coding {the} architecture

Agile software architecture sketches

Simon Brown

I help software teams understand

software architecture, technical leadership and the balance with agility

(I code too)

Training

coding architecture

Software Architecture for Developers

Software architecture, technical leadership and the balance with agility

Coding, coaching, collaboration, sketching and just enough up front design

Simon Brown

Book

Speaking

simon.brown@codingthearchitecture.com

@simonbrown on Twitter

Jersey

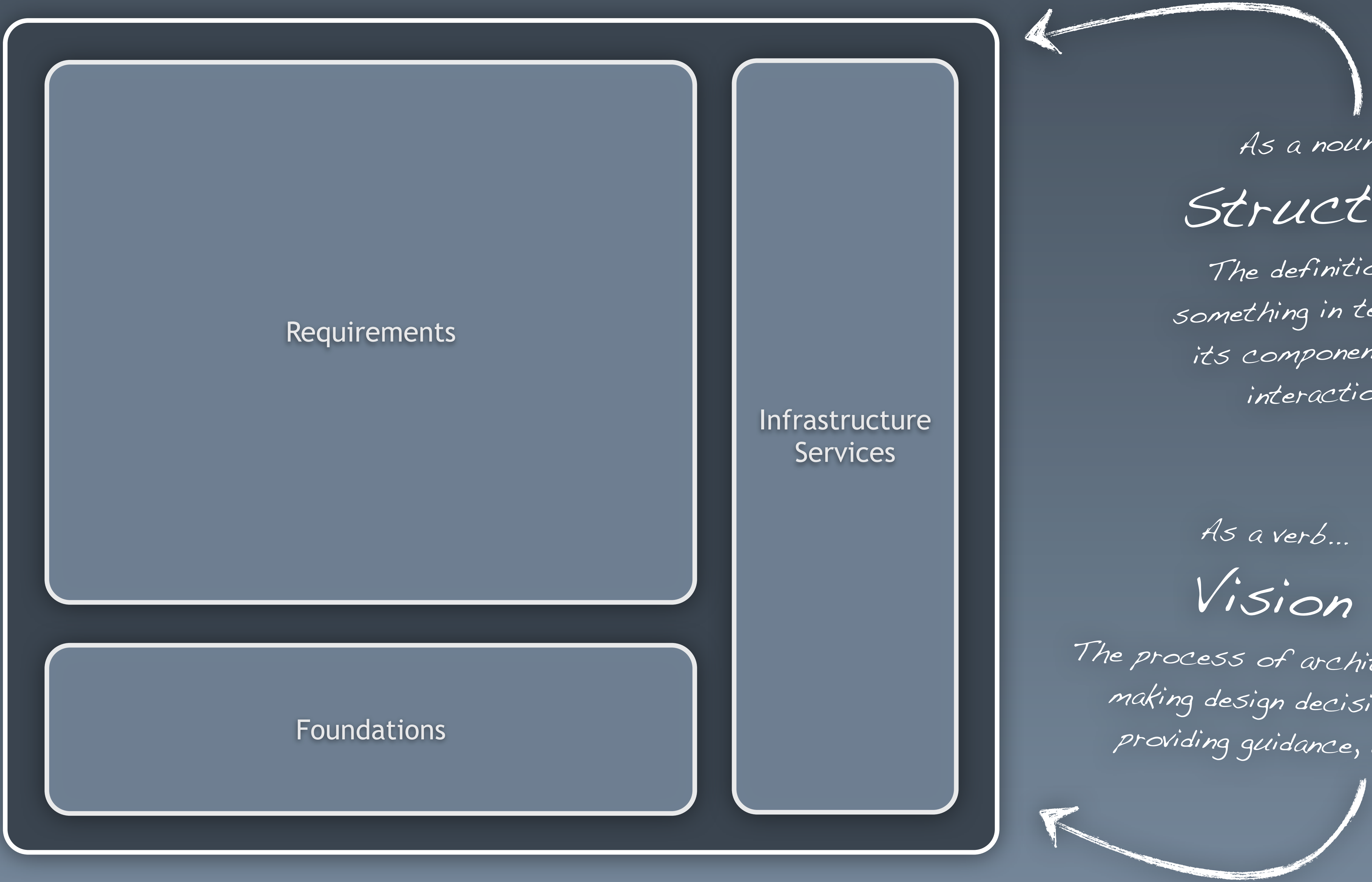
JERSEY FINANCE

VOICE OF THE INTERNATIONAL FINANCE CENTRE

DIGITAL JERSEY

Locate Jersey

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

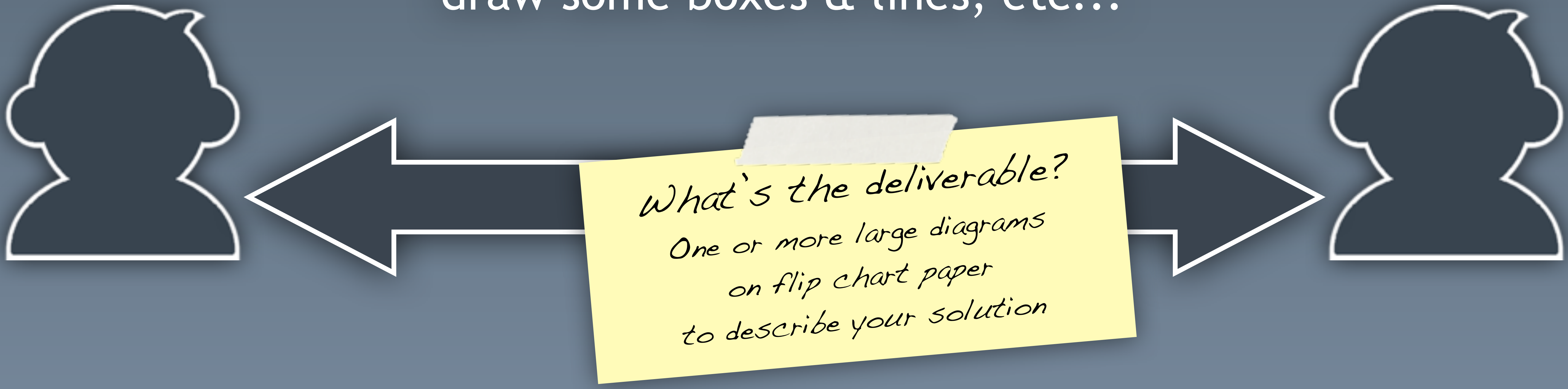
Architecture represents the **significant decisions**, where significance is measured by **cost of change**.

Grady Booch

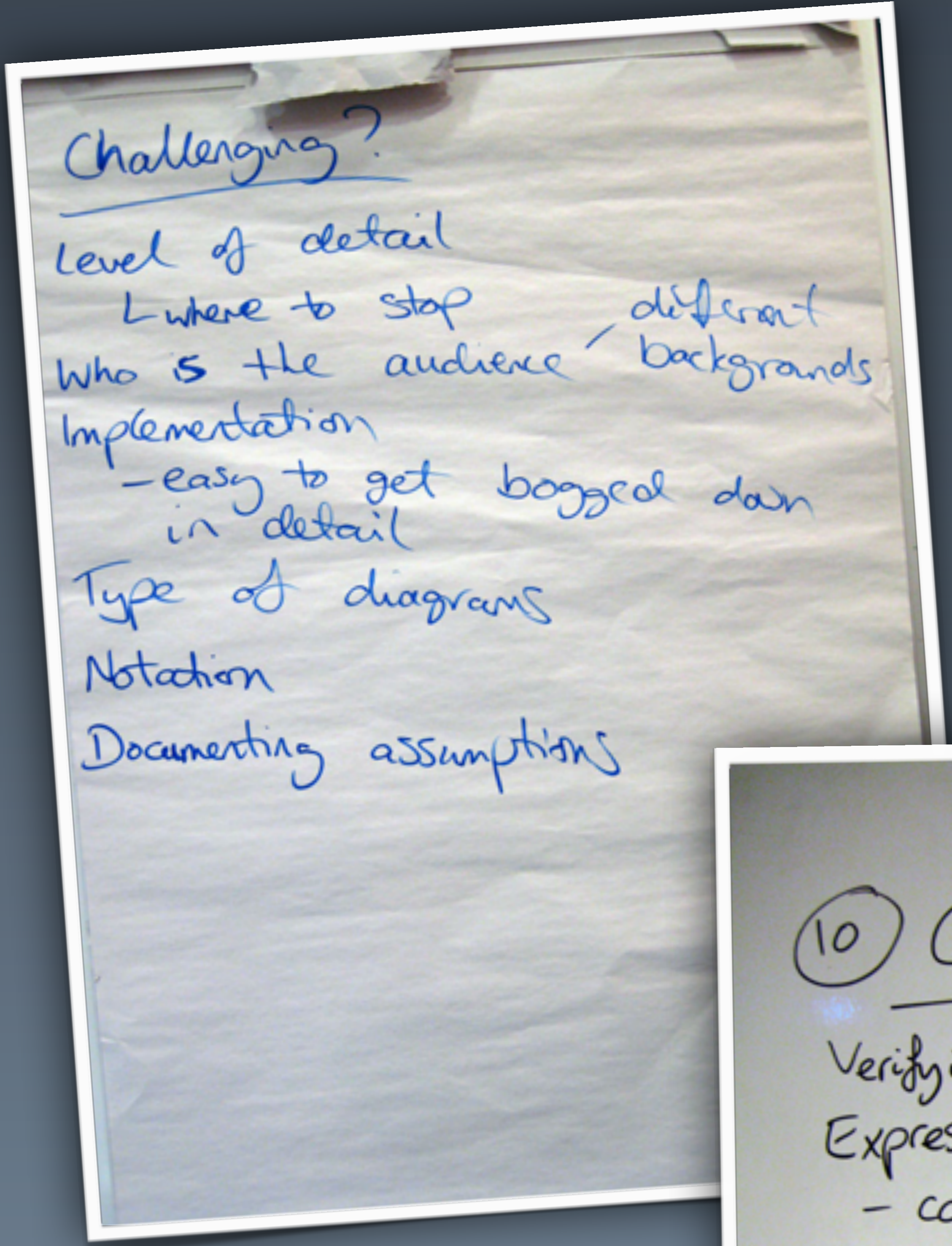
*Can you **refactor** it in an afternoon?*

Design a software solution for the financial risk system

Do some design, choose some technologies, draw some boxes & lines, etc...



What's been challenging about the exercise?


Challenging?

Level of detail
L where to stop

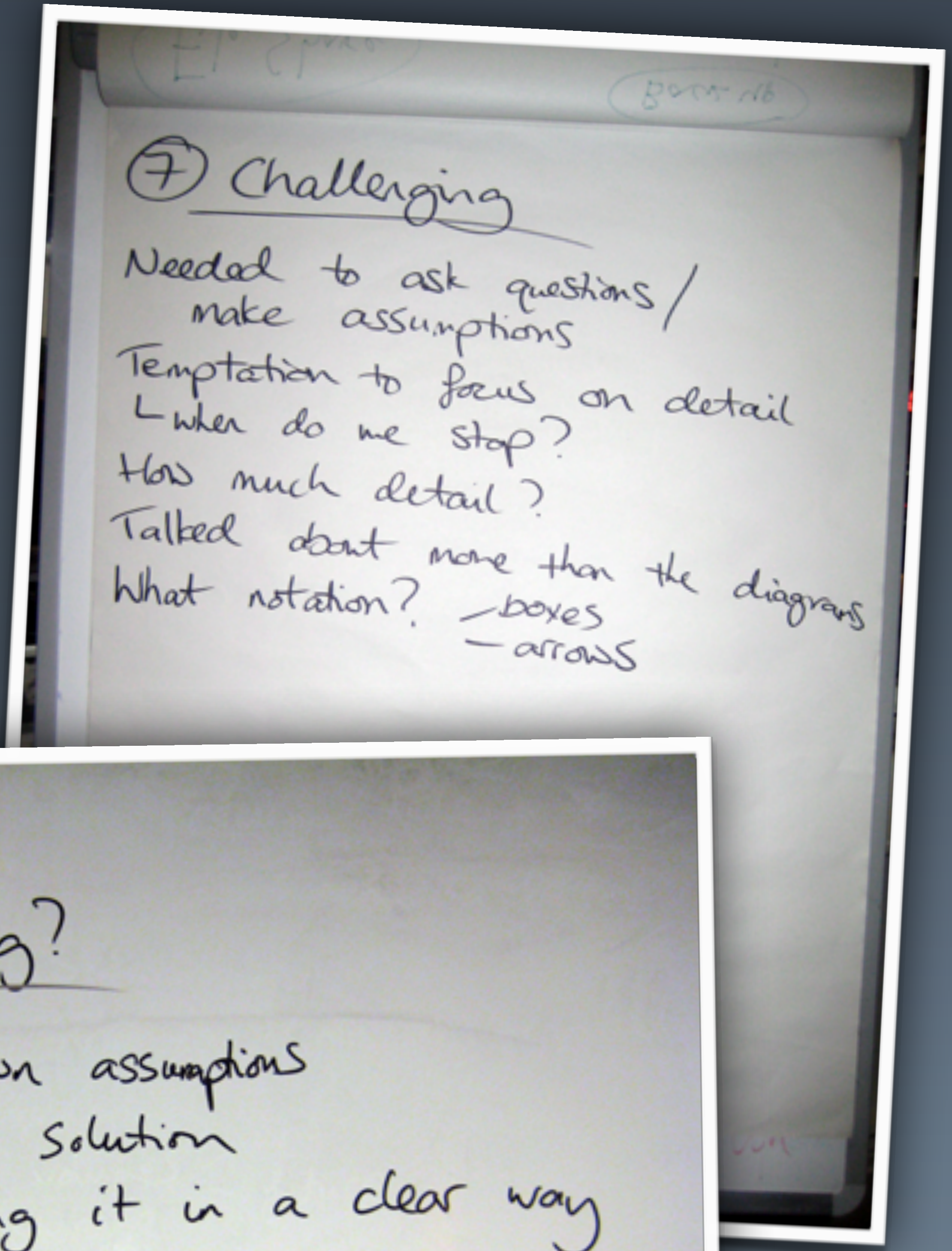
Who is the audience / different backgrounds

Implementation
- easy to get bogged down in detail

Type of diagrams

Notation

Documenting assumptions


7 Challenging

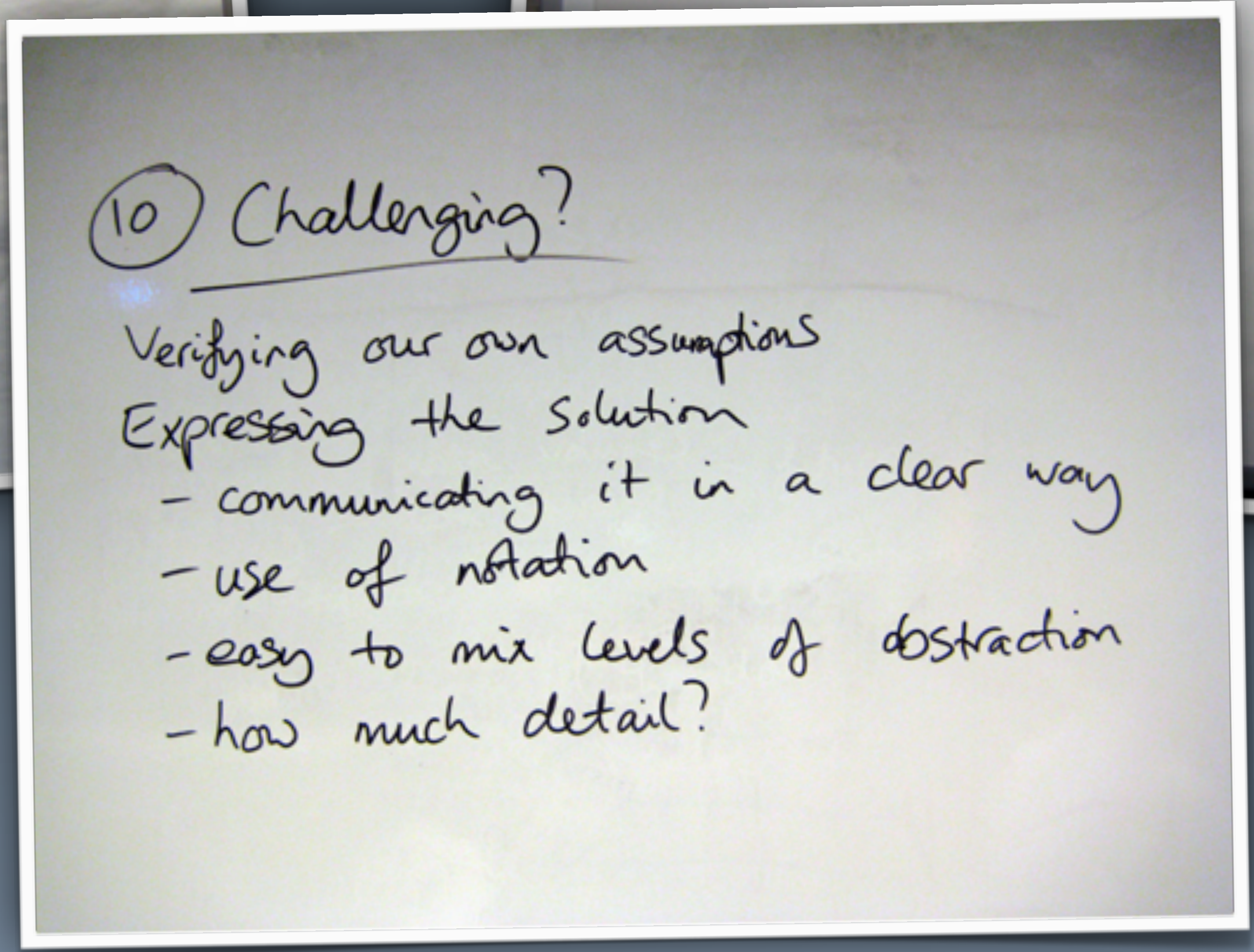
Needed to ask questions / make assumptions

Temptation to focus on detail
L 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?

Review the diagrams

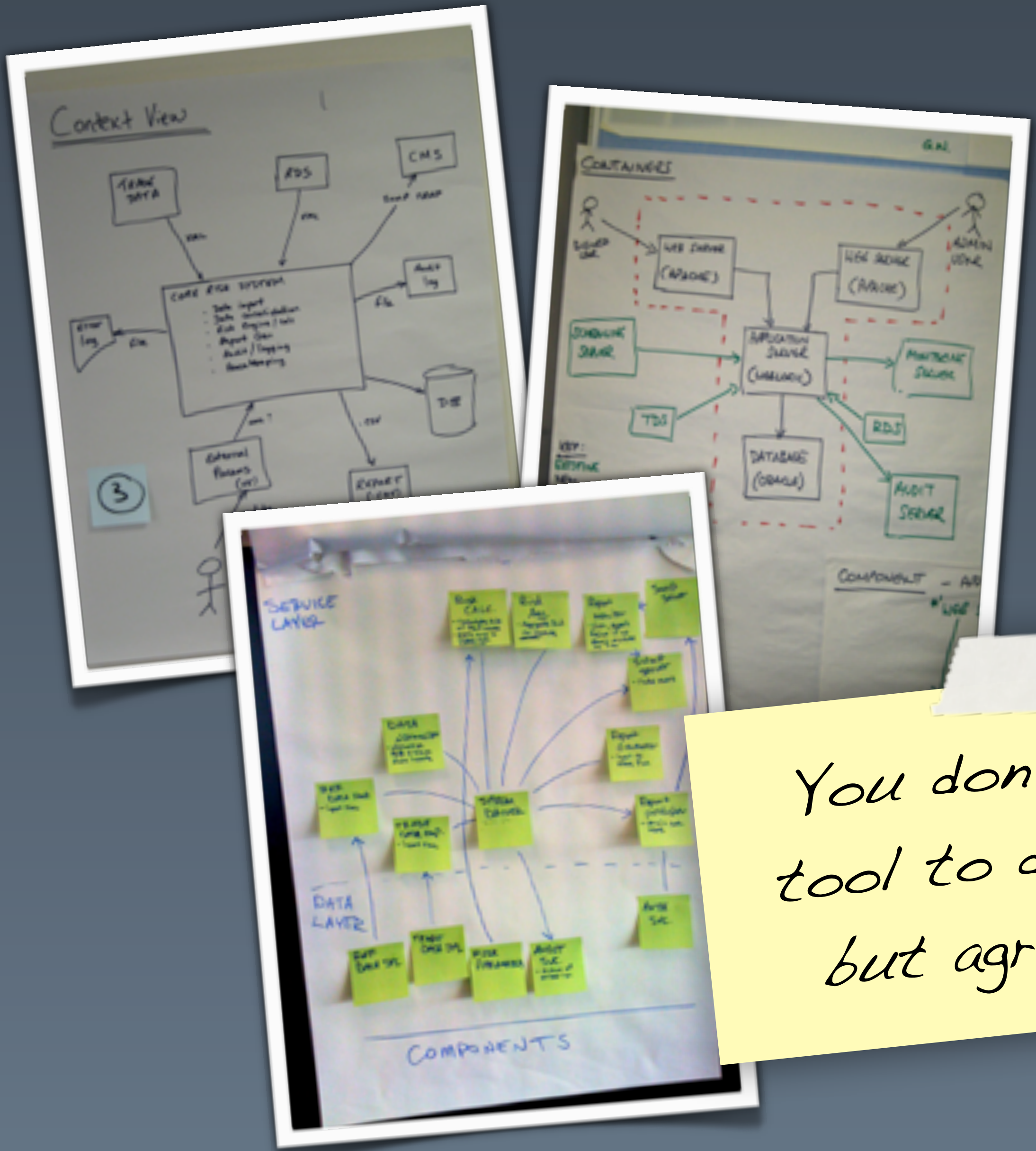
3+ things we like about the diagrams

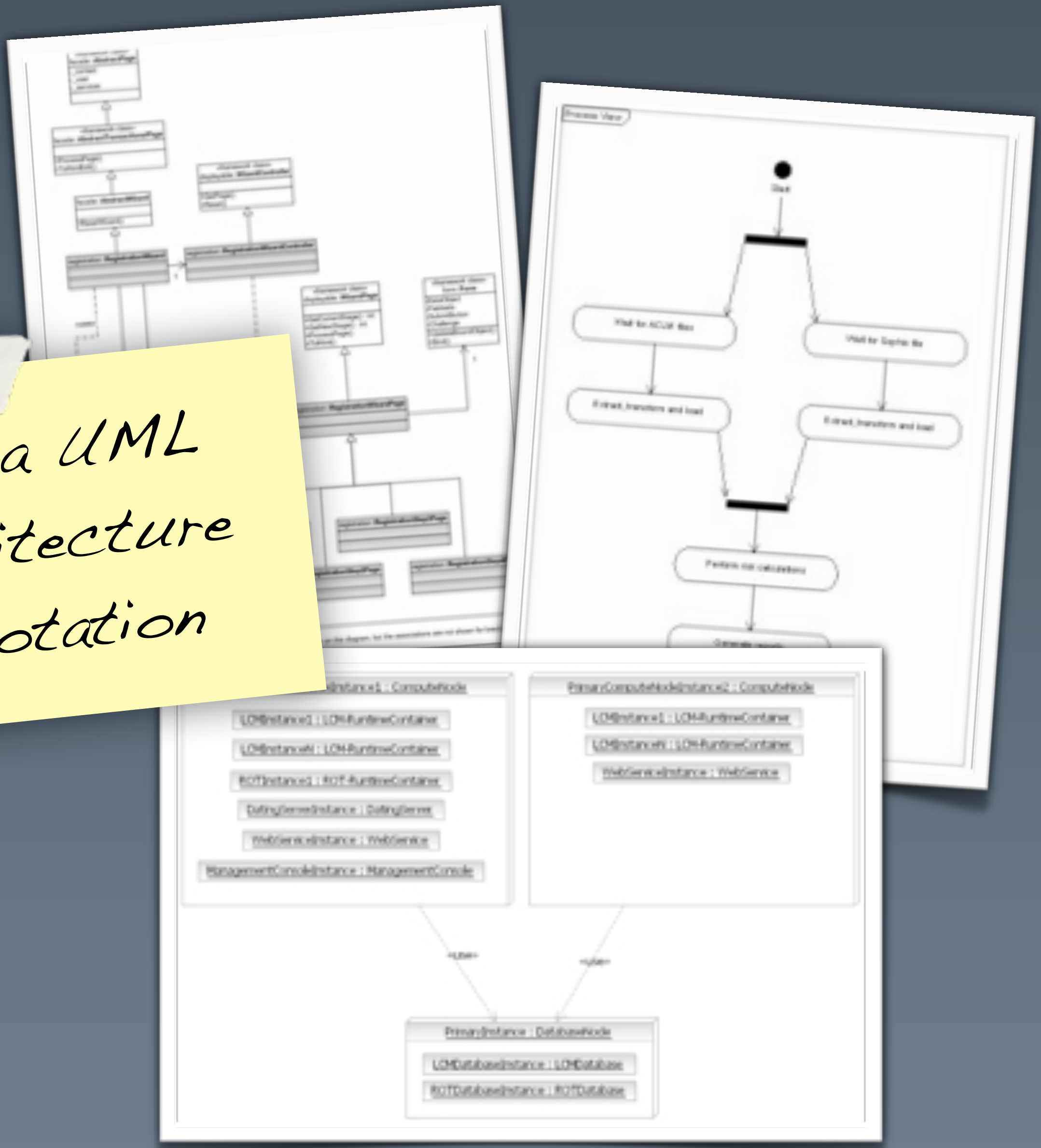
3+ things we think would improve the diagrams

People expect to present their designs and therefore

information is still stuck in their heads

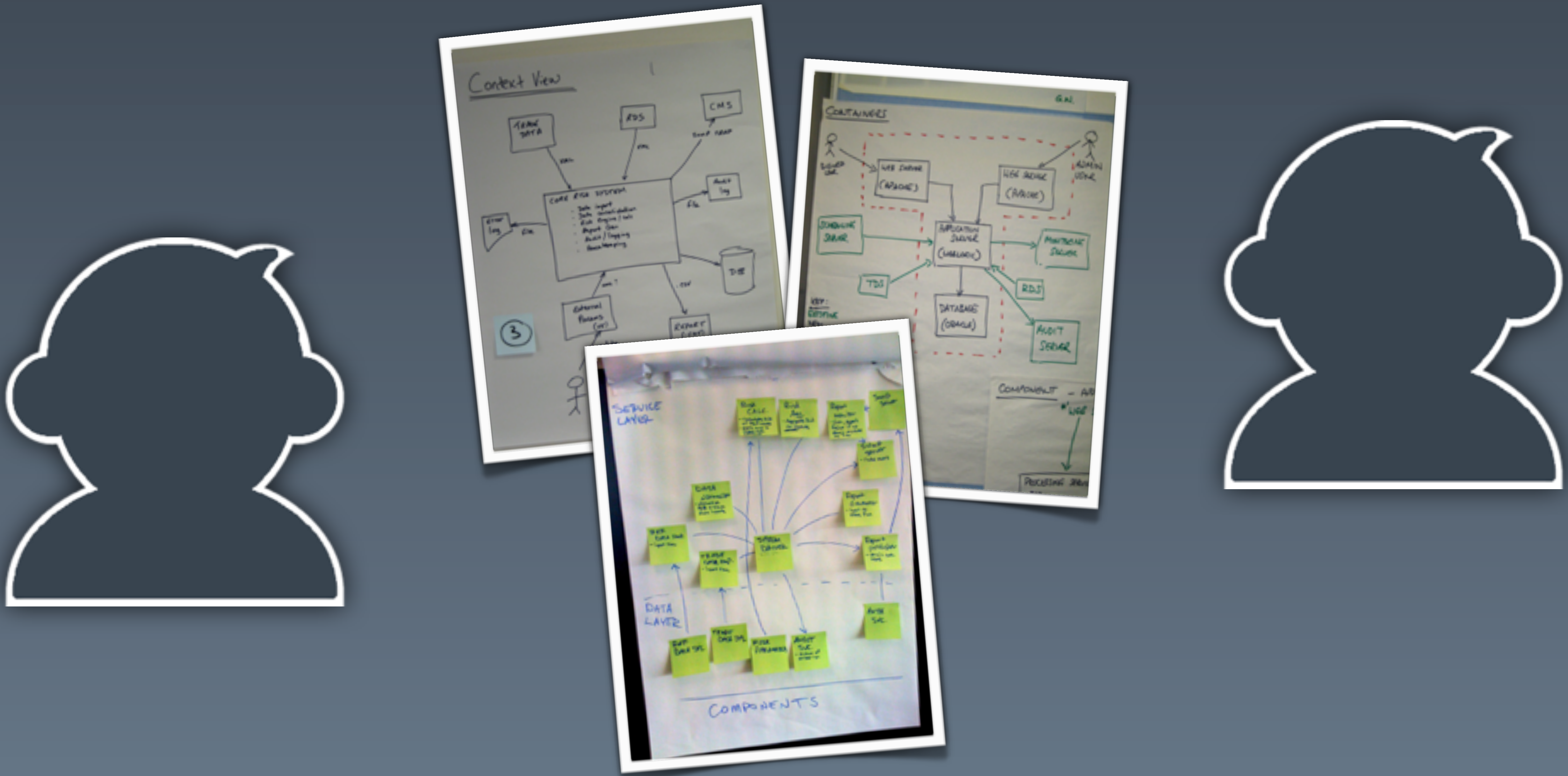
UML tool?





