

# Software Architecture vs Code

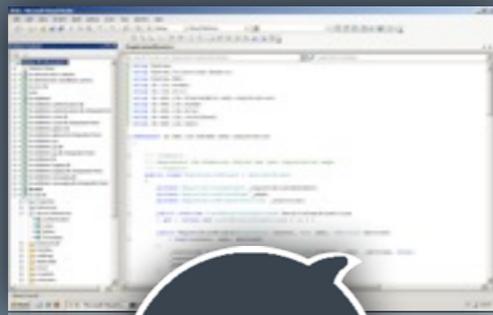


Simon Brown  
@simonbrown



Jersey, Îles de la Manche

I help software teams understand  
**software architecture,**  
**technical leadership** and  
**the balance with agility**



I code too

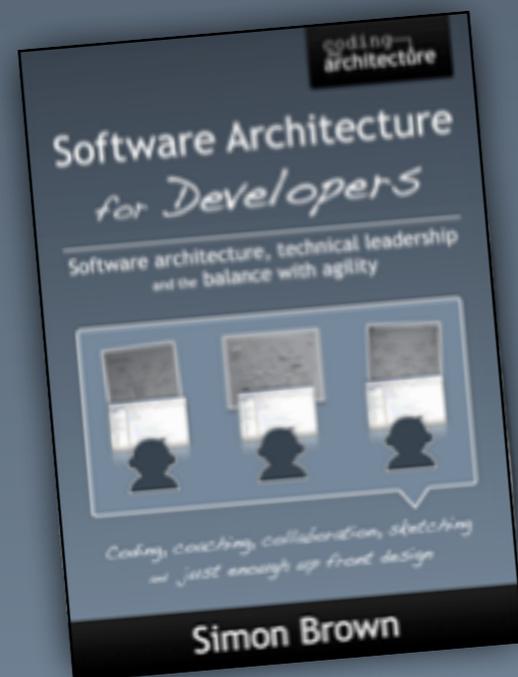


# Software architecture needs to be more accessible



## Training

In-house and public courses



## Book

[leanpub.com](http://leanpub.com)

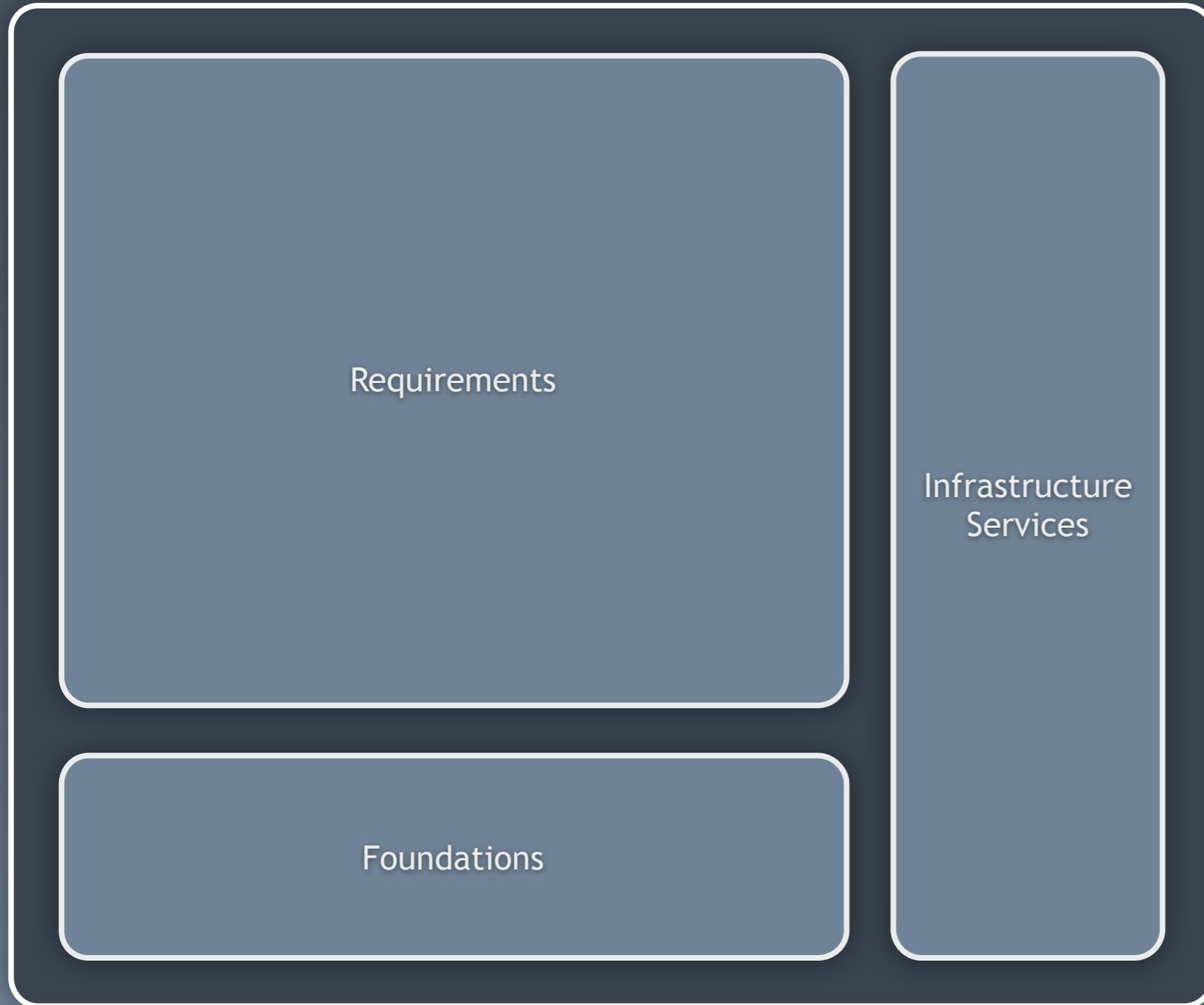


## Speaking

Conferences and user groups

# Software Architecture

# What is architecture?



*As a noun...*

**Structure**

*The definition of something in terms of its components and interactions*

*As a verb...*

**Vision**

*The process of architecting, making design decisions, providing guidance, etc*

# Architecture vs design

Architecture represents the  
**significant decisions**,  
where significance is measured  
by **cost of change**.



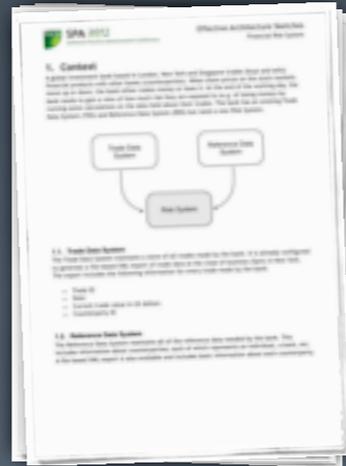
Grady Booch

*Can you **refactor**  
it in an afternoon?*

# Iteration 1 (~90 minutes)



Groups of 2-4

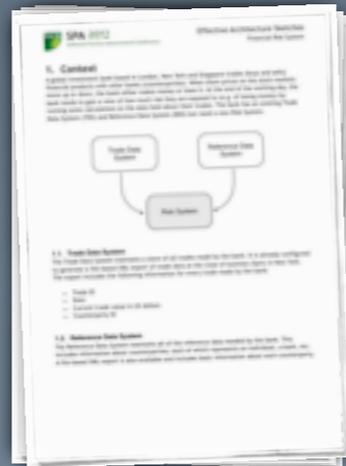


Requirements

# Iteration 2 (~90 minutes)



Groups of 2-4

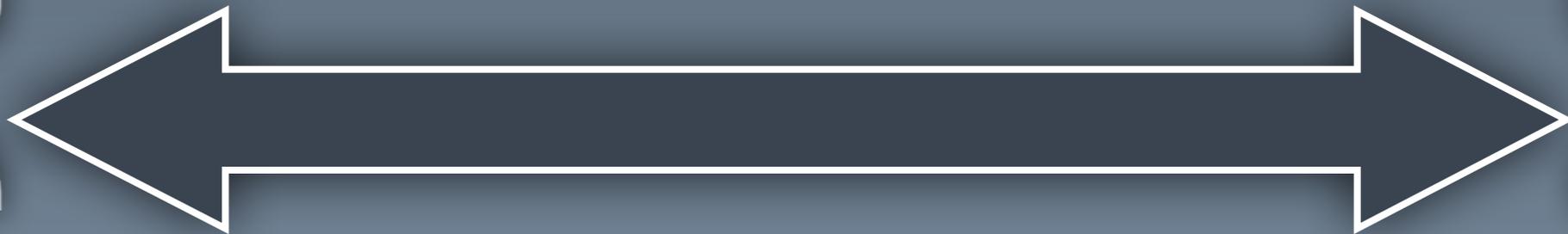


Requirements



Feedback and guidance

What's been **challenging**  
about the exercise so far?



## Challenging?

Level of detail

↳ where to stop

Who is the audience - different backgrounds

Implementation

- easy to get bogged down in detail

Type of diagrams

Notation

Documenting assumptions

## ⑦ Challenging

Needed to ask questions / make assumptions

Temptation to focus on detail

↳ when do we stop?

How much detail?

Talked about more than the diagrams

What notation? - boxes  
- arrows

## ⑩ Challenging?

Verifying our own assumptions

Expressing the solution

- communicating it in a clear way

- use of notation

- easy to mix levels of abstraction

- how much detail?

What's been challenging about the exercise?

People expect to present their designs and therefore

**information is still  
stuck in their heads**



Who here uses **UML**

on a **regular basis?**

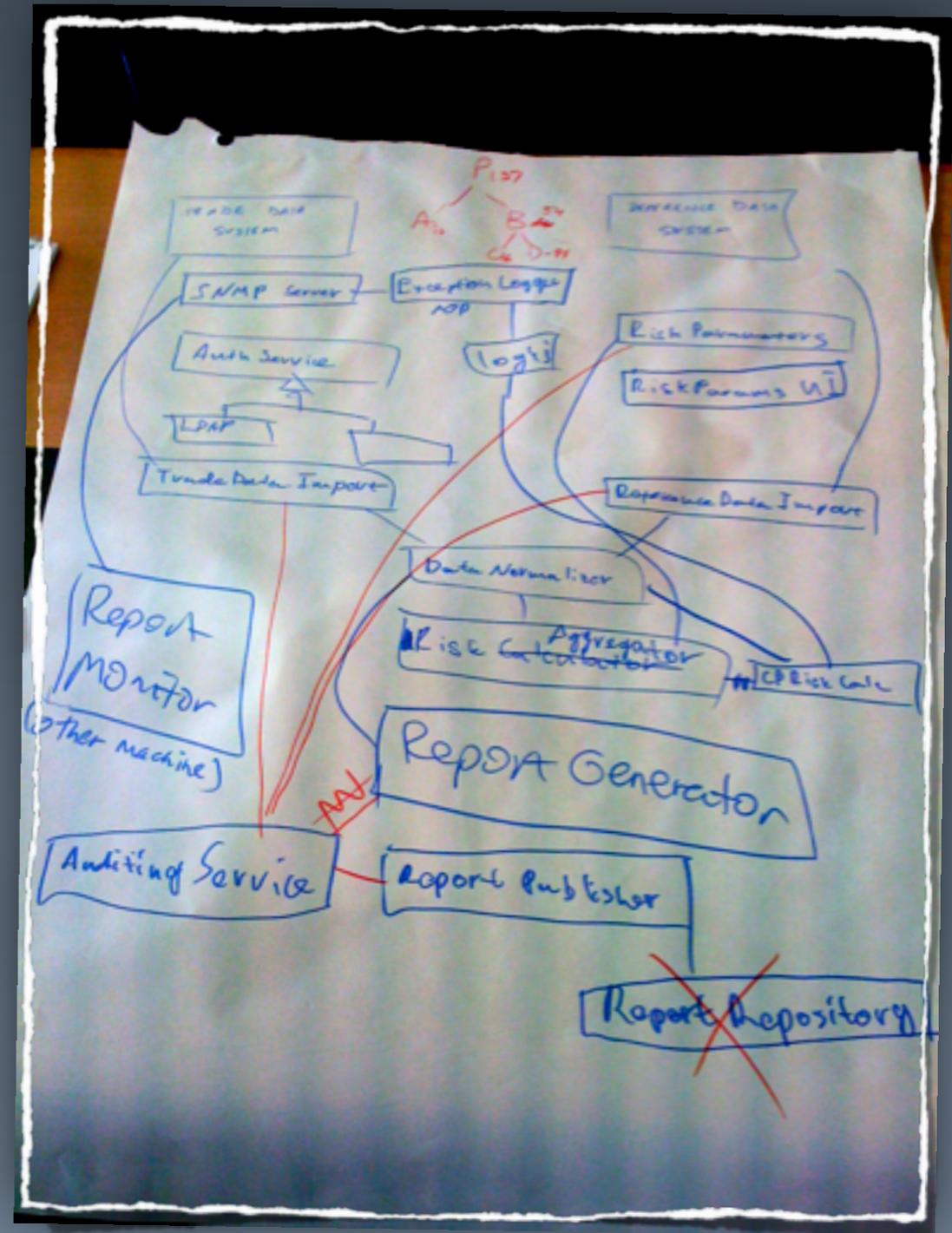




9 out of 10 people  
don't use UMI

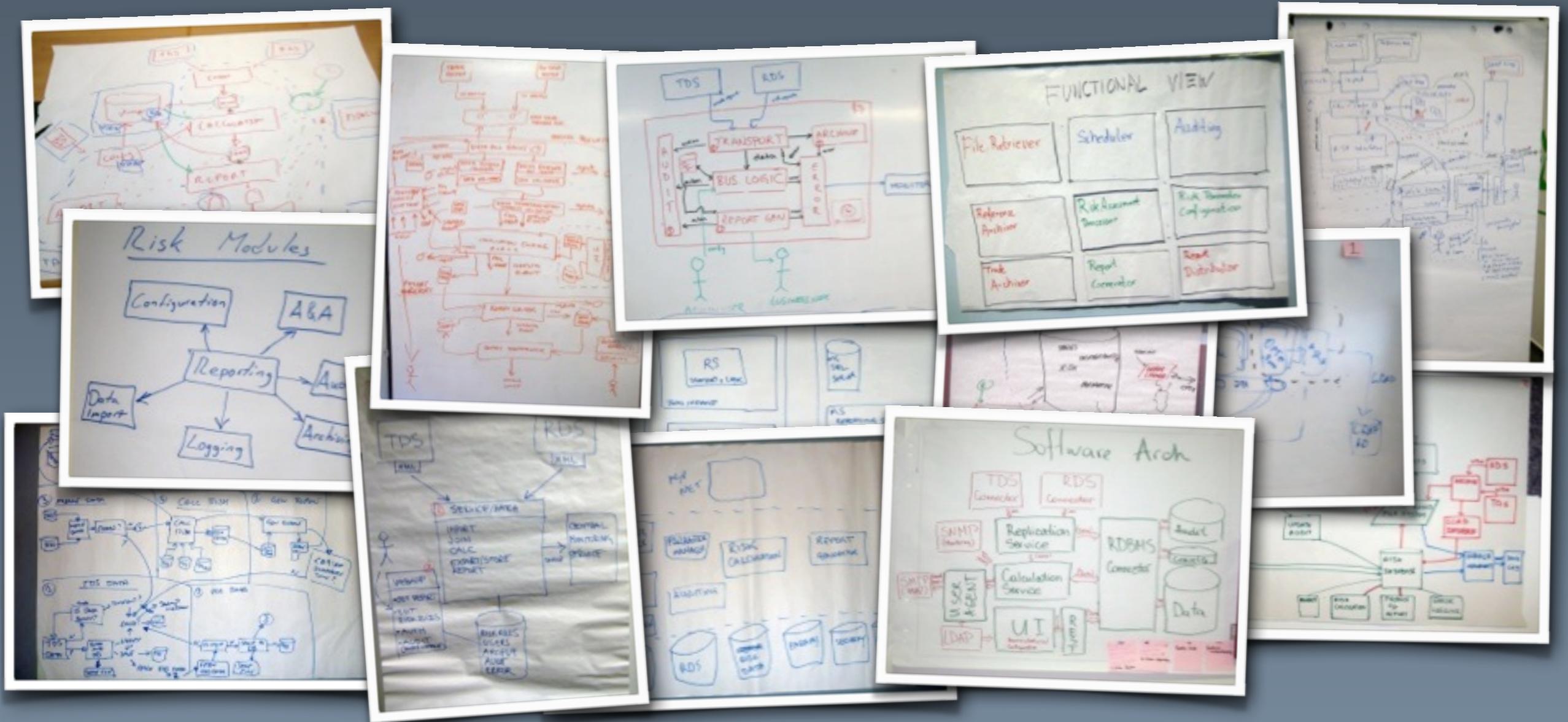
*(in my experience)*

In my experience,  
software teams  
aren't able to  
effectively  
visualise the  
software  
architecture  
of their systems



