SEVEN YEARS IN AN IT PROJECT

A story about the team, the technology, and the manager

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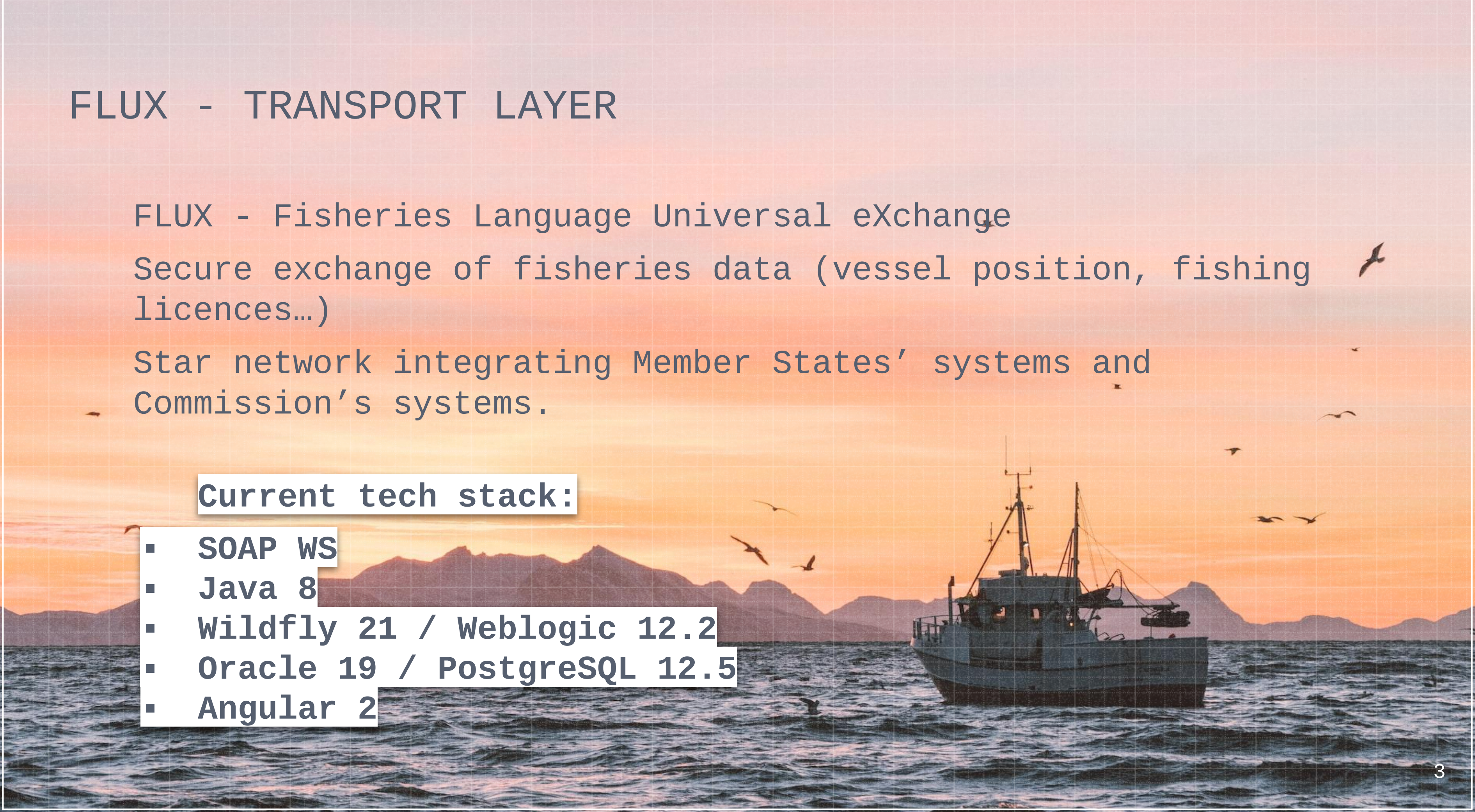
43 years old - married, two kids

“IT Operations Manager” at the European Commission (Directorate General for Maritime Affairs and Fisheries).

Working in a unit of 40 people, including 20 external contractors.



FLUX - TRANSPORT LAYER

FLUX - Fisheries Language Universal eXchange

Secure exchange of fisheries data (vessel position, fishing licences…)

Star network integrating Member States’ systems and Commission’s systems.

Current tech stack:

- **SOAP WS**
- **Java 8**
- **Wildfly 21 / Weblogic 12.2**
- **Oracle 19 / PostgreSQL 12.5**
- **Angular 2**