You don't *need* a UML tool to do architecture but agree on notation

Whiteboard or flip chart?

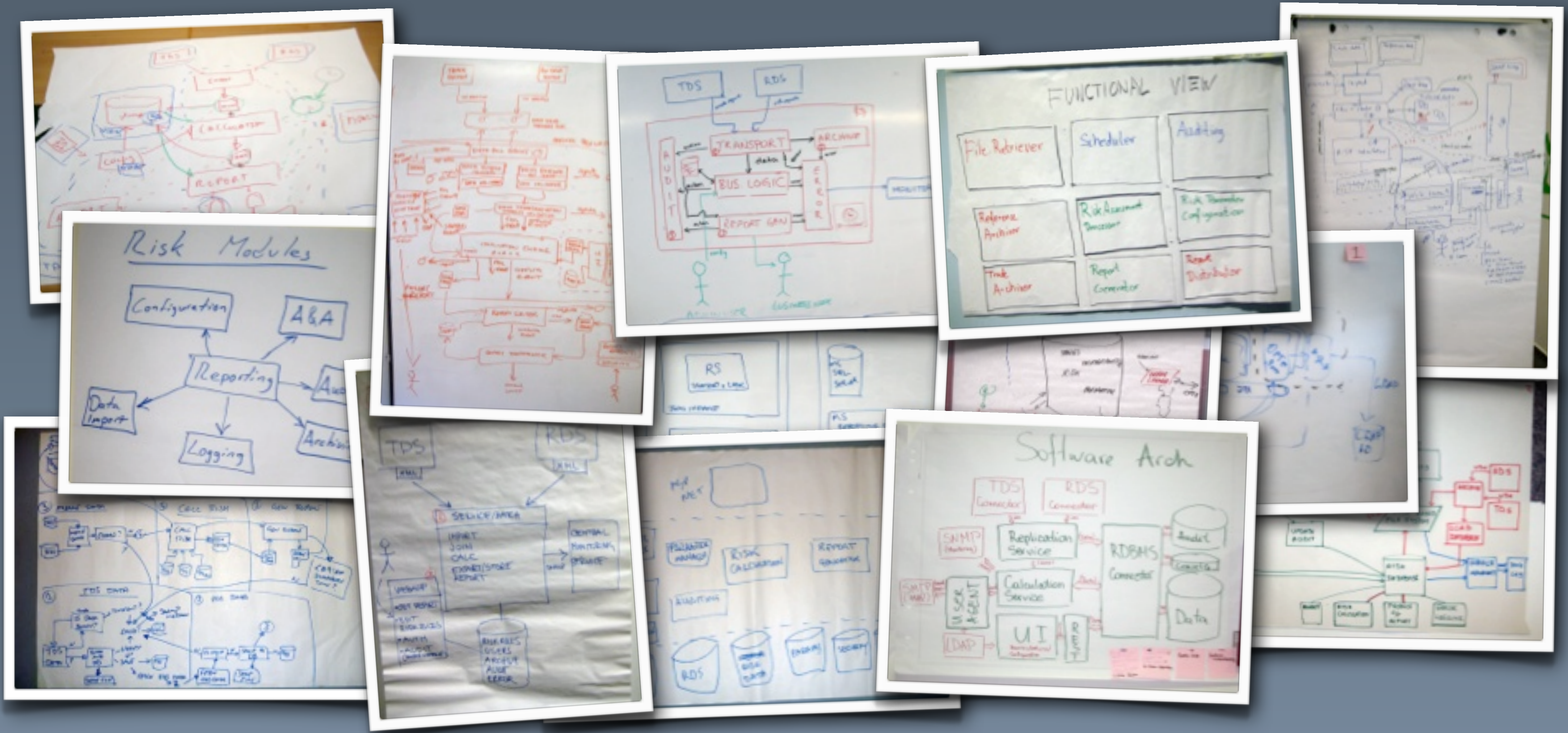


Collaborative design

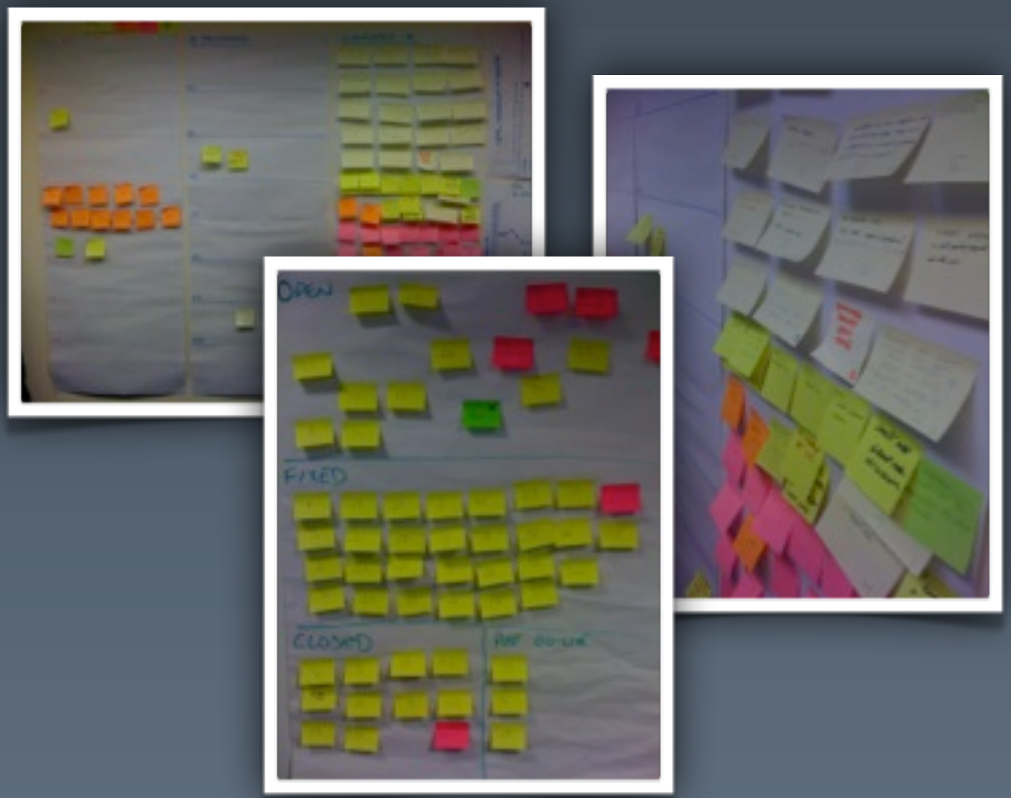
(e.g. pair architecting)

NoUML

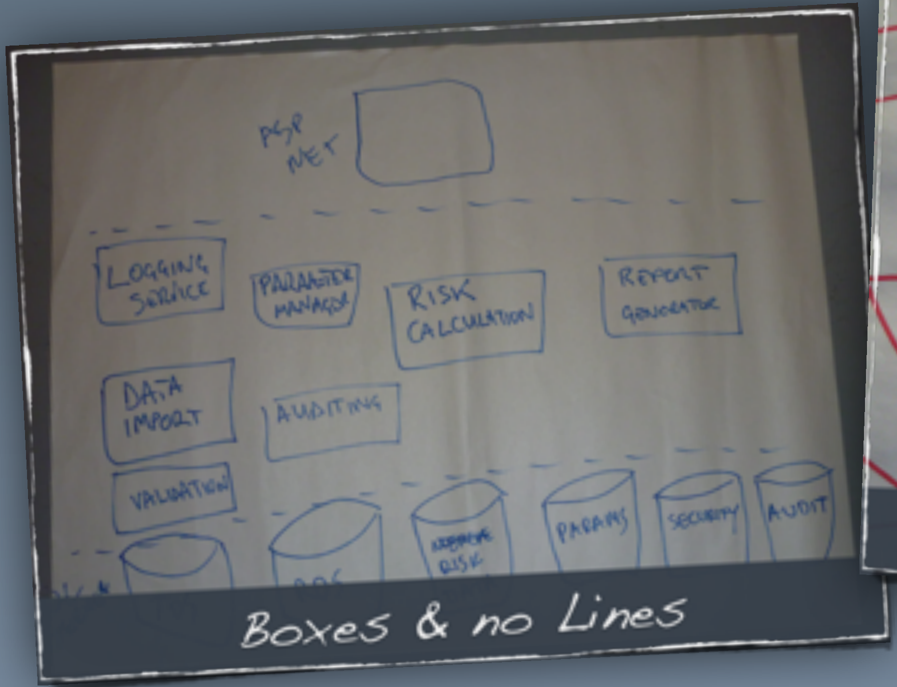
diagrams?



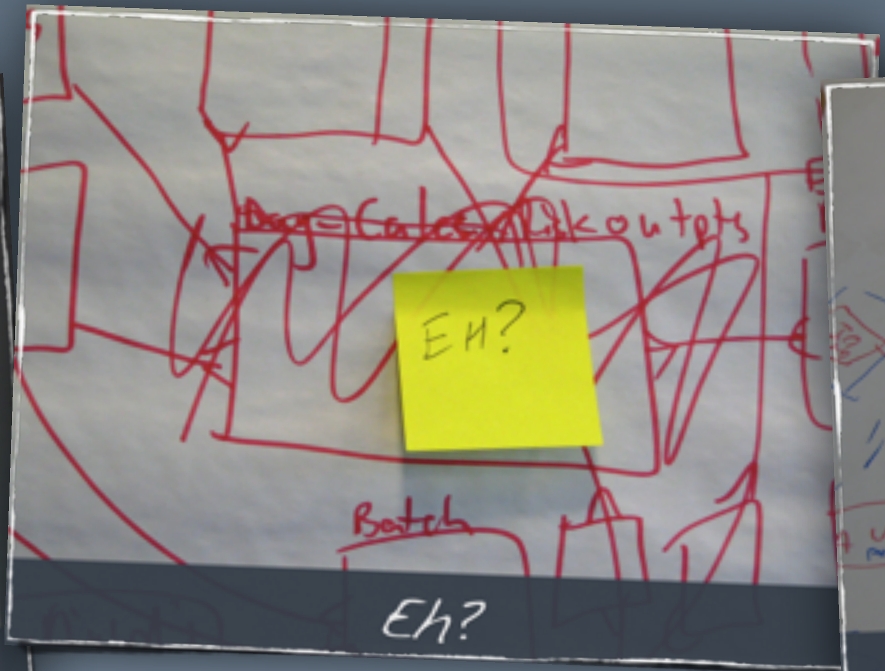
We can visualise our process…



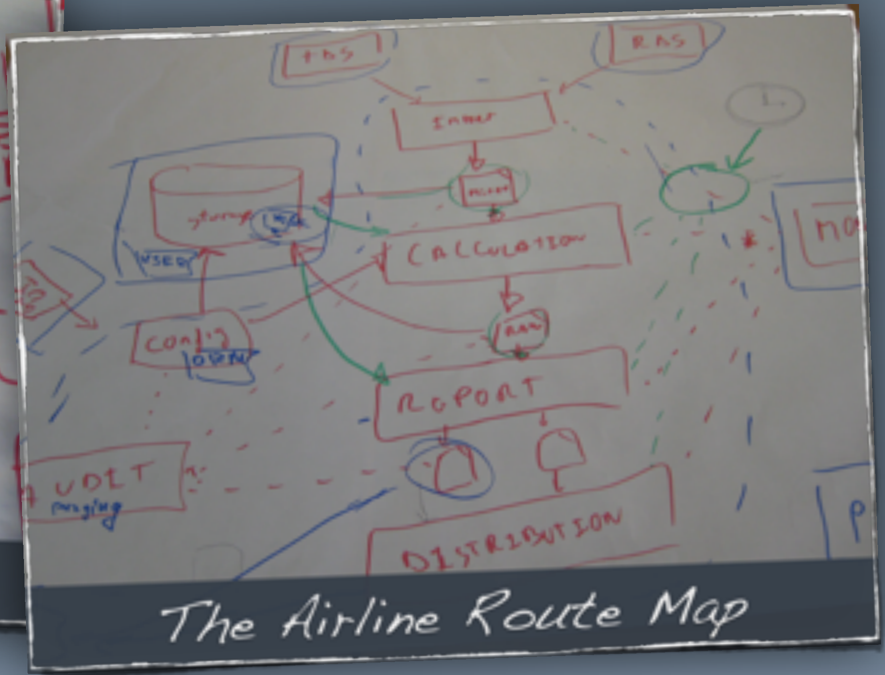
…but not our software!



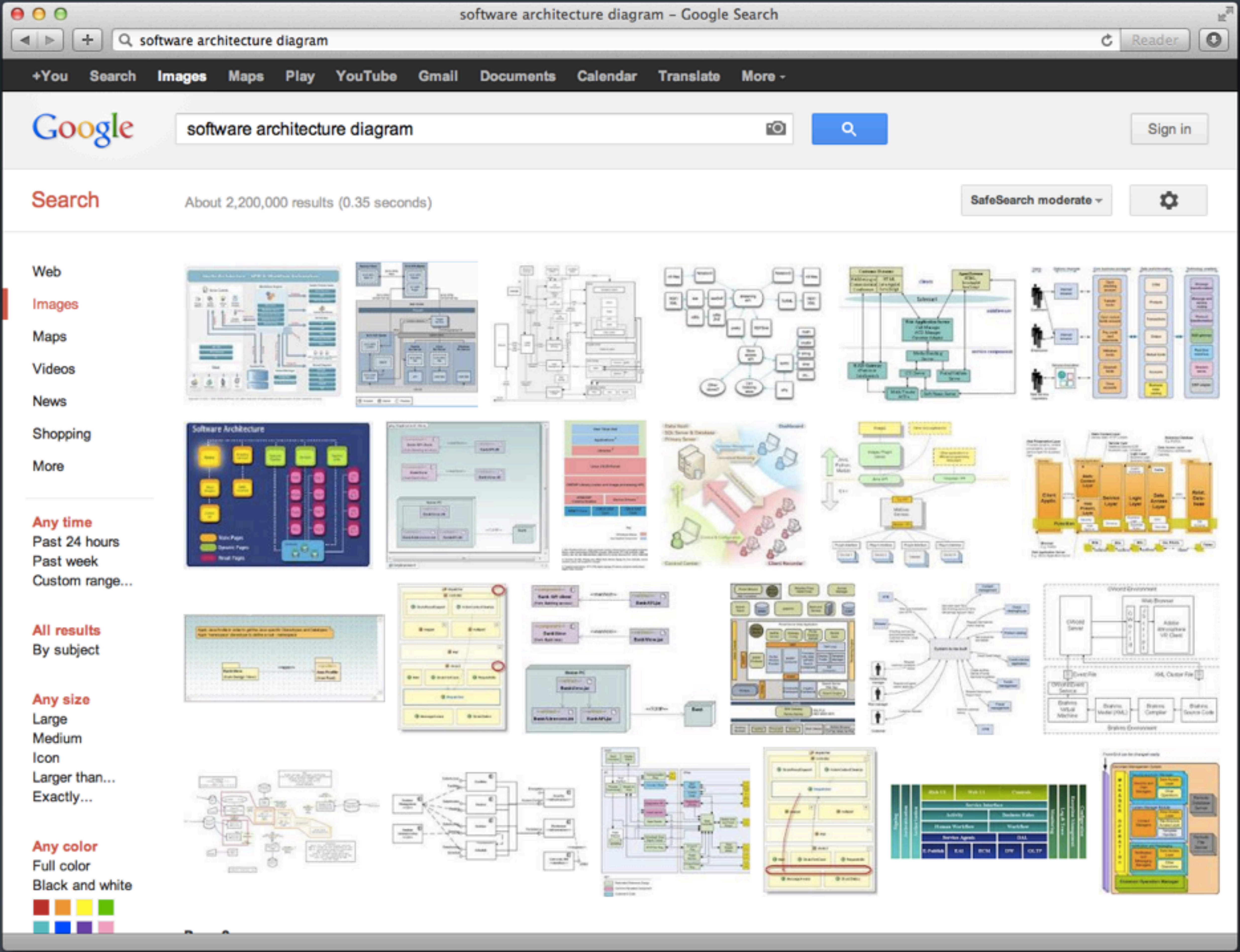
Boxes & no Lines



Eh?



The Airline Route Map



software architecture diagram

Search

About 2,200,000 results (0.35 seconds)

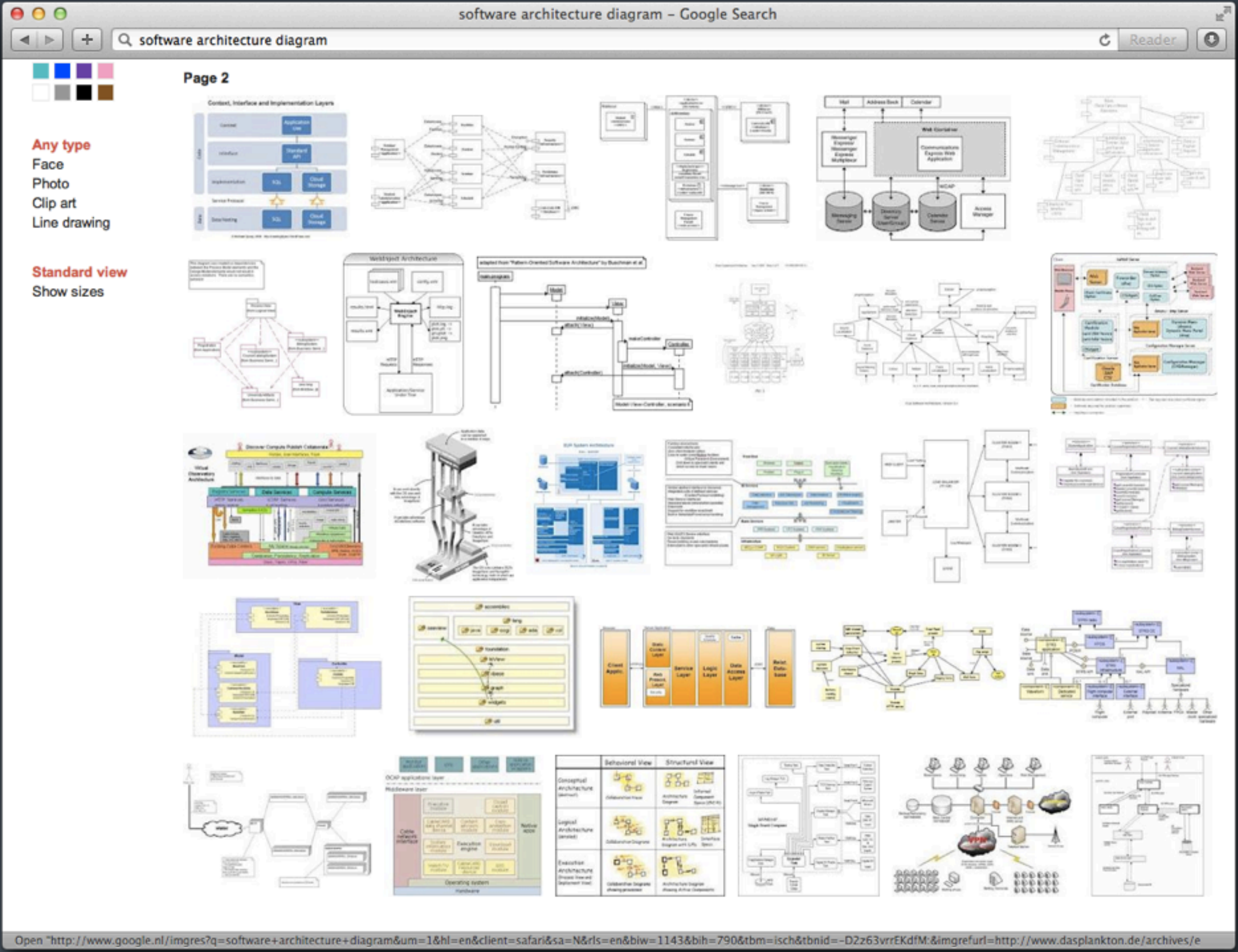
Web
Images
Maps
Videos
News
Shopping
More

Any time
Past 24 hours
Past week
Custom range...

All results
By subject

Any size
Large
Medium
Icon
Larger than...
Exactly...