# NOUML

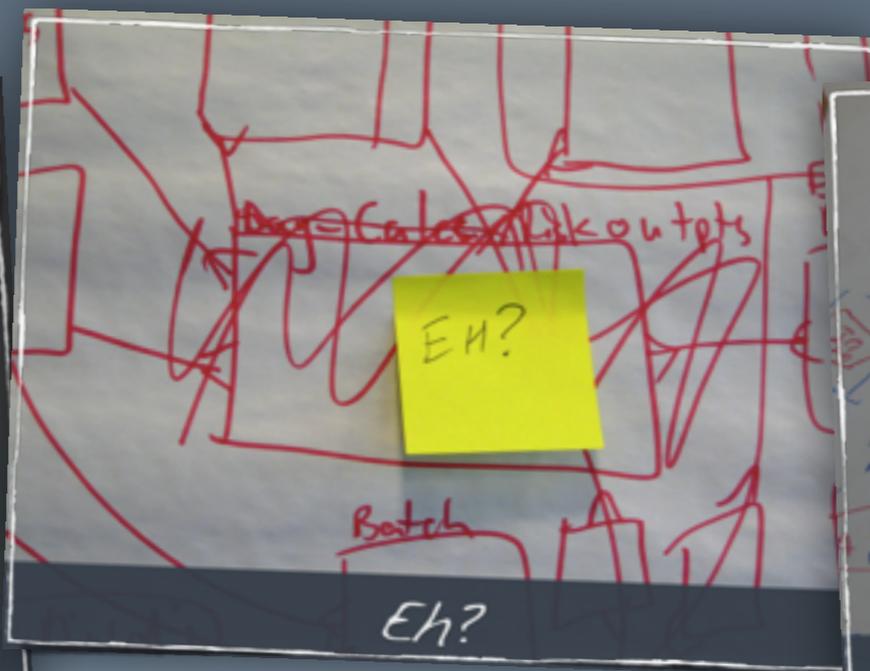
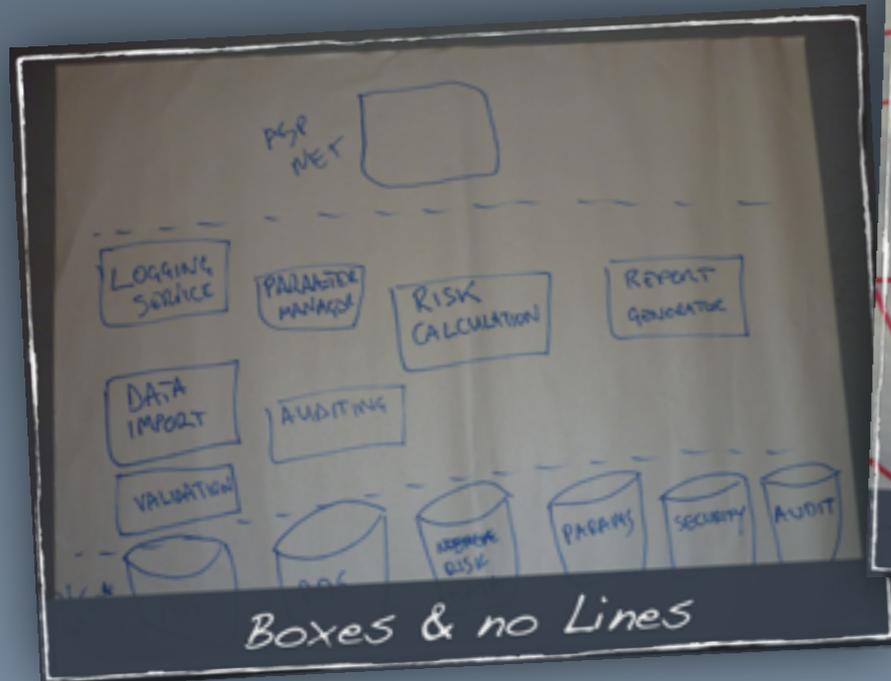
diagrams?



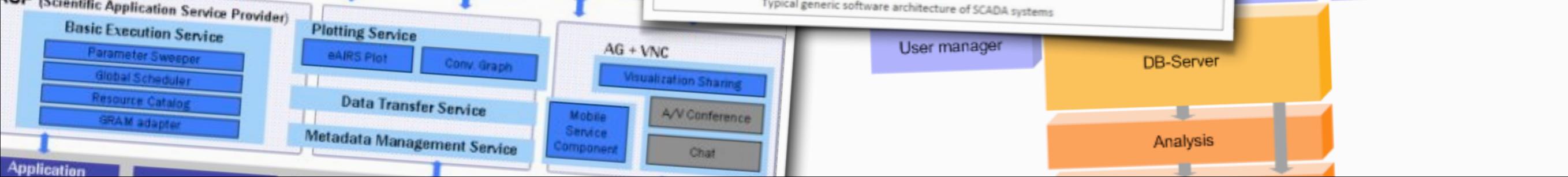
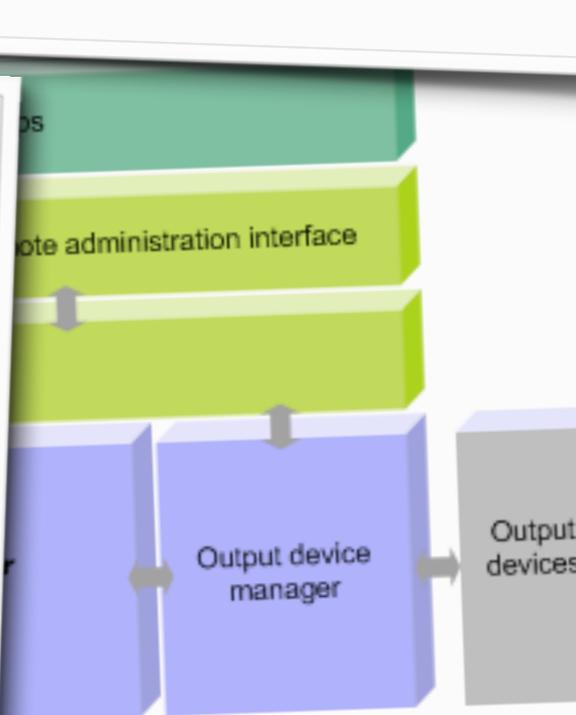
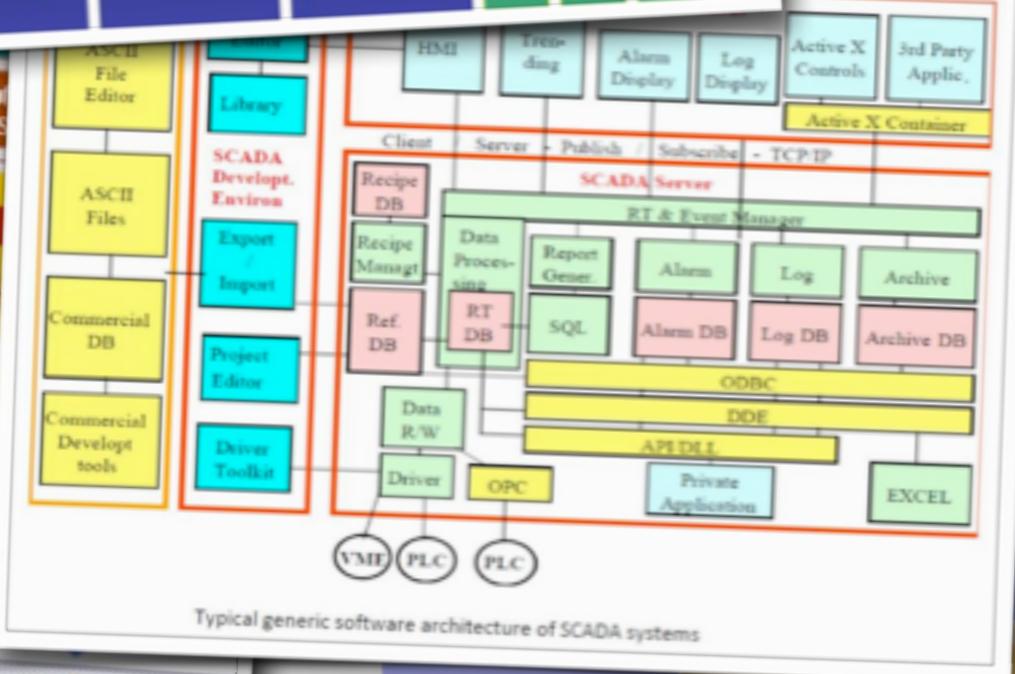
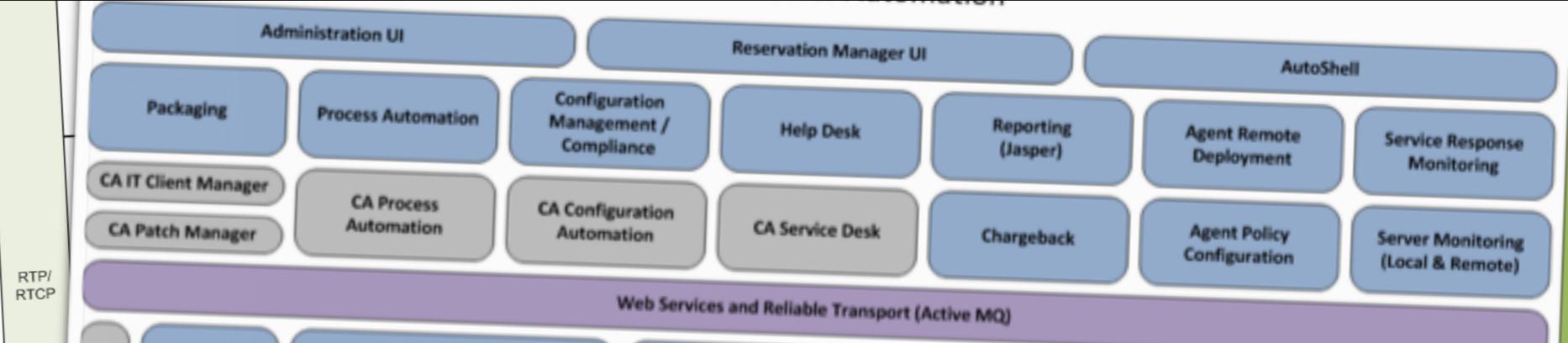
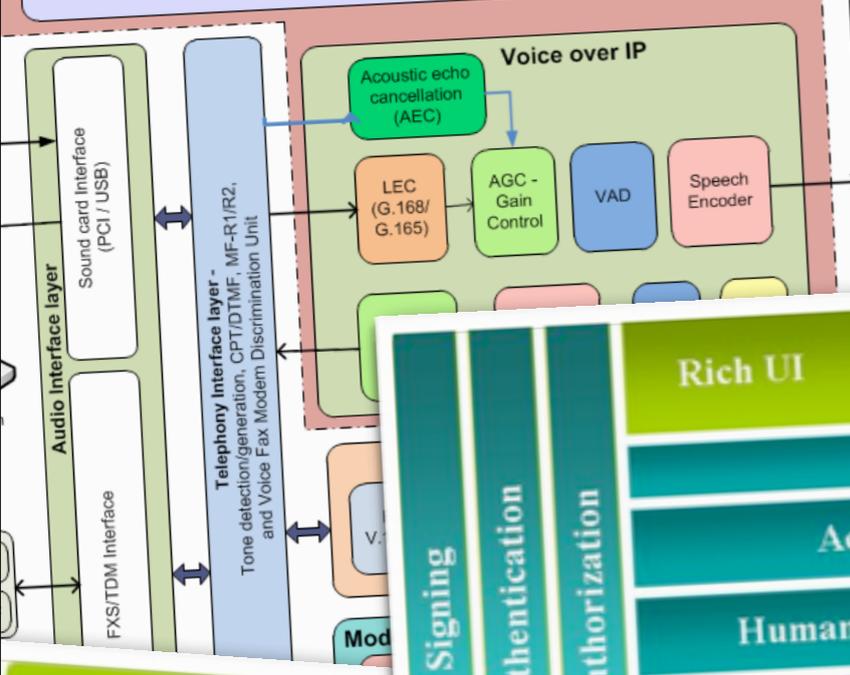
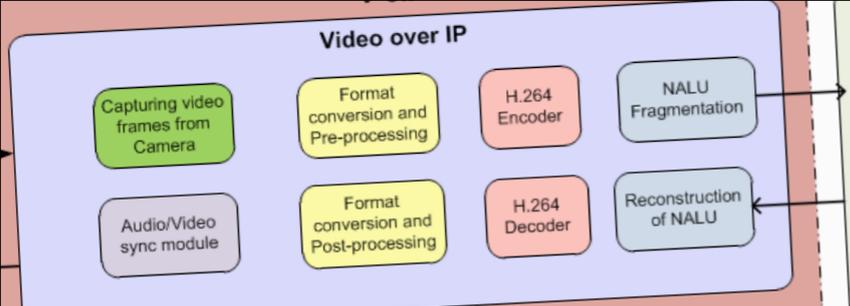
We can visualise our process...



...but not our software!



