse
ROT
ROT Database
ROT Web Services
Observation Dating Poller
ROT Replay Service
Reuters Datafeed Adapter
7. FRO Observation Notifications
8. FRO Configuration Notifications
Holiday information
Dating Server
Replay Request
s/responses
Easynet/LVL3 1Gbps Internet connections
Easynet/LVL3 1G Internet connecti
Cisco 3750
Packet Shaper
Cisco CSS
FW By-pass
FW1
FW2
F5 BIG-IP
3750 Stackwise
Blue Coat Proxy Appliances
Origin servers (Web, Application, Database, etc)
Content Delivery Infrastructure

Foolishly **hoping** for the best?

The irresponsible architect



Cross-site scripting attacks possible; weak passwords allowed; HTTP sessions didn’t timeout; …

No non-functional testing (e.g. penetration testing or load testing); …

Basic functionality errors; little or no quality assurance; rework required late in the project because of assumptions; …

No documentation; …

Oh, did I mention this was supposed to be a "strategic platform"?

Context
What is this all about?

Functional View
What does the system do?

Process View
Does the system implement business processes?

Non-functional View
Are there any significant non-functional requirements influencing the architecture?

Architectural Constraints
Are there any constraints influencing the architecture?

Architectural Principles
Are there any principles influencing the architecture?

Logical View
What does the big picture look like and how is the system structured?

Interface View
Are there internal or external system interfaces?

Design View
Is it clear how system components should be implemented?

Infrastructure View
What does the target deployment environment look like?

Deployment View
How will the system components be deployed onto the target infrastructure?

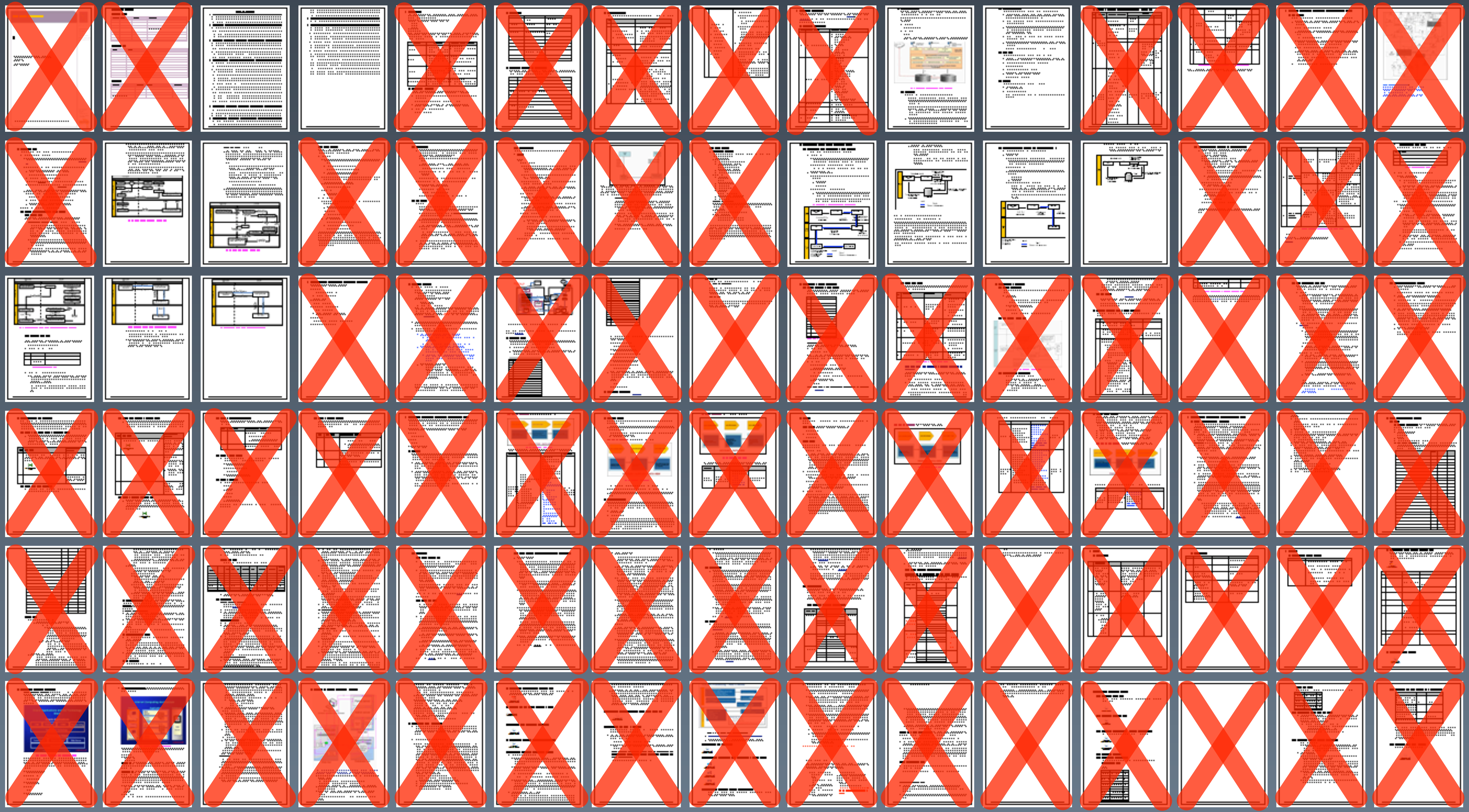
Operational View
How will people operate and support the system?

Security View
How is security handled across all tiers?

Data View
How is data managed, archived, backed-up, etc?

Technology Selection
What led to the selection of the technologies in use?

Architecture Justification
Does the chosen architecture “work”?



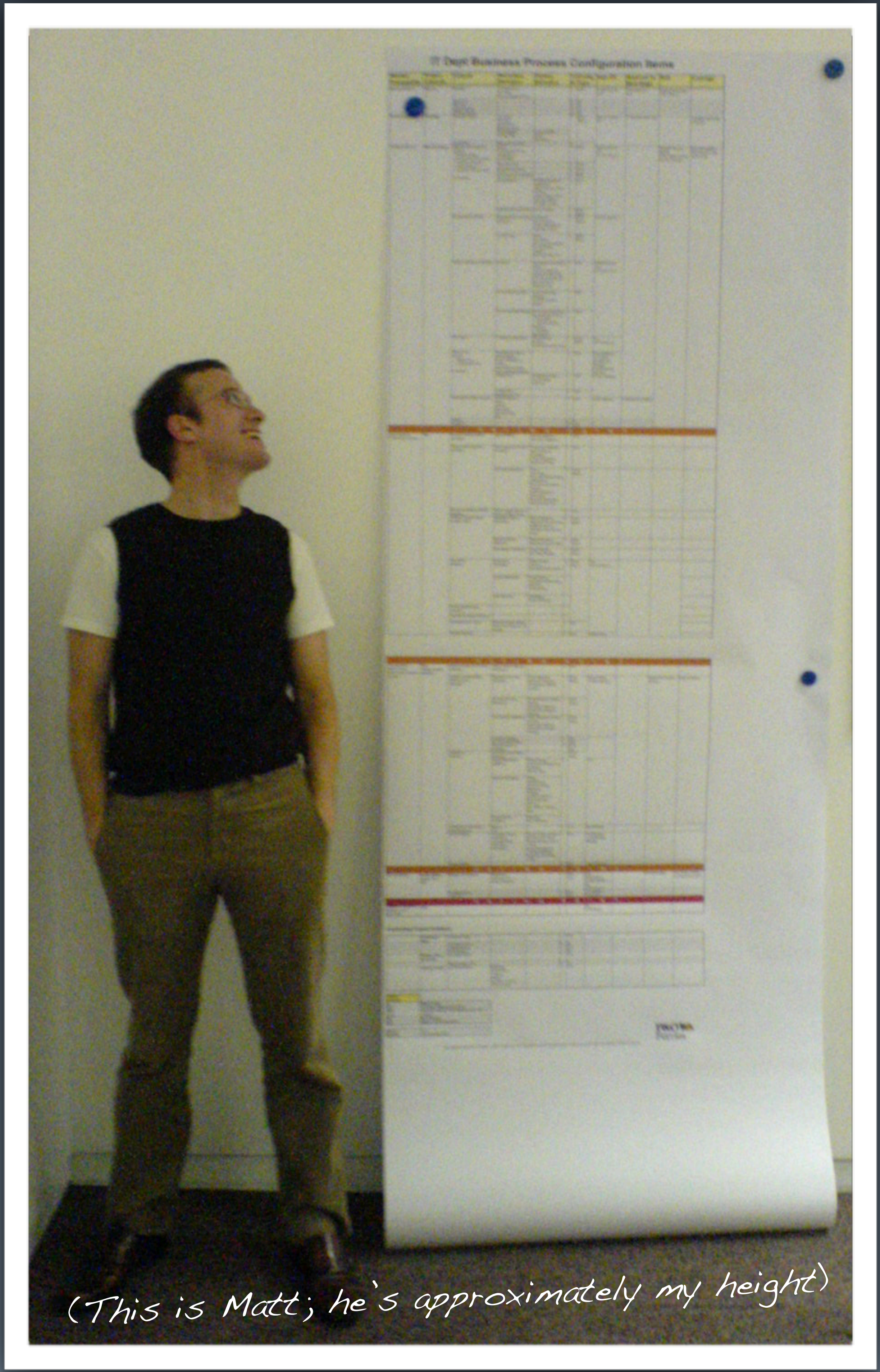
Author or architect?

coding
{the}
architecture

#win

Project Managing
{the}
architecture

#fail



(This is Matt; he's approximately my height)