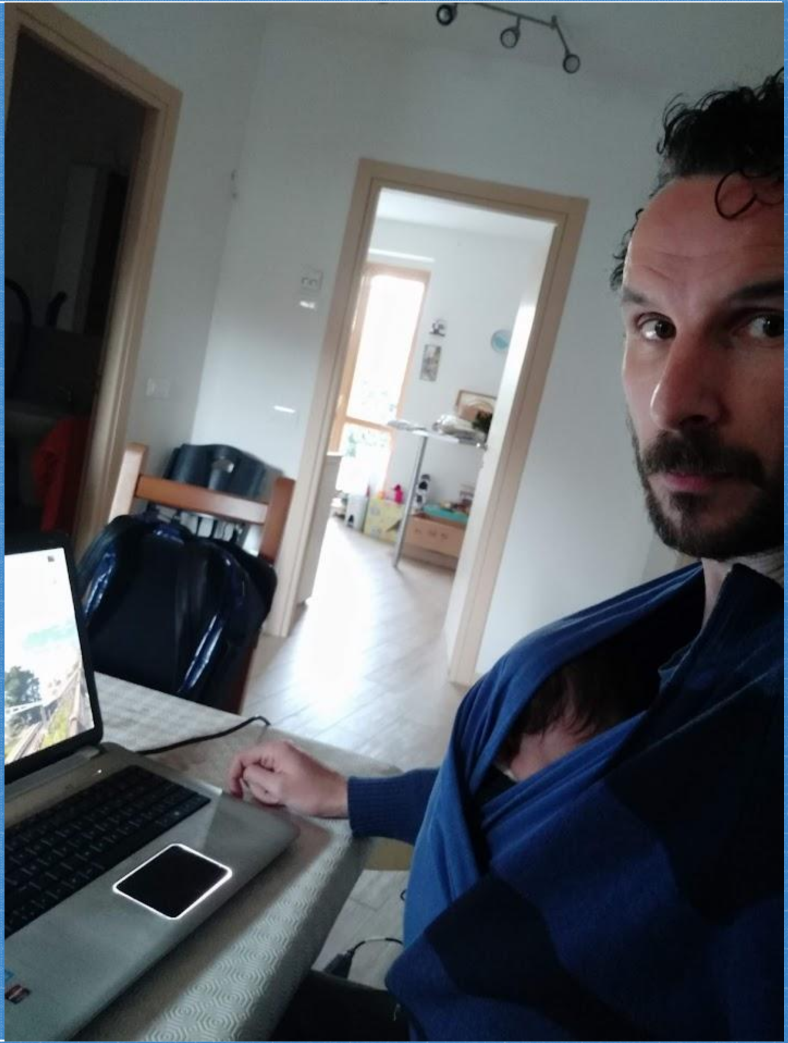
ONBOARDING A NEW MANAGER

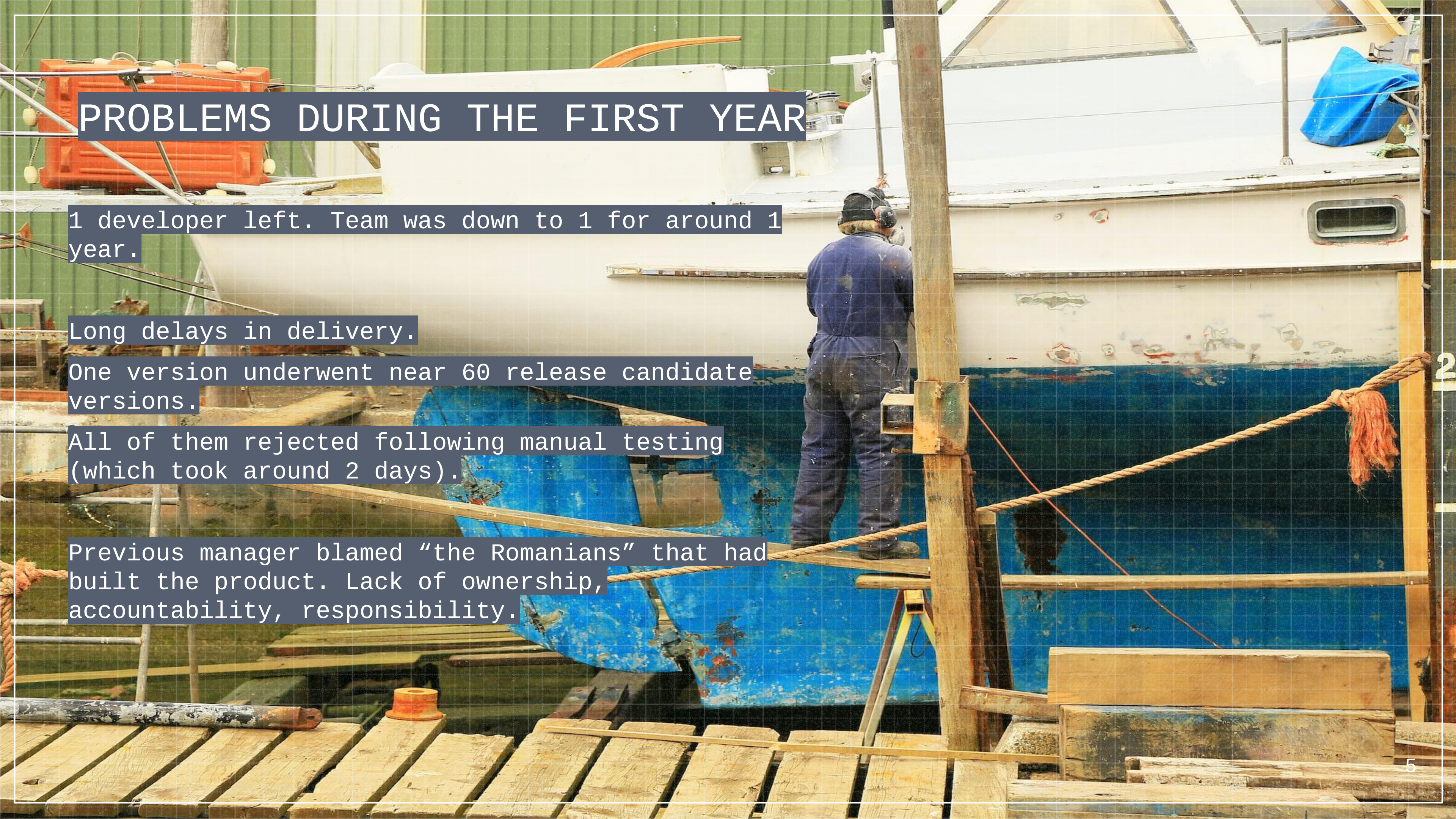
Appointed IT manager in 2017.