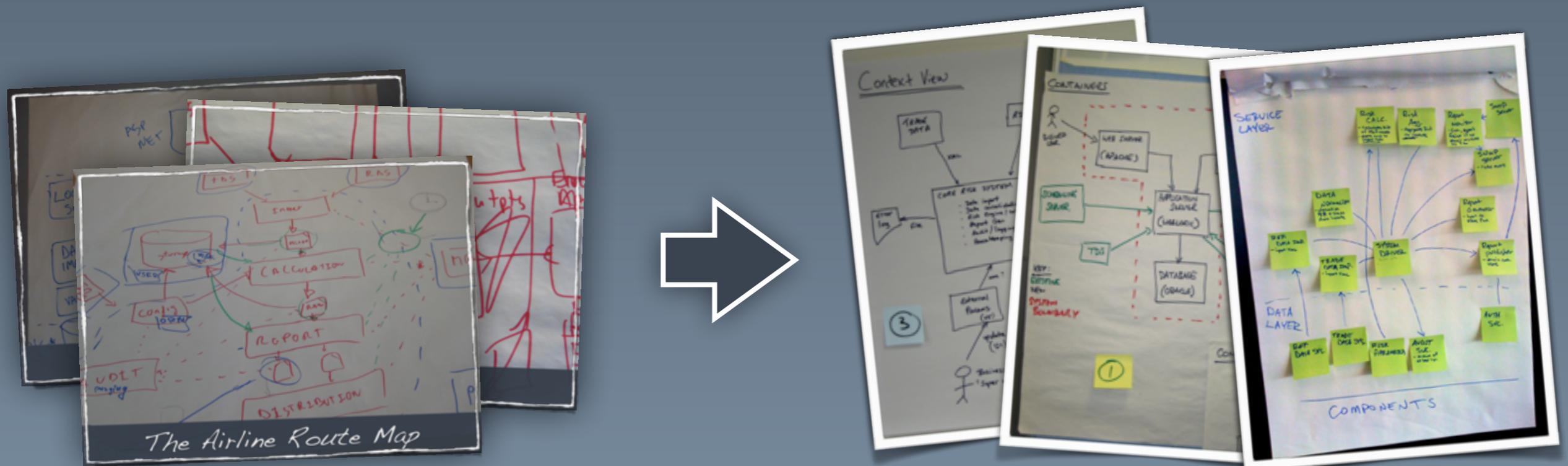






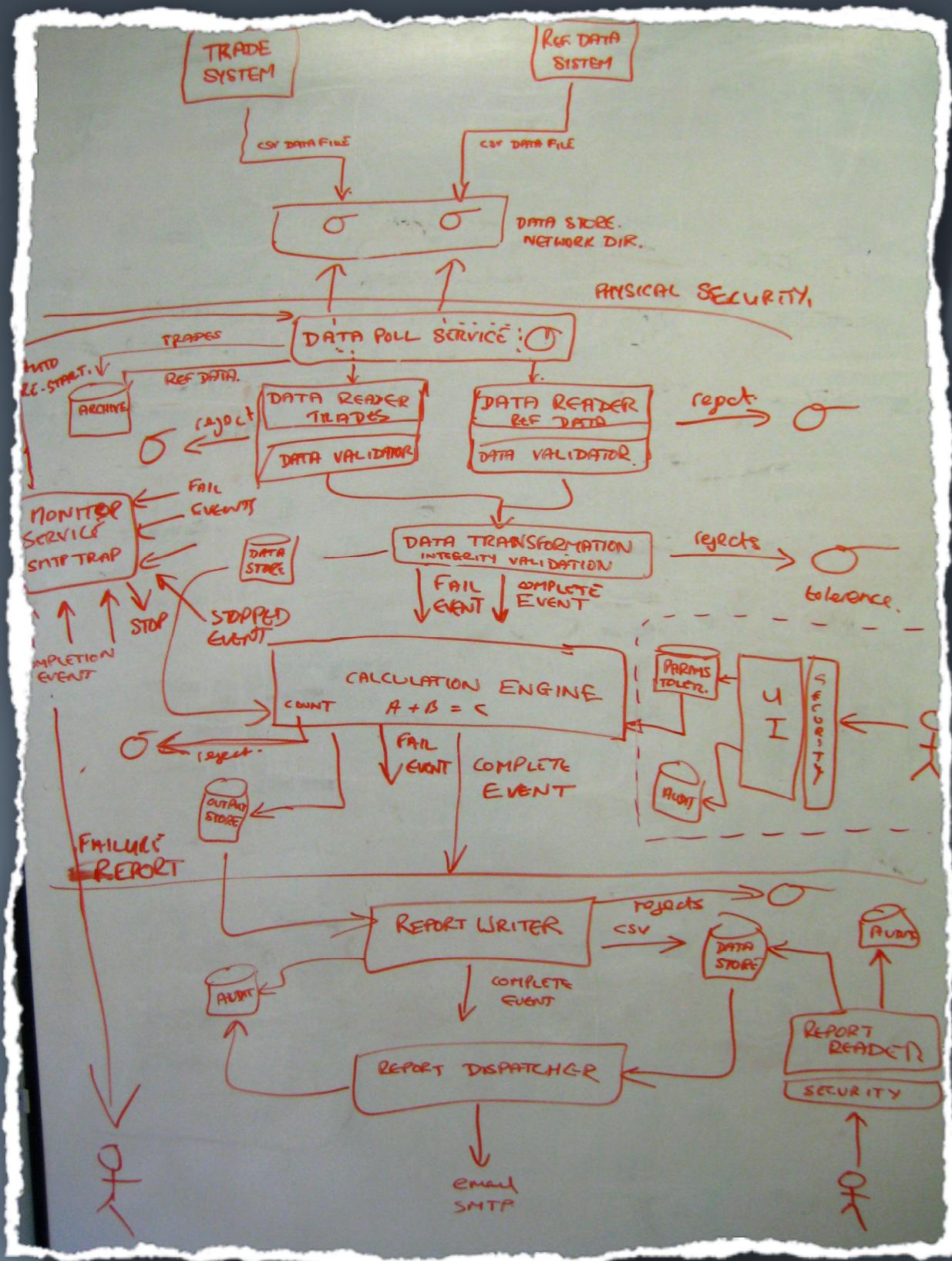
<http://www.flickr.com/photos/codingthearchitecture/sets/>

Moving fast (agility) requires  
**good**  
**communication**



It's usually difficult to show the entire design on a **single** diagram

Different **views** of the design can be used to manage complexity and highlight different aspects of the solution



Do the **names**  
of those views make sense?

Conceptual vs Logical

Process vs Functional

Development vs Physical

Development vs Implementation

Physical vs Implementation

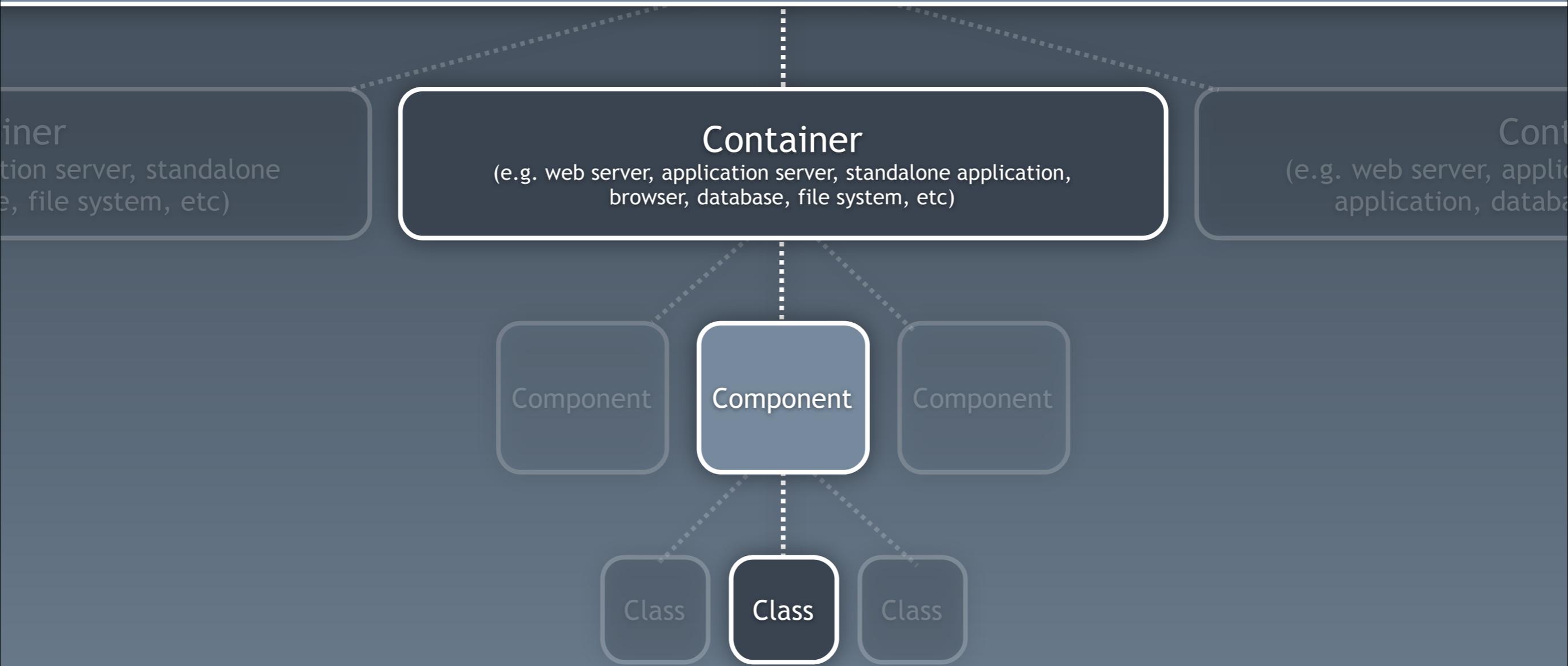
Physical vs Deployment

Would you

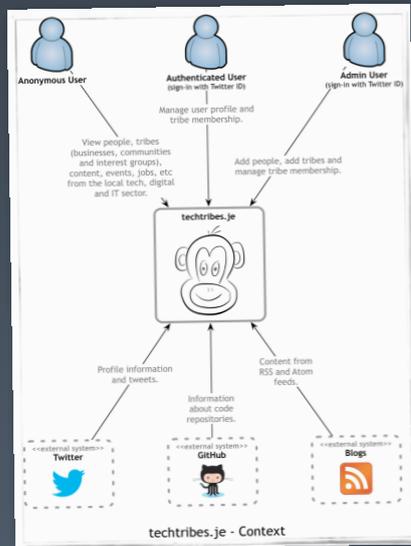
code

it that way?

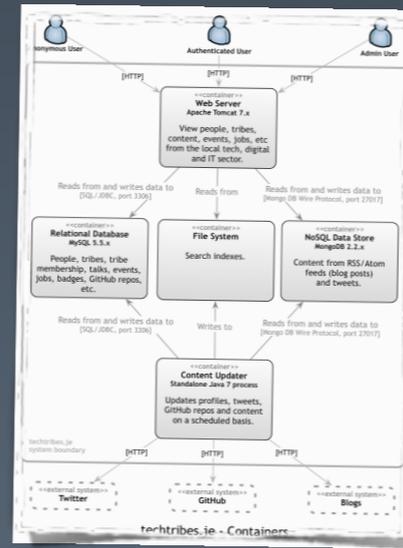
# Software System



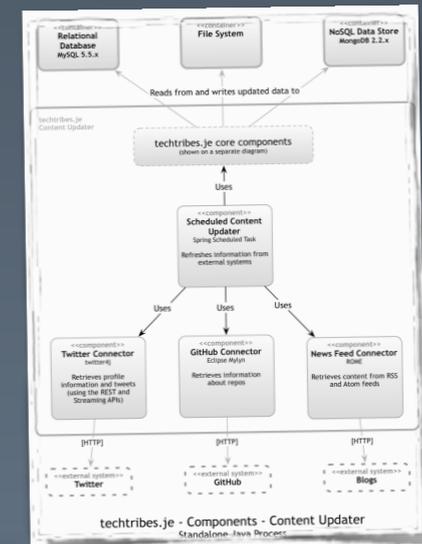
Agree on a simple set of **abstractions** that the whole team can use to communicate