Any color
Full color
Black and white
🟥 🟧 🟨 🟩
🟦 🟦 🟪 🟪



software architecture diagram – Google Search

software architecture diagram

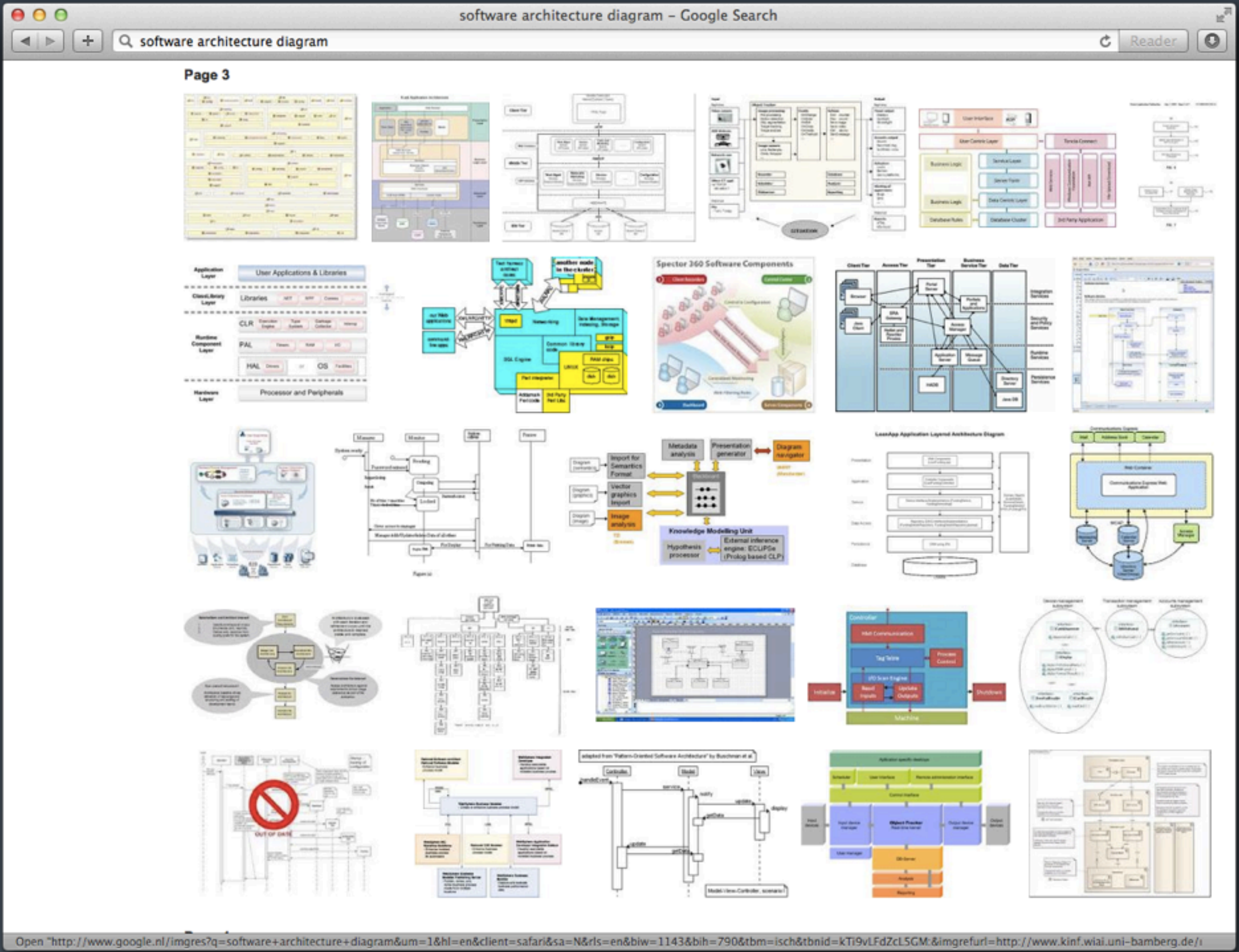
Reader

Page 2

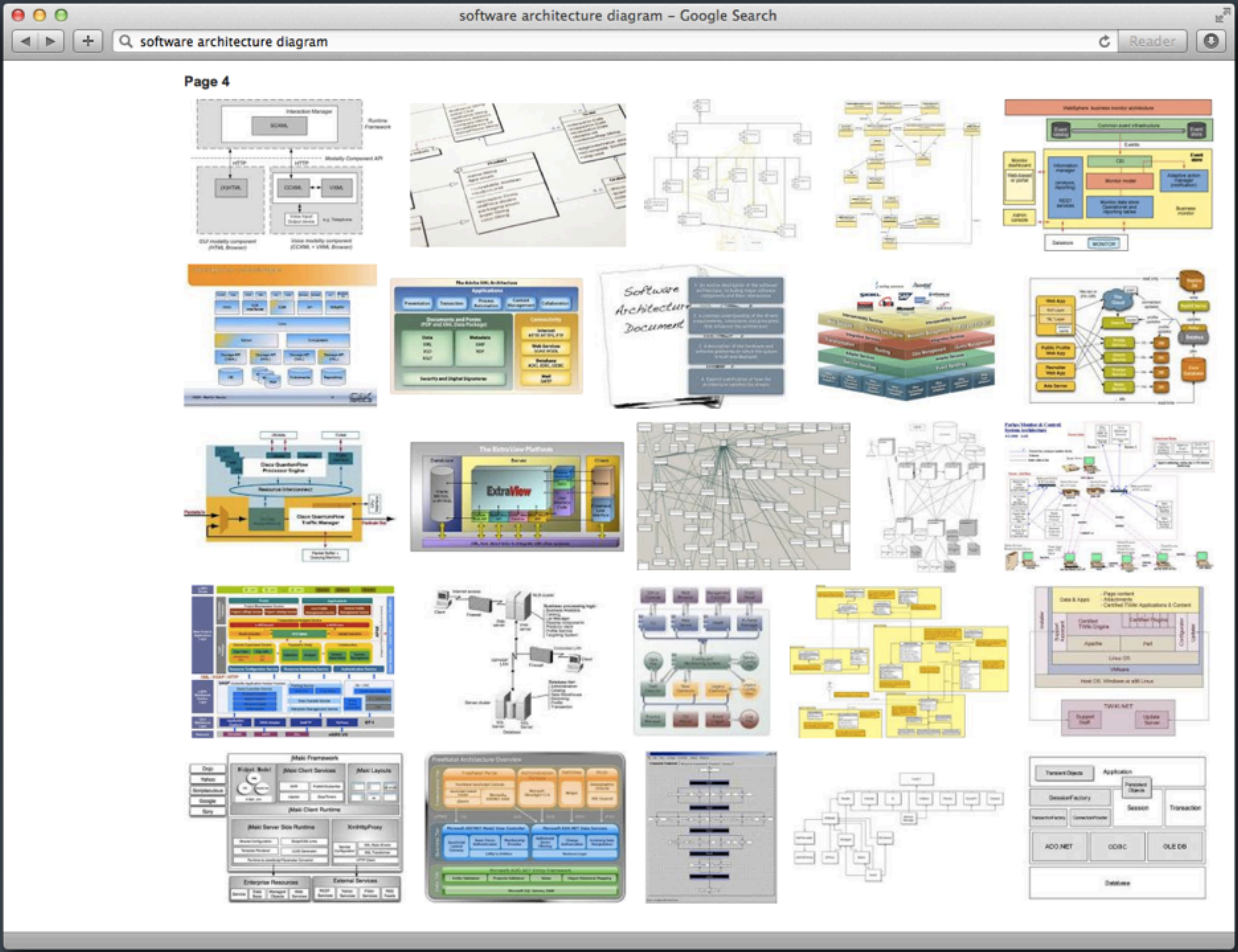
Any type
Face
Photo
Clip art
Line drawing

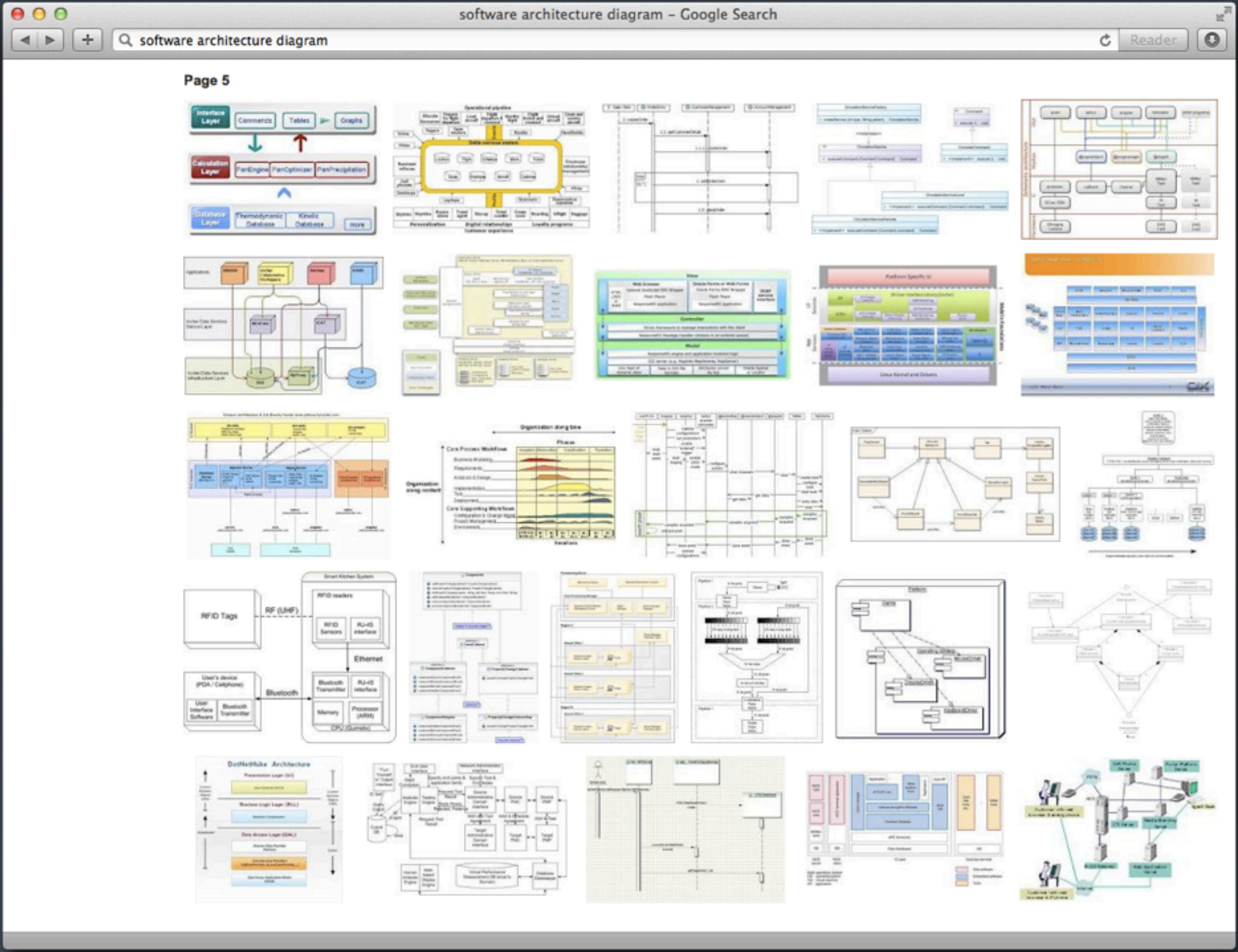
Standard view
Show sizes

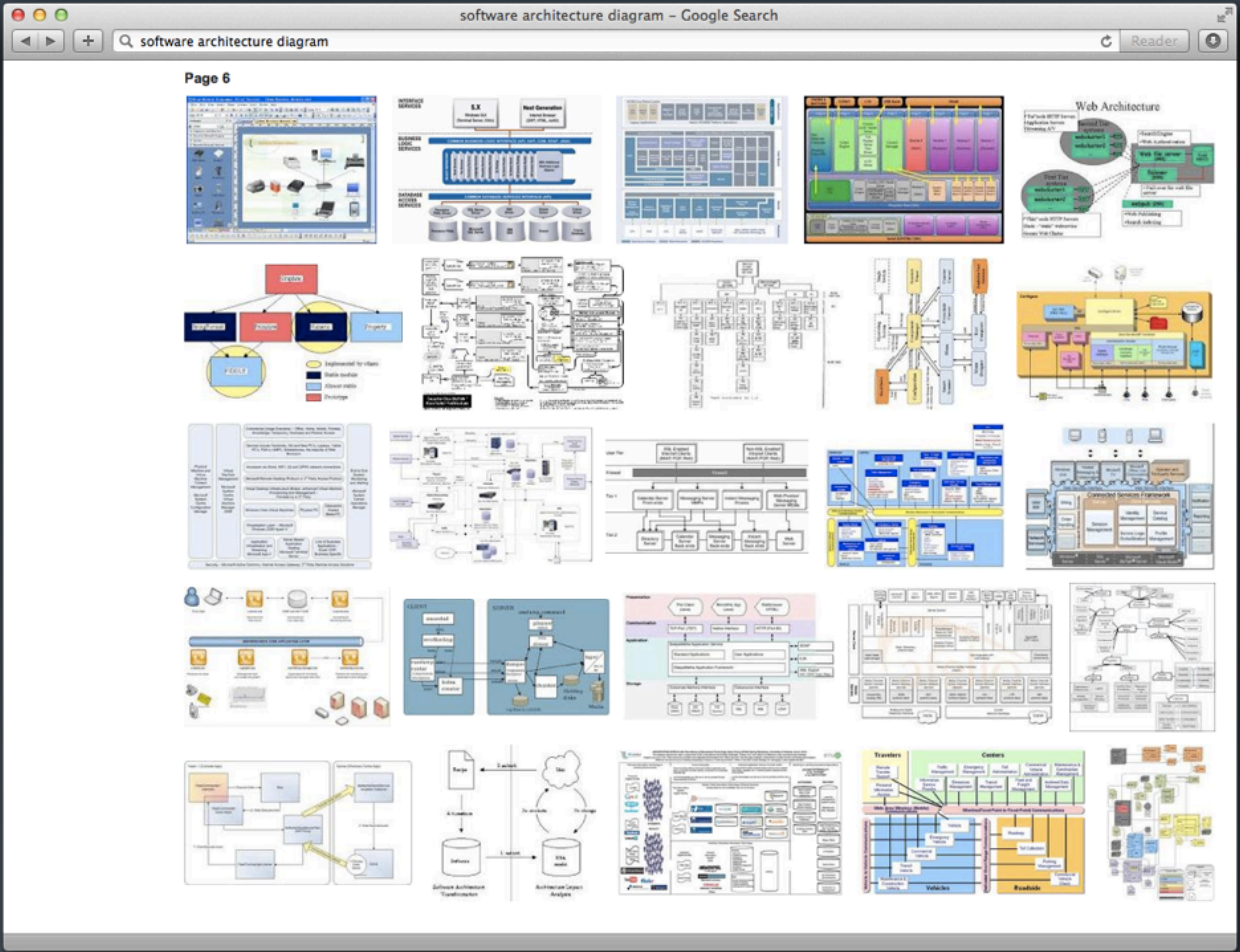
Open "http://www.google.nl/imgres?q=software+architecture+diagram&um=1&hl=en&client=safari&sa=N&rls=en&biw=1143&bih=790&tbm=isch&tbnid=-D2z63vrrEKdfM:&imgrefurl=http://www.dasplankton.de/archives/e

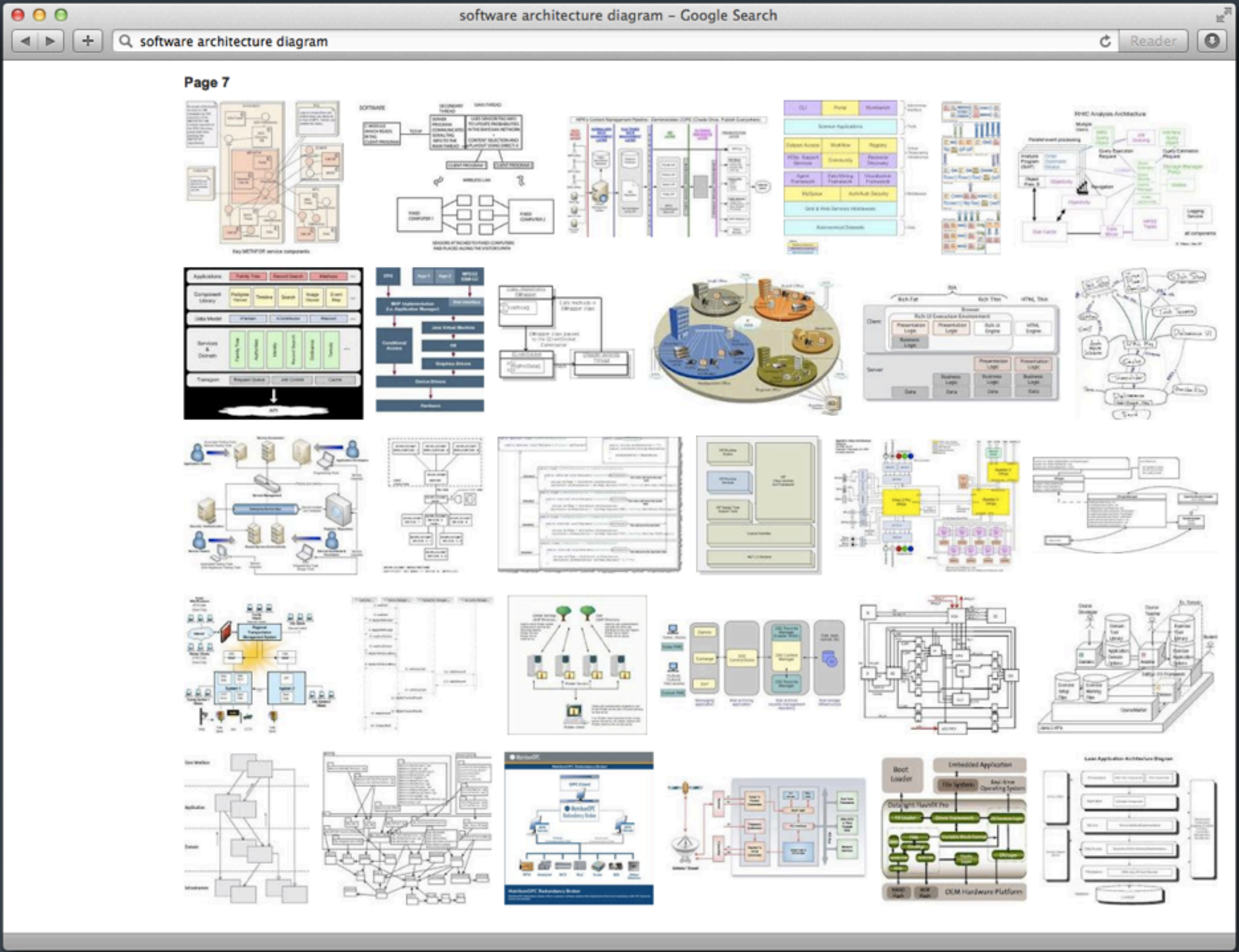

software architecture diagram - Google Search
software architecture diagram
Reader
Page 3

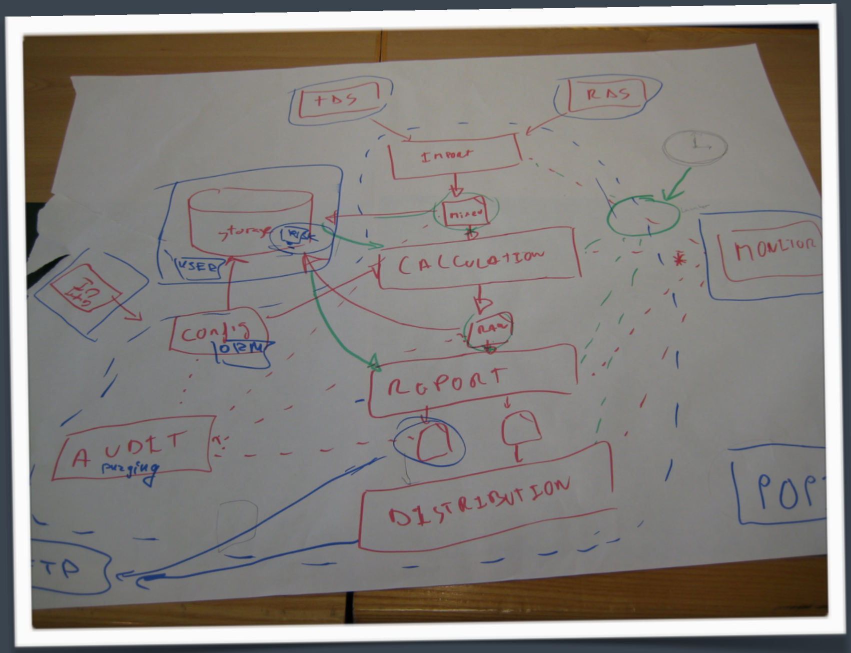
Open "http://www.google.nl/imgres?q=software+architecture+diagram&um=1&hl=en&client=safari&sa=N&rls=en&biw=1143&bih=790&tbm=isch&tbnid=kTi9vLFdZcL5GM:&imgrefurl=http://www.kinf.wiai.uni-bamberg.de/


software architecture diagram – Google Search
software architecture diagram
Reader
Page 4


software architecture diagram - Google Search
software architecture diagram
Reader
Page 5


software architecture diagram – Google Search
software architecture diagram
Reader
Page 6
Web Architecture
Connected Services Framework
Travelers
Centers
Vehicles
Roadside

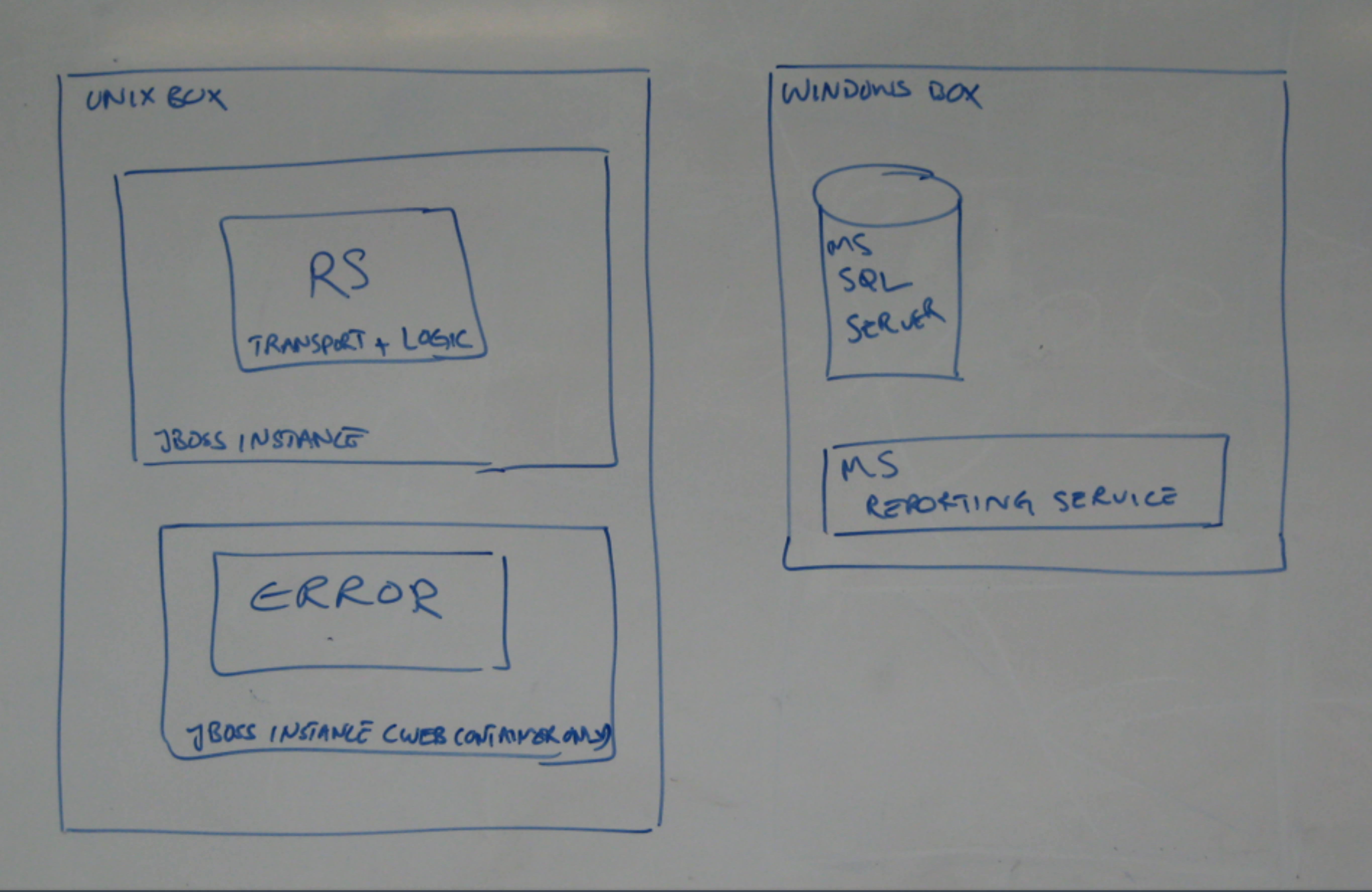

software architecture diagram – Google Search
software architecture diagram
Reader
Page 7



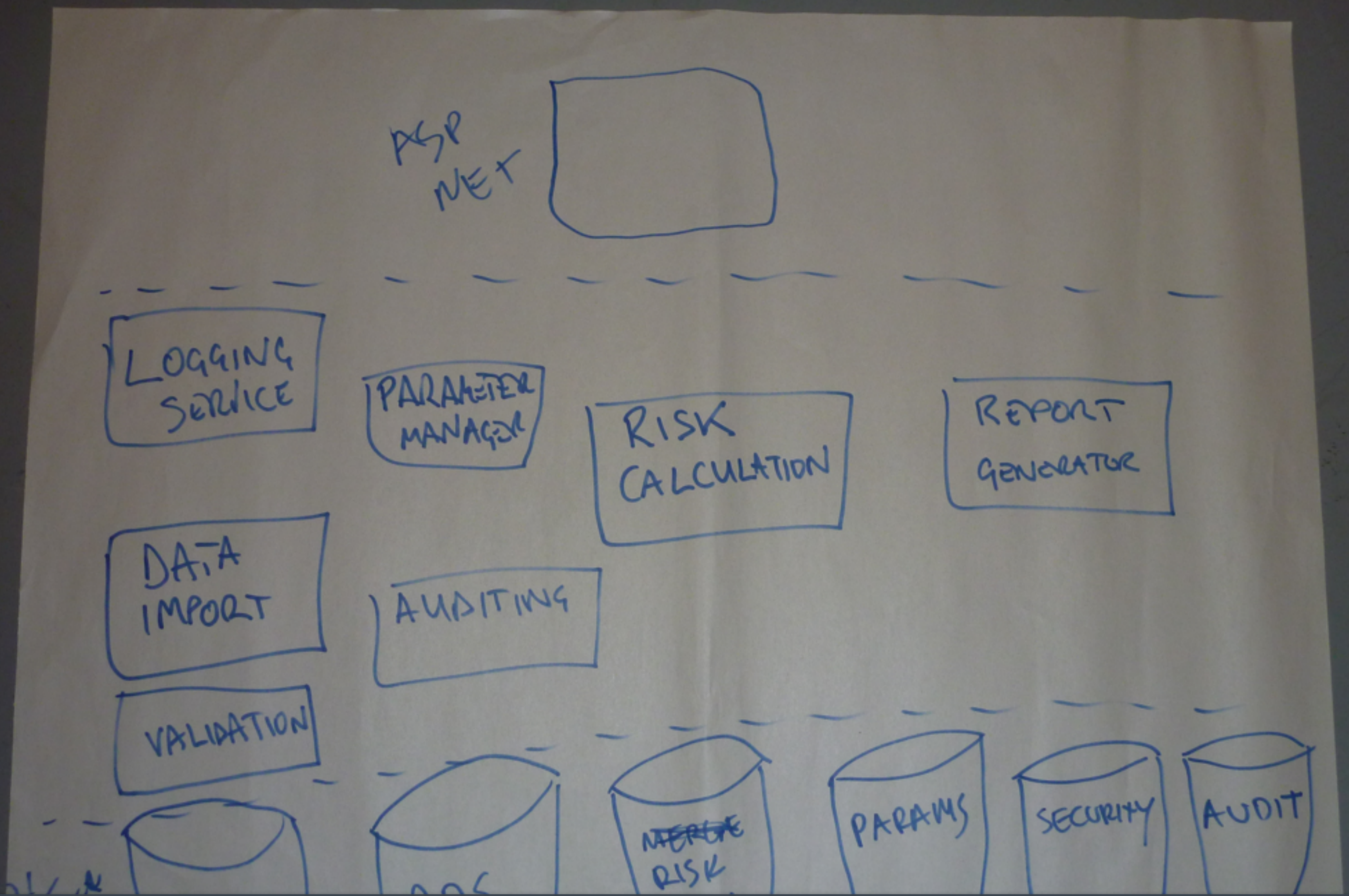
Shared vision of

WTF?!