The first version had been delivered by an external company, with which we were not working anymore.

The manager at the time was very technical, but paid little attention to governance. My task was to align the project with the corporate governance (e.g. write vision document, draft basic planning).

Team at the time: 2 Java developers.





PROBLEMS DURING THE FIRST YEAR

1 developer left. Team was down to 1 for around 1 year.

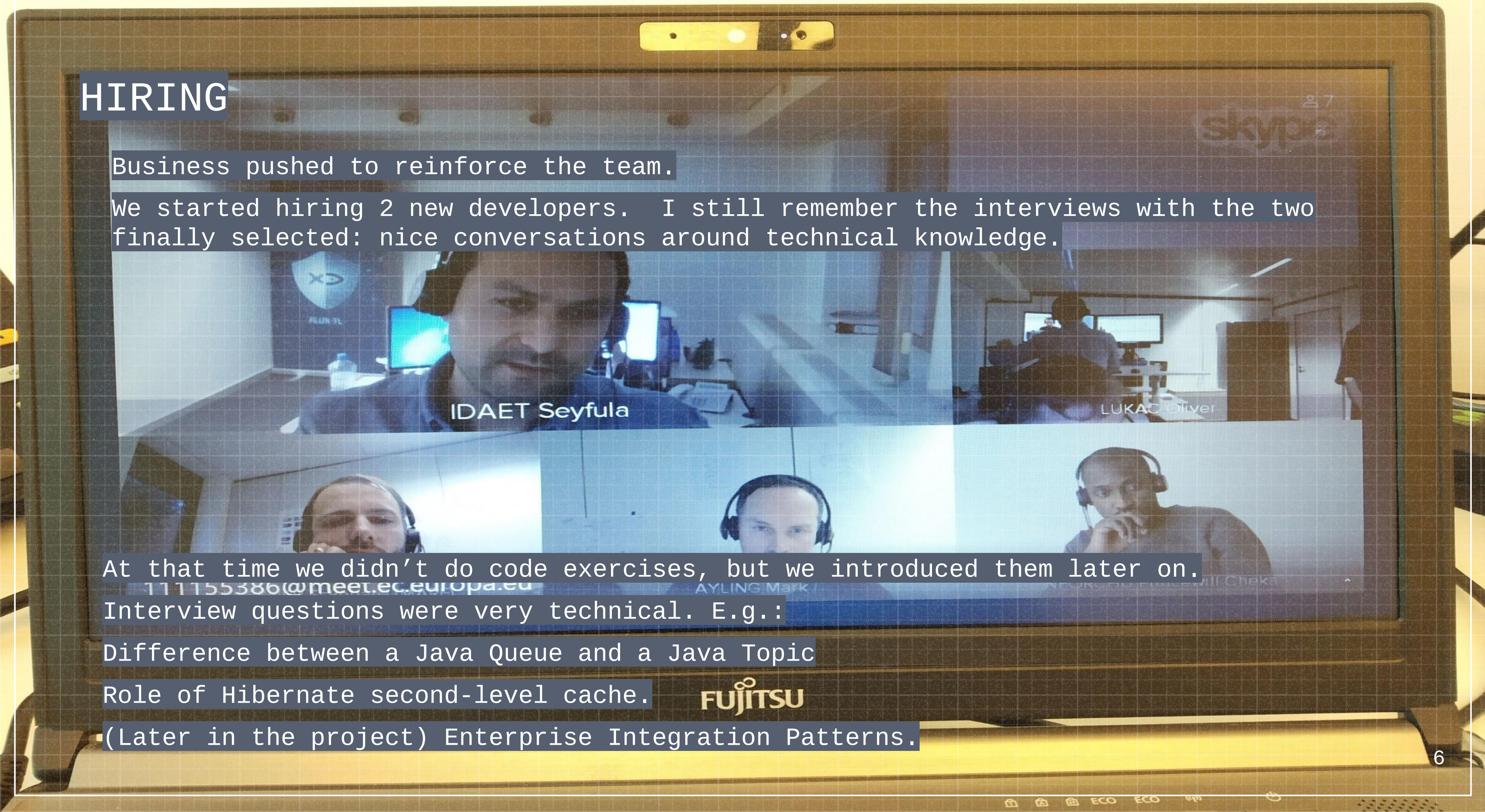
Long delays in delivery.

One version underwent near 60 release candidate versions.

All of them rejected following manual testing (which took around 2 days).