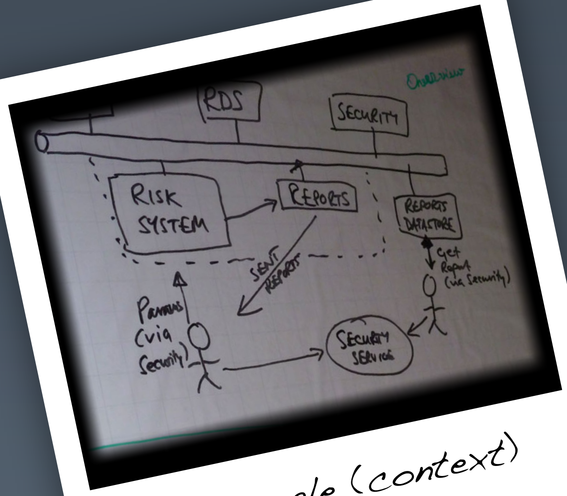
Technical Project Managers

tend to focus more on

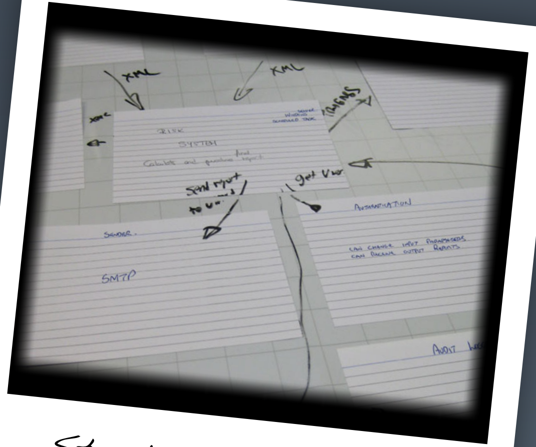
project management

than technology

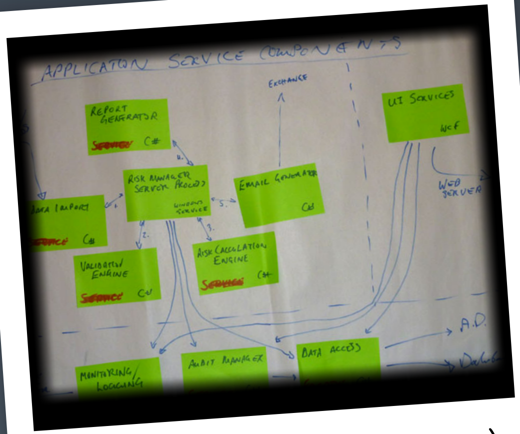
Serenity



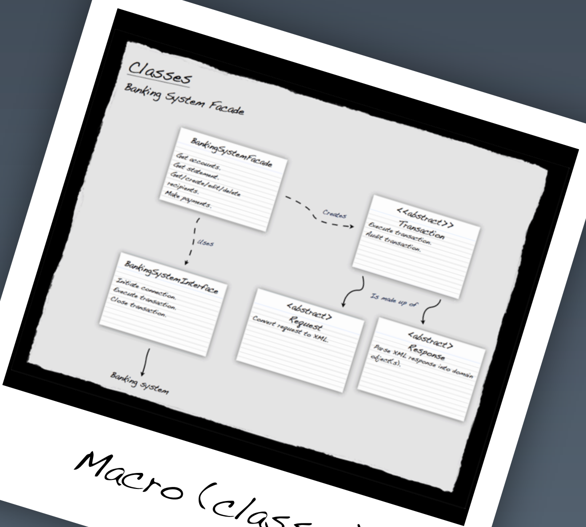
Wide angle (context)



Standard (containers)



Telephoto (components)

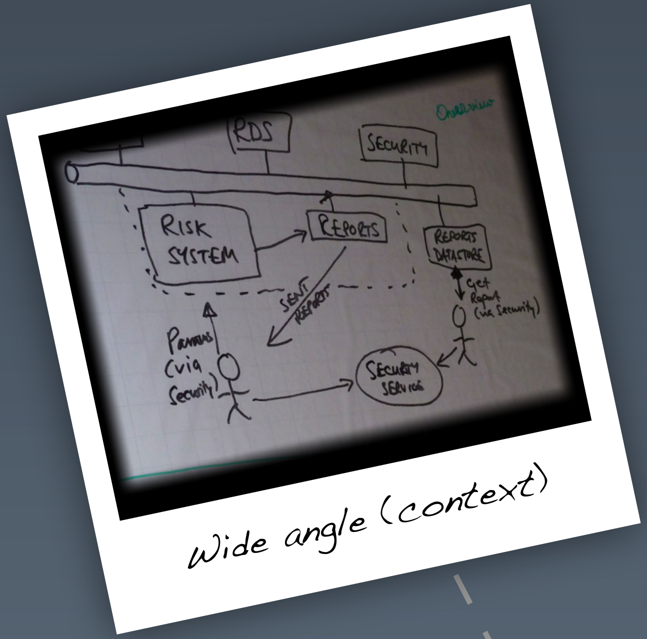


Macro (classes)

Abstract

Specific

As developers, the code is usually our main focus



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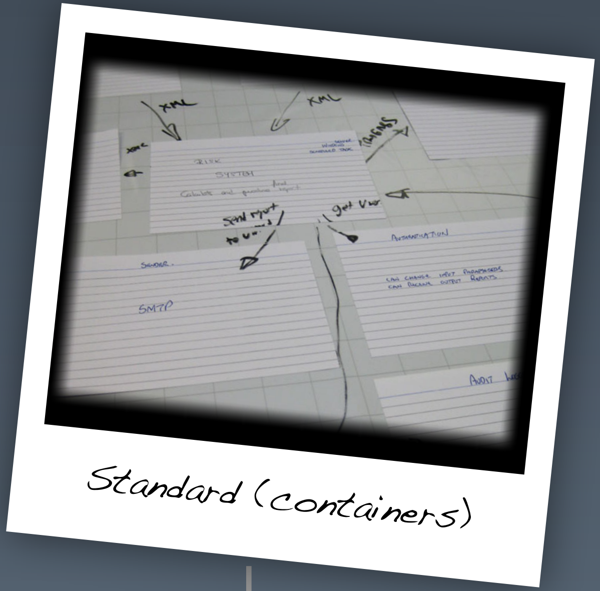

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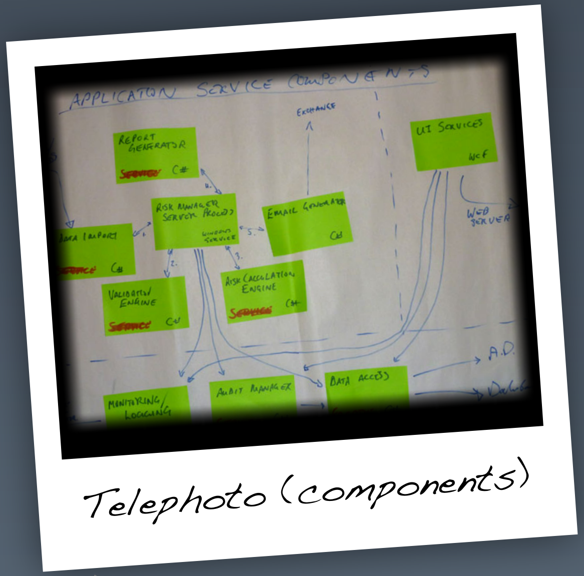

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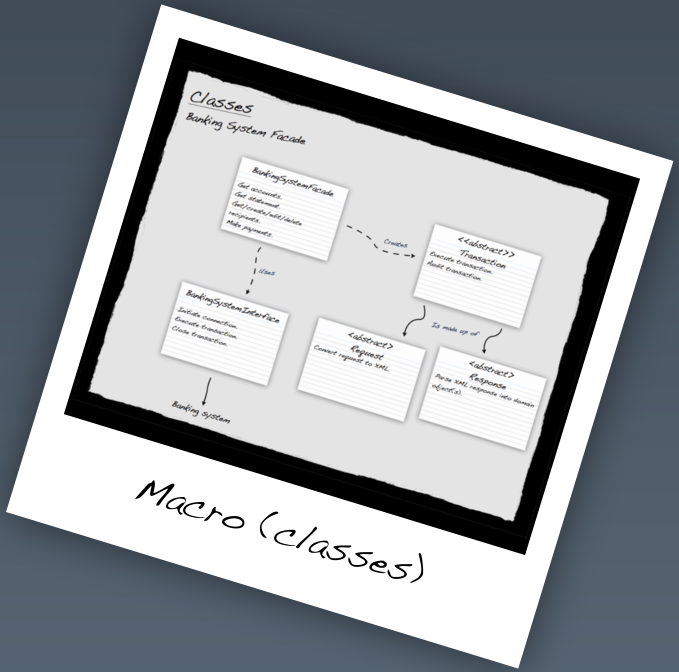
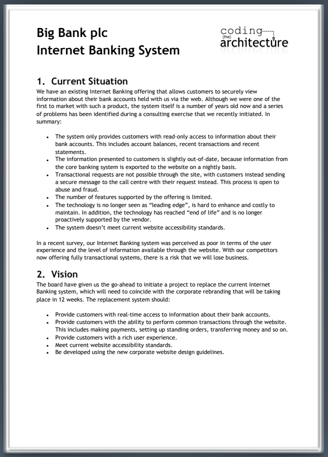


Macro (classes)

Abstract

Specific

Sometimes you need to
step back from your IDE



Big Bank plc
Internet Banking System

coding {the} architecture

1. Current Situation

We have an existing Internet Banking offering that allows customers to securely view information about their bank accounts held with us via the web. Although we were one of the first to market with such a product, the system itself is a number of years old now and a series of problems has been identified during a consulting exercise that we recently initiated. In summary:

- The system only provides customers with read-only access to information about their bank accounts. This includes account balances, recent transactions and recent statements.
- The information presented to customers is slightly out-of-date, because information from the core banking system is exported to the website on a nightly basis.
- Transactional requests are not possible through the site, with customers instead sending a secure message to the call centre with their request instead. This process is open to abuse and fraud.
- The number of features supported by the offering is limited.
- The technology is no longer seen as “leading edge”, is hard to enhance and costly to maintain. In addition, the technology has reached “end of life” and is no longer proactively supported by the vendor.
- The system doesn’t meet current website accessibility standards.