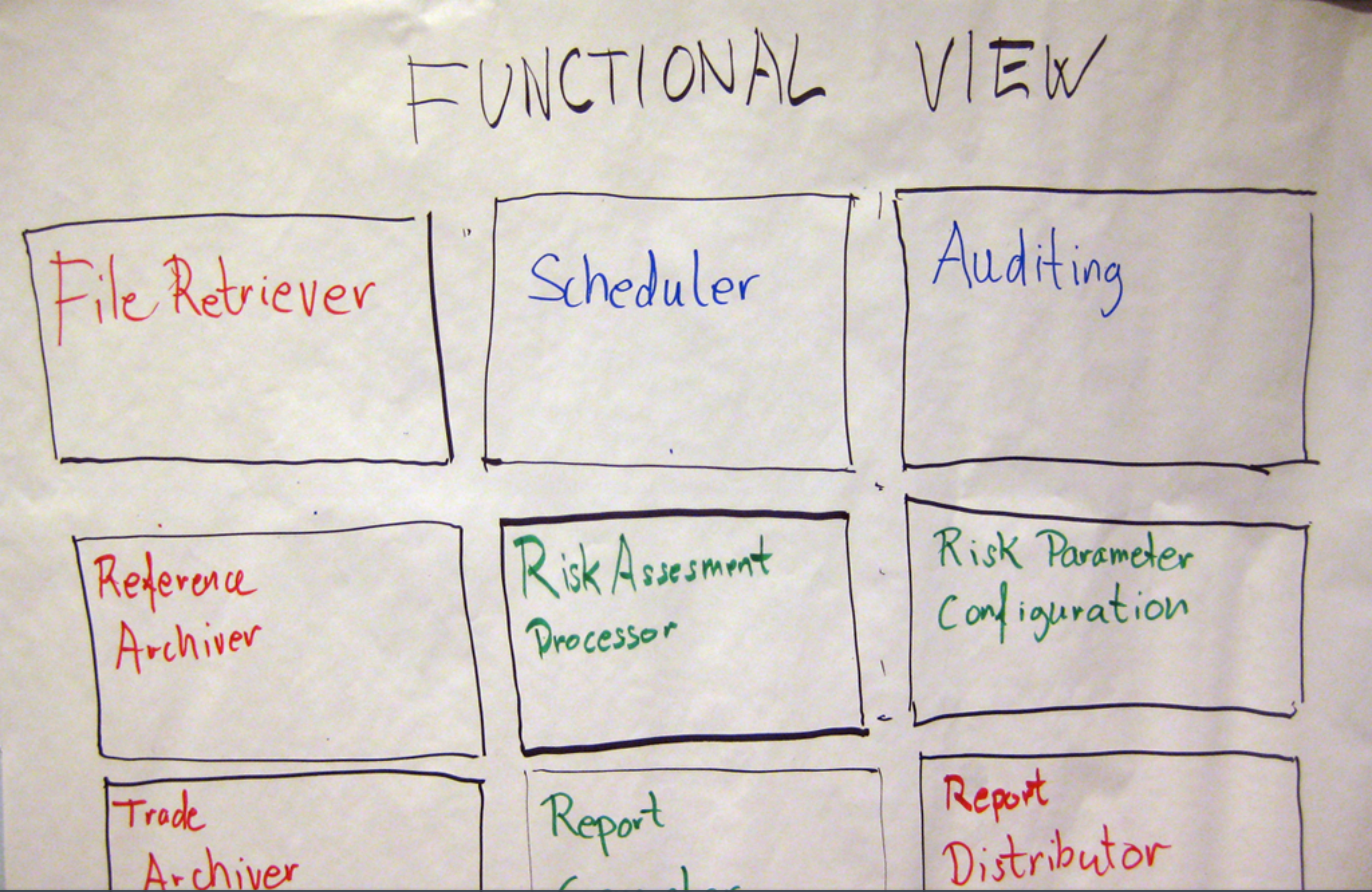
Are these effective *sketches?*



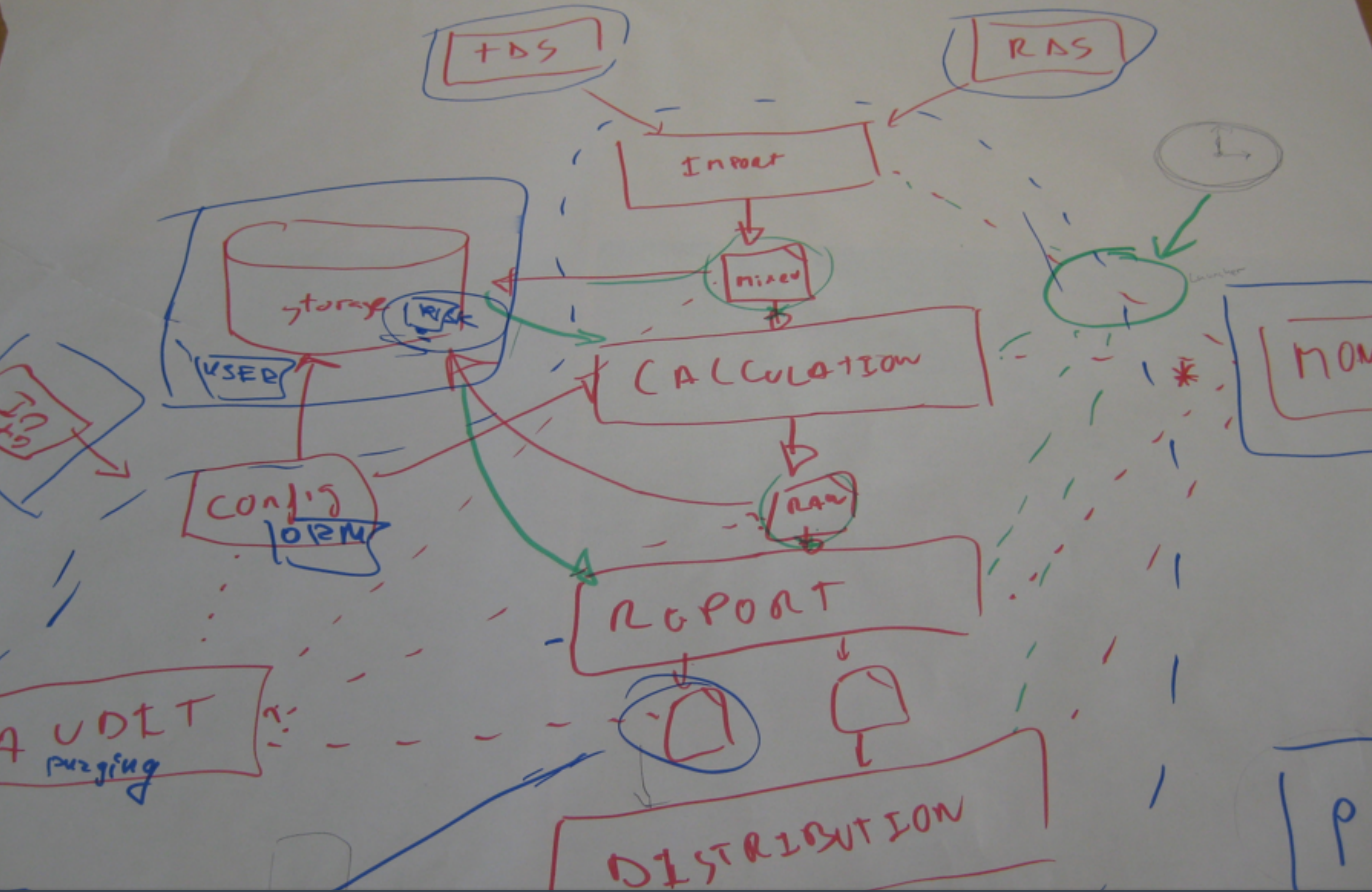
The Shopping List



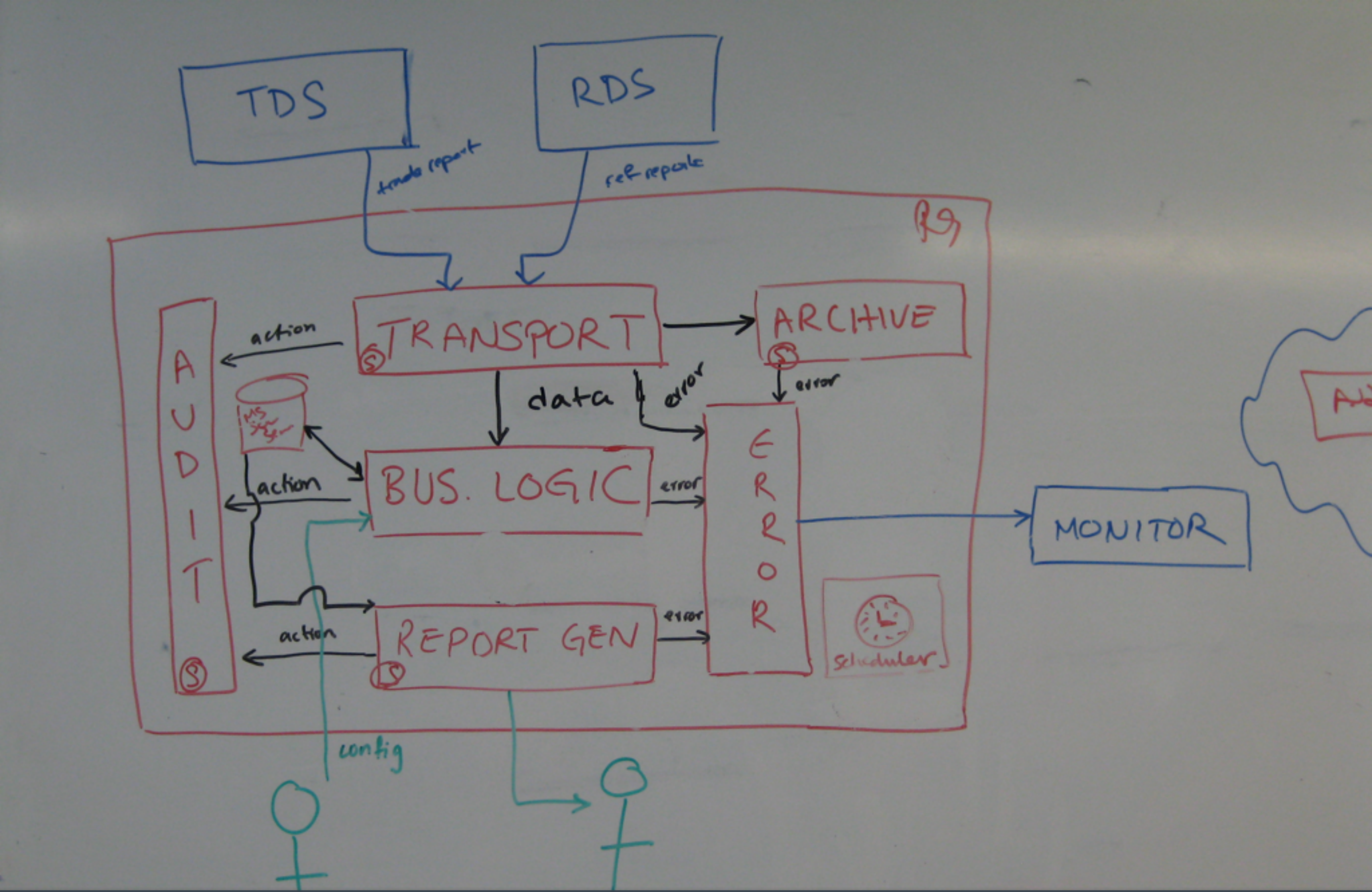
Boxes & No Lines



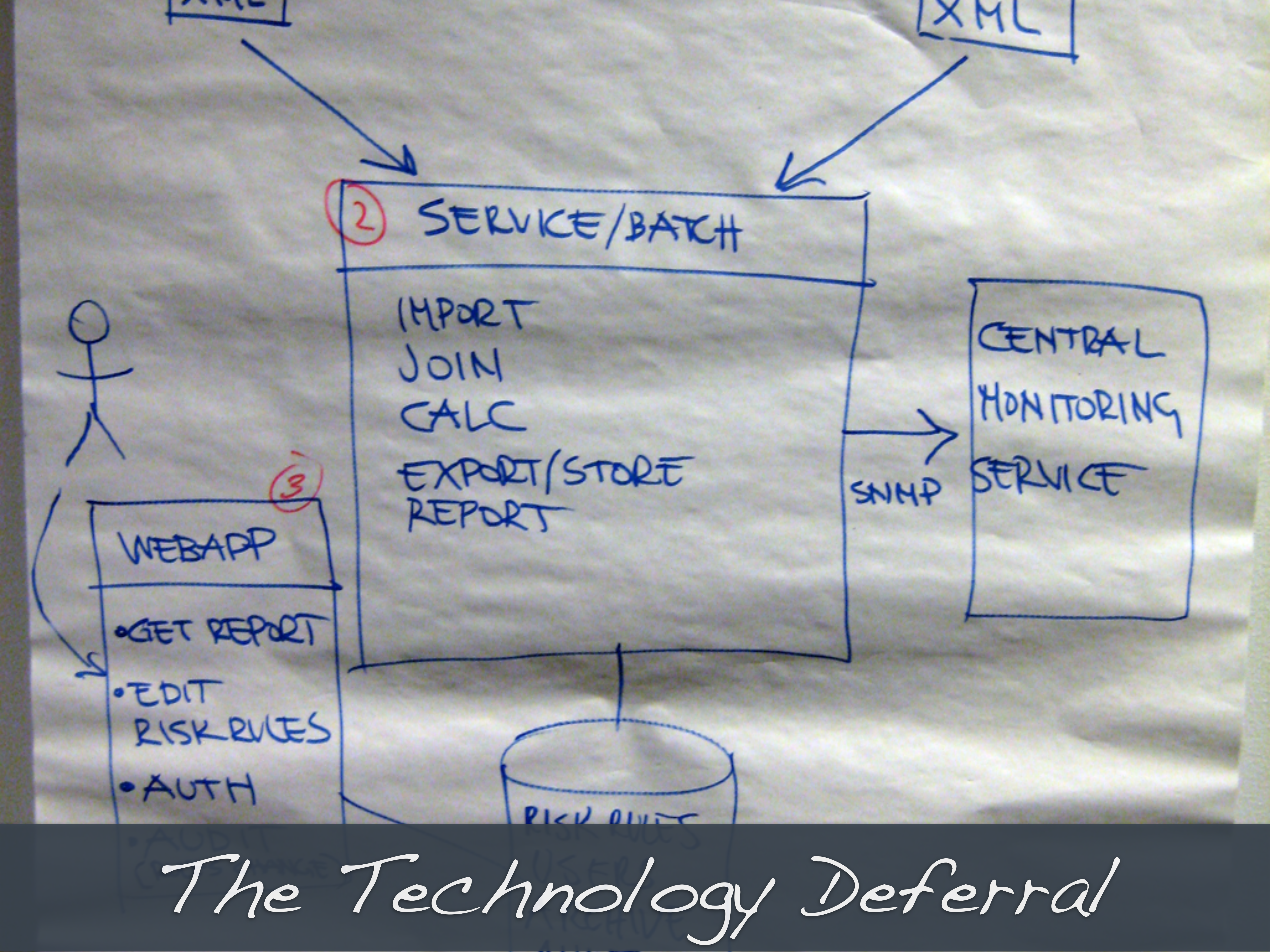
The Functional View



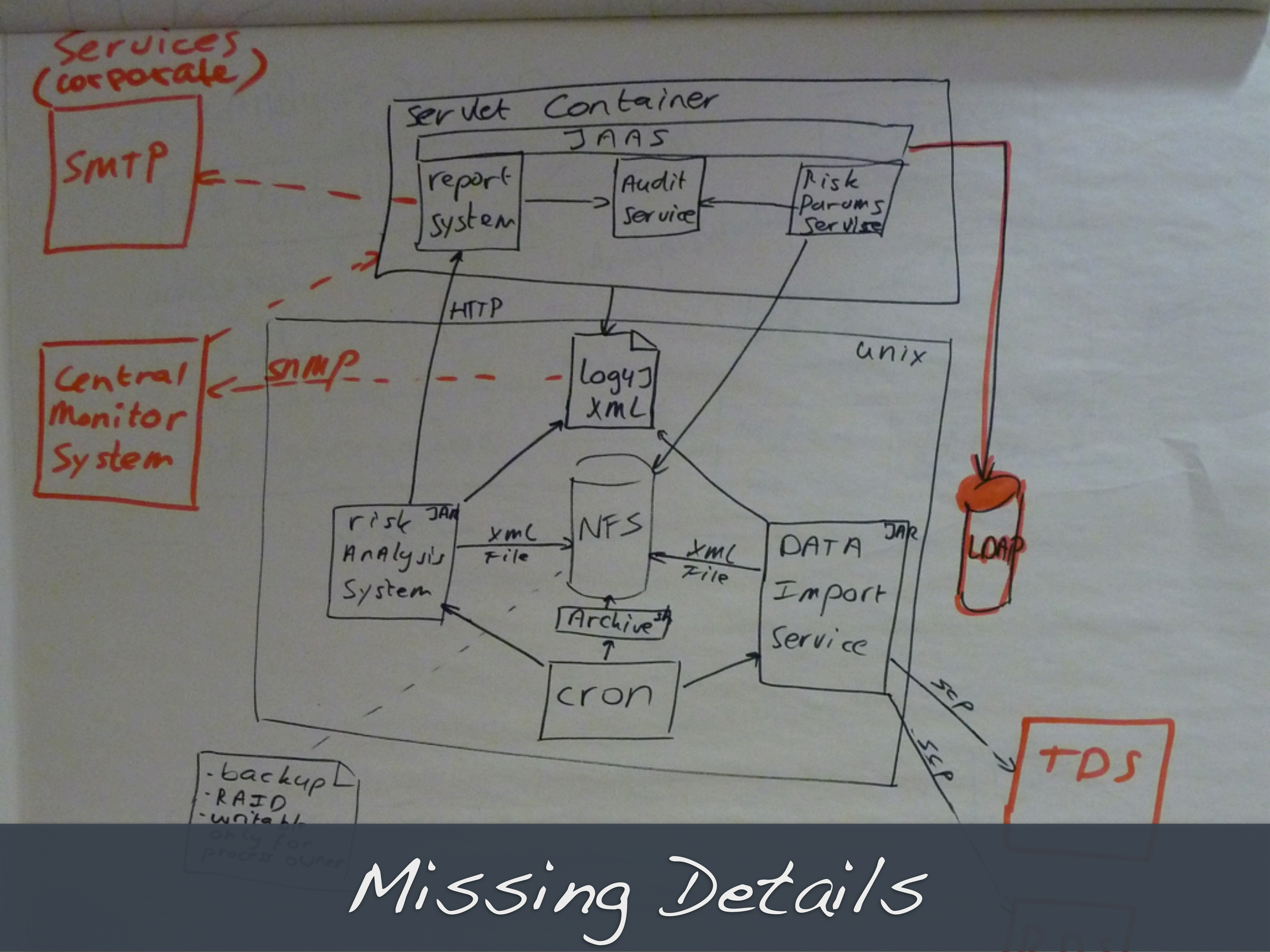
The Airline Route Map



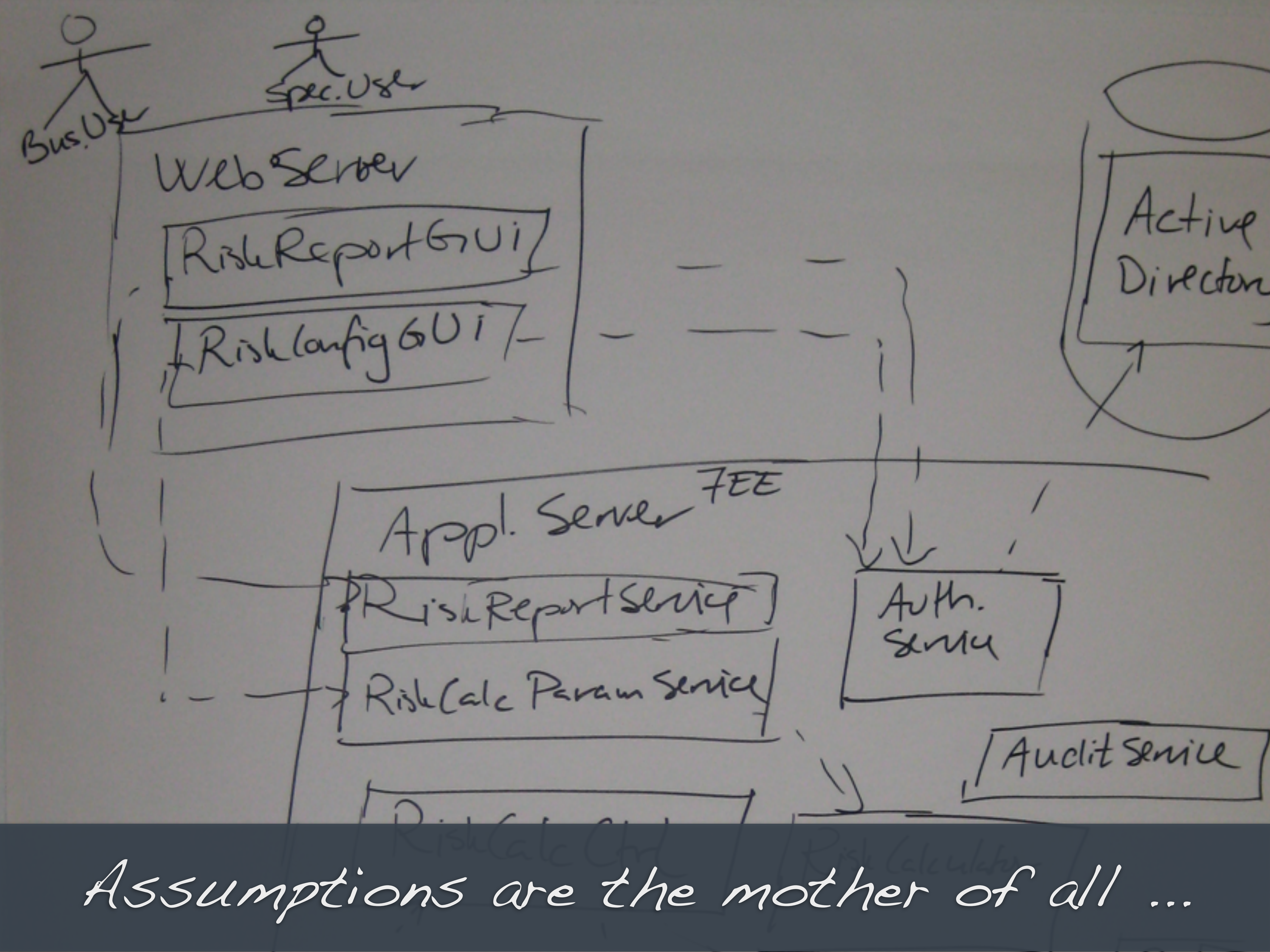
Generically True



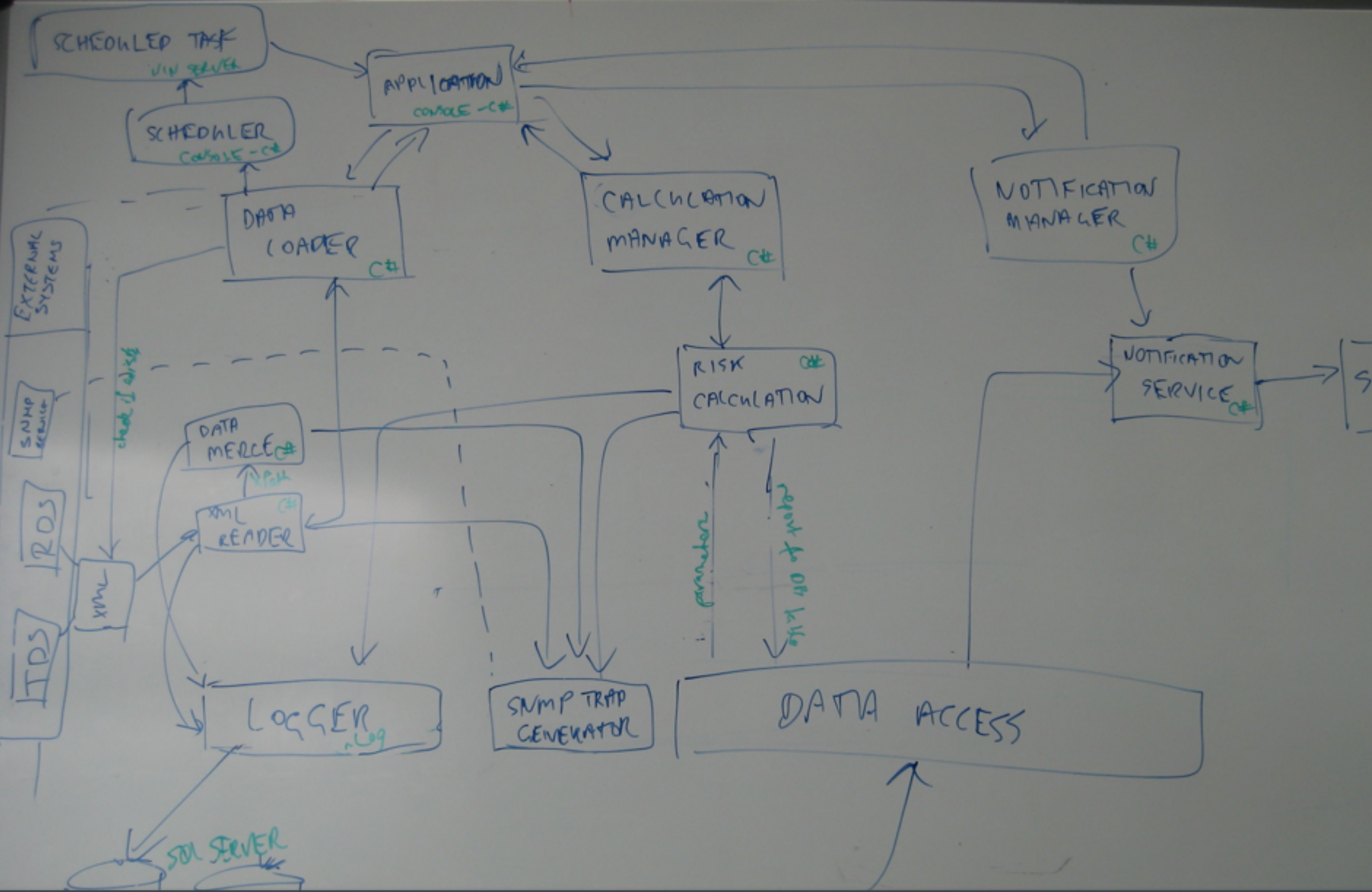
The Technology Deferral



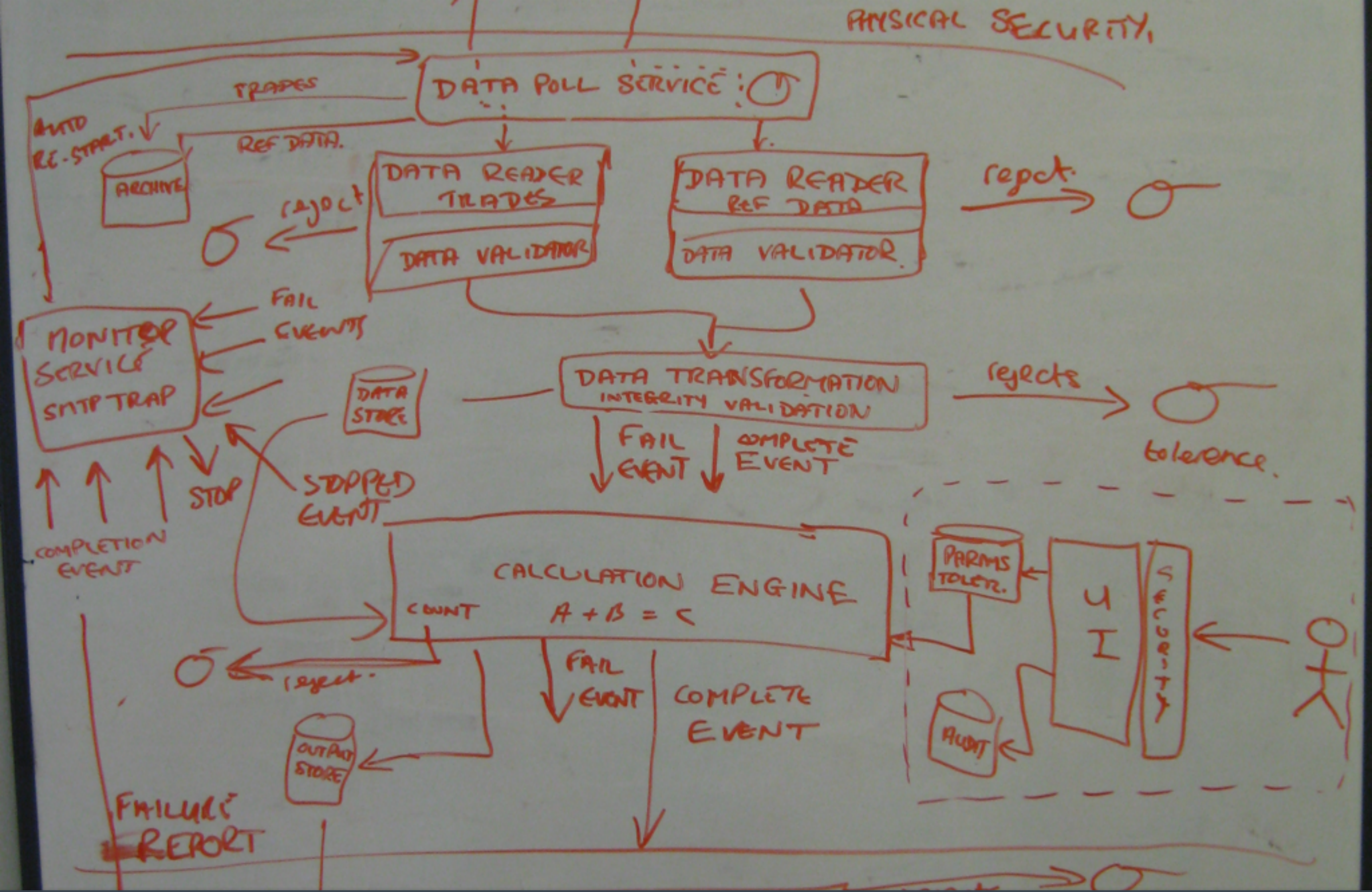
Missing Details



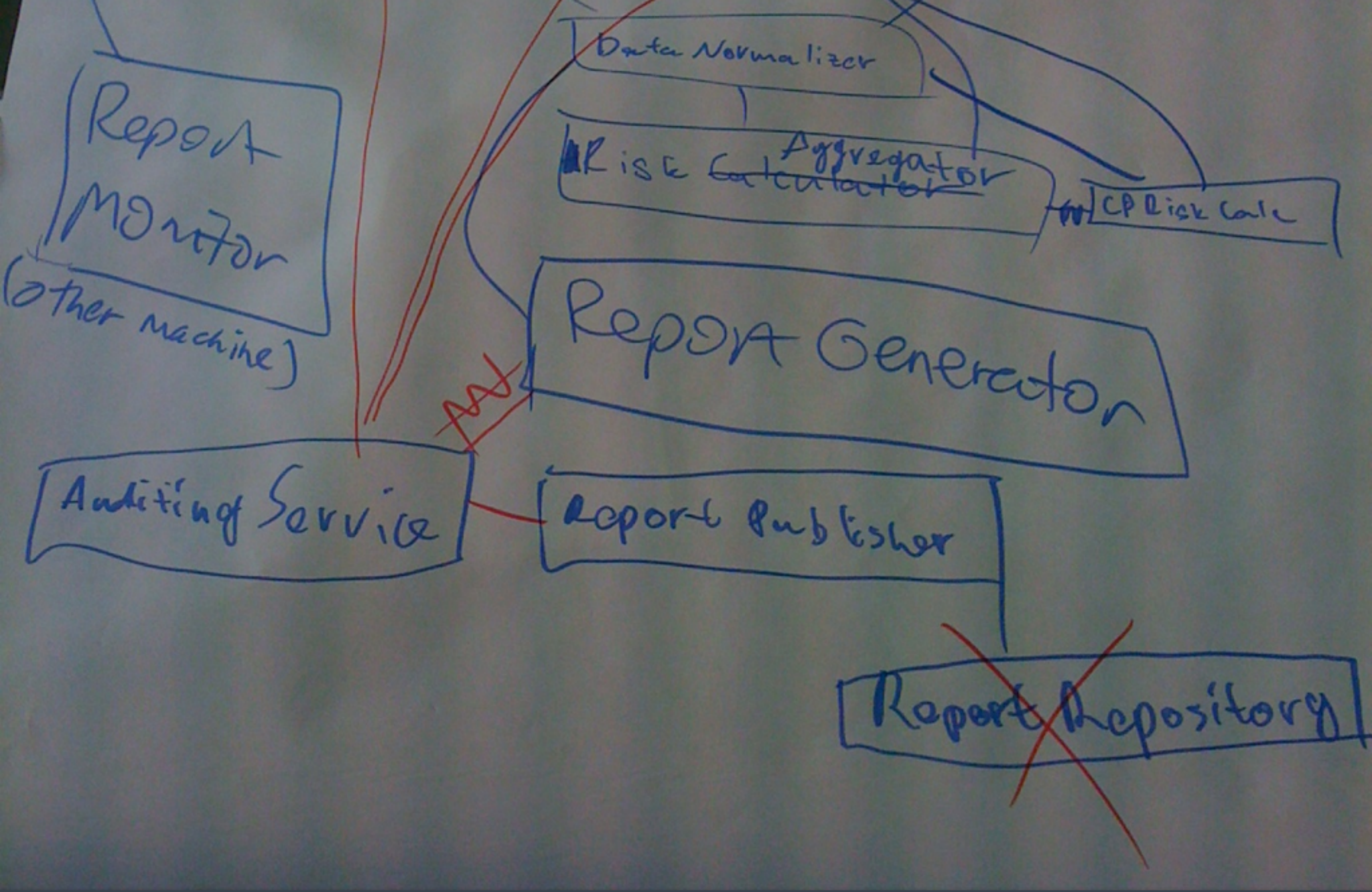
Assumptions are the mother of all ...



Homeless Old C# Object (HOCO)



The Adventure Book



Should have used a whiteboard!

Trades
ref_current
Ref_hist
Params
Calcs
Calcs
Risk outputs
Error
App Log
App
Error Log
Date
- Risk Cel
- calcs
- Par
Batch
Params_Risk
Detail
B_id:
Eh?

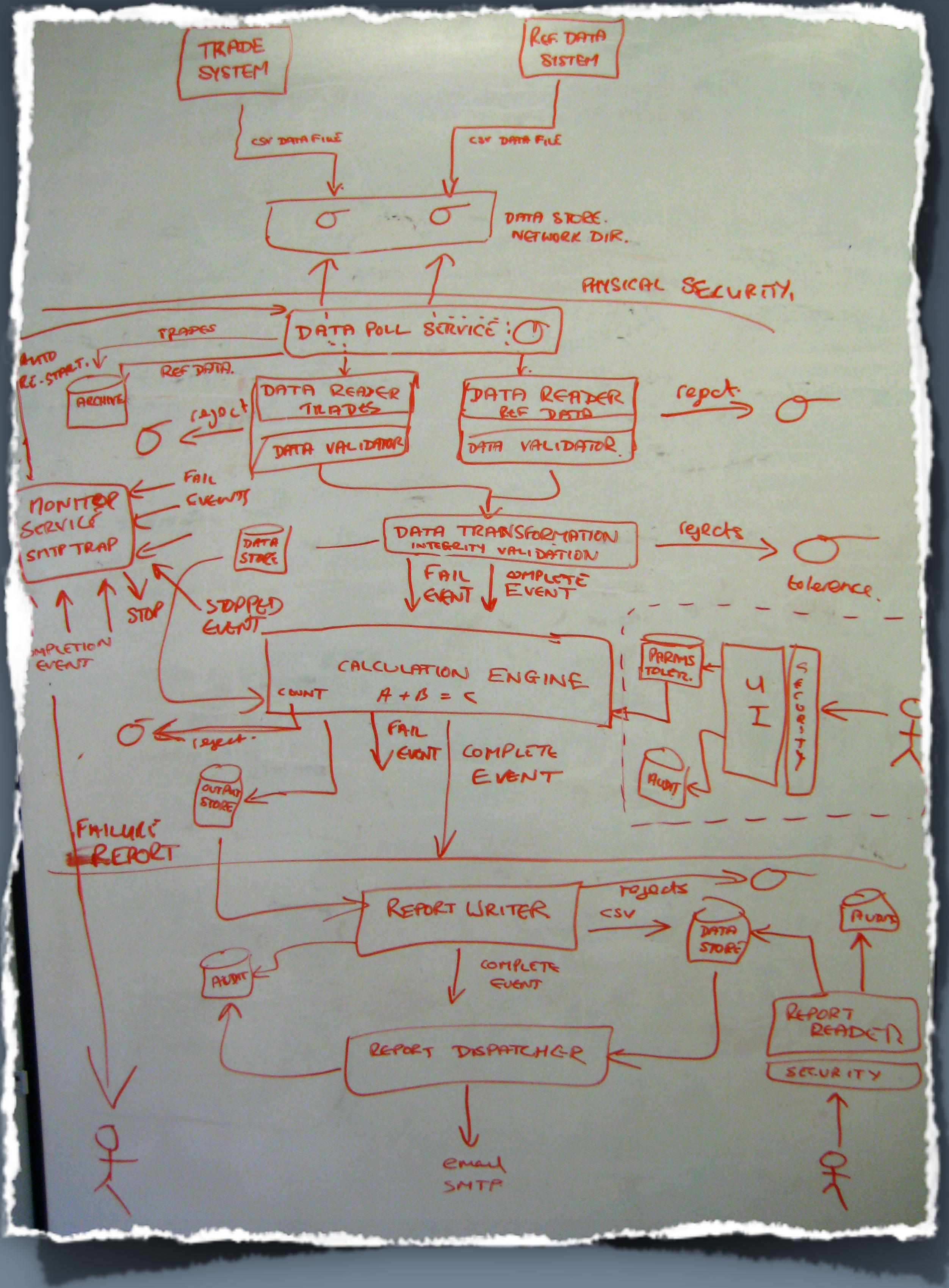
Eh?

Would you