Previous manager blamed “the Romanians” that had built the product. Lack of ownership, accountability, responsibility.

HIRING



Business pushed to reinforce the team.

We started hiring 2 new developers. I still remember the interviews with the two finally selected: nice conversations around technical knowledge.

At that time we didn’t do code exercises, but we introduced them later on.

Interview questions were very technical. E.g.:

Difference between a Java Queue and a Java Topic

Role of Hibernate second-level cache.

(Later in the project) Enterprise Integration Patterns.

TEAM CHANGES

The team underwent several changes in year 2.

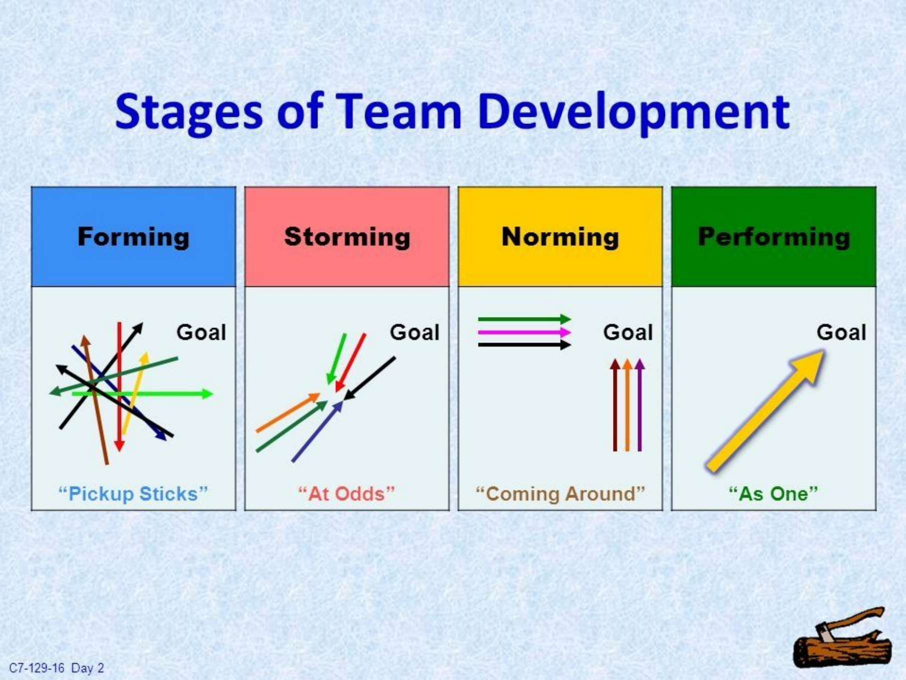
A Quality Assurance engineer joined to do manual and automated testing.

There were conflicts in the team (as with all teams: Form, Storm, Norm, Perform).

Lead developer left the team. Another great developer joined. But it took months to be productive (as it is to be expected).

We had another substitution, this time a junior developer joined.

From here onwards, 3 years of team stability.



Stages of Team Development

CREATING A HARNESS OF SYSTEM INTEGRATION TESTS

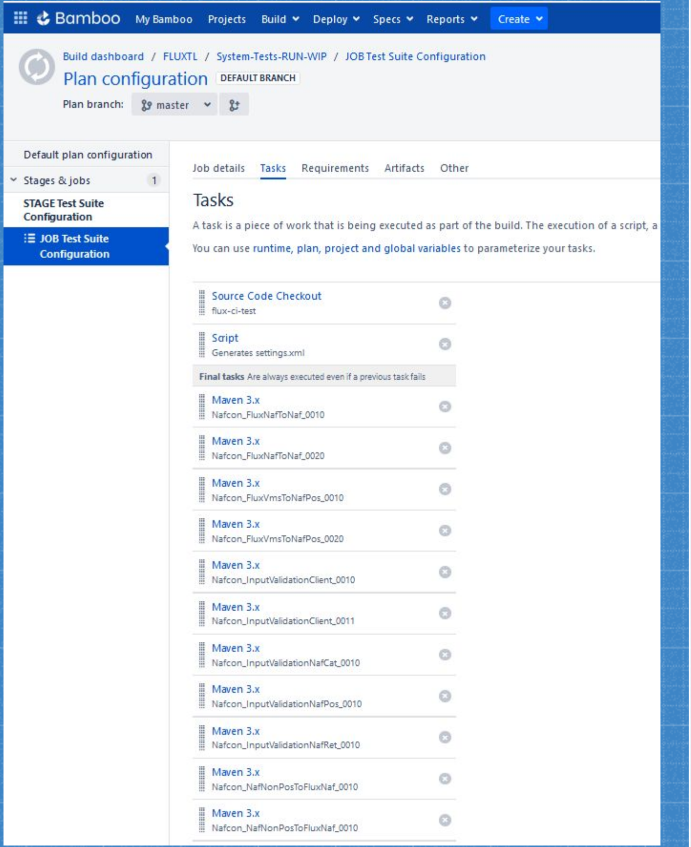
We analysed the reason for the 60 failed release candidates. We first identified the issue of not having automated tests.

Developers started to build 16 automated tests for basic integration between the 4 modules of the system.

We had low unit test coverage then. We still have it today (35%).

System integration tests have been reworked several times.

They became our main tool to decide if we could release. They still are.