# 1. Context

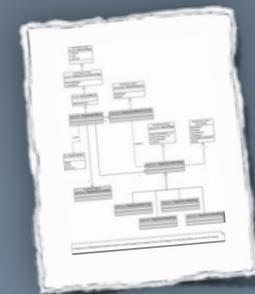


# 2. Containers



# 3. Components

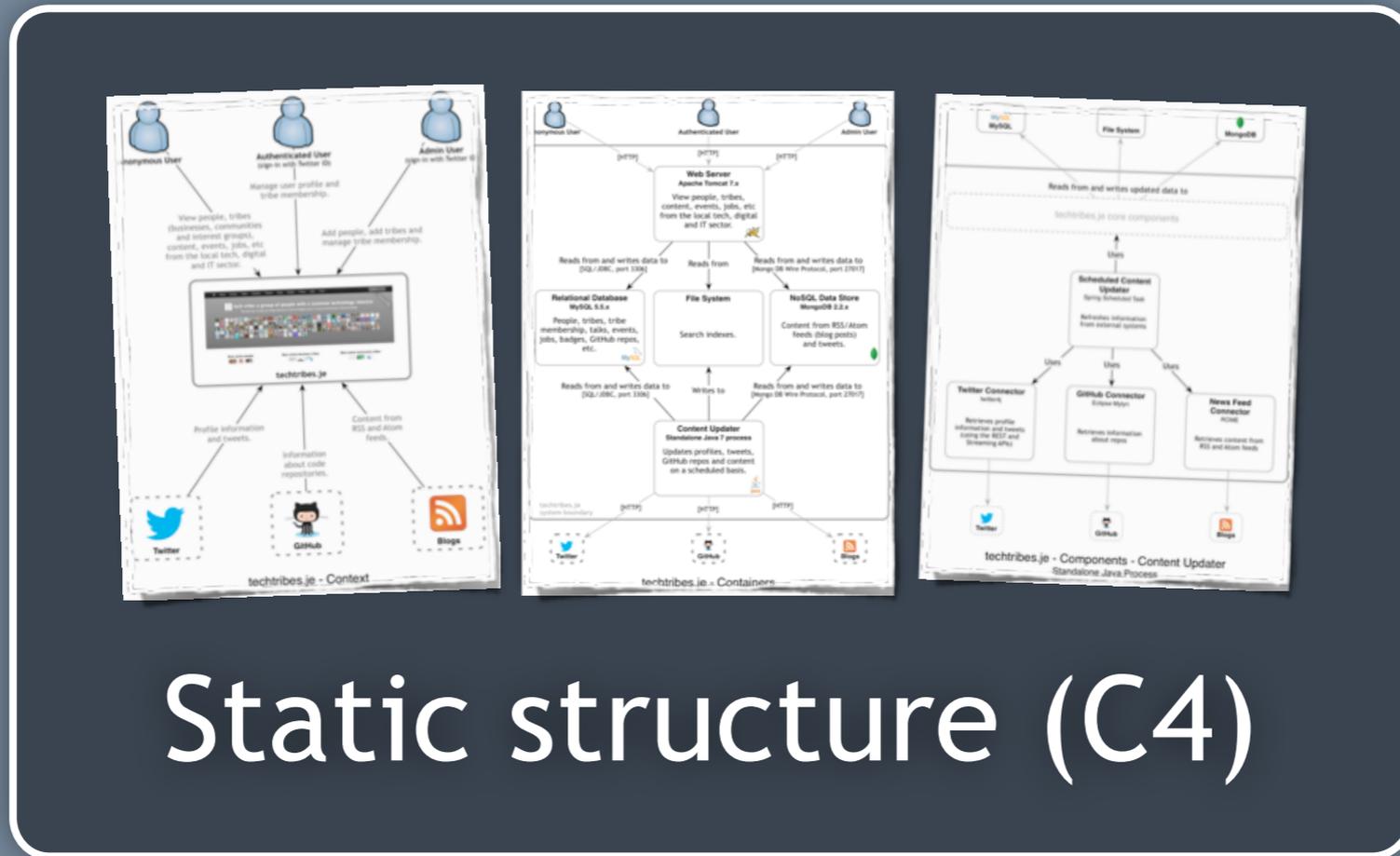
# C4



# 4. Classes

# Sequence & collaboration

# Process & workflow



## Static structure (C4)

# Infrastructure

# Deployment

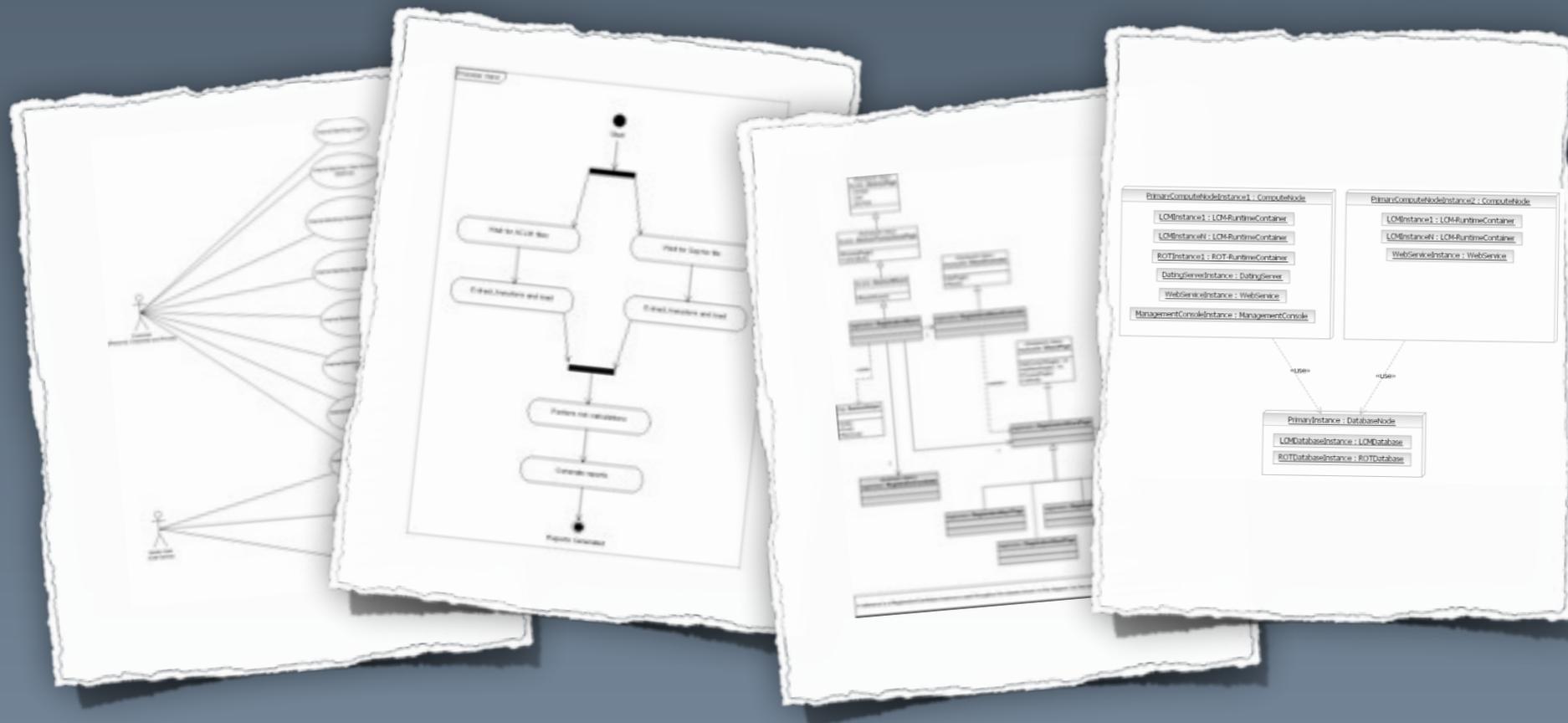
This **isn't** about  
creating a standard

A common set of  
abstractions

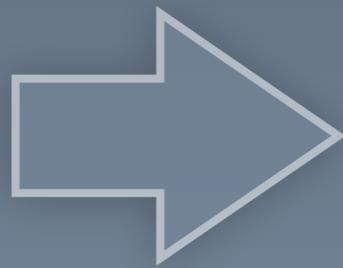
is more important than  
a common notation

# I do use UML

(activity, class, sequence, collaboration, state)



Think about the  
**target**  
**audience**



Non-technical

Semi-technical

Very technical



Most active people



Most active business tribes



Most active community tribes



# News

## @ C5 Alliance plans Microsoft events in Channel Islands

Channel Island cloud provider, C5 Alliance are organising two breakfast events in both Jersey and Guernsey, named 'Leveraging Microsoft Technologies for Regulatory Compliance'. The breakfast briefings are due to include demonstrations of the latest Microsoft technologies and how they are combined. The briefings will cover Microsoft CRM process driven forms, SharePoint Workflow & Collaboration and SQL Server Data Warehousing technology. C5 Alliance, who work with a number of clients, both financial and...

Posted Today

## @ Jersey residents set to have choice in fibre broadband

Sure customers will soon be able to access Jersey's fibre network following the reaching of an agreement between Sure and JT that finalises the commercial arrangements for access to the network. The agreement means that JT has gone some way to fulfilling the second condition of the eight that were set out in the States of Jersey's funding arrangements for the network, as agreed by the Treasury Minister, Senator Philip Ozouf. "This is excellent news for our broadband customers who have been extremely pati...

Posted Yesterday

## @ Logicalis Group taking over Jersey cloud provider

Logicalis Group, the International IT solutions and managed services provider, has announced the acquisition of Jersey's IConsult Limited, a privately owned Jersey company and provider of desktop and mail hosted solutions to the small medium businesses (SMB) market within the Channel Islands. Through their data facility in Jersey the company services over 800 users on the islands, mainly in the financial and professional services sectors. Their main offering is a hosted desktop solution, using primarily ...

Posted 18 Oct 2013

[More...](#)

# Local events

2014 2013 2012

## Ivan Nikkhoo - Growth Funding

Topics of discussion will be: Growth capital, Funding cycles, Investment decisions plus Valuation and exits. With over 29 years of industry experience in various senior capacities internationally, Ivan is a Managing Director at Siemer & Associates and a...

Pomme d'Or Hotel, St Helier, Jersey  
29 Oct 2013 at 17:30

## Tech Tribes Talks

The third set of Tech Tribes talks are ready to rock your world! After a very successful July event at the Royal Yacht we've decided to go back for our October talks. We have a great line up of speakers and we take great pleasure in inviting you to atte...

The Royal Yacht, St Helier  
24 Oct 2013 at 17:30

## The Internet of Everything and Gigabit Jersey

"The Internet of everything" Currently, there are an estimated 10 to 15 billion 'things' connected to the Internet and this is predicted to grow to 50 billion by 2020. How will this change our lives? What infrastructure will we need? What opportun...

The Grand Hotel, St Helier, Jersey  
Tomorrow at 17:15

# Talks by local speakers

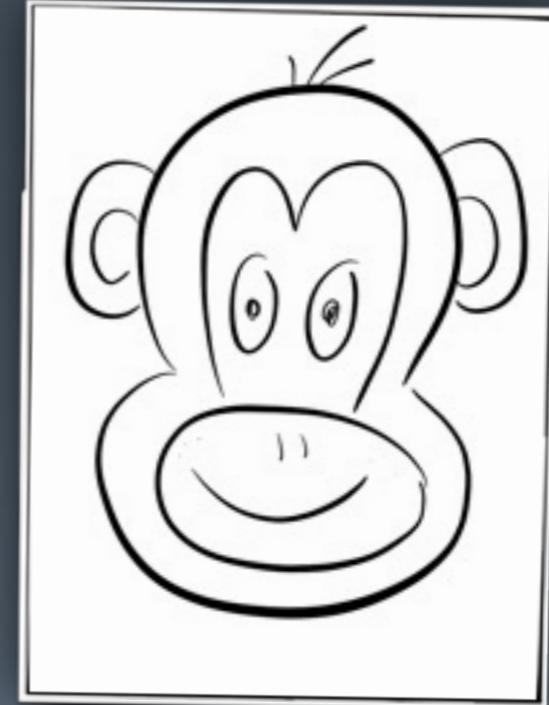
2014 2013 2012

Ted talk

Agile software

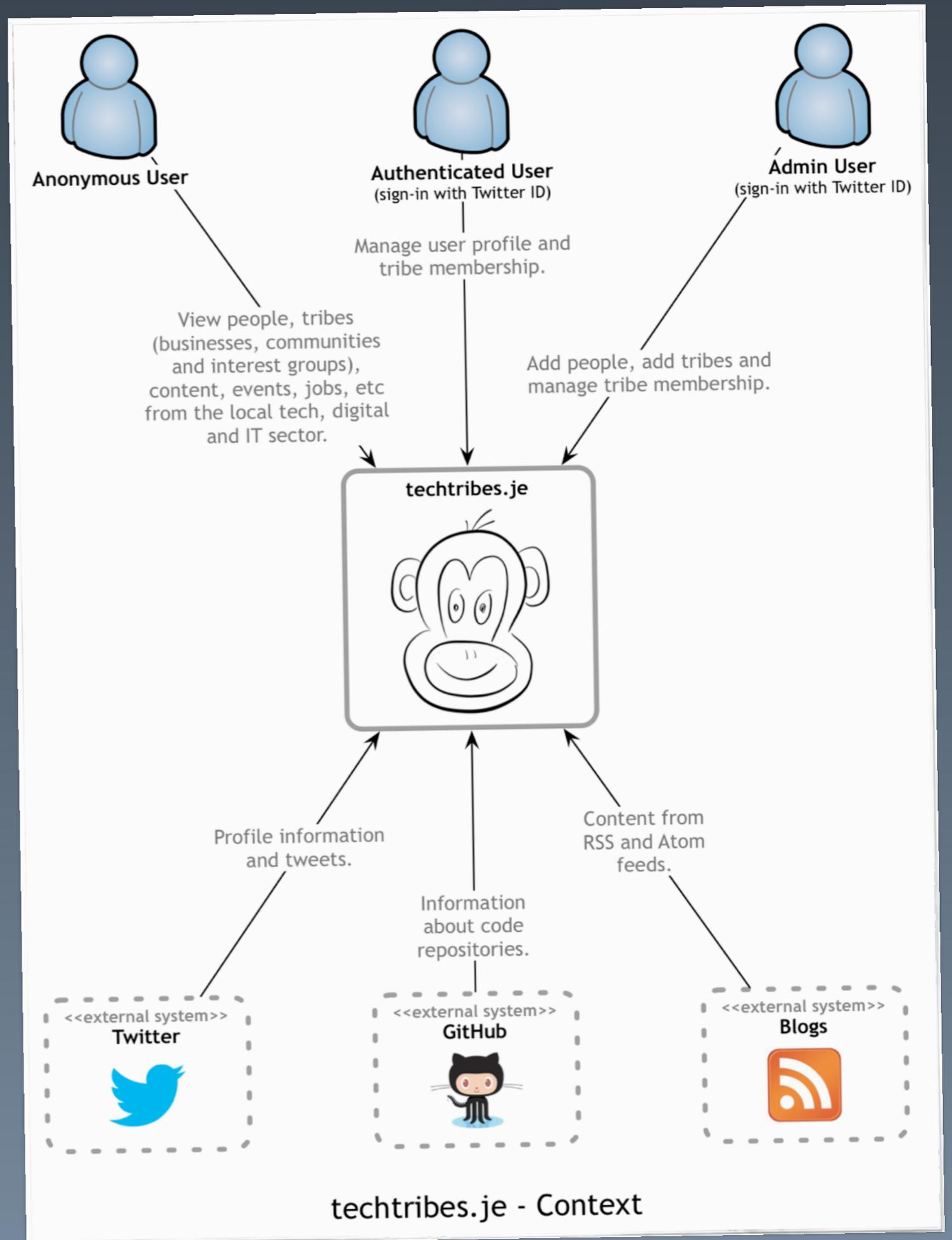
Software architecture and

# techtribes.je



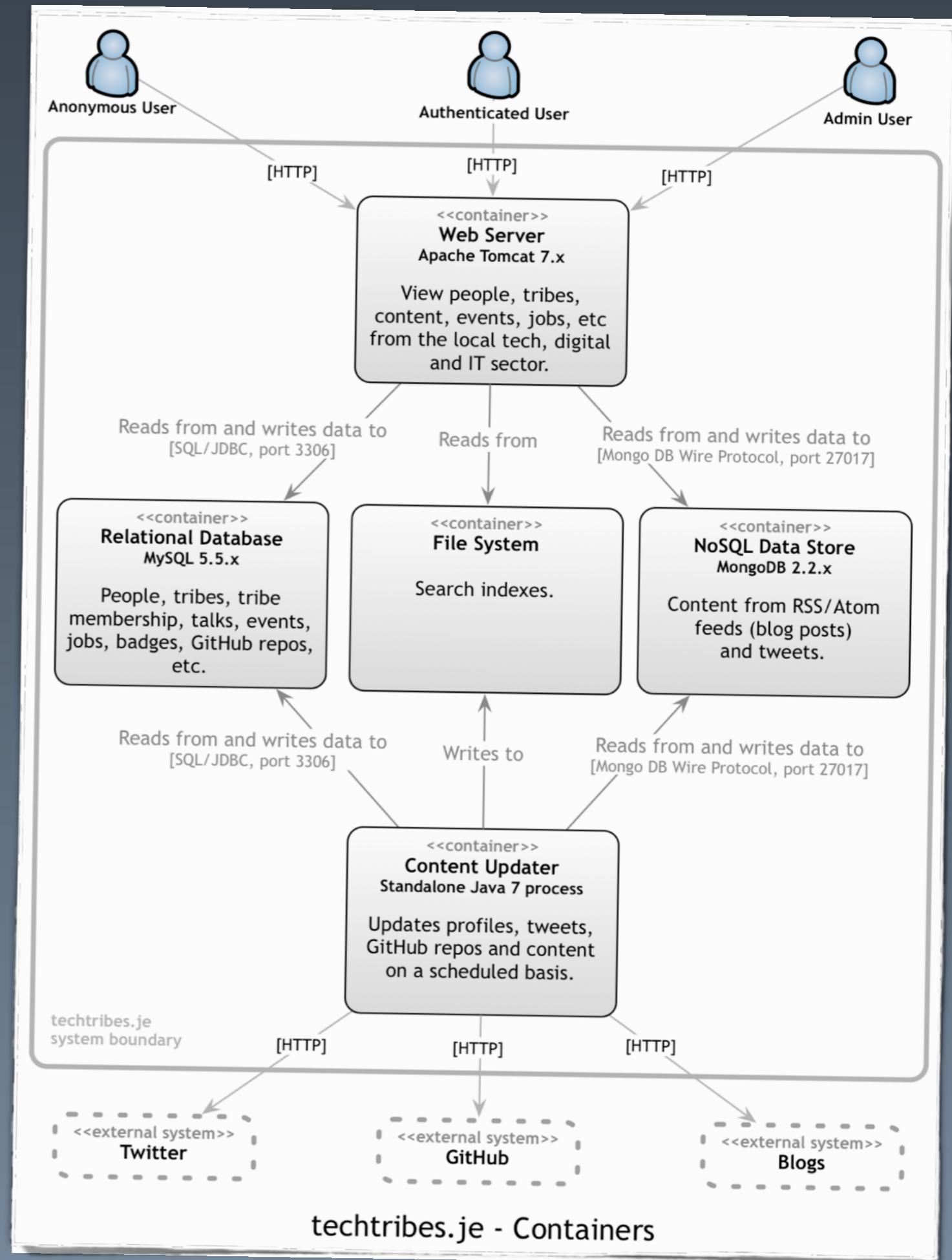
# Context

- What are we building?
- Who is using it?  
(users, actors, roles, personas, etc)
- How does it fit into the existing IT environment?  
(systems, services, etc)