code

it that way?

This is why
software architects
must be master-builders

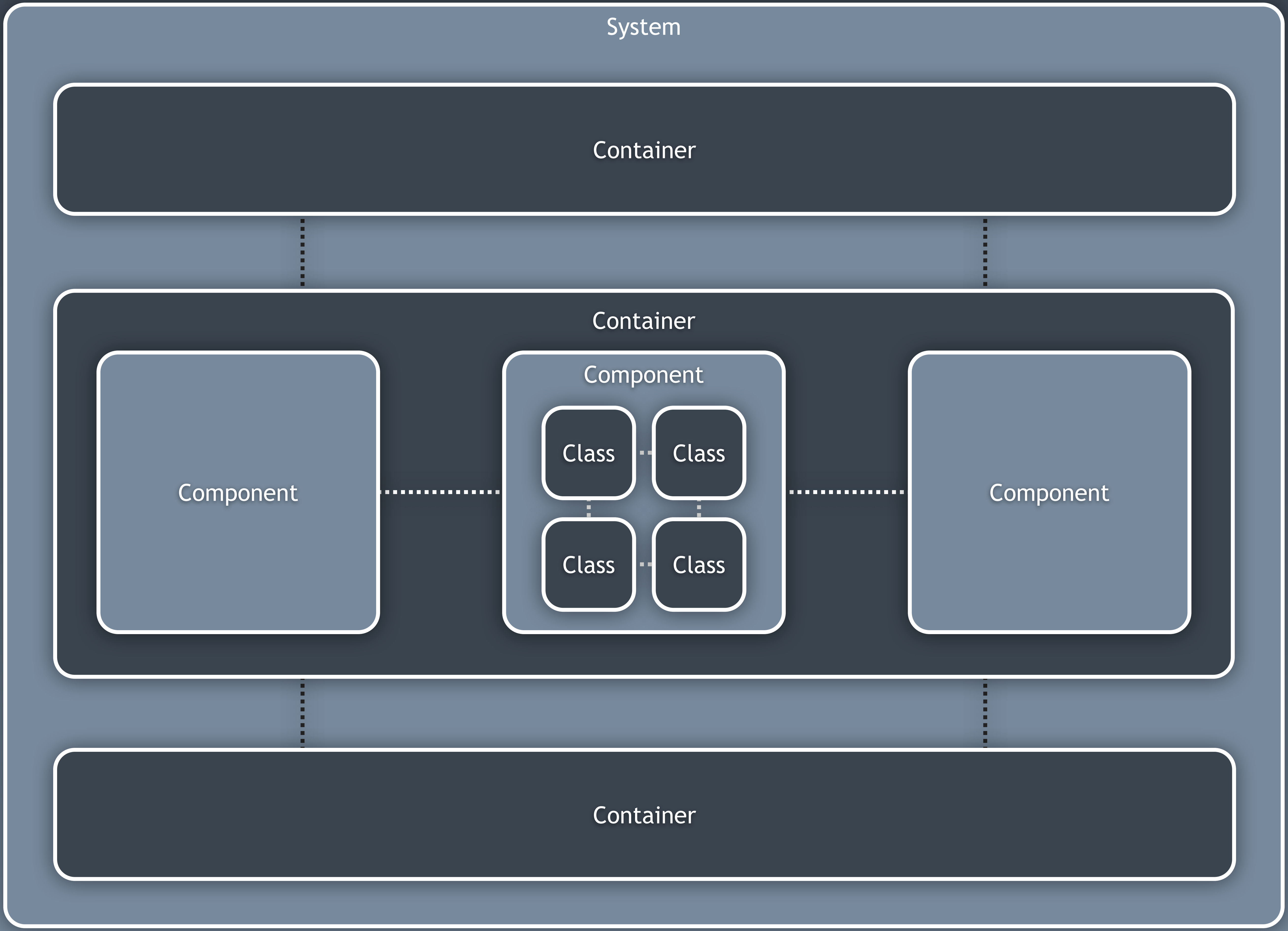


It's usually difficult to show the entire design on a **single** diagram

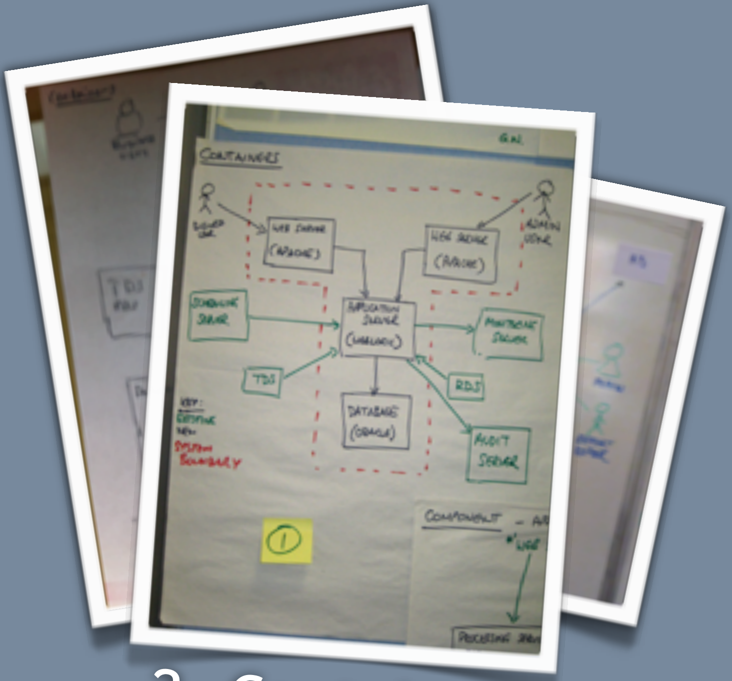
Different **views** of the design can be used to manage complexity and highlight different aspects of the solution

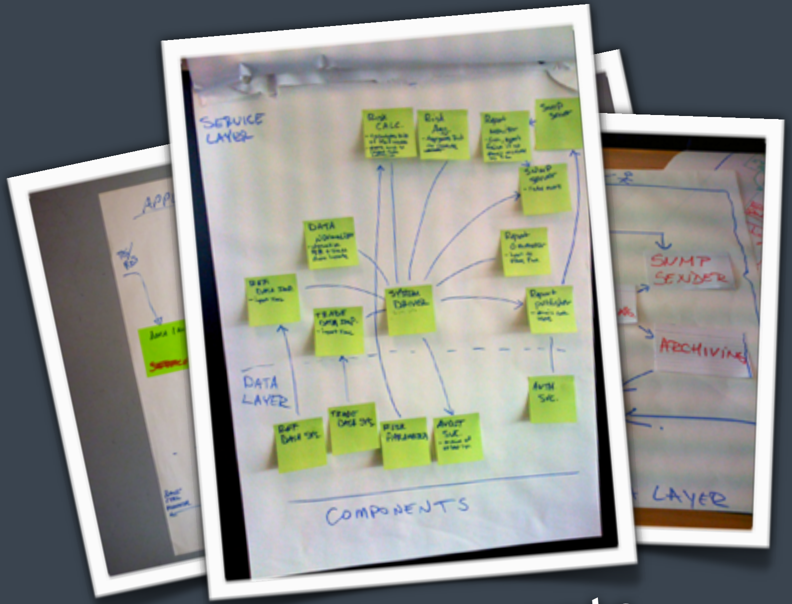
- Software System
  - Containers
    - Components
      - Classes

Agree on a simple abstraction that the whole team can use to communicate


System
Container
Container
Component
Component
Class
Class
Class
Class
Component
Container

1. Context


2. Containers


3. Components

This only covers the static structure (runtime, infrastructure, deployment, etc are also important)

… and, optionally,
4. Classes

C4

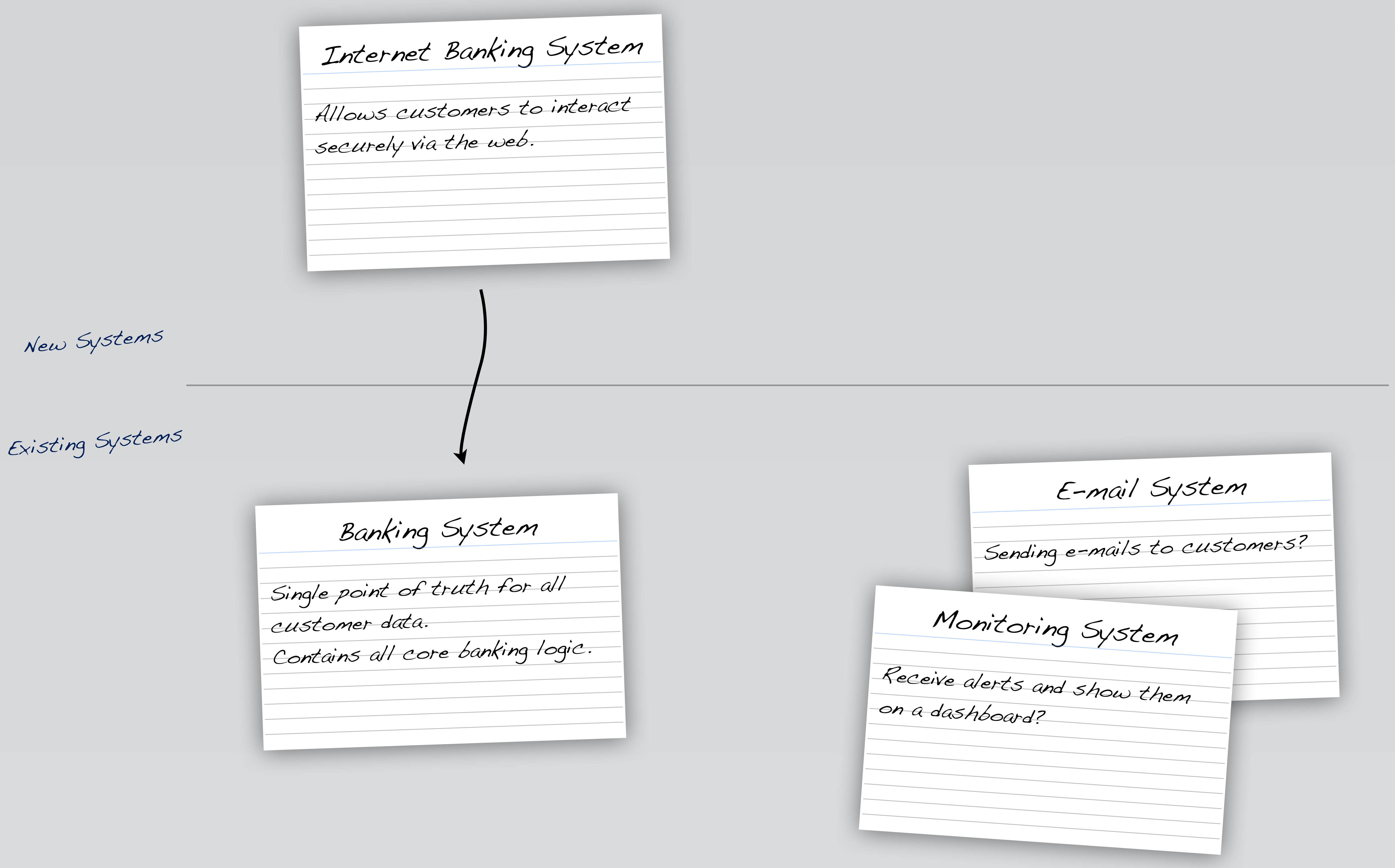
- Context
- Containers
- Components
- Classes