Build dashboard / FLUXTL / System-Tests-RUN-WIP / JOB Test Suite Configuration

Plan configuration DEFAULT BRANCH

Plan branch: master

Tasks

A task is a piece of work that is being executed as part of the build. The execution of a script, a

You can use runtime, plan, project and global variables to parameterize your tasks.

Source Code Checkout
flux-ci-test

Script
Generates settings.xml

Final tasks Are always executed even if a previous task fails

Maven 3.x
Nafcon_FluxNafToNaf_0010

Maven 3.x
Nafcon_FluxNafToNaf_0020

Maven 3.x
Nafcon_FluxVmsToNafPos_0010

Maven 3.x
Nafcon_FluxVmsToNafPos_0020

Maven 3.x
Nafcon_InputValidationClient_0010

Maven 3.x
Nafcon_InputValidationClient_0011

Maven 3.x
Nafcon_InputValidationNafCat_0010

Maven 3.x
Nafcon_InputValidationNafPos_0010

Maven 3.x
Nafcon_InputValidationNafRet_0010

Maven 3.x
Nafcon_NafNonPosToFluxNaf_0010

Maven 3.x
Nafcon_NafNonPosToFluxNaf_0010

DEALING WITH ARCHITECTURE

With only 2 developers, we paid little attention to architecture. Also, there was no effort to align with other teams.

In our unit (30 people) the lack of architecture was identified as a transversal problem. An “Architecture Office” was put in place: 2 enterprise architects plus 2 system architects.

Architecture Office wanted to put in place a heavy process (ITIL-based).

For me, this meant conflict. Arch Office wanted to be the bottleneck and approve everything. This took away team independence.

Headquarters of the Antwerp Port Authority, designed by Iraqi-British architect Zaha Hadid.

DEALING WITH ARCHITECTURE -II

We asked the Architecture Office for advice to increase performance of the system. They said **“it can’t be done”**

But we increased from 3 to 10 to 20 to 60 messages per second in successive refactored versions.

That’s how we got independence from Architecture Office.

But what about system architecture itself?

We had a developer with strong architectural skills.

And we need architectural skills all across the team. It can’t be something that “someone outside” knows.

Today in the unit there is a new Lead Architect, coordinating an Architecture Board. This board has one member of each team (including ours). It’s more like a guild.

ARCHITECTURAL ELEMENTS - LATENCY TOLERANCE

We run a central node connected with 40 other nodes. The system dispatches 500.000 messages per day.

When a node is not available, delivery queues grow. In the past the system slowed down and eventually stopped working.

2 years ago we implemented a circuit breaker. When a node is not responding, the system doesn’t retry immediately. Instead it breaks the circuit.

We chose the library Hystrix. Made by Netflix, now deprecated, substituted by Resilience4J.

HYSTRIX
DEFEND YOUR APP

RESILIENCE4J

REWRITING THE SYSTEM

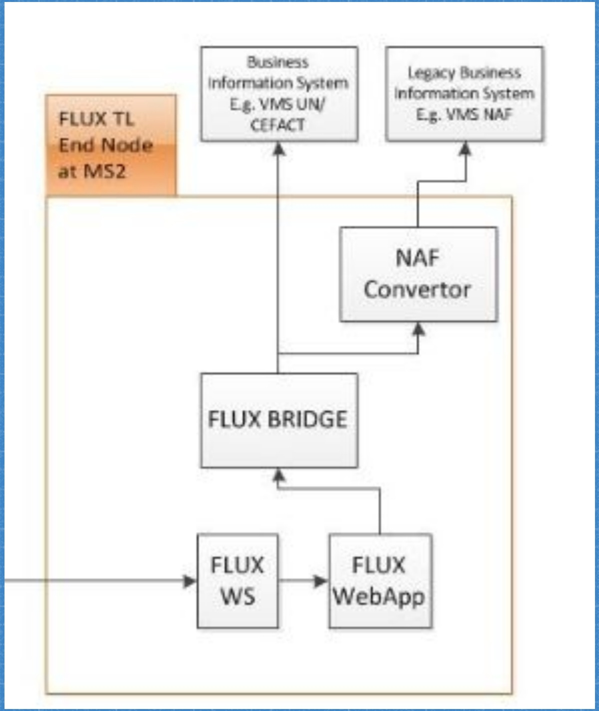
During the period in which I had less control of the system, one of the developers took the decision to start rewriting the three main modules. It took several months.