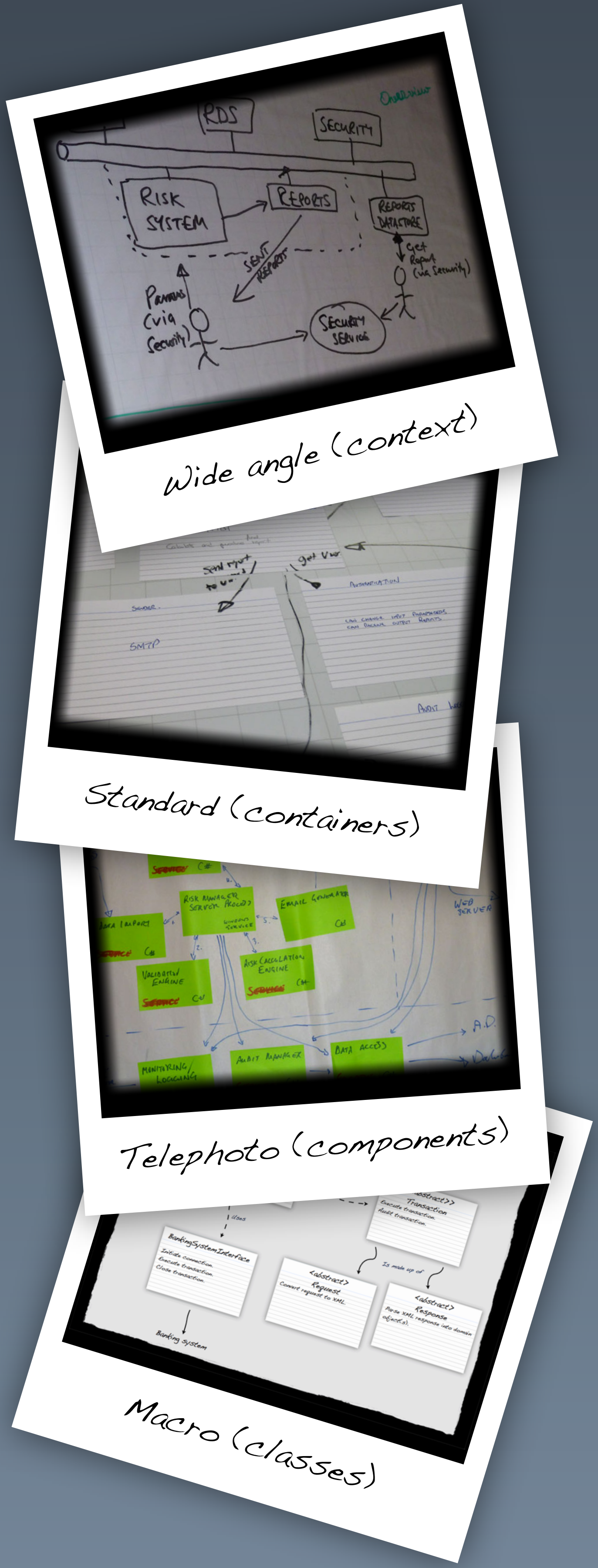
In a recent survey, our Internet Banking system was perceived as poor in terms of the user experience and the level of information available through the website. With our competitors now offering fully transactional systems, there is a risk that we will lose business.

2. Vision

The board have given us the go-ahead to initiate a project to replace the current Internet Banking system, which will need to coincide with the corporate rebranding that will be taking place in 12 weeks. The replacement system should:

- Provide customers with real-time access to information about their bank accounts.
- Provide customers with the ability to perform common transactions through the website. This includes making payments, setting up standing orders, transferring money and so on.
- Provide customers with a rich user experience.
- Meet current website accessibility standards.
- Be developed using the new corporate website design guidelines.

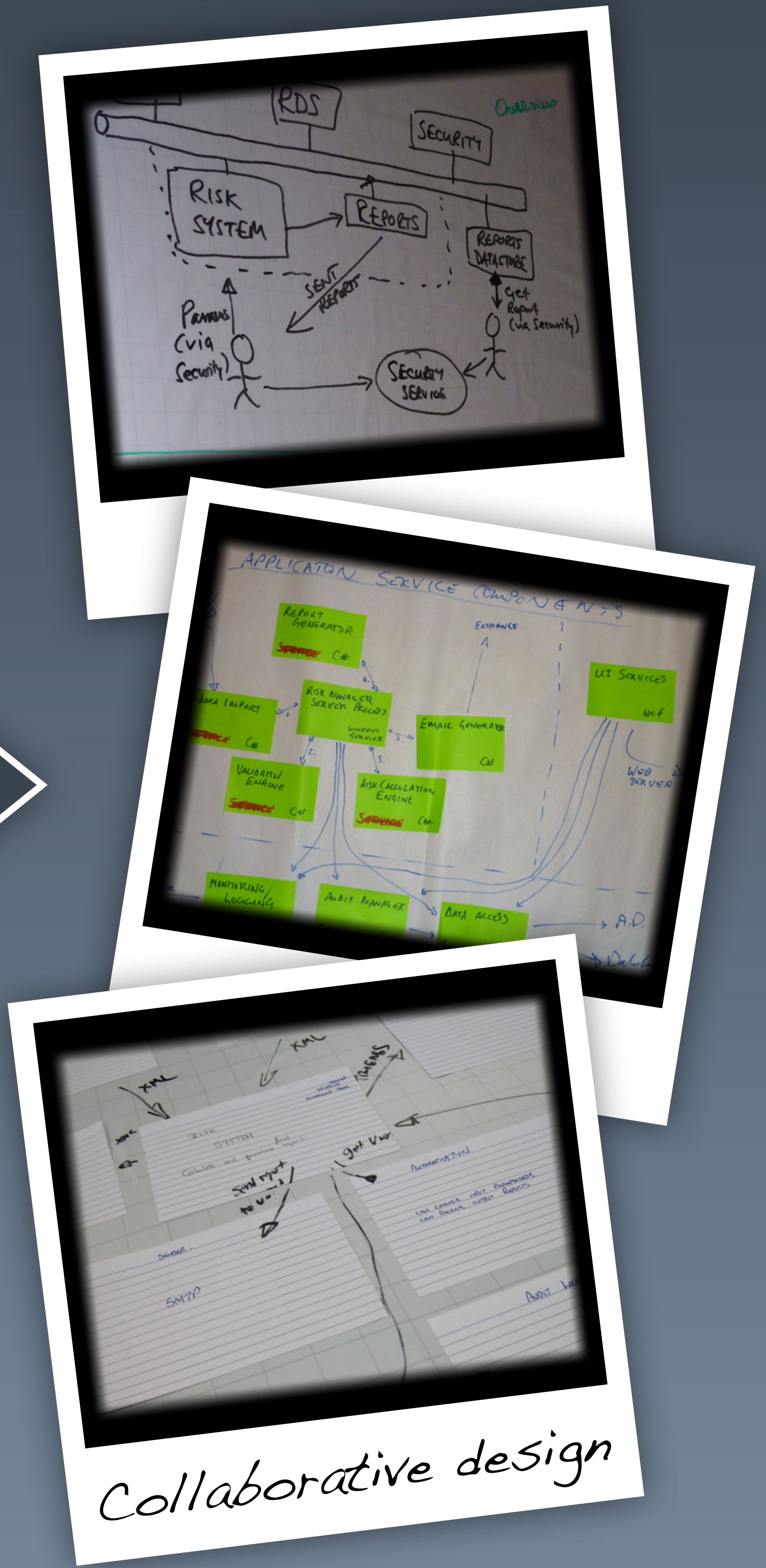
Options



Functional & non-functional requirements

Constraints

Principles



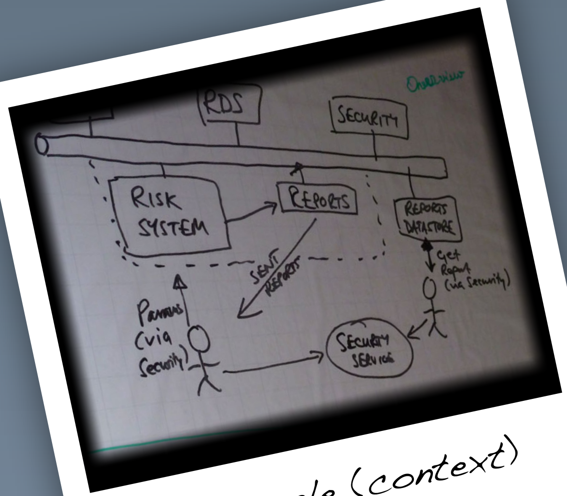
Collaborative design

Effective sketches

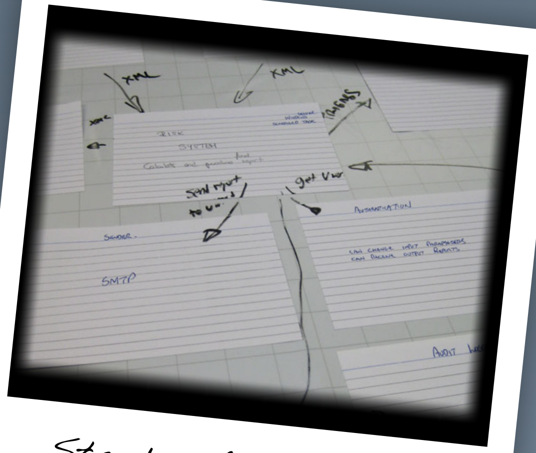
are an excellent way to

collaborate

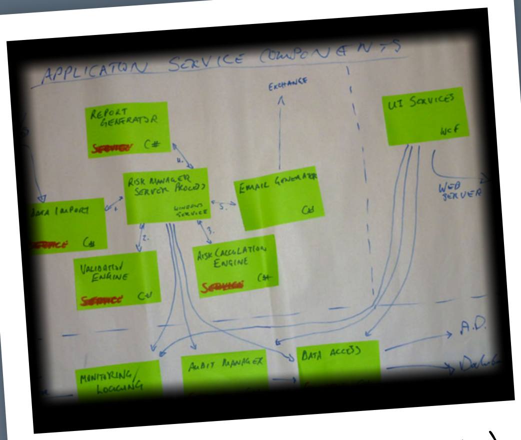
on software architecture



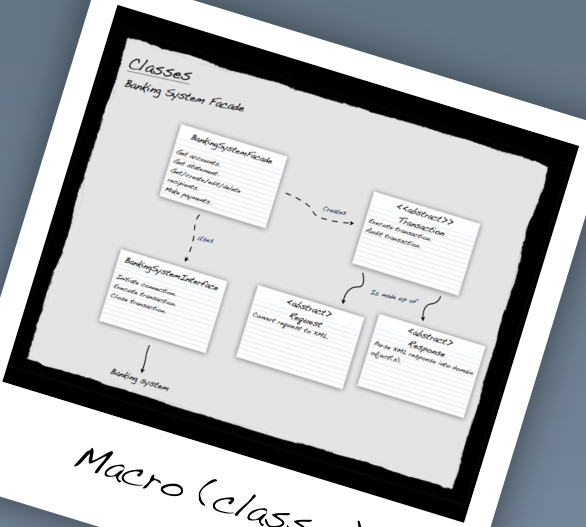
Wide angle (context)