Thinking inside the box

This isn't about creating a standard

It's about providing you some organisational ideas

Context

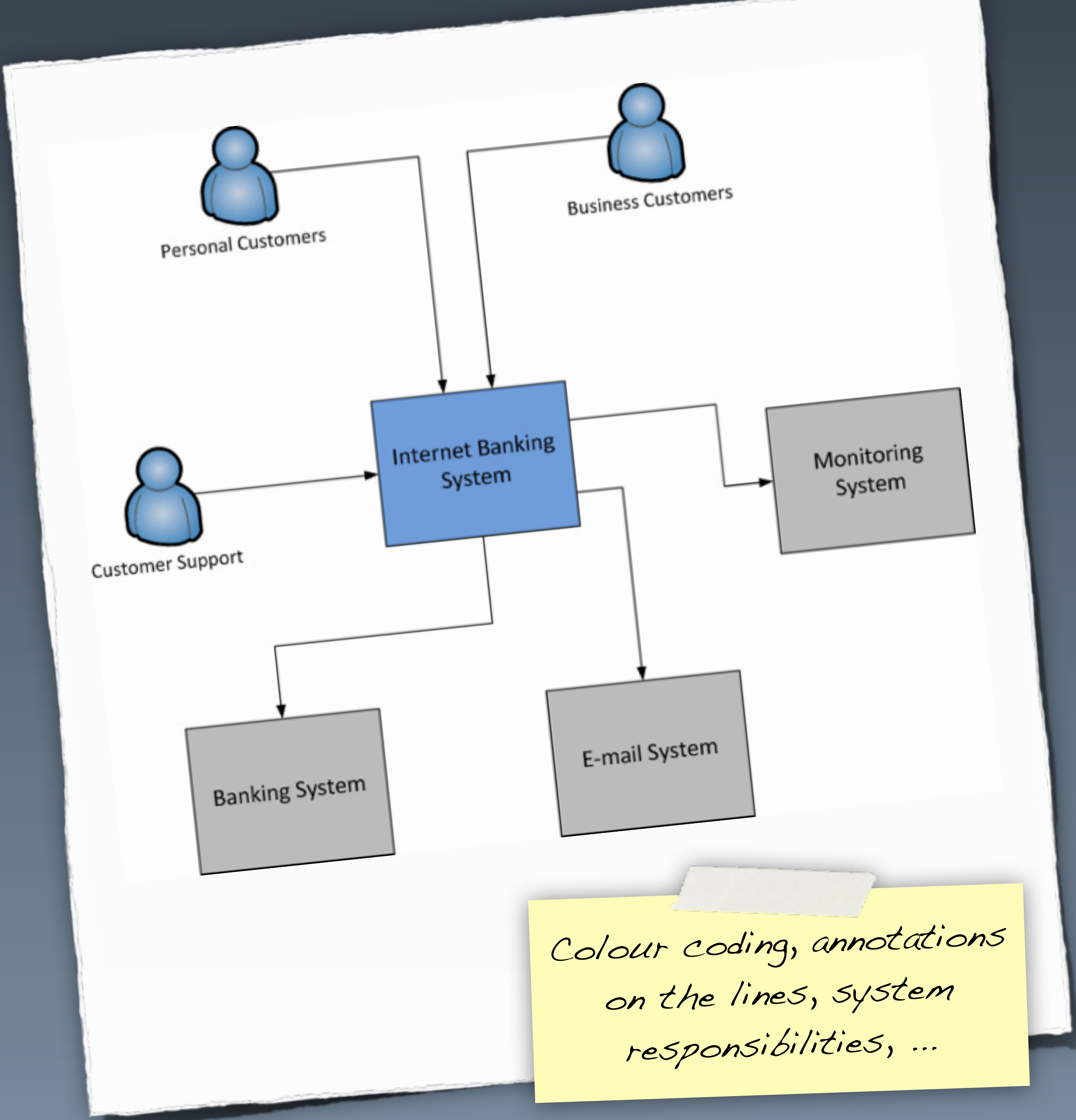

Internet Banking System
Allows customers to interact securely via the web.
New Systems
Existing Systems
Banking System
Single point of truth for all customer data.
Contains all core banking logic.
E-mail System
Sending e-mails to customers?
Monitoring System
Receive alerts and show them on a dashboard?

What

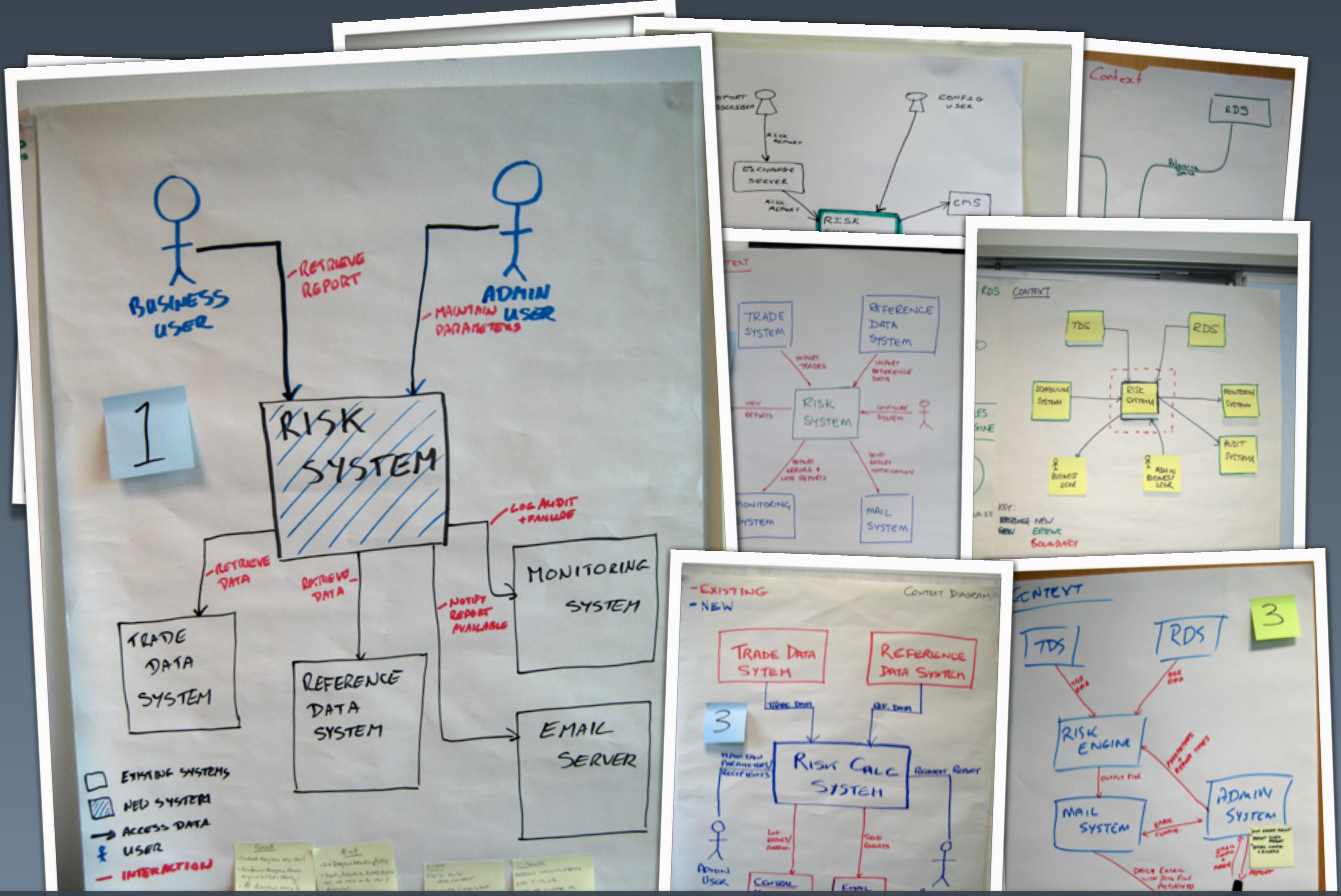
are we building?

Who

is using it?

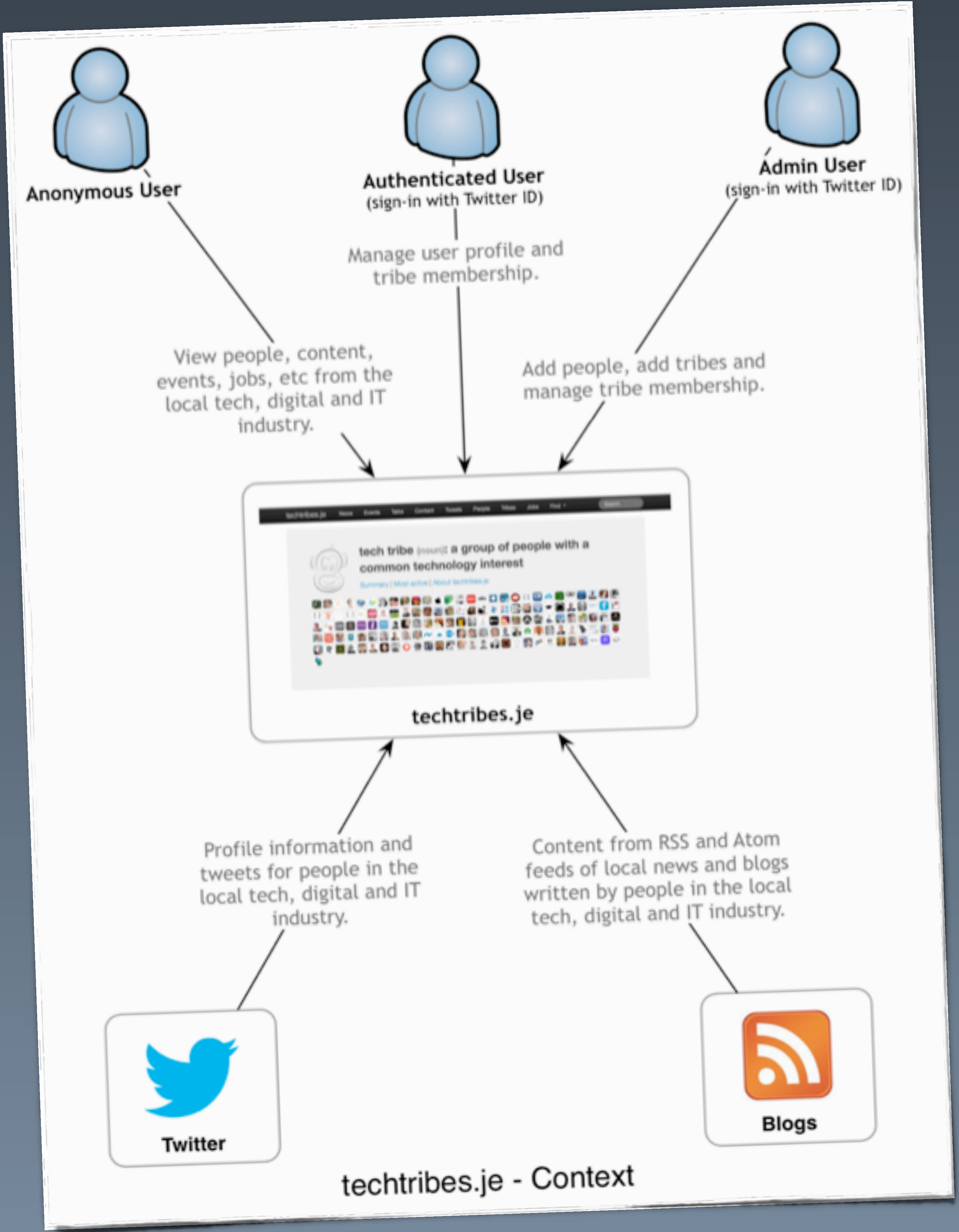


Colour coding, annotations on the lines, system responsibilities, ...



Context

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


Anonymous User
Authenticated User
(sign-in with Twitter ID)
Admin User
(sign-in with Twitter ID)
View people, content, events, jobs, etc from the local tech, digital and IT industry.
Manage user profile and tribe membership.
Add people, add tribes and manage tribe membership.
tech tribe (noun): a group of people with a common technology interest
techtribes.je
Profile information and tweets for people in the local tech, digital and IT industry.
Content from RSS and Atom feeds of local news and blogs written by people in the local tech, digital and IT industry.
Twitter
Blogs
techtribes.je - Context

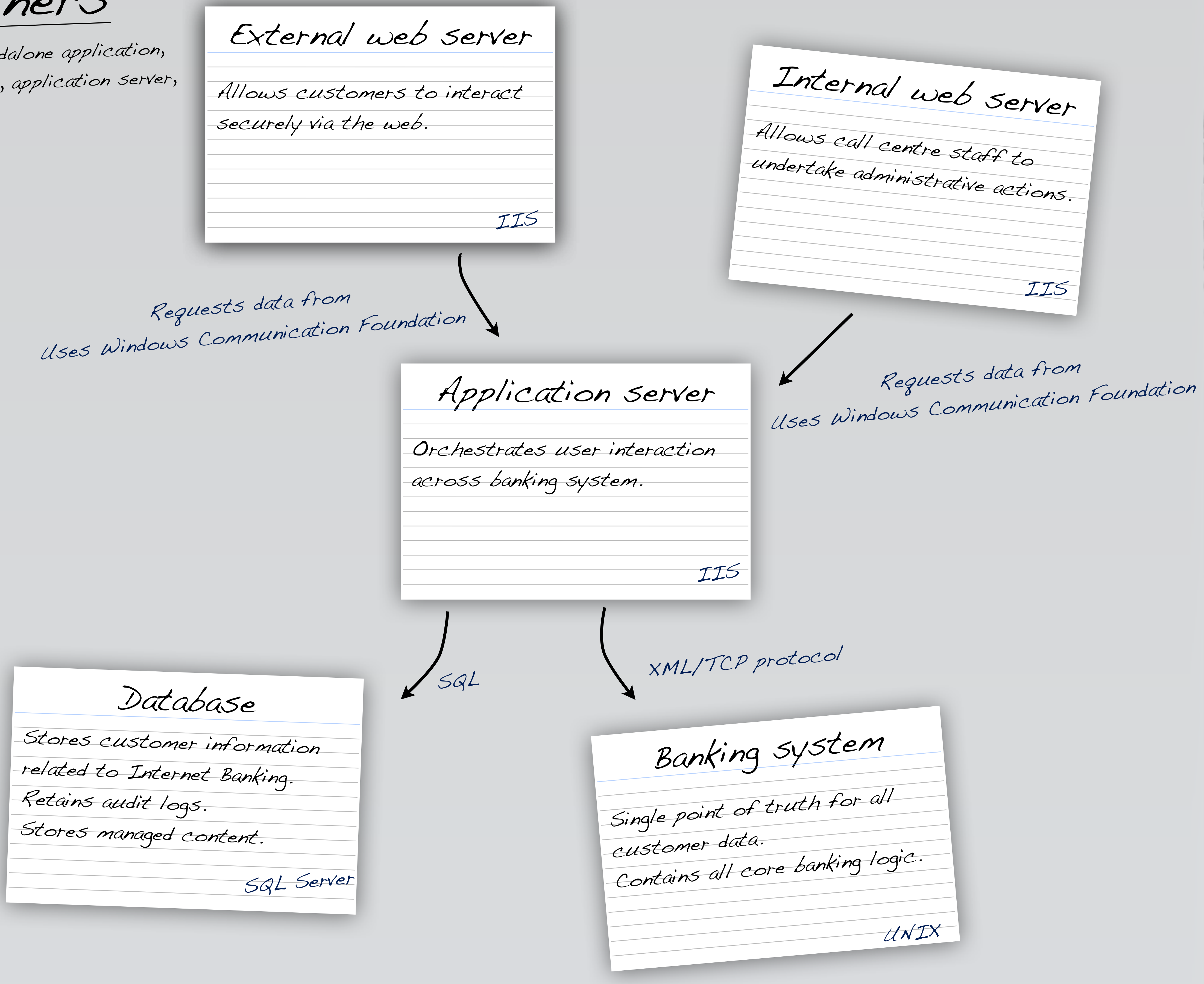
What are we building?

Who is using it?
(users, actors, roles, personas, etc)

How does it fit into the existing IT environment?

Containers

Web server, standalone application, Windows service, application server, plugin, etc



External web server: Allows customers to interact securely via the web.

Internal web server: Allows call centre staff to undertake administrative actions.

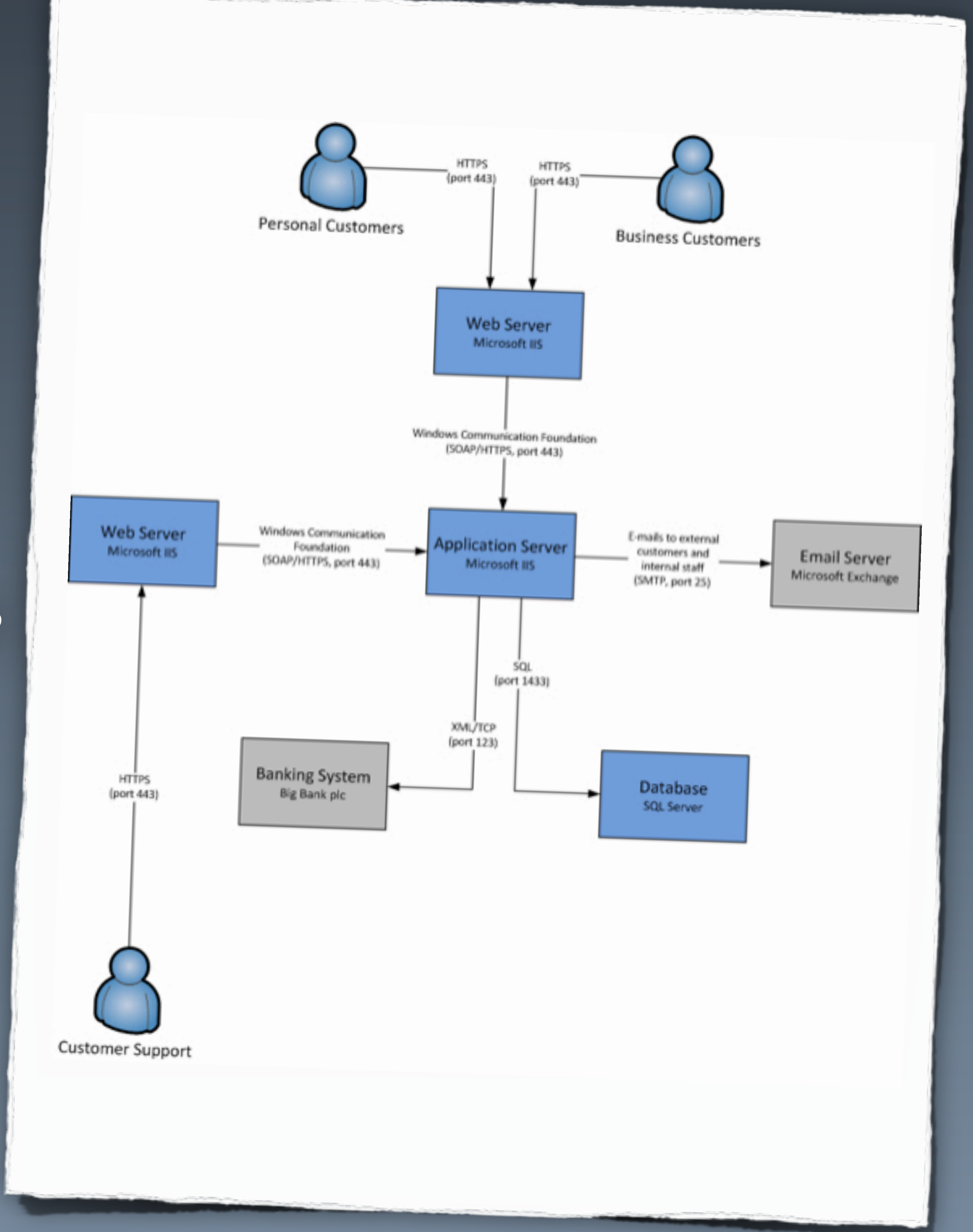
Application server: Orchestrates user interaction across banking system.

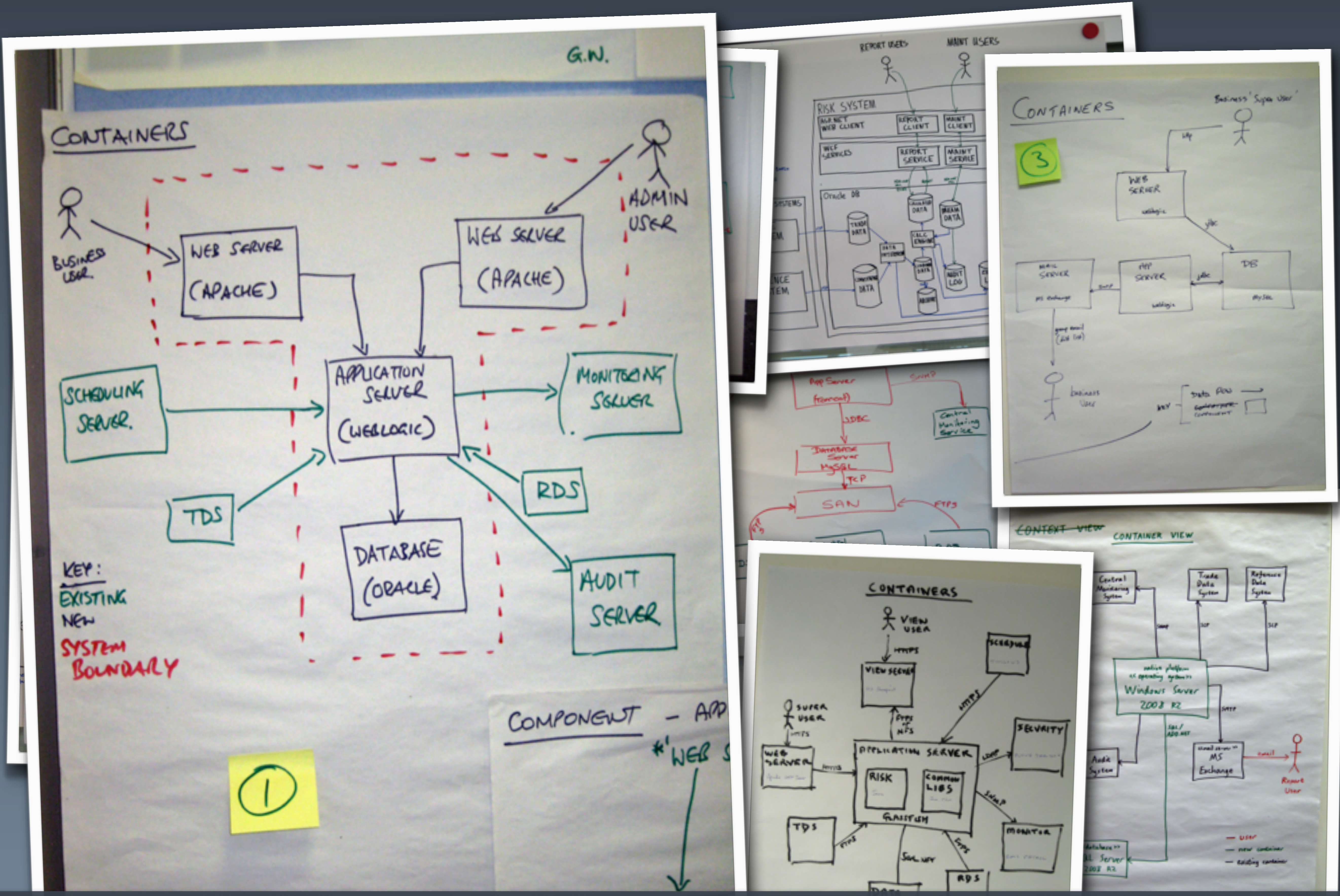
Database: Stores customer information related to Internet Banking. Retains audit logs. Stores managed content.

Banking system: Single point of truth for all customer data. Contains all core banking logic.

What **containers** is the system made up of?