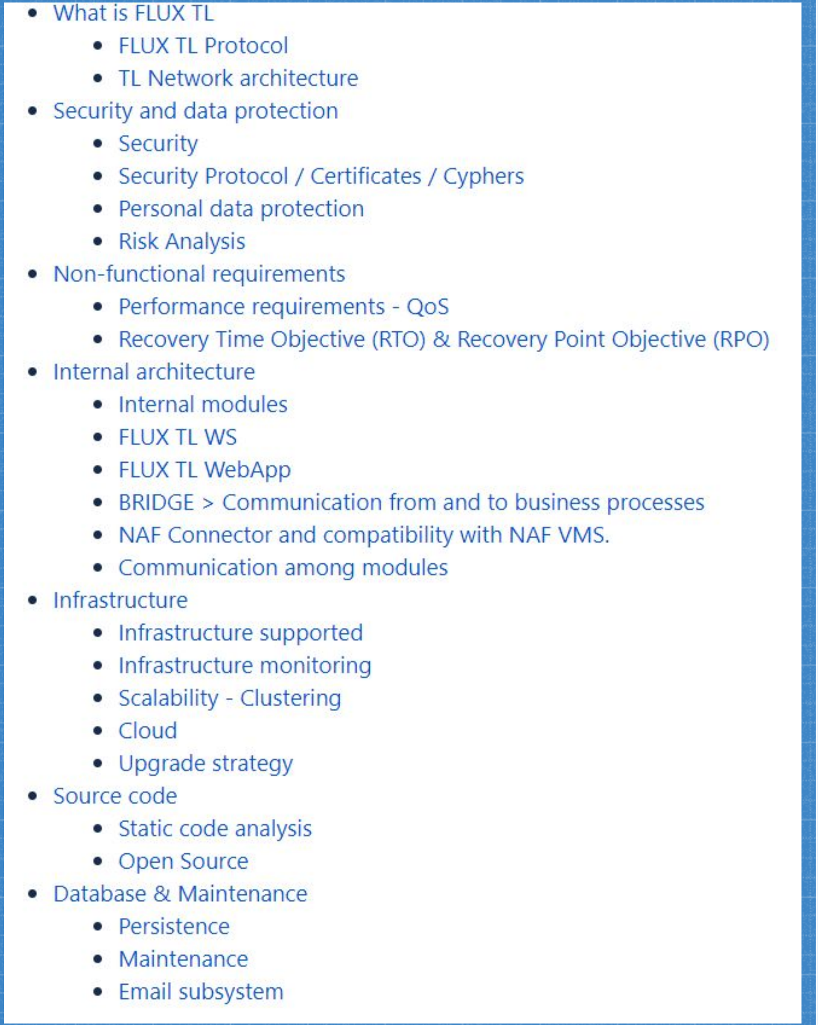
This developer took great ownership of the system

It was what technologically was needed

If I had had full oversight, I might have not allowed this. And still, this was the greatest change that could have happened.

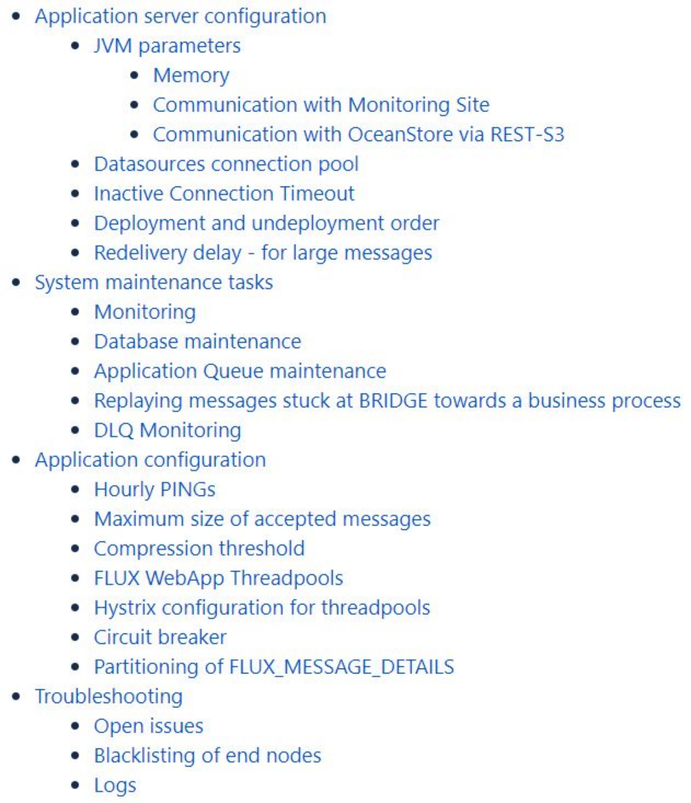
FLUX TL ARCHITECTURE SUMMARY


Business Information System E.g. VMS UN/ CEFACT
Legacy Business Information System E.g. VMS NAF
FLUX TL End Node at MS2
NAF Convertor
FLUX BRIDGE
FLUX WS
FLUX WebApp