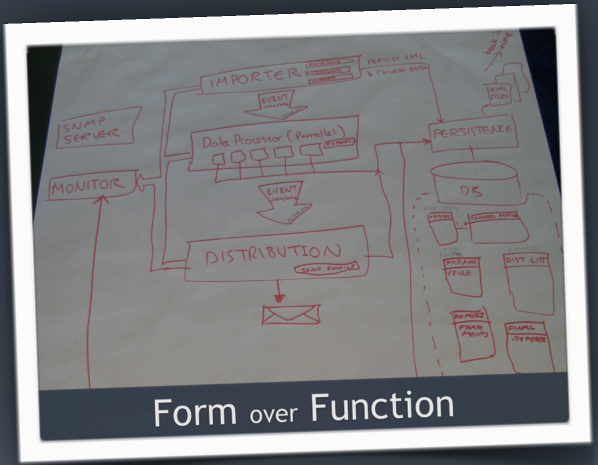
Standard (containers)



Telephoto (components)



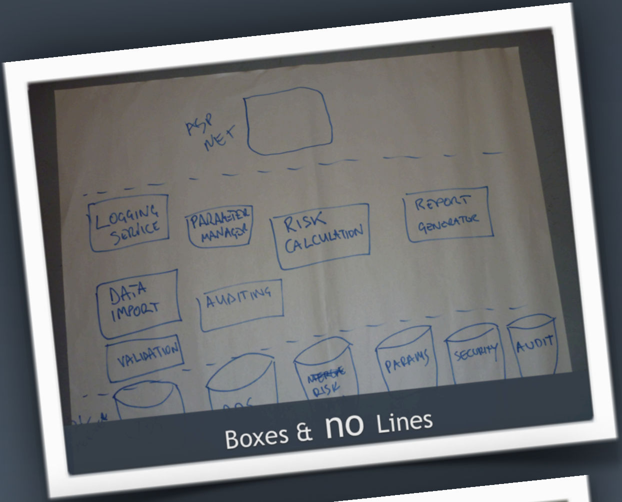
Macro (classes)