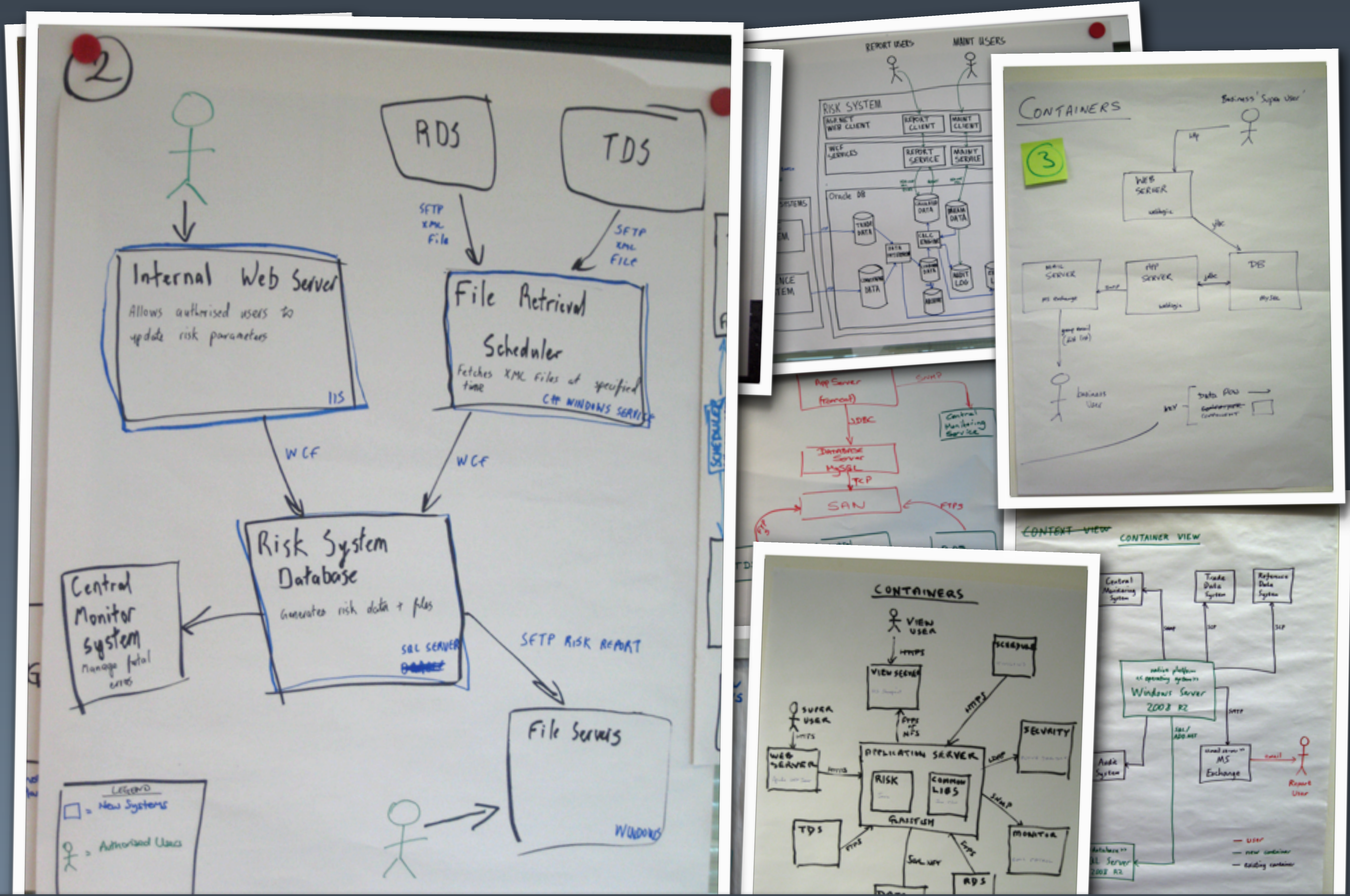
How do they **communicate**?





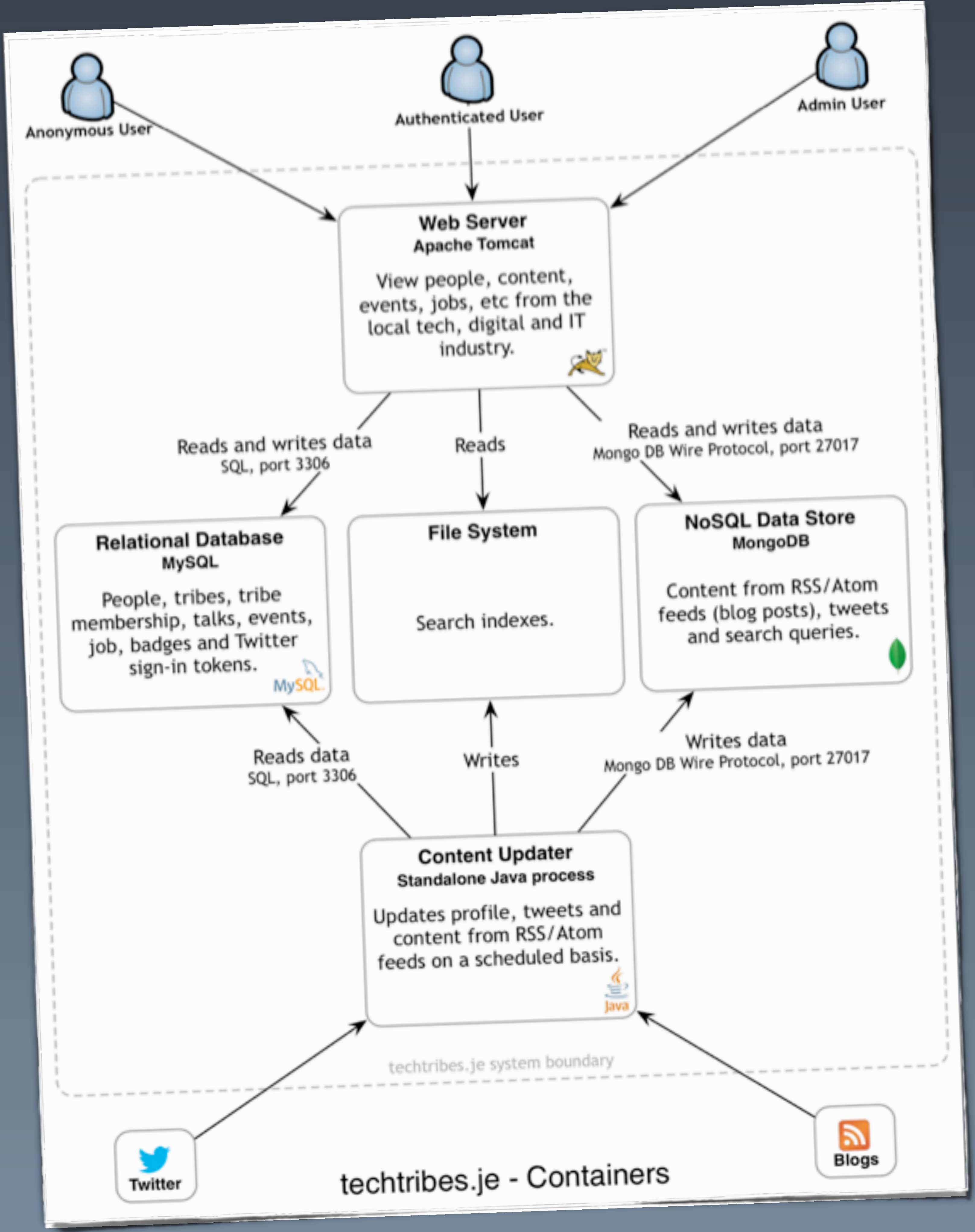
Containers

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



Containers

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



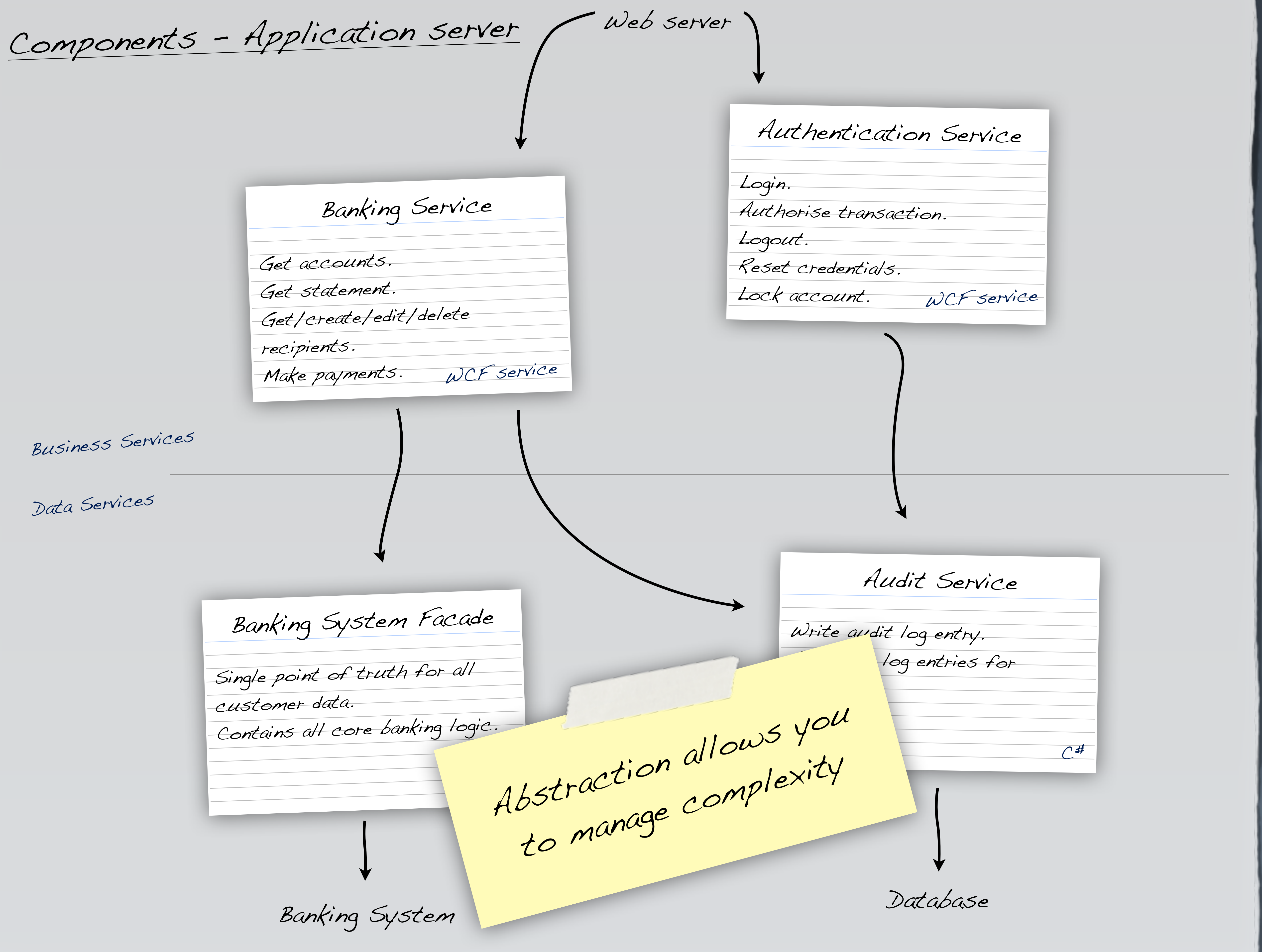
Anonymous User
Authenticated User
Admin User
Web Server
Apache Tomcat
View people, content, events, jobs, etc from the local tech, digital and IT industry.
Reads and writes data
SQL, port 3306
Reads
Reads and writes data
Mongo DB Wire Protocol, port 27017
Relational Database
MySQL
People, tribes, tribe membership, talks, events, job, badges and Twitter sign-in tokens.
File System
Search indexes.
NoSQL Data Store
MongoDB
Content from RSS/Atom feeds (blog posts), tweets and search queries.
Reads data
SQL, port 3306
Writes
Writes data
Mongo DB Wire Protocol, port 27017
Content Updater
Standalone Java process
Updates profile, tweets and content from RSS/Atom feeds on a scheduled basis.
techtribes.je system boundary
Twitter
Blogs
techtribes.je - Containers

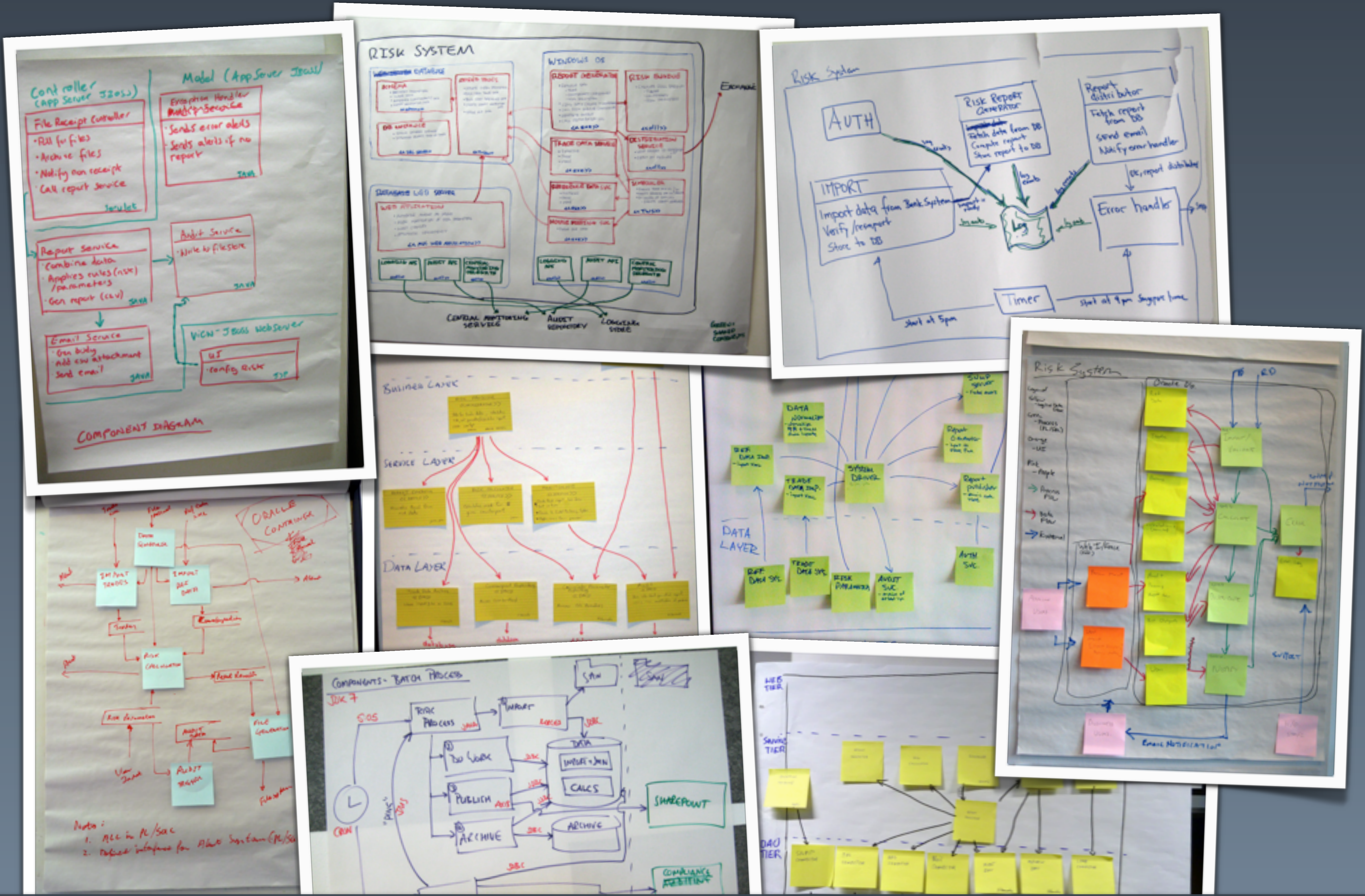
What are the high-level technology decisions?

How do containers communicate with one another?

As a developer, where do I need to write code?

Components - Application server

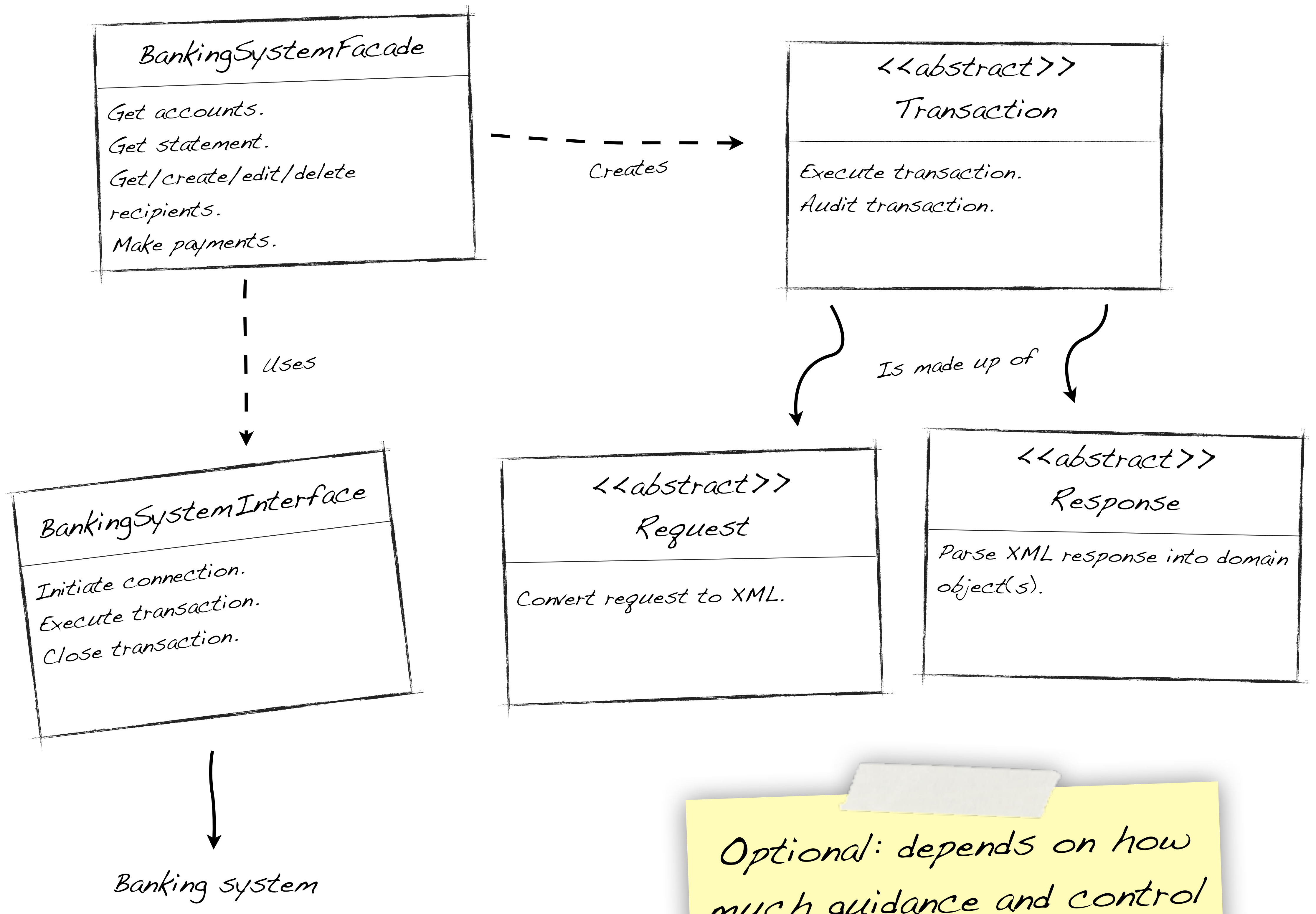




Components

- What components/services is the system made up of?
- Is it clear how the system works at a high-level?
- Do all components have a home (a container)?

Classes - Banking System Facade



Optional: depends on how much guidance and control you need to introduce

Some tips for *effective sketches*

Titles
Short and meaningful, numbered if diagram order is important

Lines
Make line style and arrows explicit, add annotations to lines to provide additional information

Layout
Sticky notes and index cards make a great substitute for drawn boxes, especially early on

Labels
Be wary of using acronyms

Colour
Ensure that colour coding is made explicit

Orientation
Users at the top and database at the bottom? Or perhaps “upside-down”?

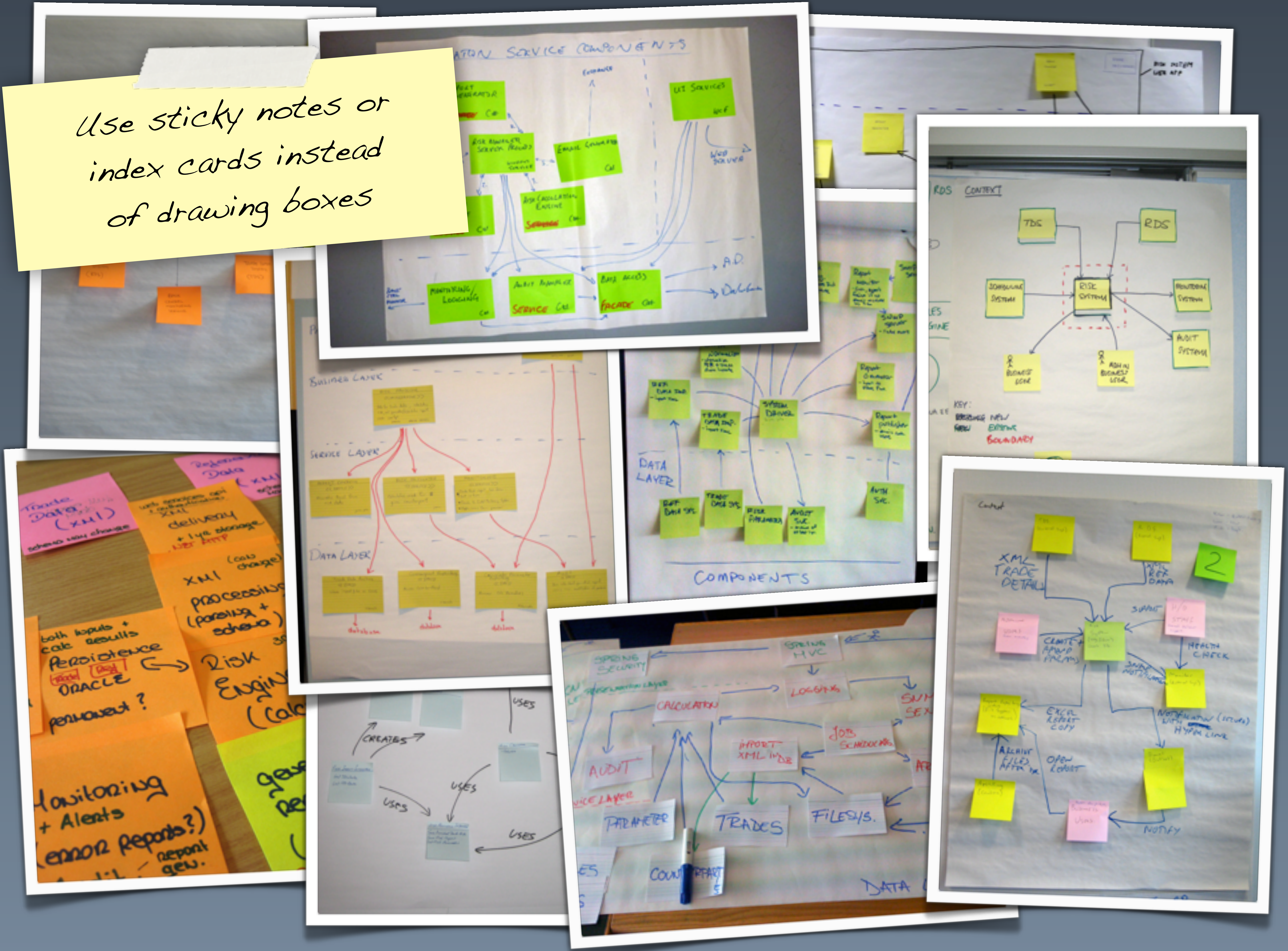
Shapes
Don’t assume that people will understand what different shapes are being used for

Borders
Use borders to provide emphasis or group related items, but ensure people know why

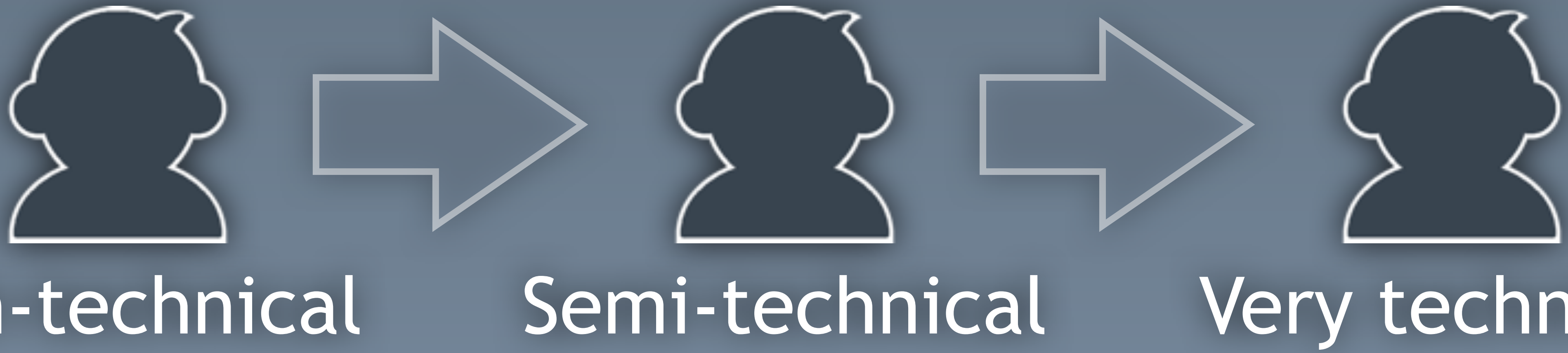
Keys
Explain shapes, lines, colours, borders, acronyms, etc

Responsibilities
Adding responsibilities to boxes can provide a nice “at a glance” view