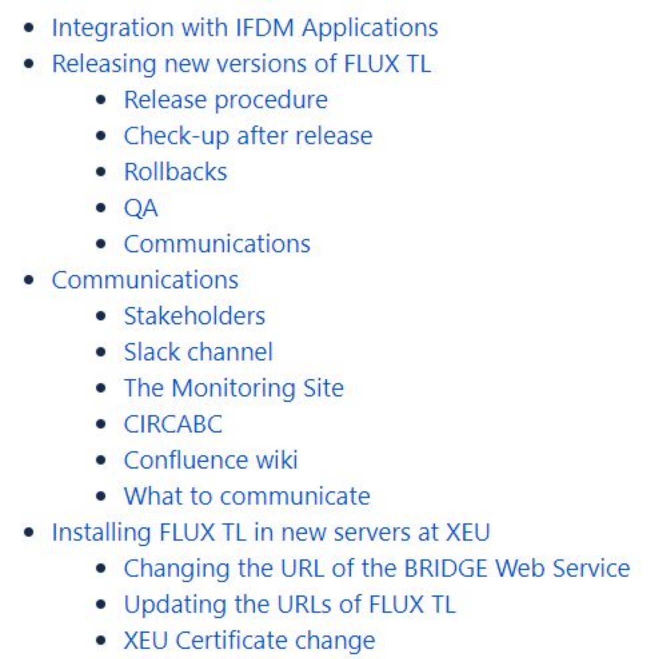


- What is FLUX TL
  - FLUX TL Protocol
  - TL Network architecture
- Security and data protection
  - Security
  - Security Protocol / Certificates / Cyphers
  - Personal data protection
  - Risk Analysis
- Non-functional requirements
  - Performance requirements - QoS
  - Recovery Time Objective (RTO) & Recovery Point Objective (RPO)
- Internal architecture
  - Internal modules
  - FLUX TL WS
  - FLUX TL WebApp
  - BRIDGE > Communication from and to business processes
  - NAF Connector and compatibility with NAF VMS.
  - Communication among modules
- Infrastructure
  - Infrastructure supported
  - Infrastructure monitoring
  - Scalability - Clustering
  - Cloud
  - Upgrade strategy
- Source code
  - Static code analysis
  - Open Source
- Database & Maintenance
  - Persistence
  - Maintenance
  - Email subsystem

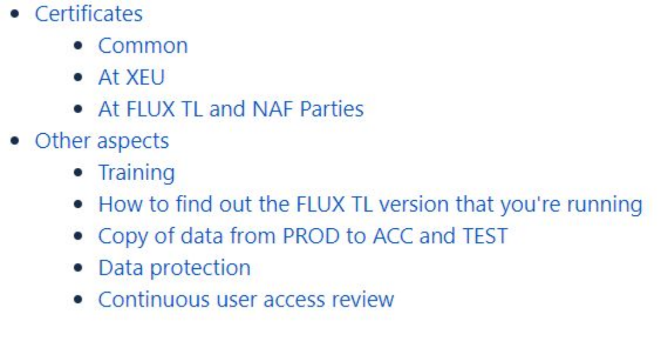
FLUX TL OPERATING MANUAL



- Application server configuration
  - JVM parameters
    - Memory
    - Communication with Monitoring Site
    - Communication with OceanStore via REST-S3
  - Datasources connection pool
  - Inactive Connection Timeout
  - Deployment and undeployment order
  - Redelivery delay - for large messages
- System maintenance tasks
  - Monitoring
  - Database maintenance
  - Application Queue maintenance
  - Replaying messages stuck at BRIDGE towards a business process
  - DLQ Monitoring
- Application configuration
  - Hourly PINGs
  - Maximum size of accepted messages
  - Compression threshold
  - FLUX WebApp Threadpools
  - Hystrix configuration for threadpools
  - Circuit breaker
  - Partitioning of FLUX_MESSAGE_DETAILS
- Troubleshooting
  - Open issues
  - Blacklisting of end nodes
  - Logs



- Integration with IFDM Applications
- Releasing new versions of FLUX TL
  - Release procedure
  - Check-up after release
  - Rollbacks
  - QA
  - Communications
- Communications
  - Stakeholders
  - Slack channel
  - The Monitoring Site
  - CIRCABC
  - Confluence wiki
  - What to communicate
- Installing FLUX TL in new servers at XEU
  - Changing the URL of the BRIDGE Web Service
  - Updating the URLs of FLUX TL
  - XEU Certificate change



- Certificates
  - Common
  - At XEU
  - At FLUX TL and NAF Parties
- Other aspects
  - Training
  - How to find out the FLUX TL version that you're running
  - Copy of data from PROD to ACC and TEST
  - Data protection
  - Continuous user access review

LEARNING ON THE JOB

Our system is heavily backend (in Java). At some moment, we had to do as well a frontend (in Angular).

So we had to:

Either have some other team do the frontend

Or bring someone external to do it

Or learn

For me, computer engineers that need to learn a new language was normal. But this generated a conflict with my boss: **“I don’t want people doing experiments. I want Angular experts”.**

Doing experiments and learning on the job was exactly what I wanted to do.

It worked. Two years later I have IT Engineers that are knowledgeable in Angular.