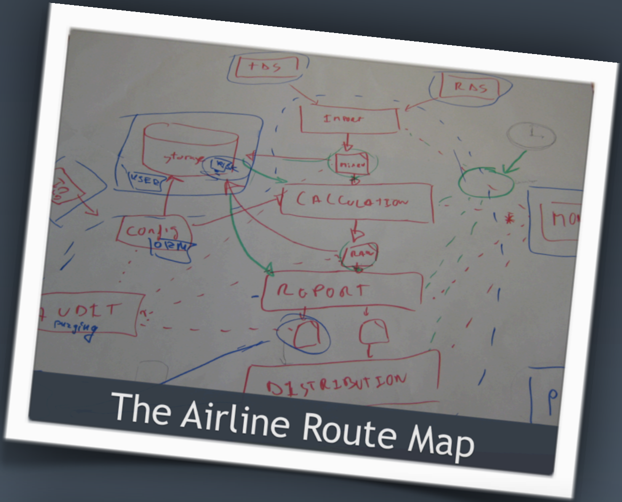
Form over Function

UNIX BOX
WINDOWS BOX
RS
TRANSPORT + LOGIC
JBOSS INSTANCE
ERROR
MS SQL SERVER
MS REPORTING SERVICE

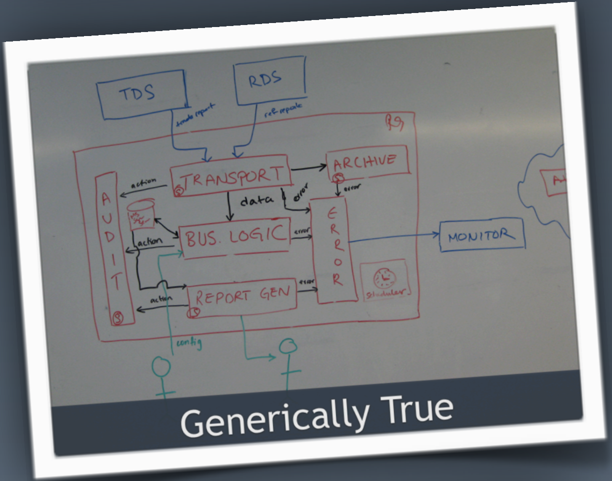
The Shopping List



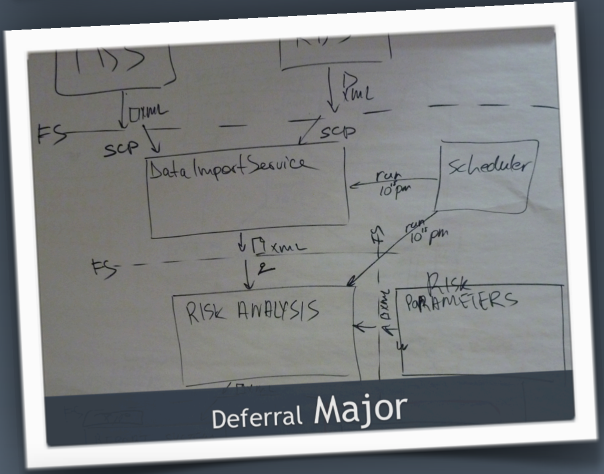
Boxes & no Lines



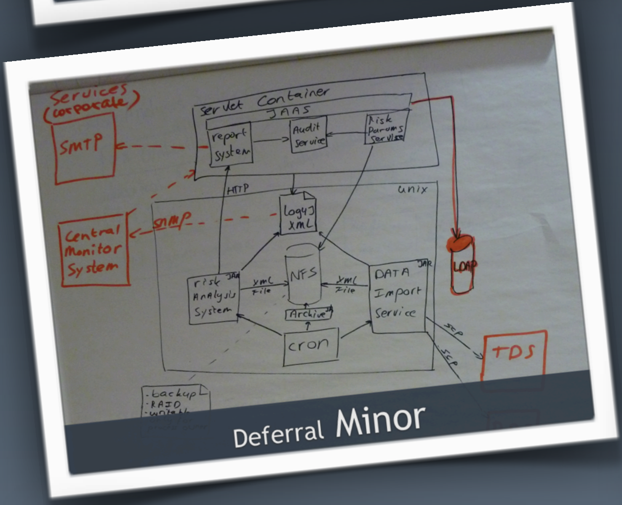
The Airline Route Map



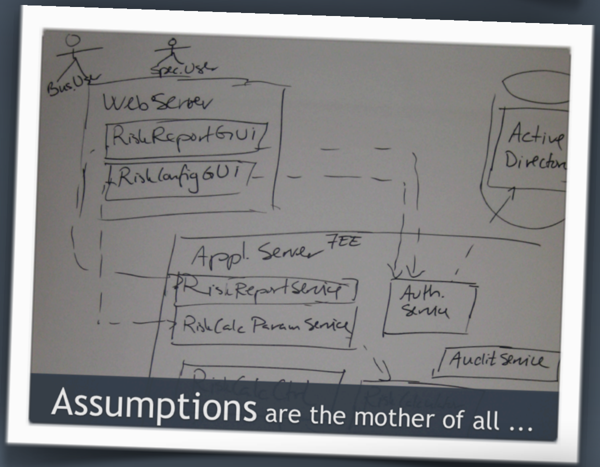
Generically True



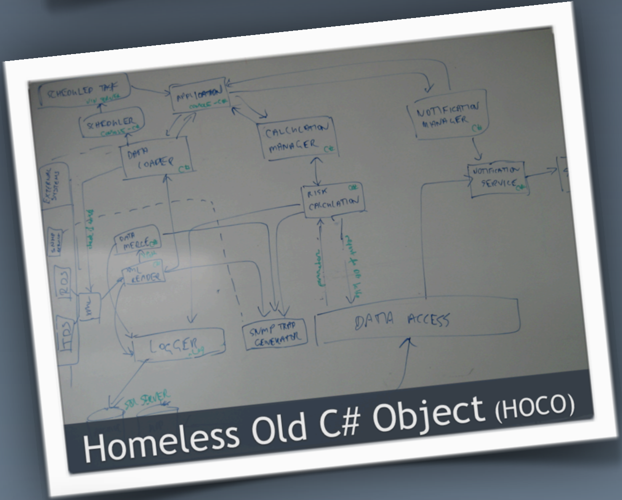
Deferral Major



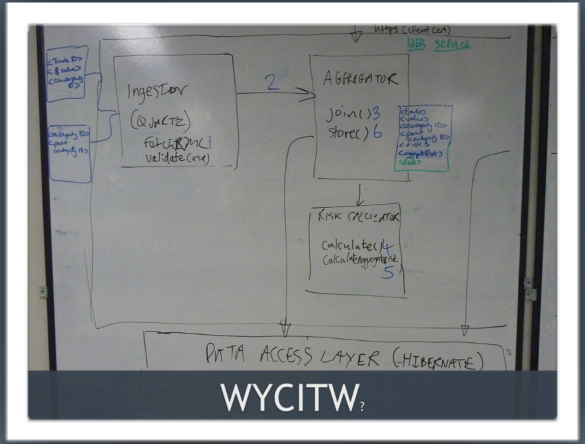
Deferral Minor



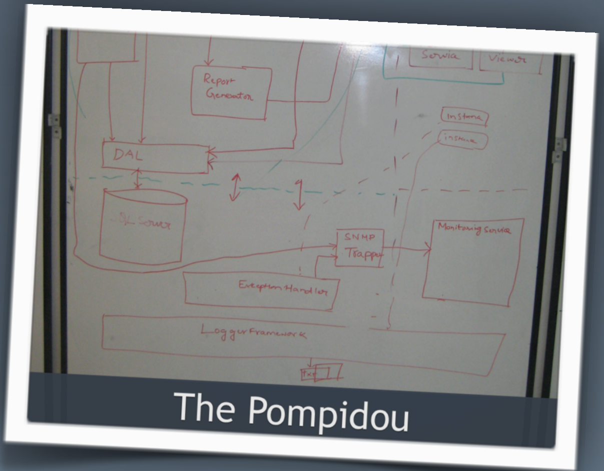
Assumptions are the mother of all …



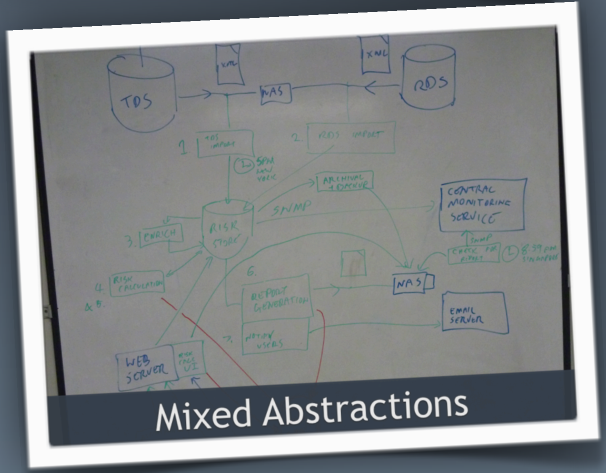
Homeless Old C# Object (HOCO)



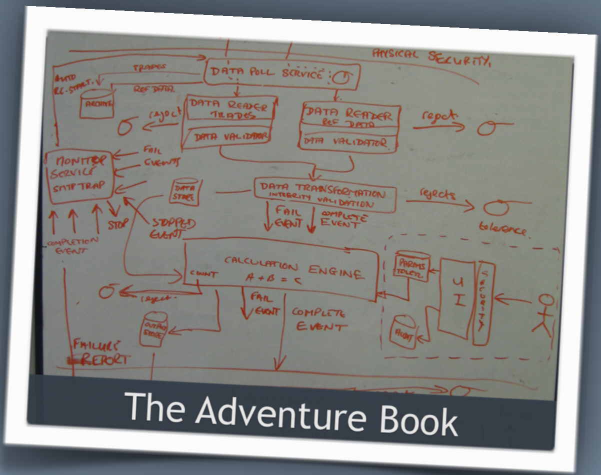
WYCITW



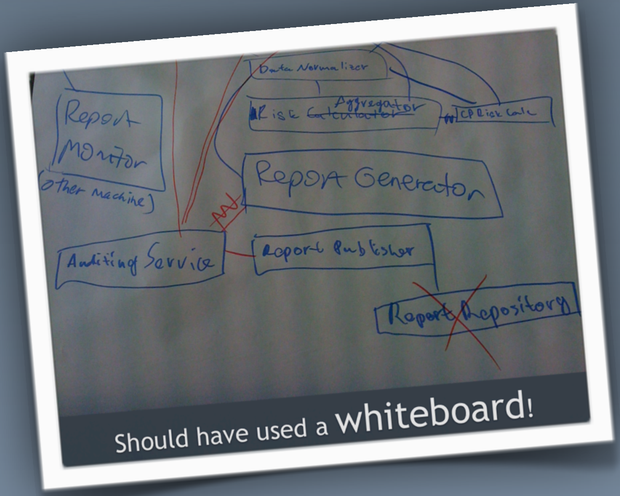
The Pompidou



Mixed Abstractions



The Adventure Book



Should have used a whiteboard!

Drawing diagrams

doesn't make you an

architect

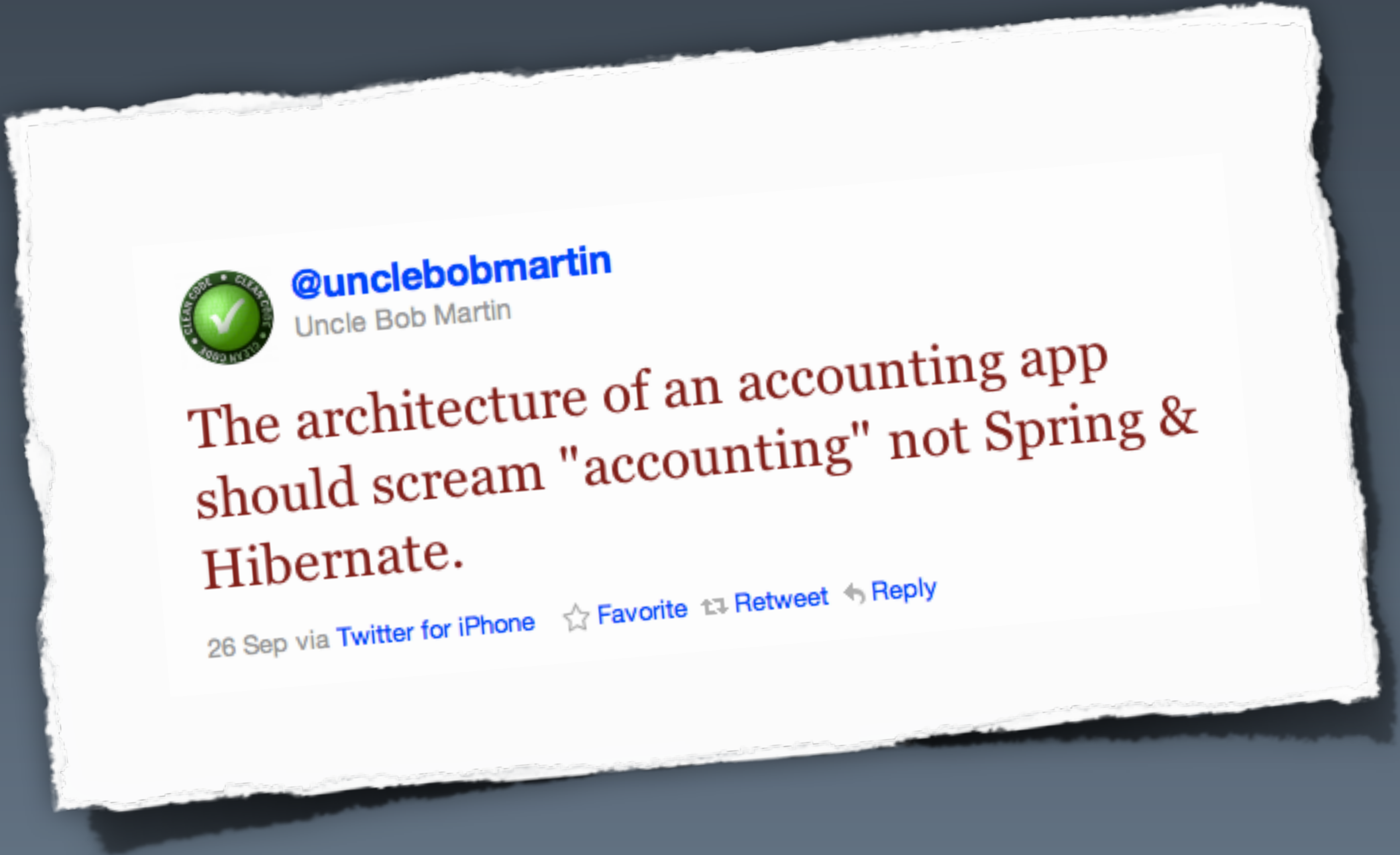
Would you

code

it that way?

This is why

software architects must be able to code!