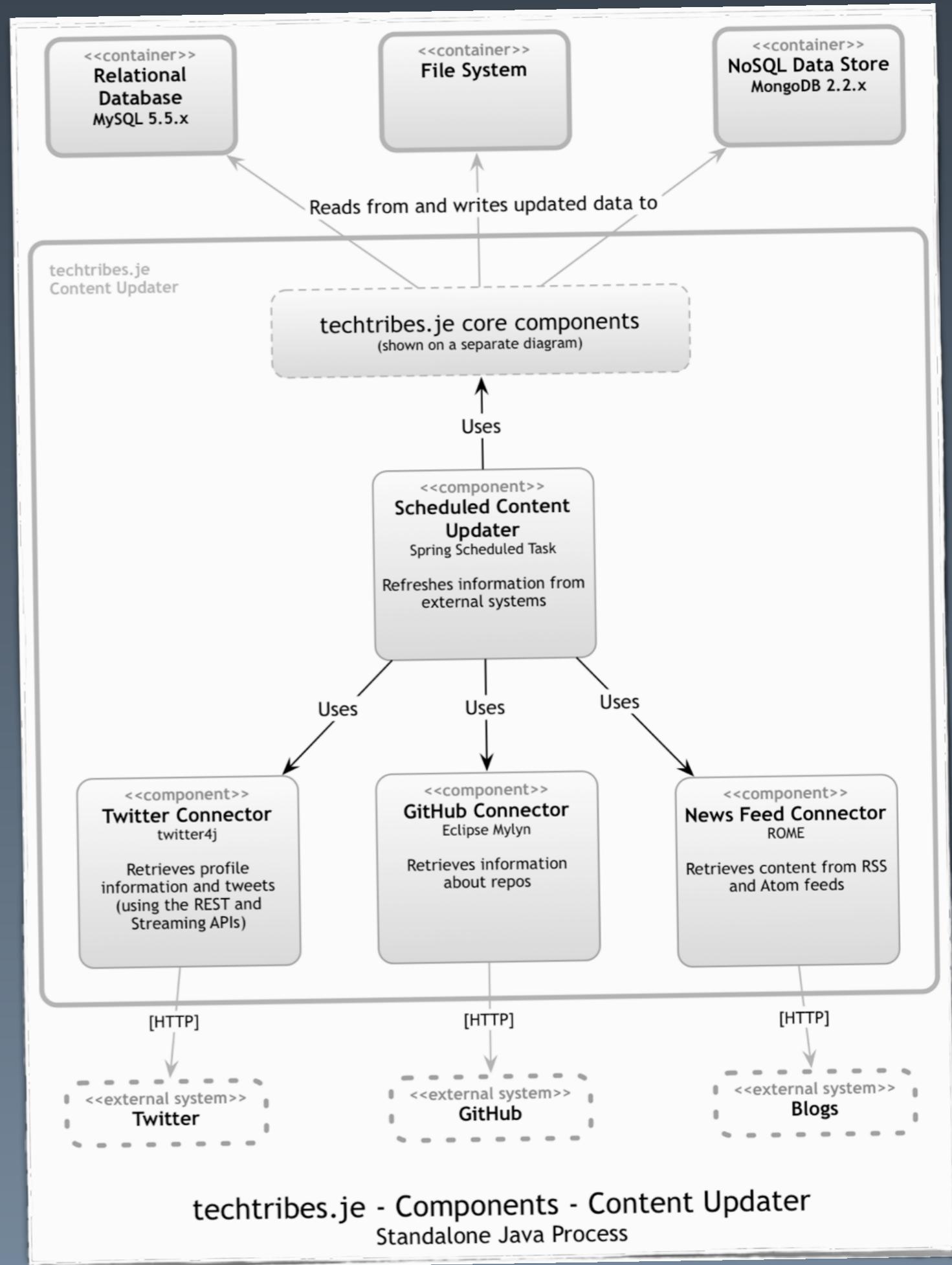
# Containers

- What are the high-level technology decisions? (including responsibilities)
- How do containers communicate with one another?
- As a developer, where do I need to write code?

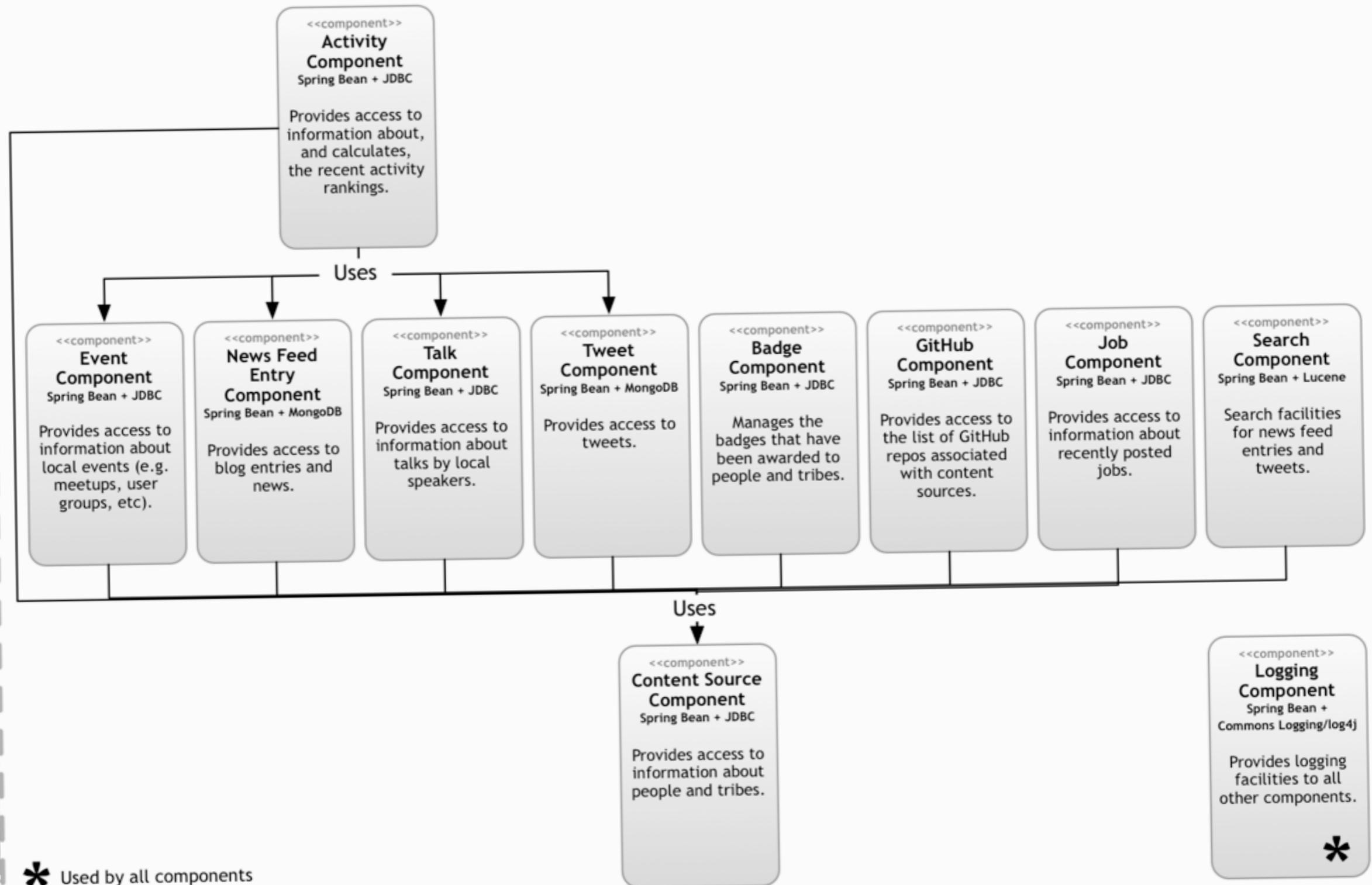


# Components

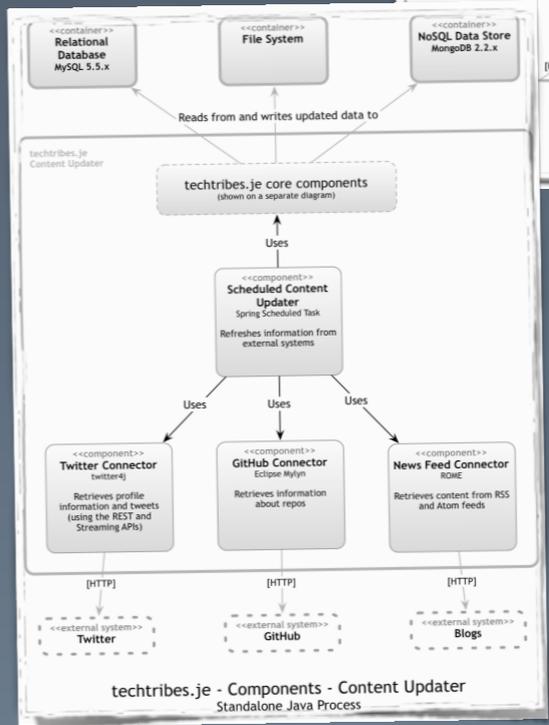
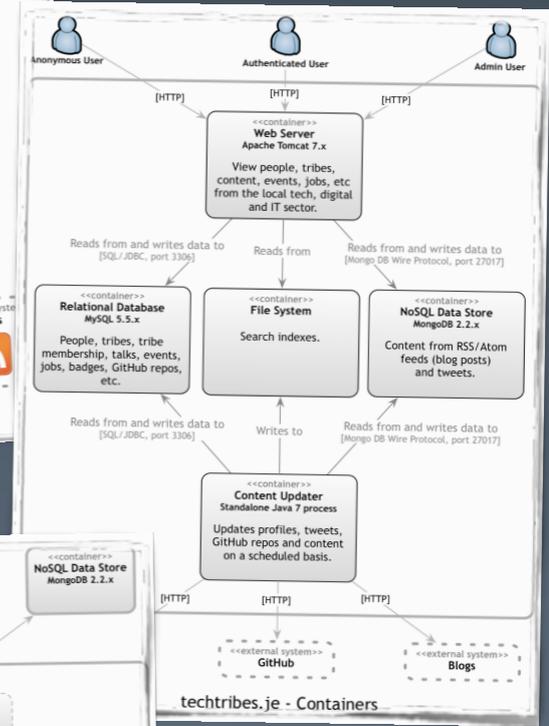
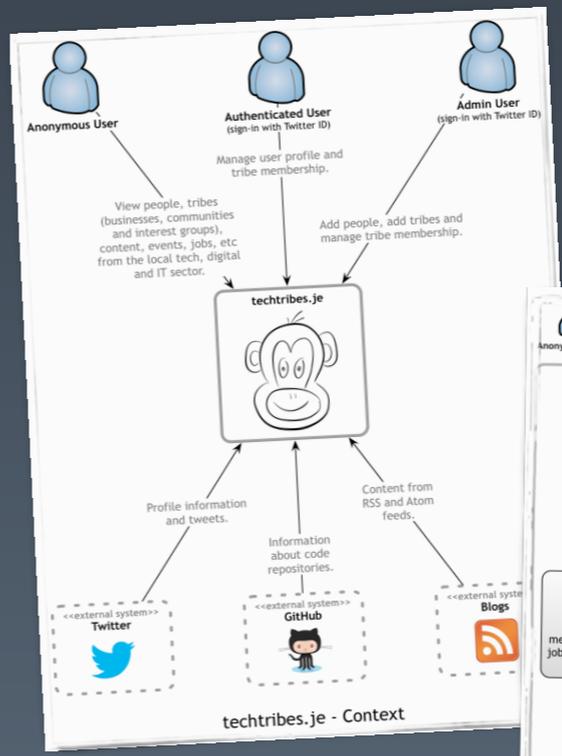
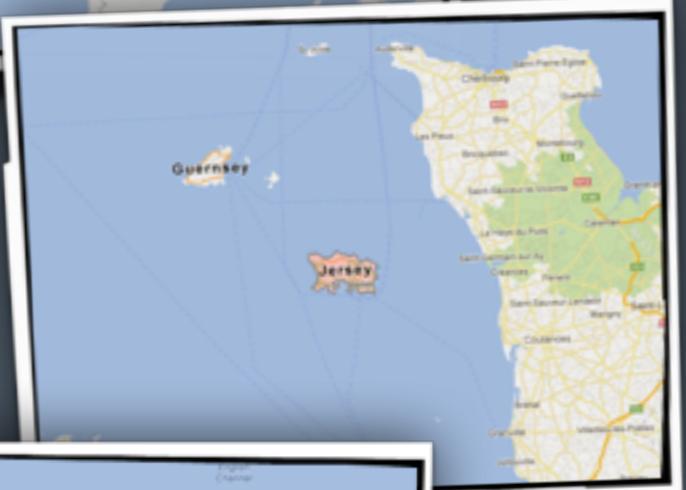
- What components/ services is the container made up of?
- Are the technology choices and responsibilities clear?