Use sticky notes or index cards instead of drawing boxes



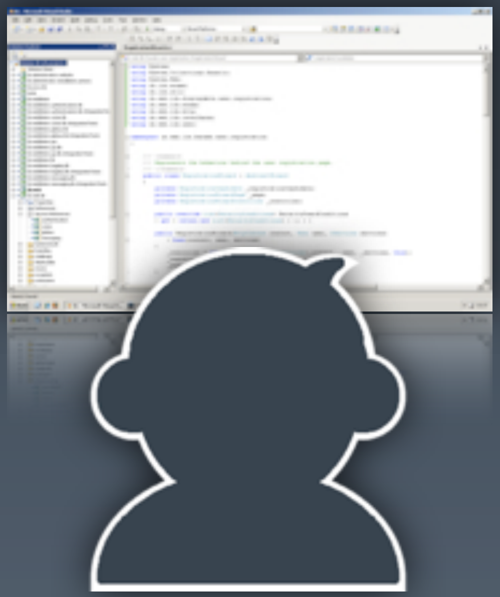
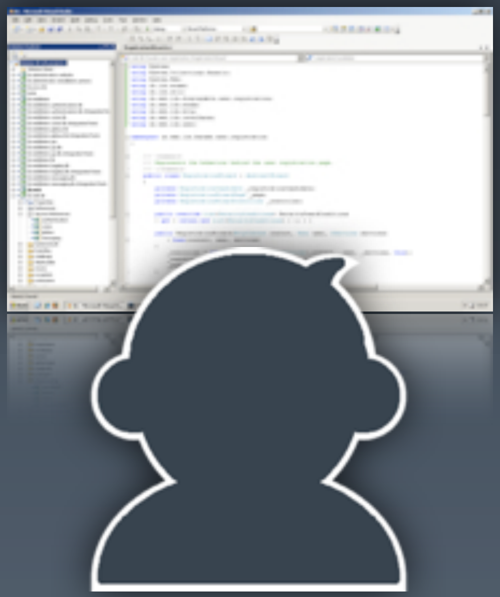
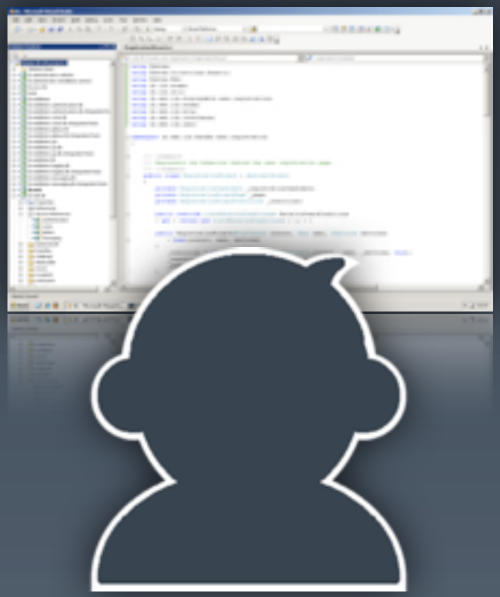
Think about the target audience



Do whatever works for

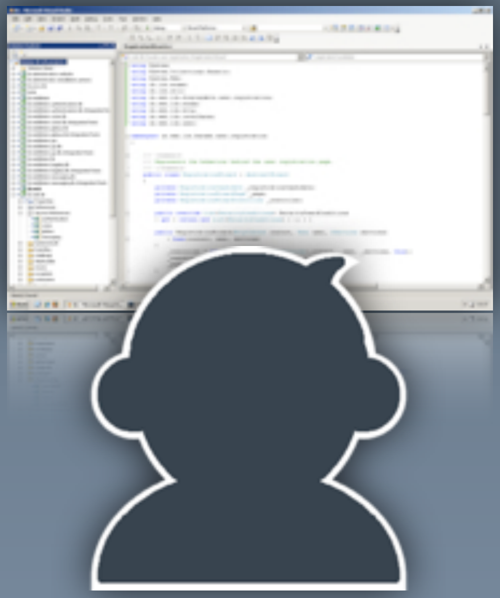
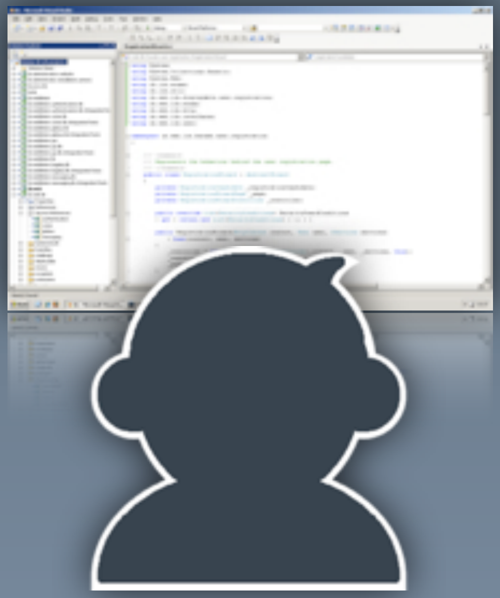
you

Sketches in context

Chaos!

Does the team understand what they are building and how they are building it?

No defined structure,
inconsistent approaches,
big ball of mud,
spaghetti code, ...

STOP

Doe

g it?

Slow, insecure, unstable, unmaintainable,
hard to deploy, hard to change,
over time, over budget, ...

Let's agree on some things

No defined structure, inconsistent approaches, big ball of mud, spaghetti code, ...

Let's make the implicit, explicit

STOP

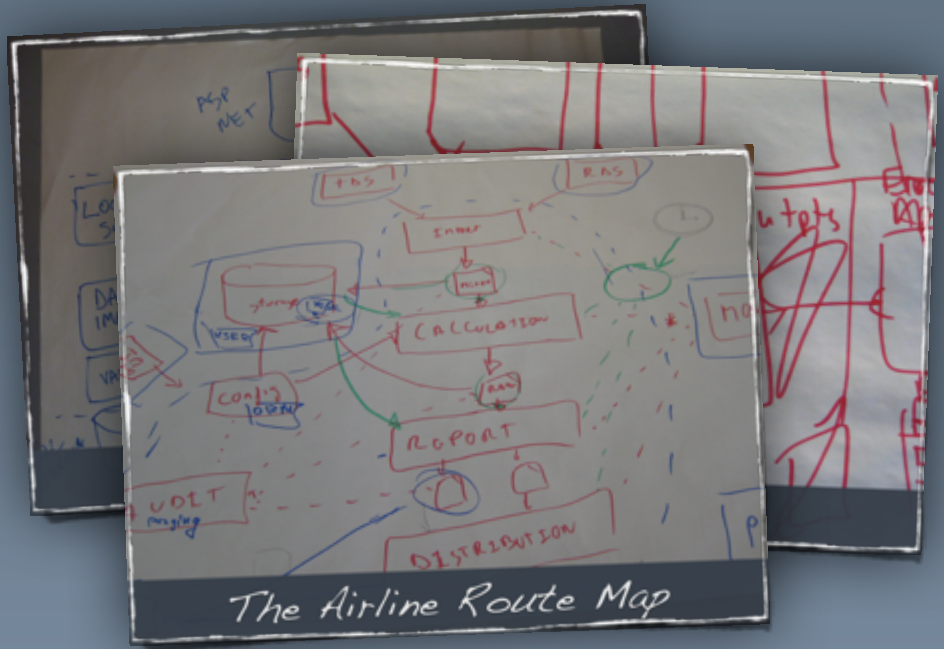
Doe

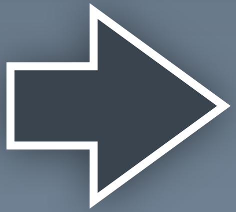
g it?

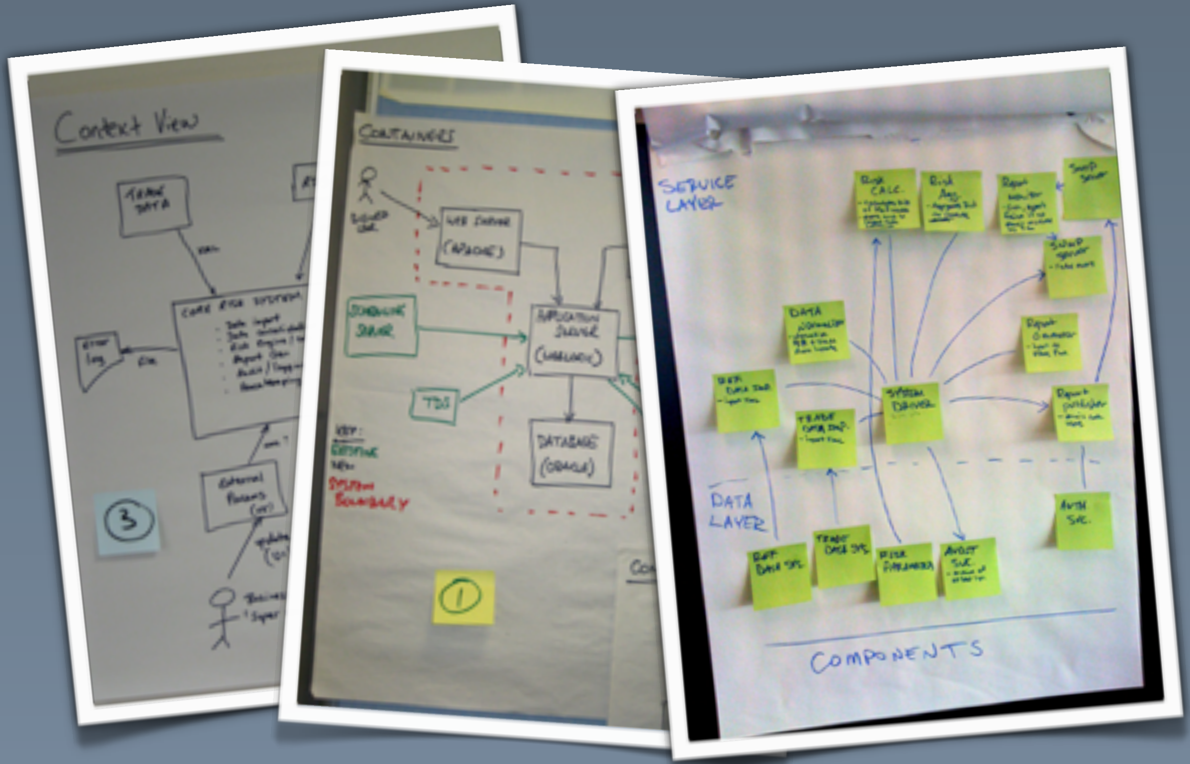
Slow, insecure, unstable, unmaintainable, hard to deploy, hard to change, over time, over budget, ...

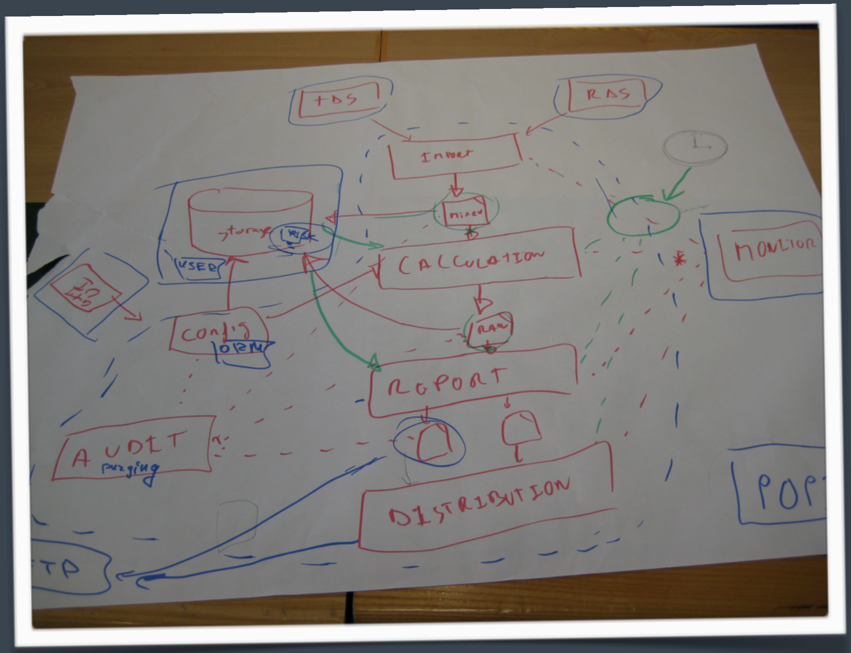
Put some boundaries and guidelines in place

Moving fast (agility) requires good communication









Shared vision of

WTF?!

Every software developer should know how to sketch

It allows you to visualise a solution and communicate it quickly

It paves the way for collaborative design and collective code ownership

✓

Sketches are not

art or

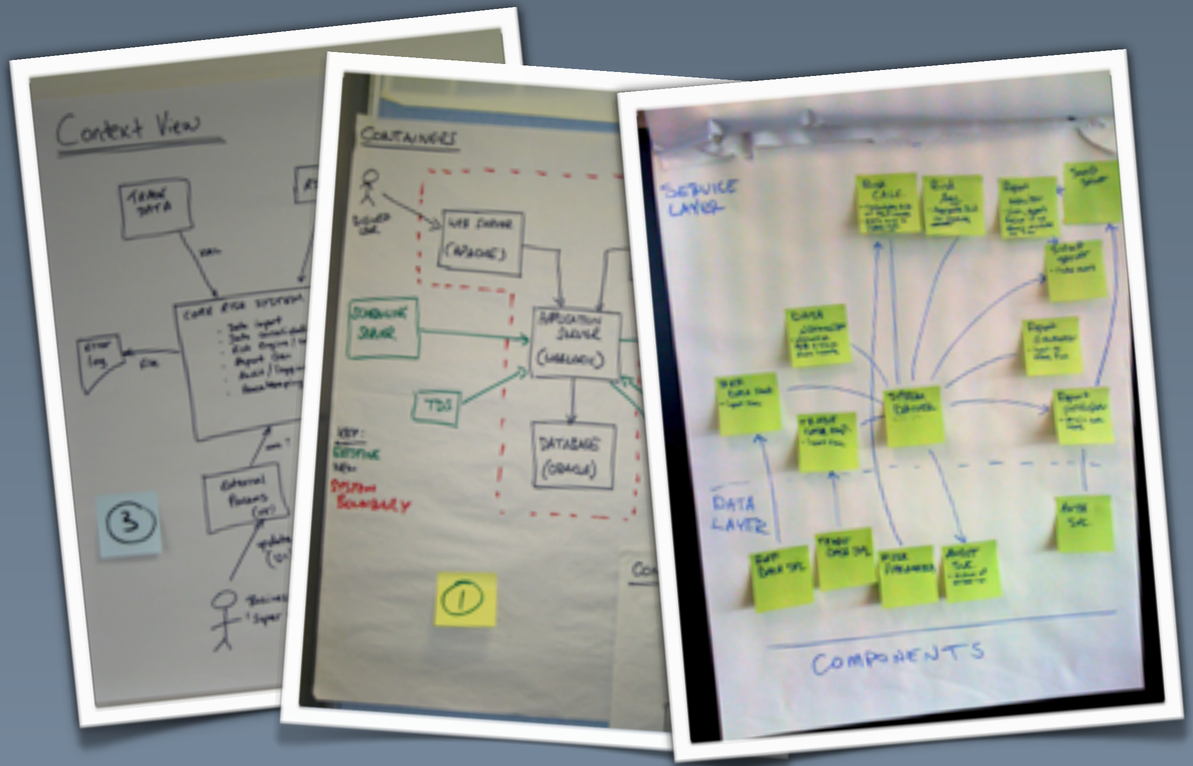
comprehensive

models

✗

Pictures

are the simplest form of documentation



Leave your *sketches* on the wall...

A point of reference for technical discussions
(something to point at)

A map to help the team navigate a complex codebase

Plus sketches are also a starting point for...

Just enough up front design to

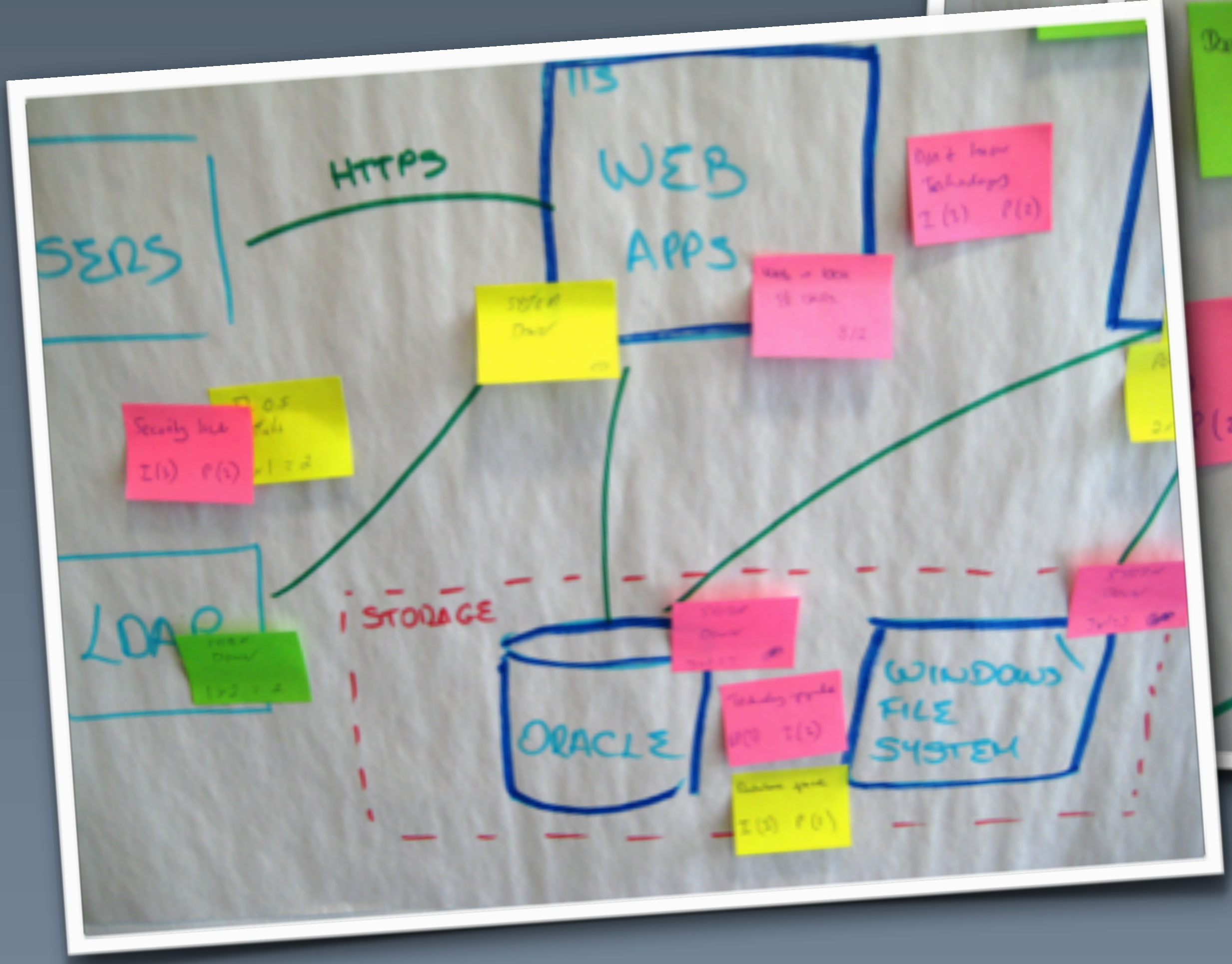
understand the structure

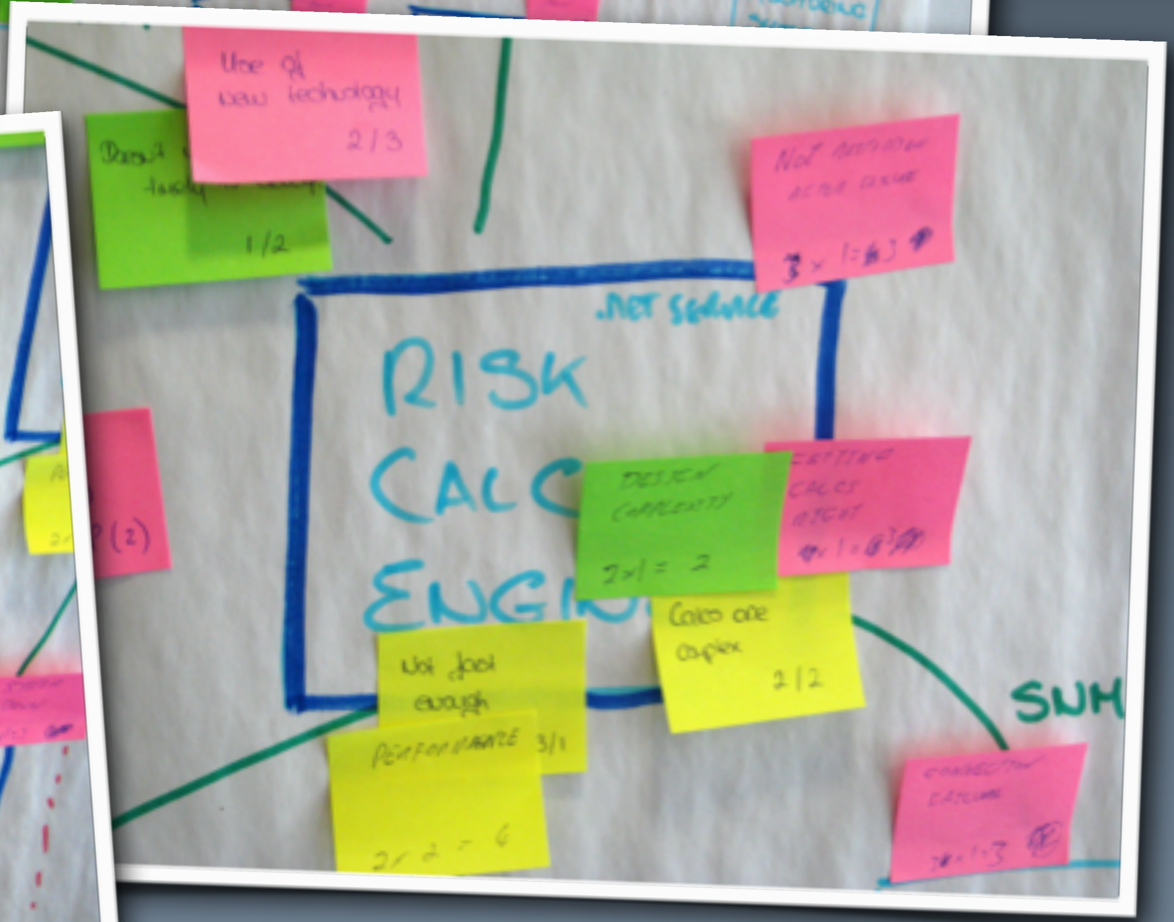
of the software and

create a shared vision

for the team

Risk-storming





A collaborative and visual technique for identifying risk

The role

"just enough"
software architecture

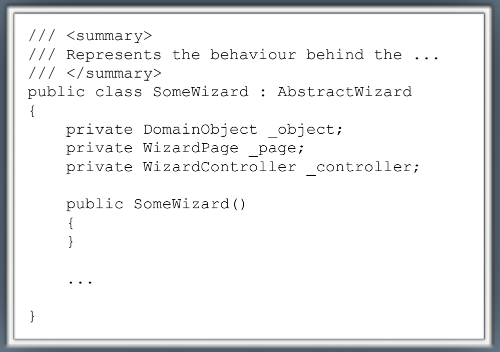
Understand how the significant elements fit together

Identify and mitigate the key risks

Provide firm foundations and a vision to move forward

Software Architecture Document

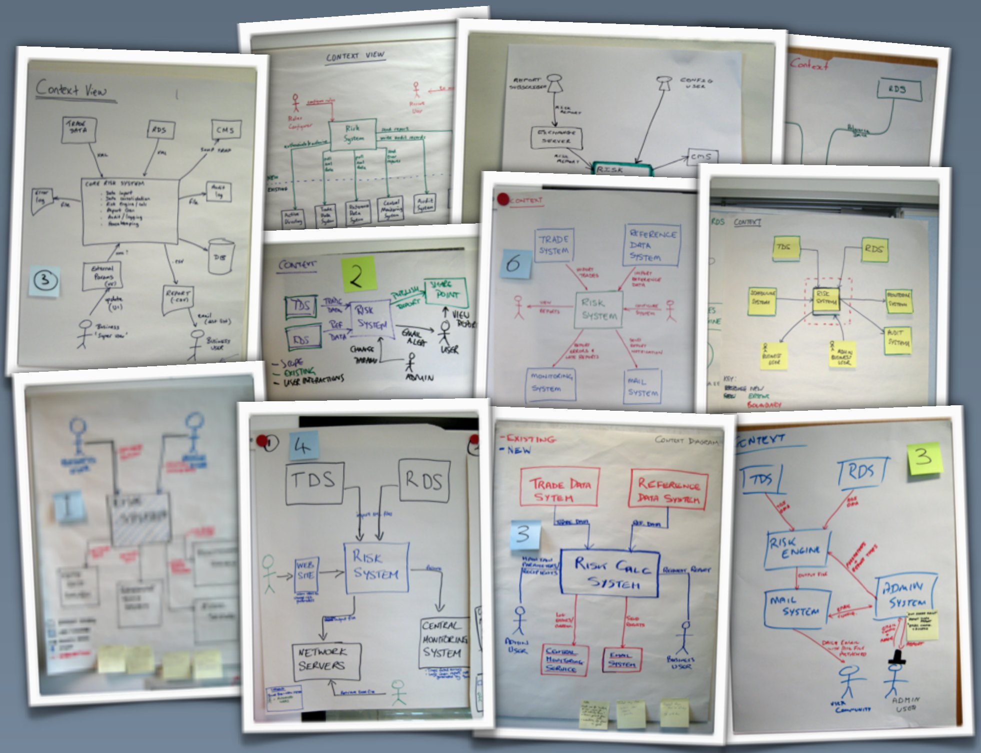
The process



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

    public SomeWizard()
    {
    }

    ...

}
```

Thanks

and happy sketching!



simon.brown@codingthearchitecture.com

@simonbrown on Twitter