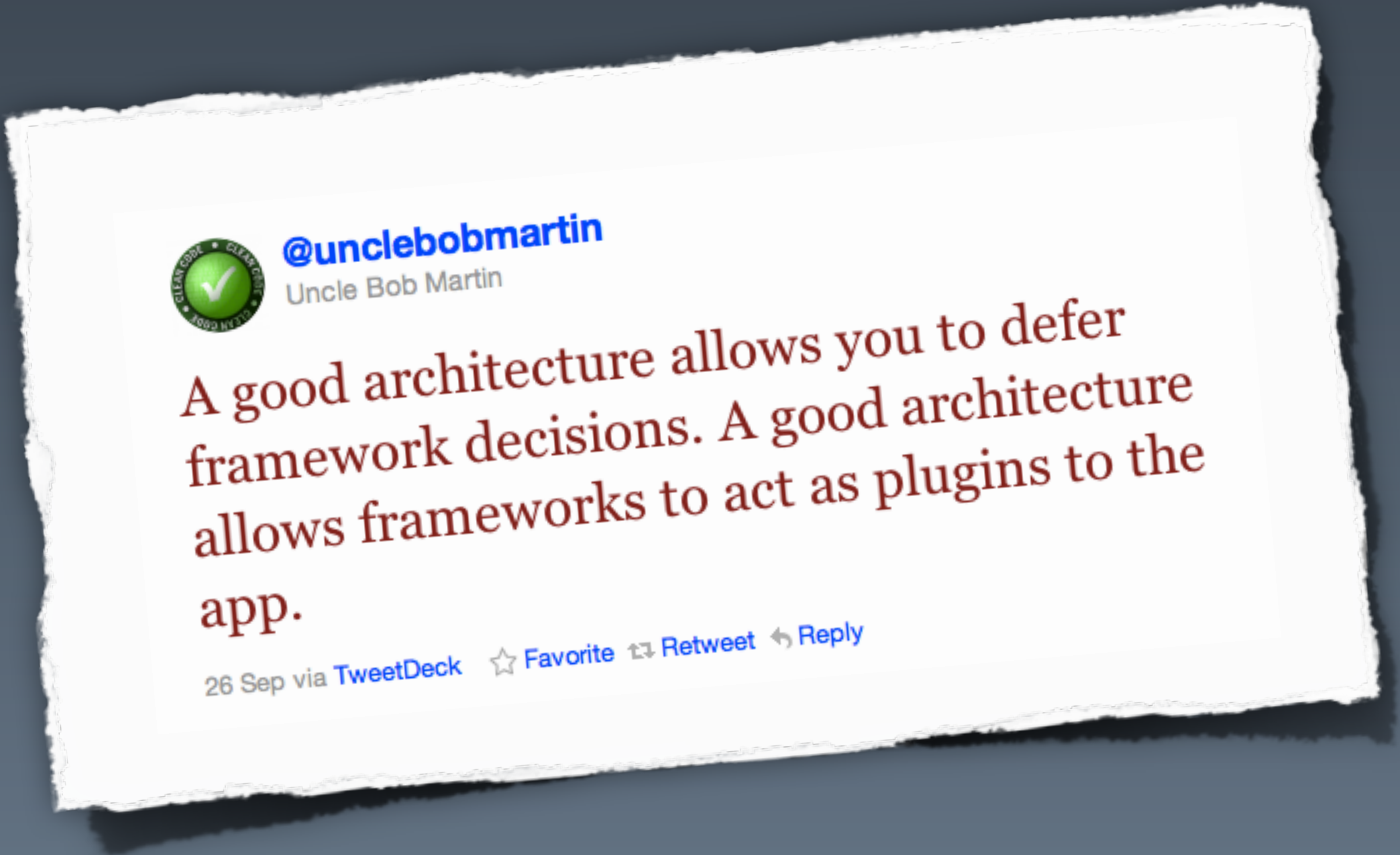
@unclebobmartin
Uncle Bob Martin

The architecture of an accounting app should scream "accounting" not Spring & Hibernate.

26 Sep via Twitter for iPhone

Or preferably **both**; I like software architectures to be grounded in reality

(and that includes technology choices)



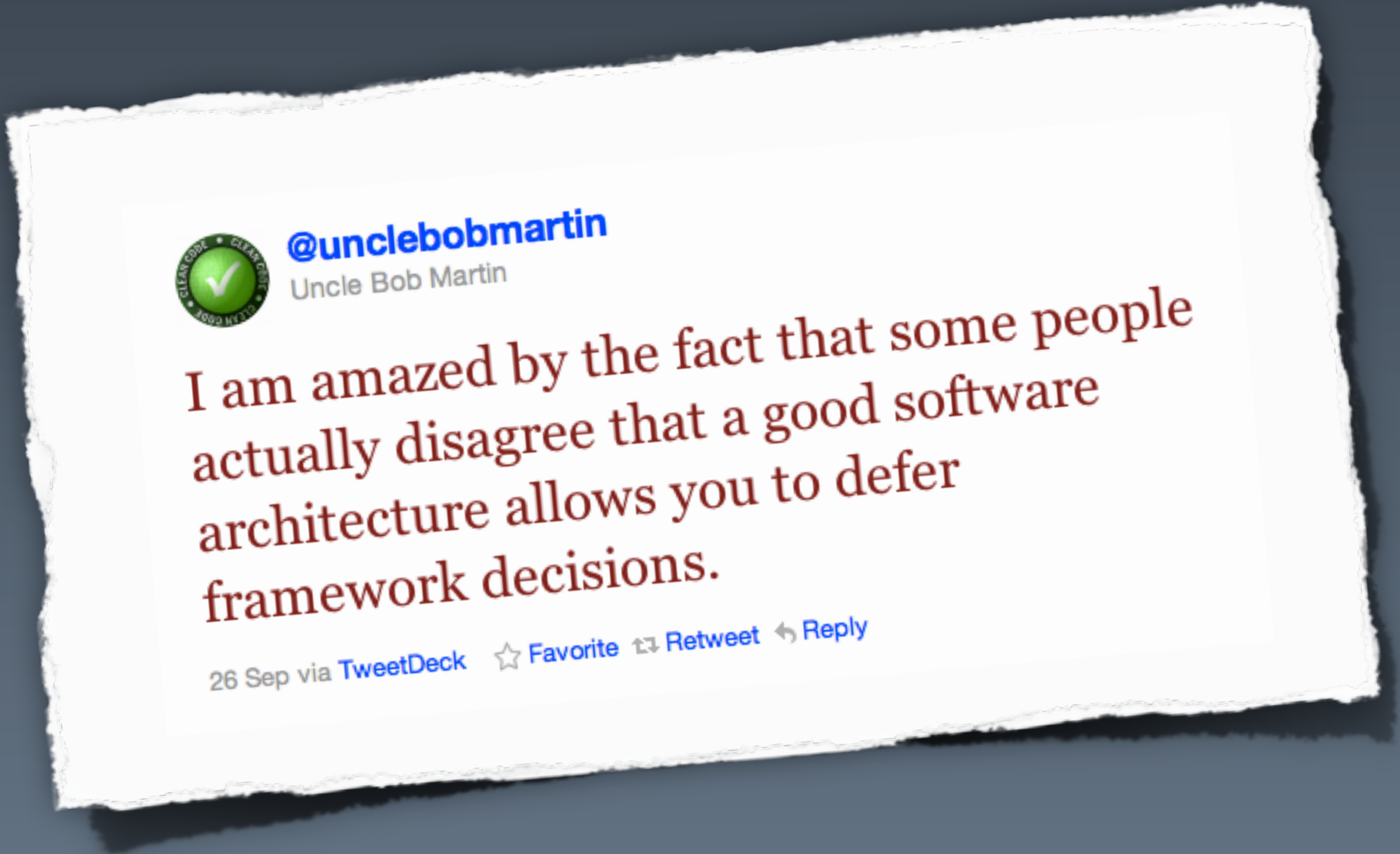
@unclebobmartin
Uncle Bob Martin

A good architecture allows you to defer framework decisions. A good architecture allows frameworks to act as plugins to the app.

26 Sep via TweetDeck ☆ Favorite Retweet Reply

Maybe, maybe not

(remember what I said about technology choices?)



@unclebobmartin
Uncle Bob Martin

I am amazed by the fact that some people actually disagree that a good software architecture allows you to defer framework decisions.

26 Sep via TweetDeck ☆ Favorite Retweet Reply

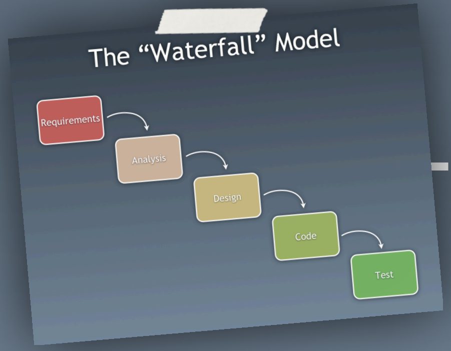
Deferring framework decisions and isolating them should be a

conscious decision

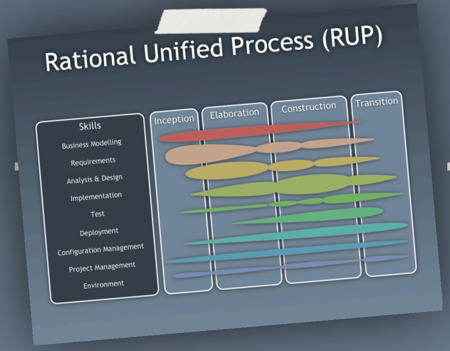
How much

architecture do you need to do?

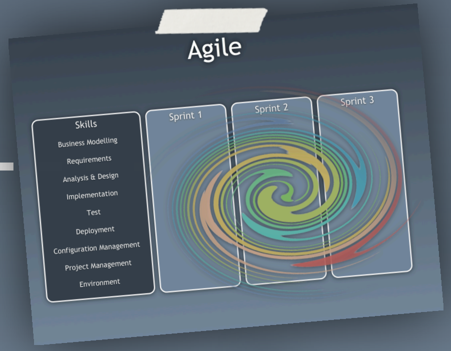
This much?



The "Waterfall" Model



Rational Unified Process (RUP)



Agile

This much?

You need to do

“just enough”

architecture

Base your architecture on requirements, travel light and prove your architecture with concrete experiments.

Scott Ambler
http://www.agilemodeling.com/essays/agileArchitecture.htm

If you **flex** functionality,

does the architecture

change?