# Components



\* Used by all components



Sketches are maps that help a team navigate a complex codebase

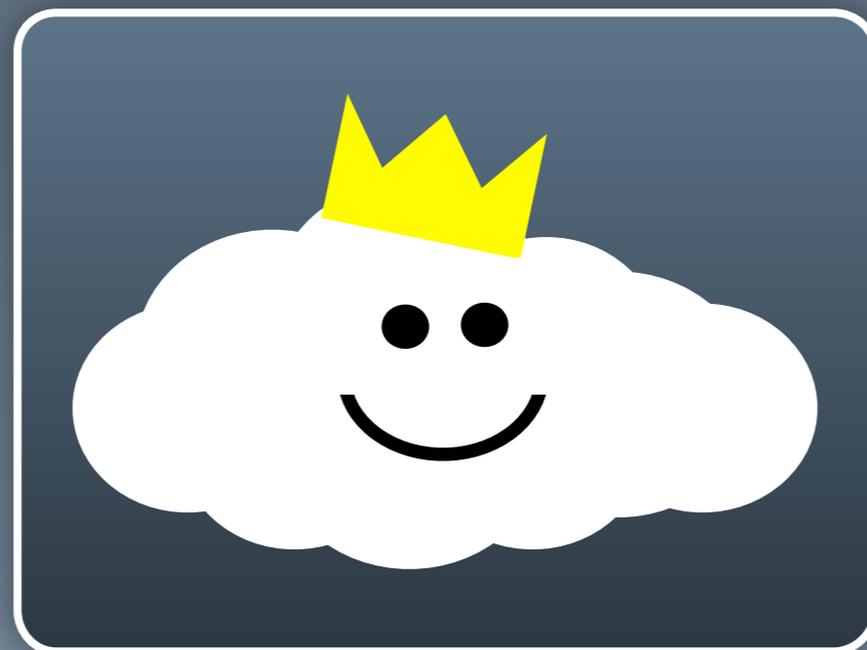
Code

There's a common misconception  
that software architecture should be

conceptual

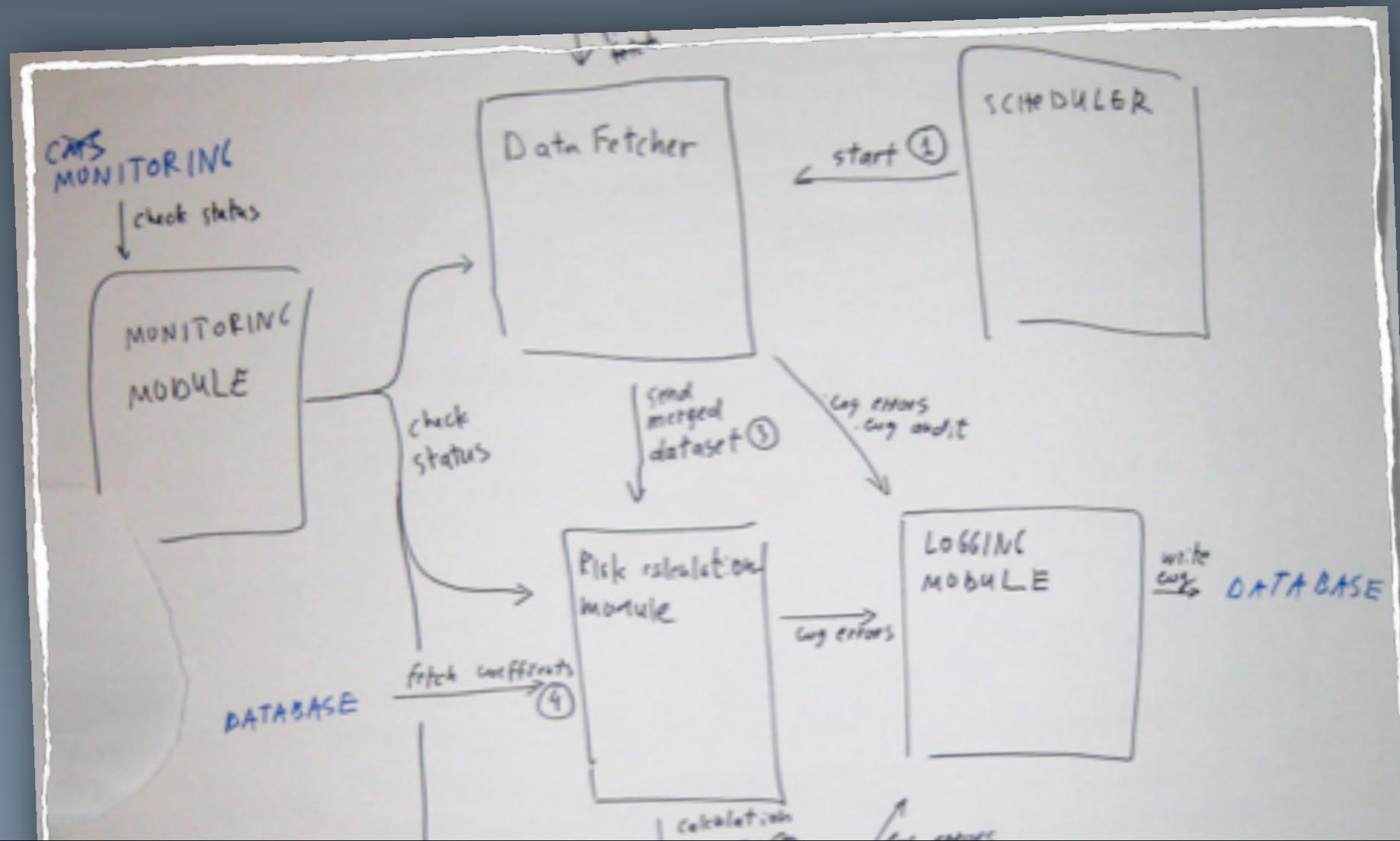
and

exclude technology



# Abstraction

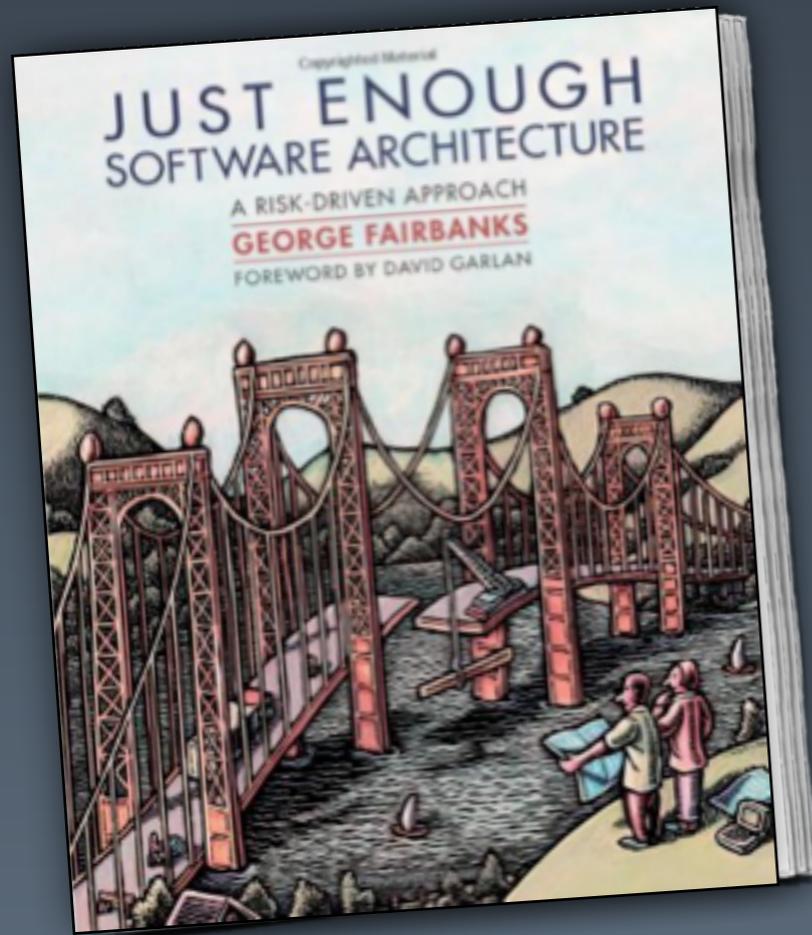
is about reducing detail rather than creating a different representation



The code is the  
**embodiment**  
of the architecture

Does your code reflect the  
**abstractions**  
that you think about?

We often think  
in components  
but write classes



# Just Enough Software Architecture

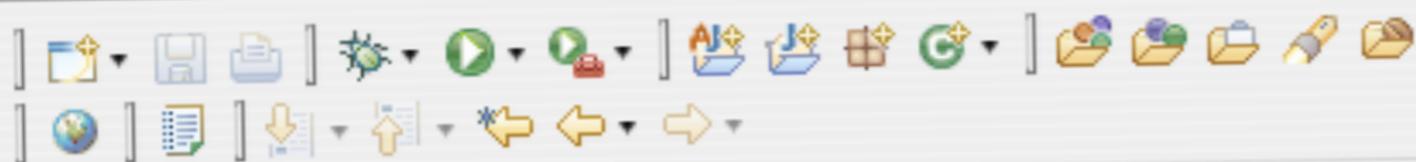
## A Risk-Driven Approach

George Fairbanks



“the model-code gap”  
and an  
“architecturally-evident  
coding style”

(subclassing, naming conventions, module dependencies, package structure, ...)



Package Explorer JUnit

- ▼ springapp
  - ▼ src
    - ▼ springapp.domain
      - ▶ Product.java
    - ▼ springapp.repository
      - ▶ JdbcProductDao.java
      - ▶ ProductDao.java
    - ▼ springapp.service
      - ▶ PriceIncrease.java
      - ▶ PriceIncreaseValidator.java
      - ▶ ProductManager.java
      - ▶ SimpleProductManager.java
    - ▶ springapp.web
  - ▶ test
  - ▶ JRE System Library [JVM 1.5.0 (MacOS X Default)]
  - ▶ Referenced Libraries
  - ▶ db
  - ▼ war
    - ▼ WEB-INF
      - ▼ classes
        - ▶ springapp
        - ▶ jdbc.properties
        - ▶ messages.properties
      - ▼ jsp
        - ▶ hello.jsp
        - ▶ include.jsp

1 Answer

active oldest votes

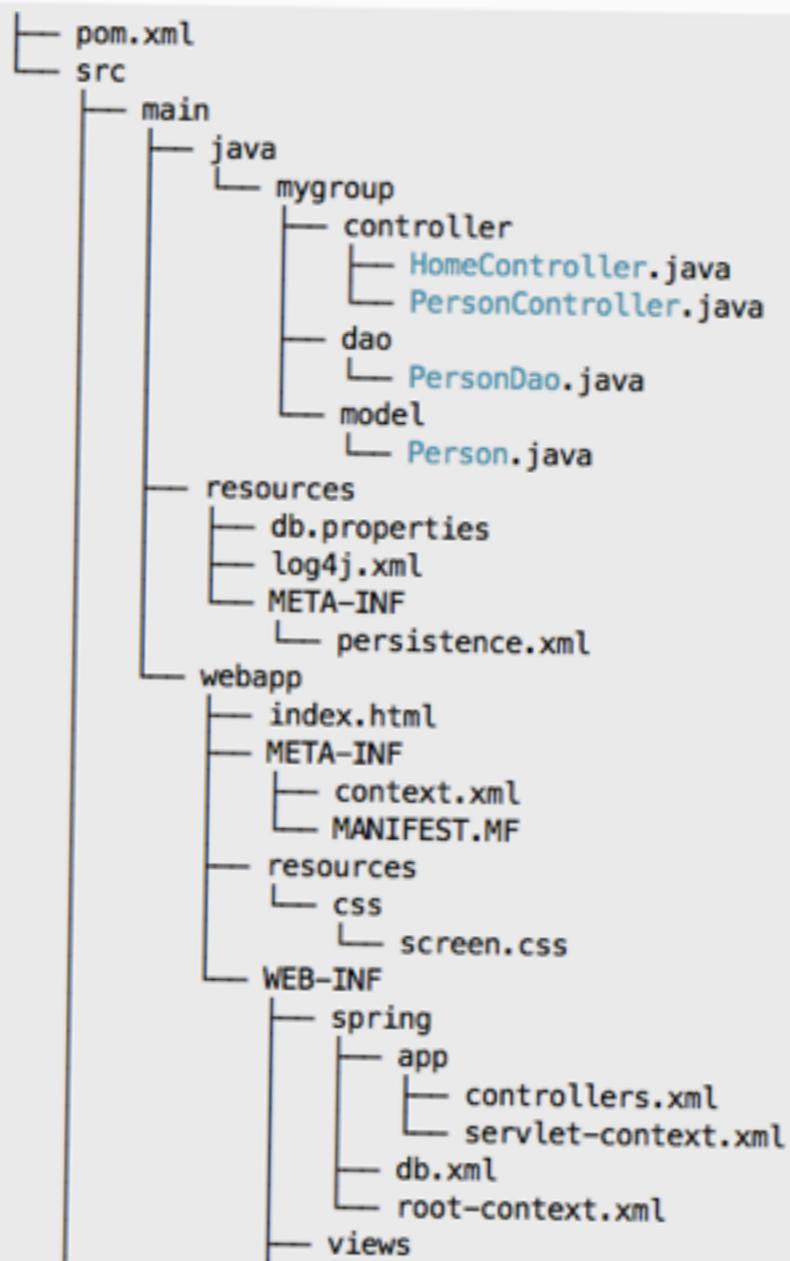


If you are using maven, it's best to follow the standard maven project layout. You can get maven to generate this structure for you by doing,

```
mvn archetype:generate
```

and select spring-mvc-jpa-archetype from the list of choices

This will give you a package structure like,



Technical Operations Engineer,  
Devops, Cloud Systems and AWS  
Voyanta  
London, United Kingdom

Linux Service Engineers  
Shazam  
London, United Kingdom

3 x Senior Engineer (Ruby) 3  
month+ contract  
We are Friday Limited  
London, United Kingdom

[More jobs near London...](#)

Related

- 2 How do I use a custom authentication mechanism for a Java web application with Spring Security?
- 0 Is there a sample web project of integrating Spring-MVC and Spring-Data-JPA?
- 1 Reusing DAOs in another web application
- 0 Java Web Application Warming
- 3 Is a parallel Spring-MVC application possible with a non-spring web app?
- 2 Adding a web interface (Spring MVC) to existing Java application
- 0 package structure for Spring MVC project with multiple sub projects using maven
- 0 How to add a setup



HomeController.cs

MvcMovie.Controllers.HomeCont Index()

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.Mvc;

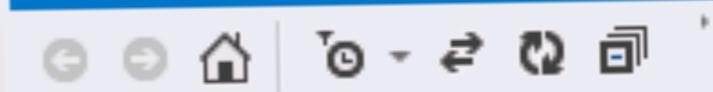
namespace MvcMovie.Controllers
{
    public class HomeController : Controller
    {
        public ActionResult Index()
        {
            ViewBag.Message = "Modify this template to create your app's home page."

            return View();
        }

        public ActionResult About()
        {
            ViewBag.Message = "Your app description here."