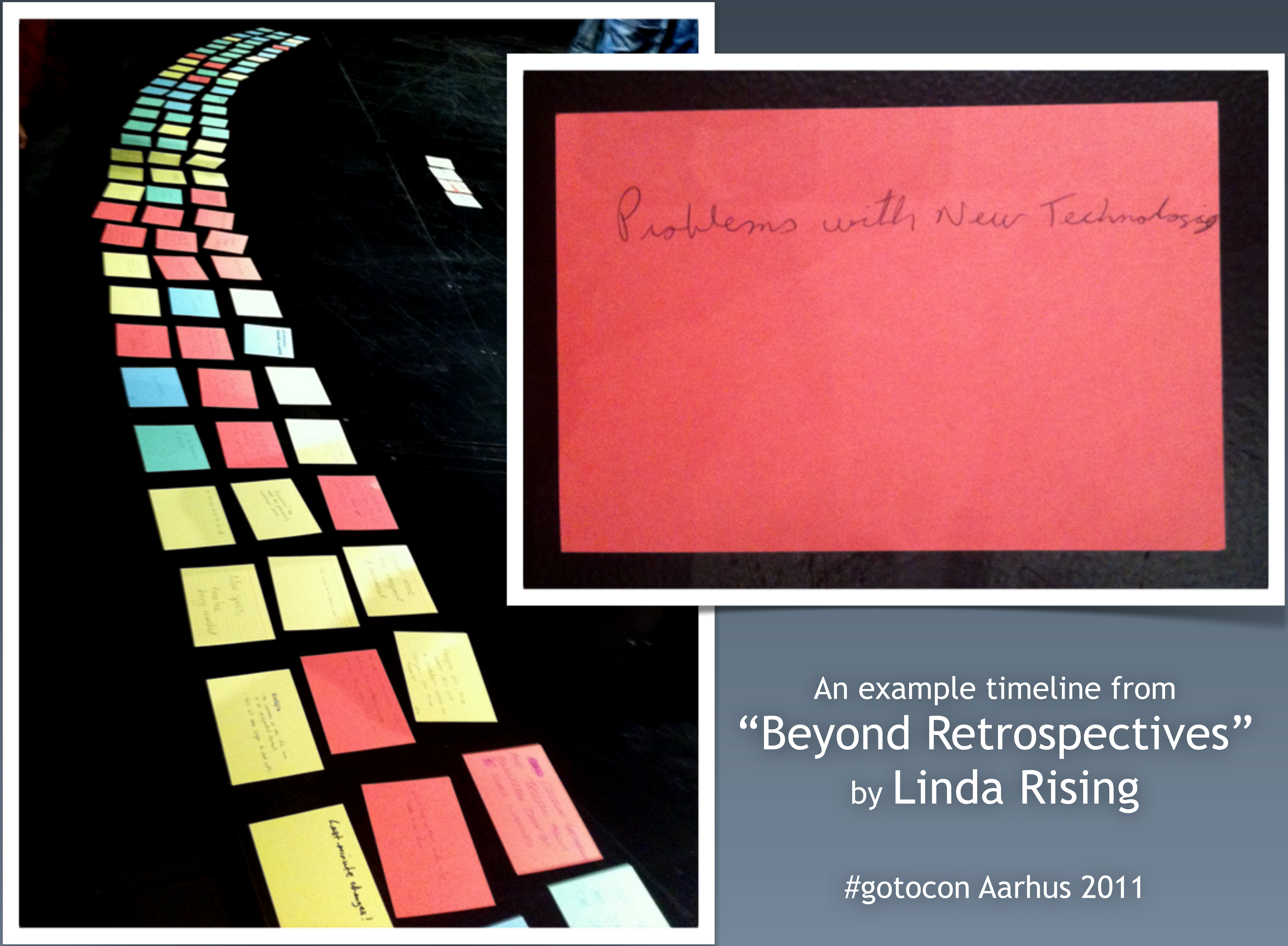
Probably not, so just make some decisions...

What is architecturally significant?

Costly to change
(can you refactor it
in an afternoon?)

Complex and risky

New



An example timeline from

“Beyond Retrospectives”

by Linda Rising

#gotocon Aarhus 2011

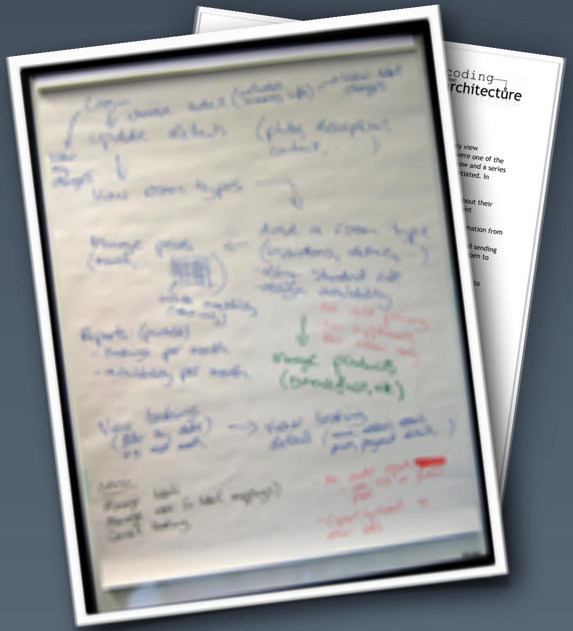
Just enough

Understand how the significant elements fit together

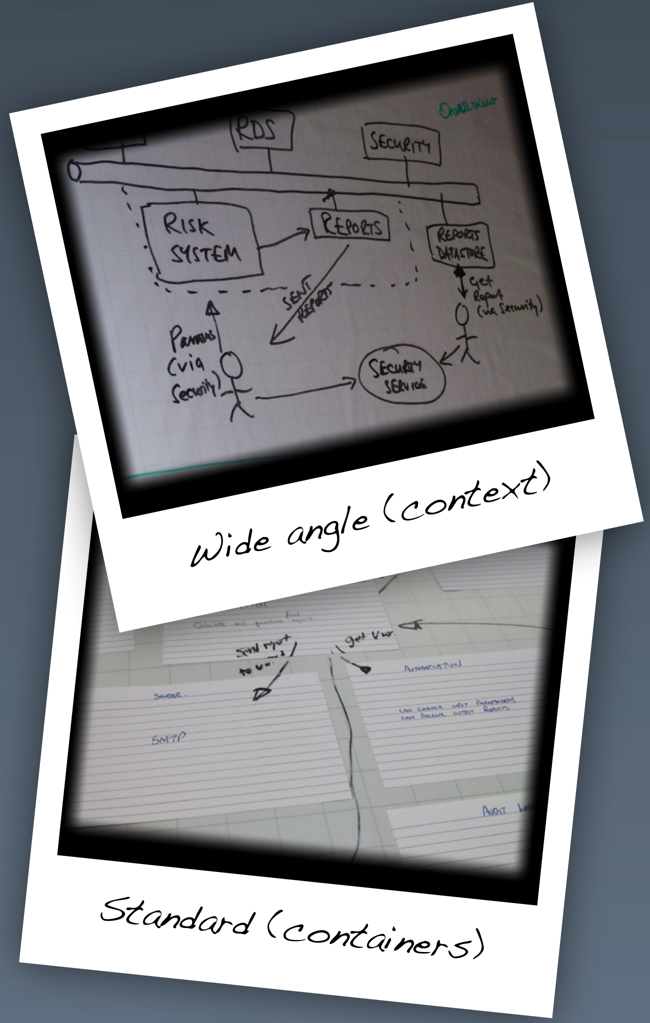
Mitigate the key risks

Provide the foundations and vision to move forward

Requirements



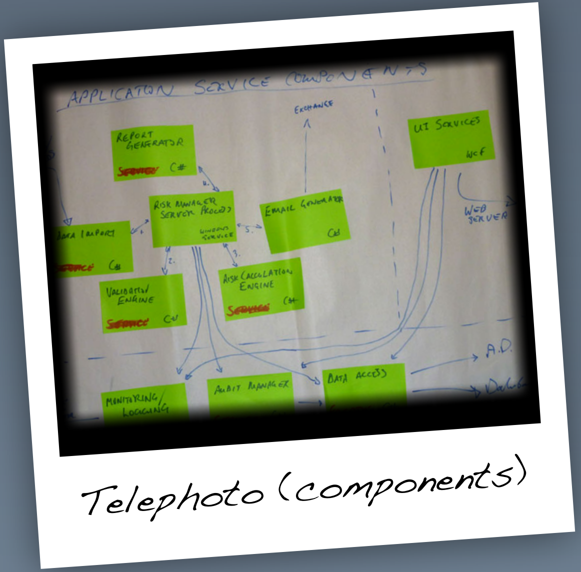
Context and Containers



Wide angle (context)

Standard (containers)

1-2 days



Telephoto (components)

Components (and Ballpark Estimates)

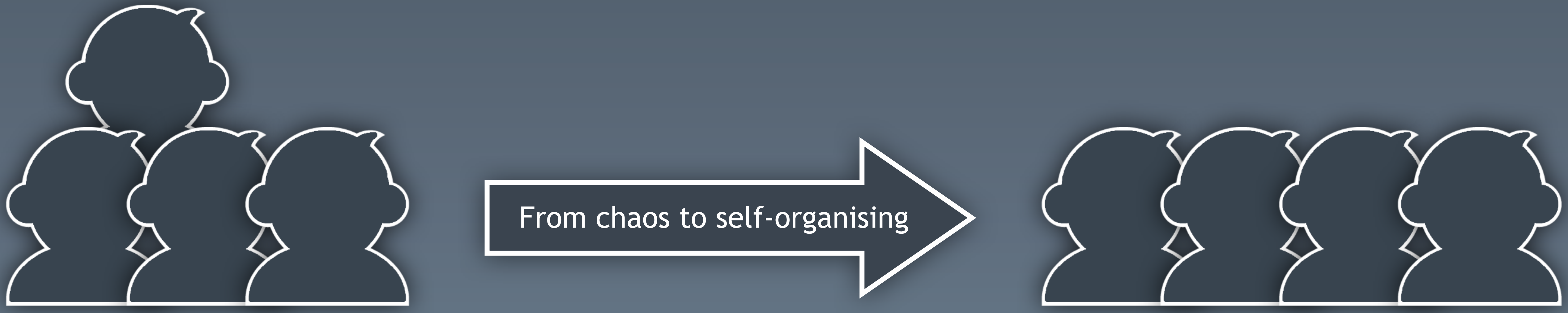
Doing this collaboratively allows people's separate ideas to meet