            return View();
        }
    }
}
```

Solution Explorer



Search Solution Explorer (Ctrl+;)

- Solution 'MvcMovie' (1 project)
- MvcMovie**
  - Properties
  - References
  - App\_Data
  - App\_Start
  - Content
  - Controllers
  - Filters
  - Images
  - Models
  - Scripts
  - Views
  - favicon.ico
  - Global.asax
  - packages.config
  - Web.config

100 %

Do OO programming languages provide the wrong abstractions for building modern software systems?

## Creating and Using Packages

To make types easier to find and use, to avoid naming conflicts, and to control access, programmers bundle groups of related types into packages.

---

**Definition:** A *package* is a grouping of related types providing access protection and name space management. Note that *types* refers to classes, interfaces, enumerations, and annotation types. Enumerations and annotation types are special kinds of classes and interfaces, respectively, so *types* are often referred to in this lesson simply as *classes and interfaces*.

---

The types that are part of the Java platform are members of various packages that bundle classes by function: fundamental classes are in `java.lang`, classes for reading and writing (input and output) are in `java.io`, and so on. You can put your types in packages too.

What's a package?

Should packages be  
considered  
harmful?

Should layers be  
**considered**  
**harmful?**

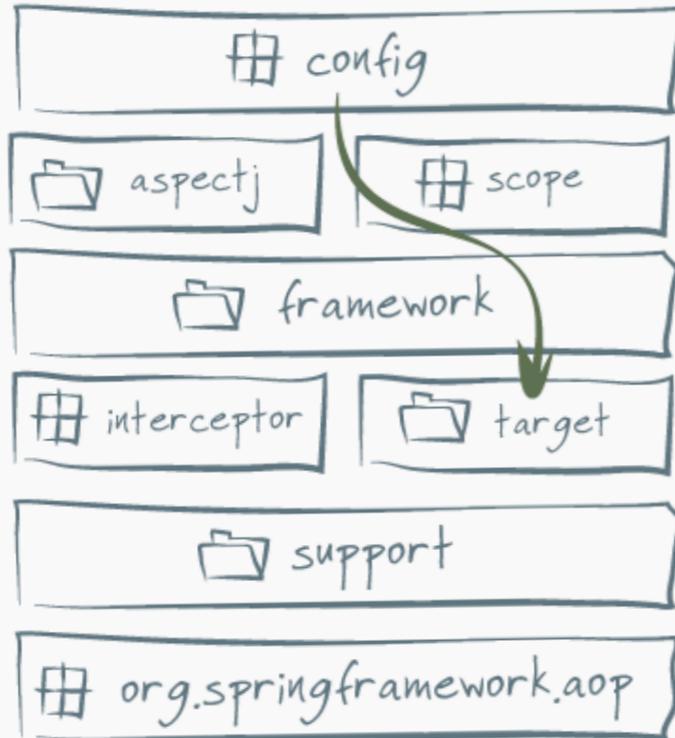
Diagramming tools see

packages

and classes

rather than components

## Architecture



### Diagrams & rules

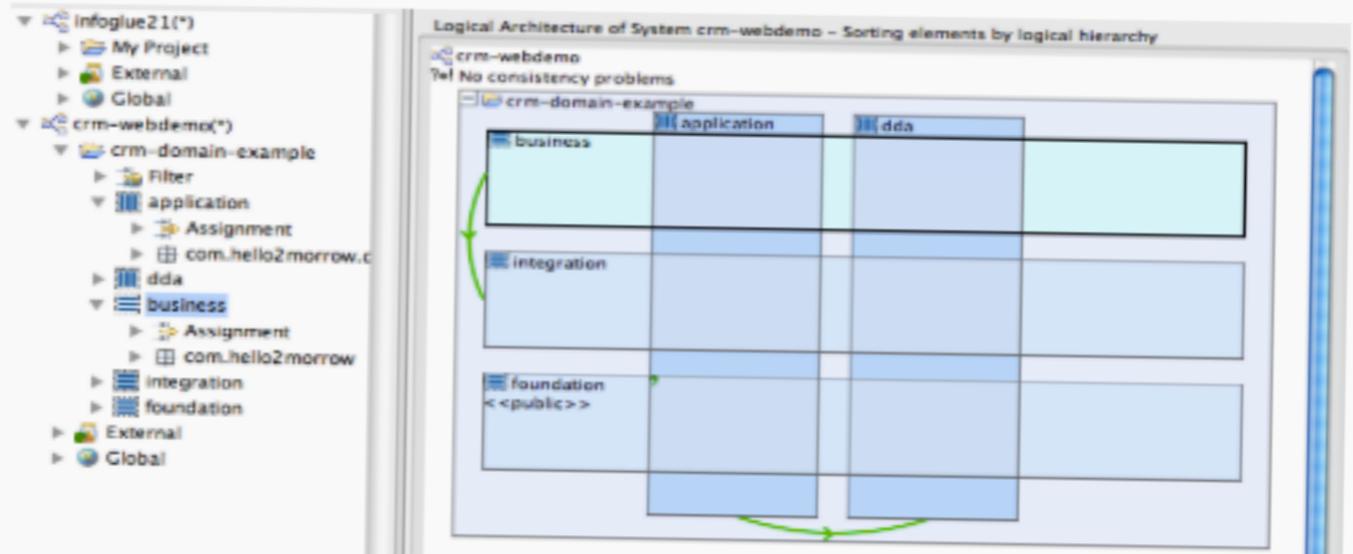
Define your desired architecture with Structure101's semantically rich, intuitive, layered block architecture diagrams, present it to your developers through our IDE plugin and enforce it by integrating into your build.

### Design

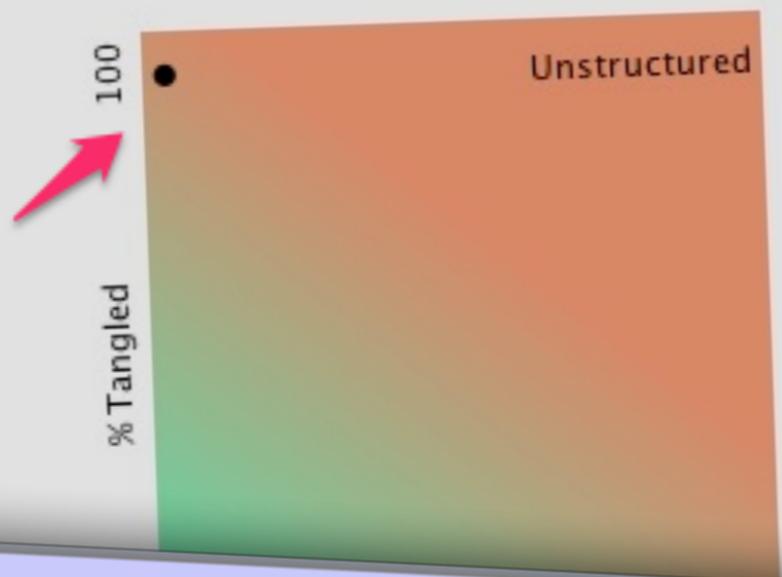
#### Define and Enforce Architecture

Sonargraph-Architect is designed to simplify software architecture and dependency management. You begin by defining the intended logical architecture of your system and map it to your code. A logical architecture is a set of rules designating allowed and forbidden dependencies in your code. Typical rules would be "the UI layer is not allowed to directly access the DAO layer" or "the UI layer cannot use JDBC directly".

Once defined, our IDE plugins (for Eclipse or IntelliJ IDEA) check every code change for rule compliance. Violating code lines will be marked with error markers so that developers are able to fix rule violations even before they commit their changes to the version control system. If you are not using Eclipse or IntelliJ, you can always use Sonargraph-Architect standalone for immediate rule checking. Moreover Sonargraph-Architect integrates with ANT and Maven so that architecture rules can also be enforced in your build process.



### Structural over-complexity



### Levelized Structure Map (LSM)



org.apache.tools

- ant.taskdefs
- ant
  - load...
  - input
  - listener
  - help
  - filter
- util
- types
- \*
- UTILITIES

\$root	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
cvslib	1														
compilers	2				4										
rmic	3				10										
condition	4				47						6	1	2		
email	5				3		23								
*	6	50	61	41	6		9								33
loader	7														
listener	8														
helper	9														
input	10				4								1	2	
filters	11				7									10	
util	12				25								16	48	
types	13	3	13	5	3	1	284	3	2	18	2	33		52	64
*	14	5	297	67	4	8	1378					88	95		49
UTILITIES	15	66	79	59	69	75	2800	5	18	300	18	60	175	585	
					14	123		10						10	



Sonargraph-Architect

Logical Package Physical

Dashboard (!) Summary (!) Workspace Architecture Exploration Dependencies Cycles Duplicate Code Source

Show all dependencies

Physical Architecture of 'tt' - Sorting elements by logical hierarchy; highlighting outgoing restrictions