The role of the software architect and

the process of software architecture are

different

The role



From chaos to self-organising

Dedicated
software architect

Single point of responsibility for the technical aspects of the software project

Everybody is a
software architect

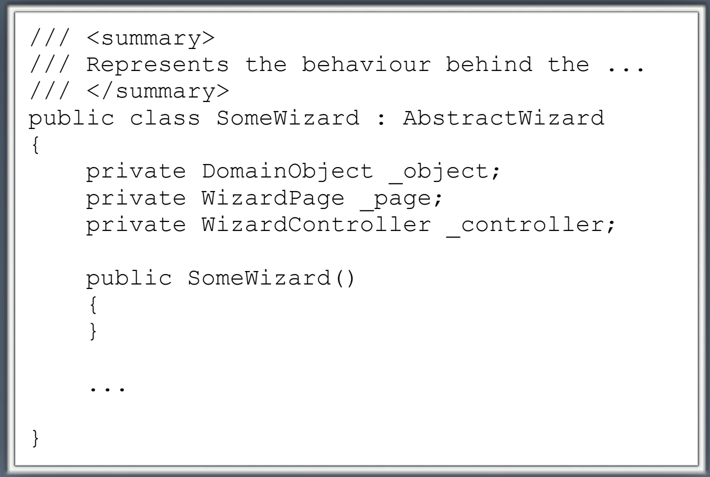
Joint responsibility for the technical aspects of the software project

The process

Big up front design

Requirements capture, analysis and design complete before coding starts

From big design up front to evolutionary



```
/// <summary>
/// Represents the behaviour behind the ...
/// </summary>
public class SomeWizard : AbstractWizard
{
    private DomainObject _object;
    private WizardPage _page;
    private WizardController _controller;

    public SomeWizard()
    {
    }

    ...

}
```

Evolutionary architecture

The architecture evolves secondary to the value created by early regular releases of working software

Just enough

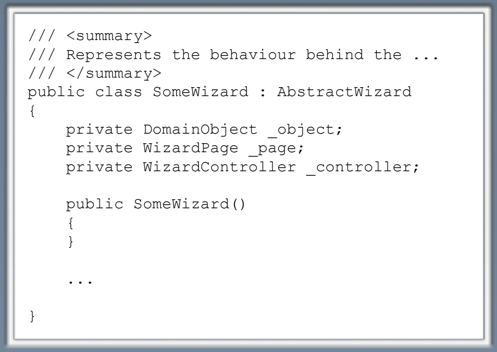
Understand how the significant elements fit together

Mitigate the key risks

Provide the foundations and vision to move forward

The role

The process



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    public SomeWizard()
    {
    }

    ...

}
```

Let’s wrap up…

Does *agile* need architecture?

Yes, architecture provides

structure, firm foundations, vision and technical leadership

Does architecture need *agile*?

Yes, it helps software teams move away from

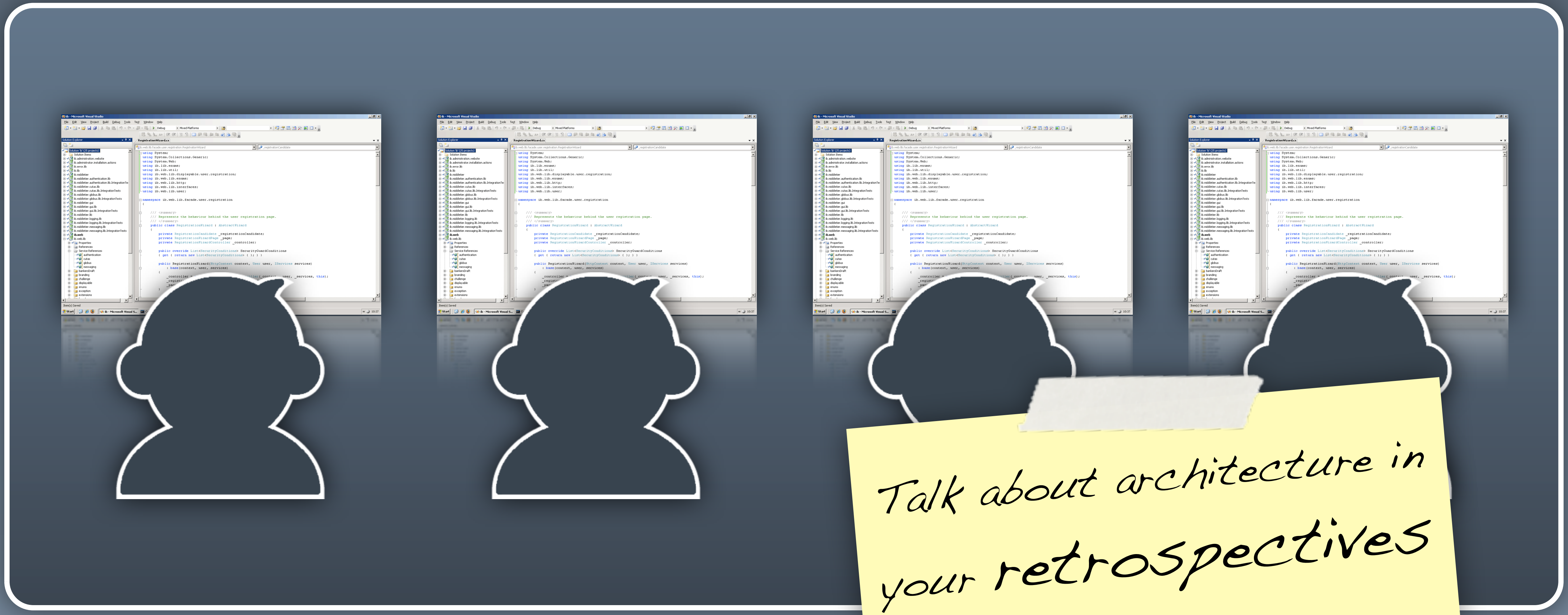
big design up front

and analysis paralysis

Define

the software architecture role and

collaborate



Talk about architecture in your retrospectives

Do you want to

code?

Software architecture documentation should

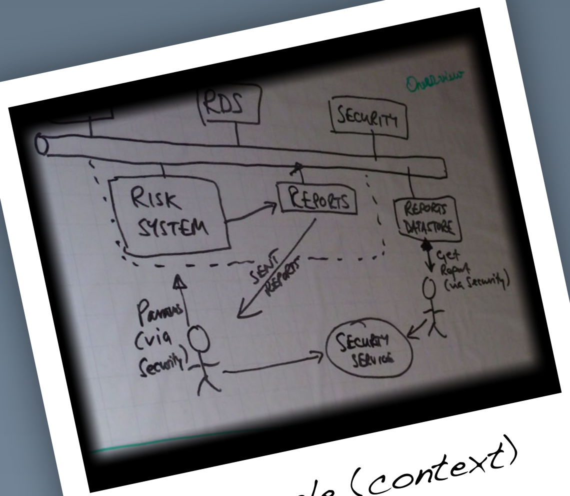
describe what the code doesn’t

Effective sketches

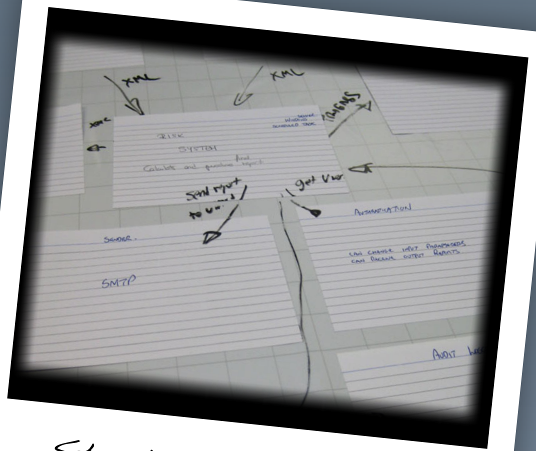
are an excellent way to

communicate

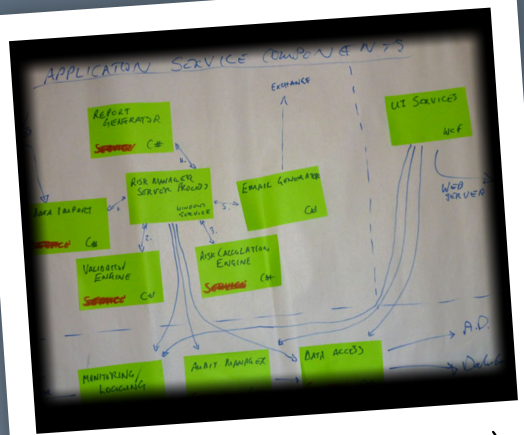
software architecture



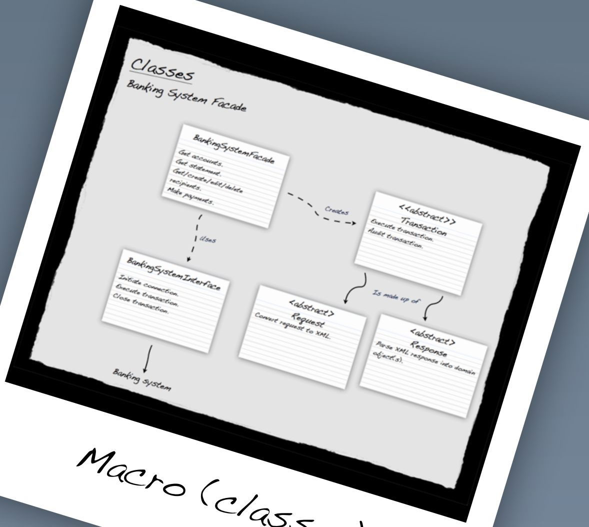
Wide angle (context)



Standard (containers)



Telephoto (components)



Macro (classes)

Apply *craftsmanship*

to

software architecture

Effective yet lightweight sketches and documentation

Software systems that actually **work**

We need to grow the architects of tomorrow

Do whatever works for

you

(just don't get distracted by shiny new things just because they're shinier!)

simon.brown@codingthearchitecture.com

@simonbrown on Twitter