tt

?! No consistency warnings

- My Project
  - (Default B...
- External
- Global

My Project

- Filter
- je.techtribes
  - component
  - domain
  - updater
  - util
- External
- Global

Ready

Sonargraph-Architect

Logical Package Physical

Dashboard (!) Summary (!) Workspace Architecture Exploration Dependencies Cycles Duplicate Code Source

Show default dependence:

Exploration (Logical Structure, Displaying Layers)

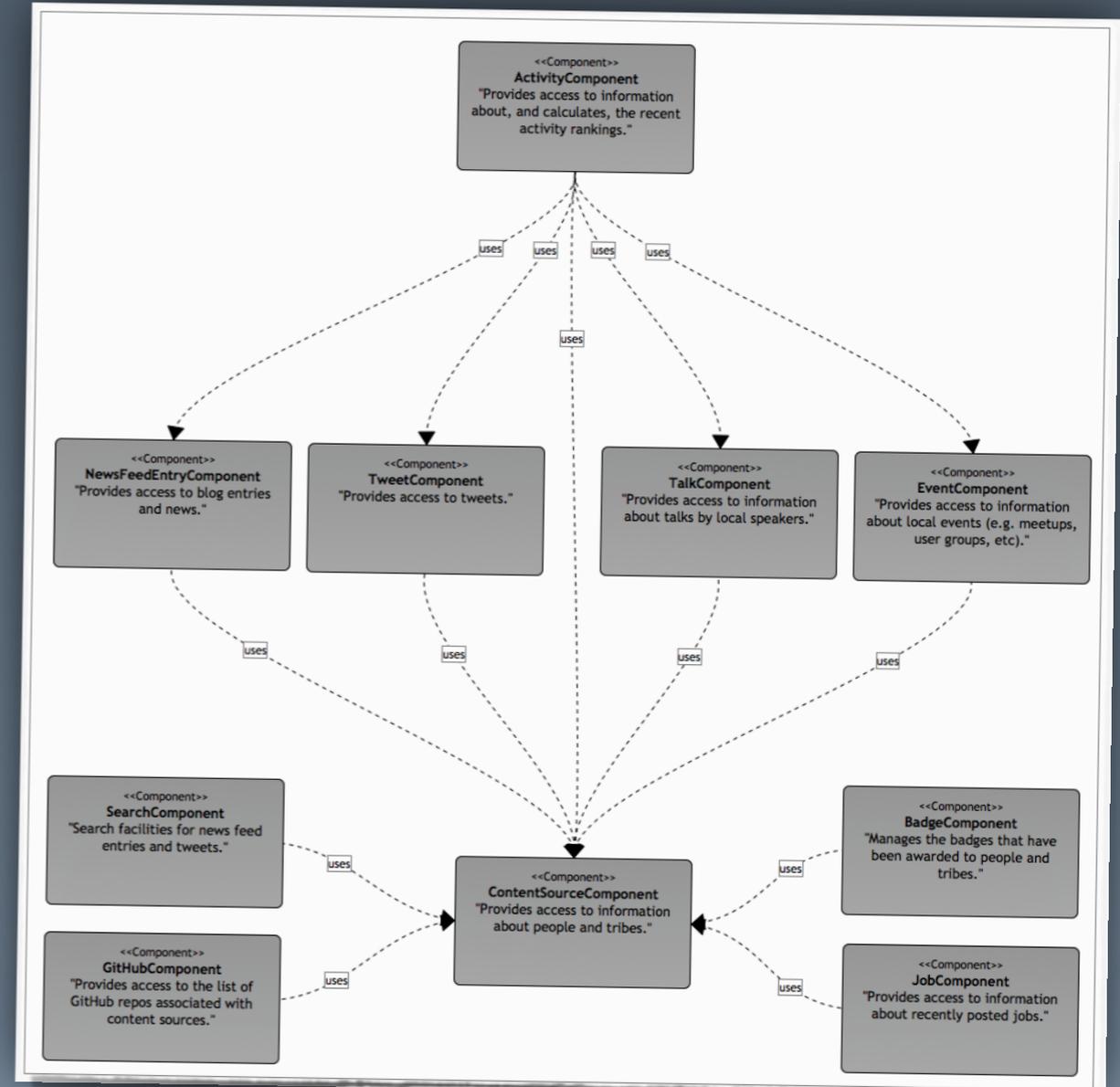
Logical structure of system 'tt'

- My Project
  - je.techtribes
    - updater
    - component
      - job
      - scheduledcontentupdater
      - search
      - twitterconnector
      - badge
      - activity
      - tweet
      - newsfeedentry
      - talk
      - github
      - githubconnector
      - newsfeedconnector
      - event
      - contentsource
      - log
    - util
    - domain
  - External

- updater
- job
- scheduledcontentupdater
- search
- twitterconnector
- badge
- activity
- tweet
- newsfeedentry
- talk
- github
- githubconnector
- newsfeedconnector
- event
- contentsource
- log
- util
- domain
- External

Ready

It's 2013, why  
can't we  
auto-generate  
a decent set of  
software  
architecture  
diagrams?!



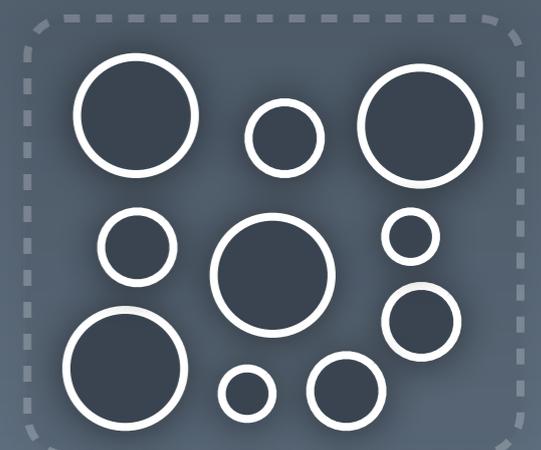
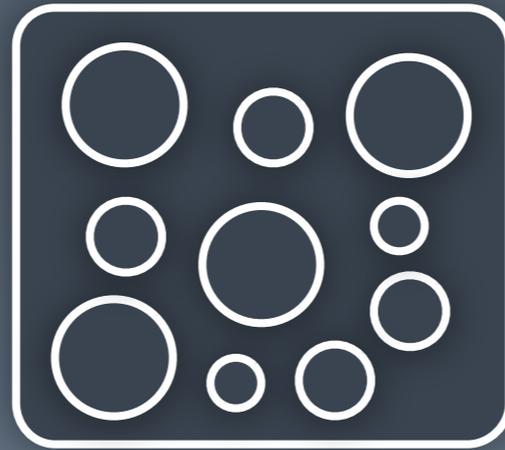
# Aligning software architecture and code

A good  
architecture  
enables

*agility*

Monolithic  
architecture

Service-based  
architecture  
(SOA, micro-services, etc)



Something in between  
(components)



Inspect

and

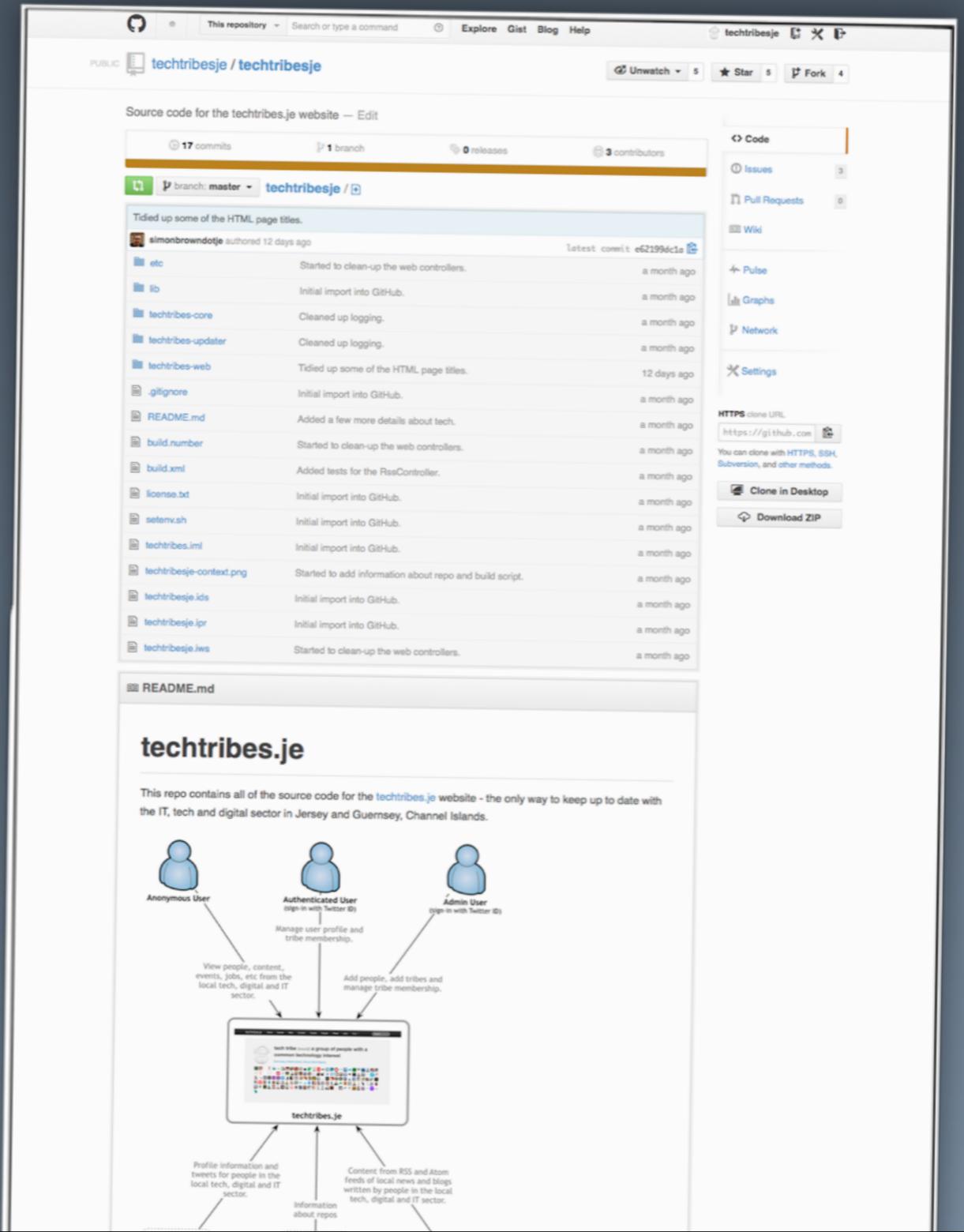
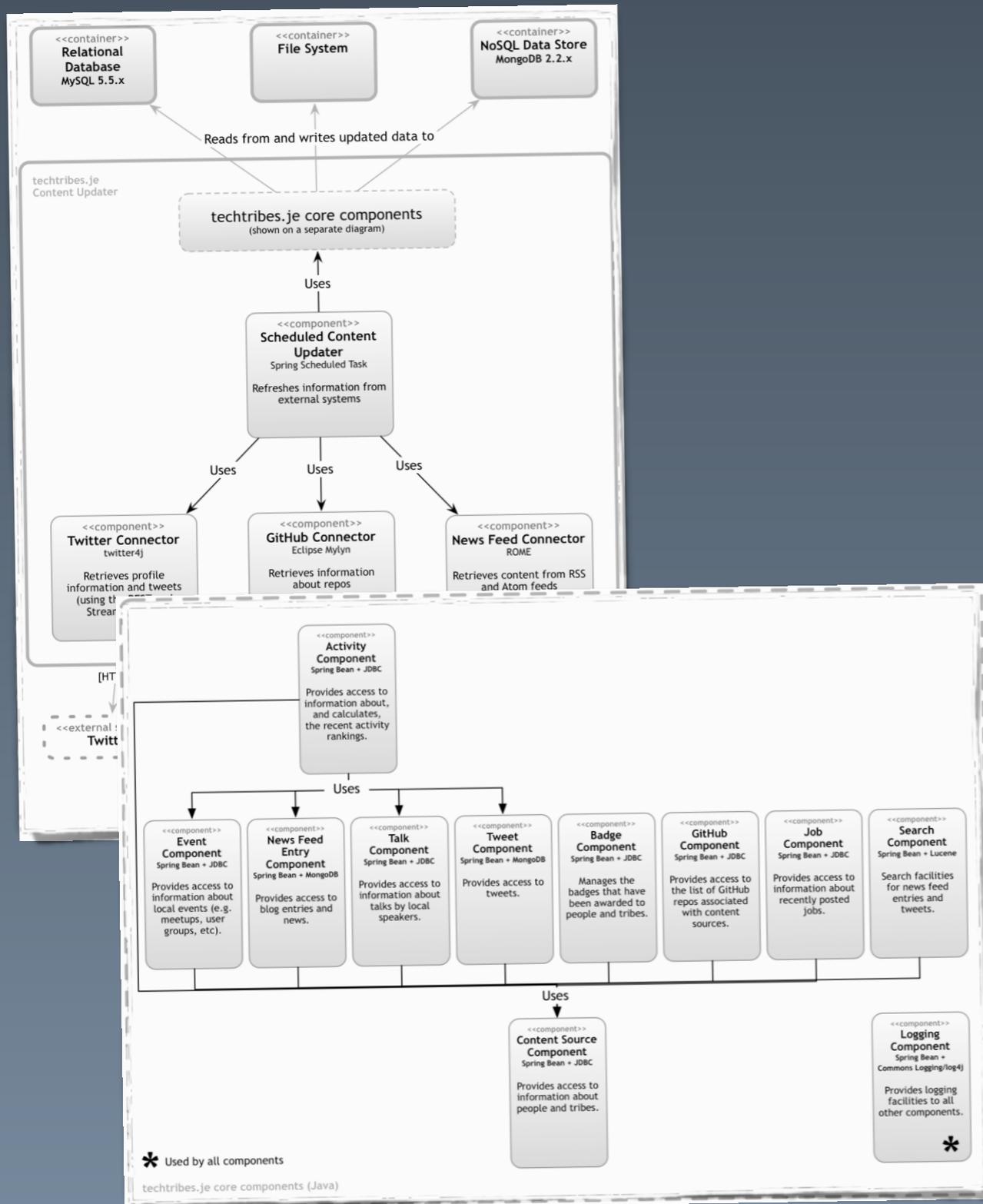
Adapt

How do we inspect  
**an existing**  
software architecture?

How do we adapt  
**an existing**  
software architecture?

Is architectural  
refactoring **hard?**

# Does your code reflect the abstractions that appear on your software architecture diagrams?



If the answer is  
“no” ... are the  
diagrams actually  
useful?

Does the code for  
techtribes.je  
reflect the abstractions  
on the software  
architecture diagrams?

https://github.com/techtribesje/techtribesje



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Source code for the techtribesje website — Edit

17 commits 1 branch 0 releases 3 contributors

branch: master techtribesje

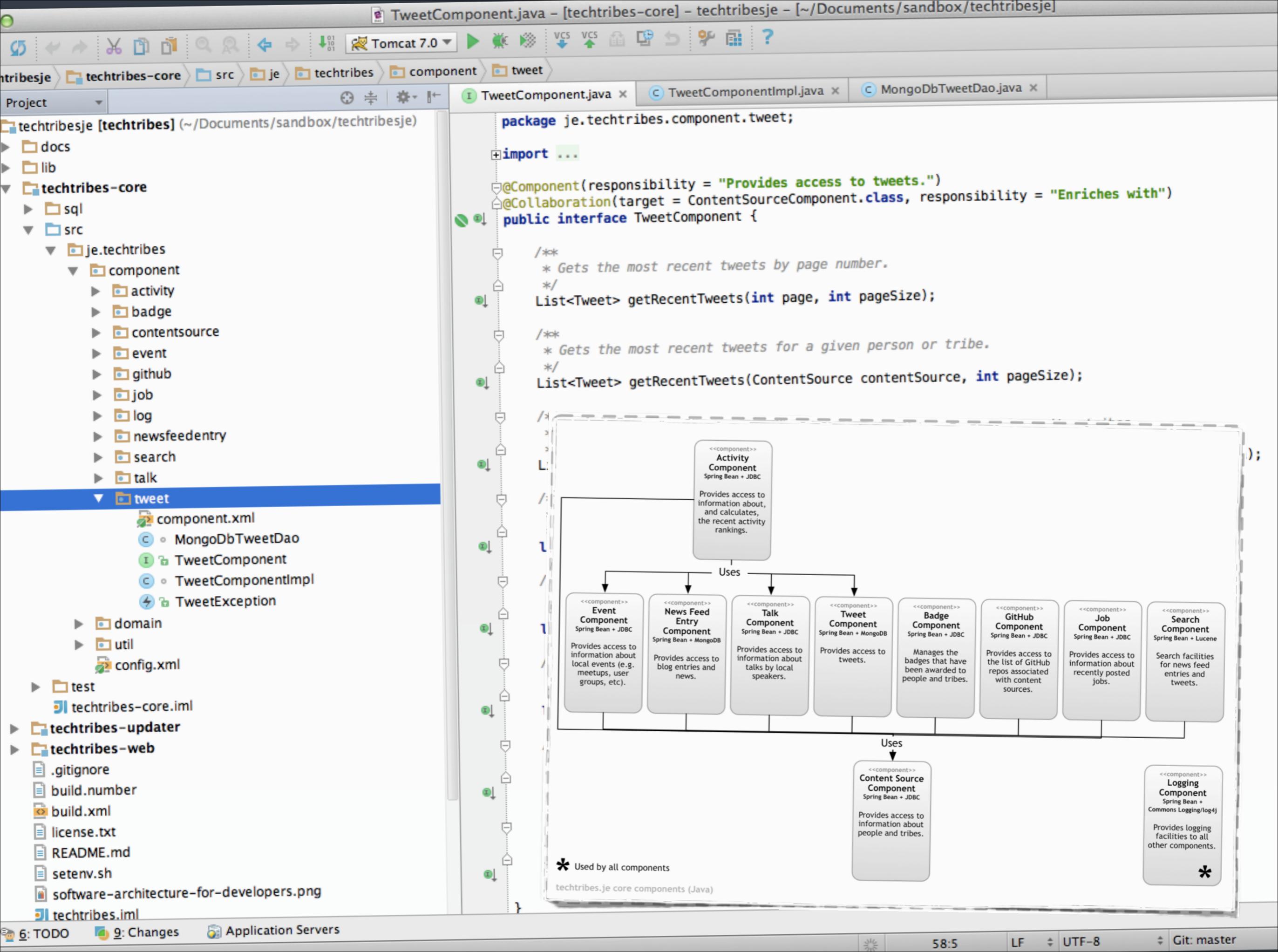
Tidied up some of the HTML page titles.  
simonbrowndotje authored 12 days ago latest commit e62199dc1a

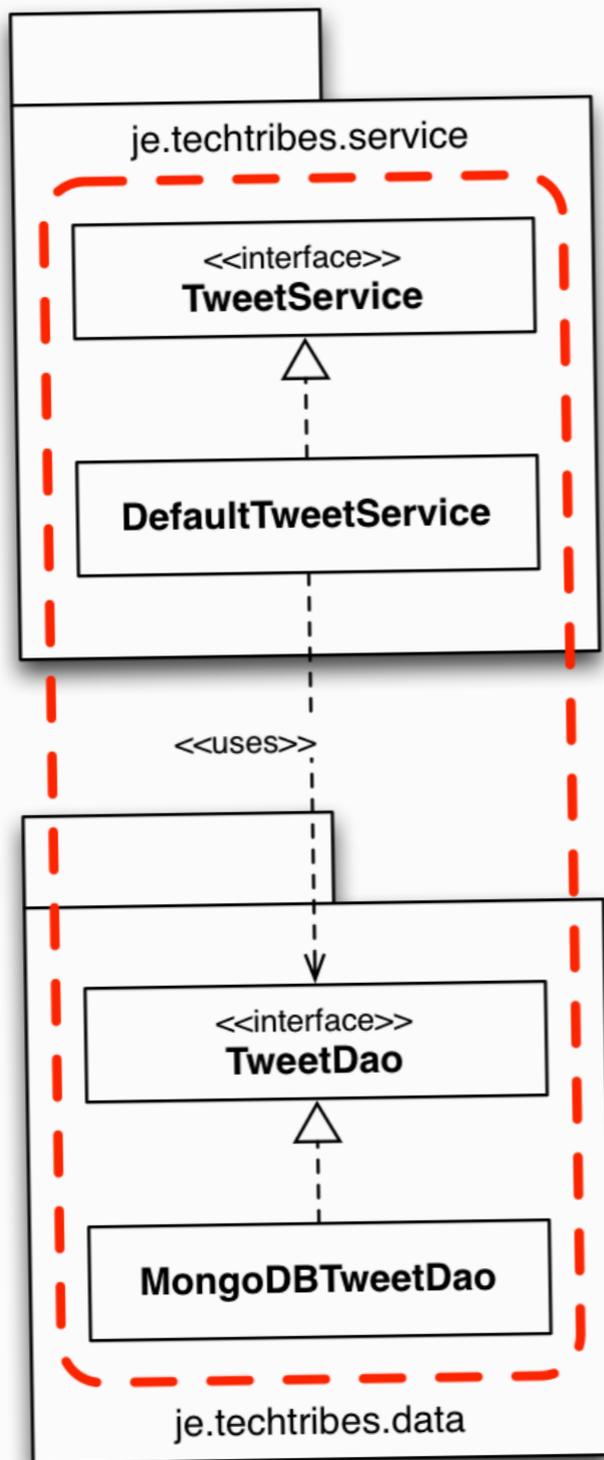
etc	Started to clean-up the web controllers.	a month ago
lib	Initial import into GitHub.	a month ago
techtribes-core	Cleaned up logging.	a month ago
techtribes-updater	Cleaned up logging.	a month ago
techtribes-web	Tidied up some of the HTML page titles.	12 days ago
.gitignore	Initial import into GitHub.	a month ago
README.md	Added a few more details about tech.	a month ago
build.number	Started to clean-up the web controllers.	a month ago
build.xml	Added tests for the RssController.	a month ago
license.txt	Initial import into GitHub.	a month ago
setenv.sh	Initial import into GitHub.	a month ago
techtribes.iml	Initial import into GitHub.	a month ago
techtribesje-context.png	Started to add information about repo and build script.	a month ago
techtribesje.ids	Initial import into GitHub.	a month ago
techtribesje.ipr	Initial import into GitHub.	a month ago
techtribesje.jws	Started to clean-up the web controllers.	a month ago

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README.md





A component is often a combination of a number of classes in different layers.

Package by layer

# What's a "component"?

Think about how to align the

software

architecture

and the

code

A *simple*  
and *explicit*  
mapping assists  
on many levels

If it's hard to explain  
the structure of your  
software system,

*change it!*



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