CONFLICT WITH BUSINESS OVER PLANNING

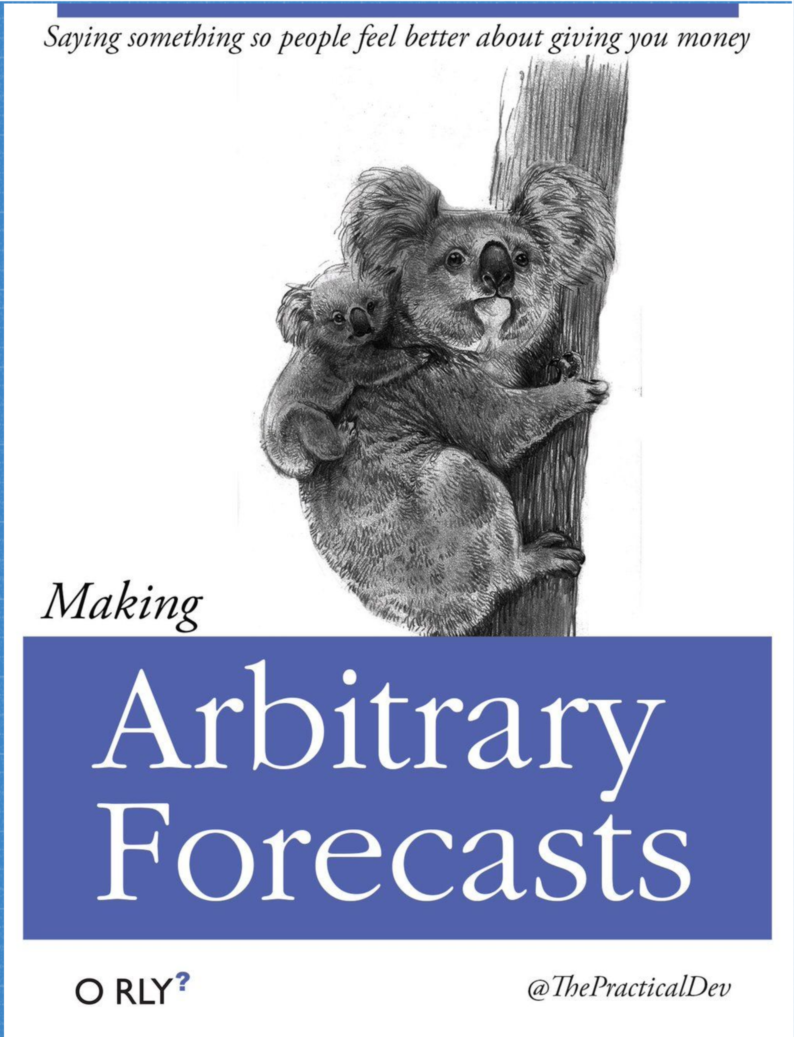
As an IT Manager, I gave estimations. I made clear they were “happy path” scenarios.

But business assumed they were commitments. And when we missed them, we were blamed.

So I said: “no more planning”. It was an ugly discussion.

From then onwards we started to agree only on priorities.

- *How long will it take?*
- *As long as it takes*


Saying something so people feel better about giving you money
Making
Arbitrary Forecasts
O RLY?
@ThePracticalDev

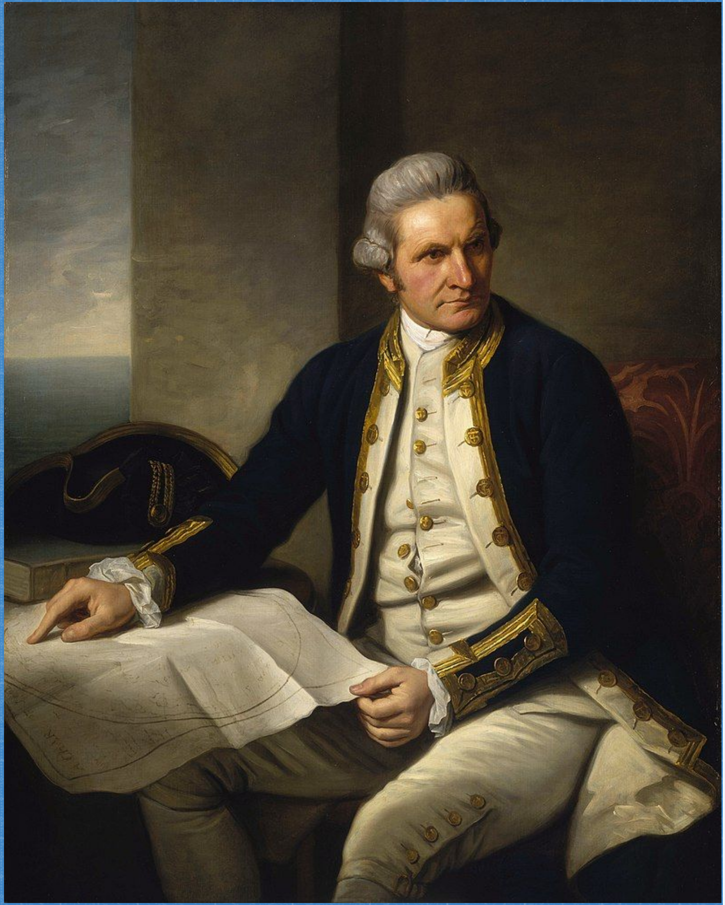
CONTRACTING OPTIONS

This is not a pure architectural question, but it will heavily influence results.

- Internal staff. How many non-IT companies hire developers?
- External developers, working intra-muros. Times & Means.
- External developers, working extra-muros. Proximity Times & Means.
- Outsourced project. Fixed Price.

Beware of conflicting interests. Outsourced projects require a lot of discussion. E.g. Captain Cook in his third trip reckoned that he had to pay much more attention to the deliverables. And in the end, the quality was worse.

I have a strong preference towards internal staff, based on my own experience.



CONTINUOUS INTEGRATION

It was hard to deploy. So we wanted to do it more often.

We moved our CI tooling from Jenkins to Bamboo to align with the corporate tooling. In a couple of years we'll move to Gitlab.

We have nightly test runs. We build, deploy in AWS using ElasticBeanStalk, and run system tests to three environments.

Next step is to automate deployments to TEST.

It's a journey. Still, today, we don't deploy to PROD on Fridays.

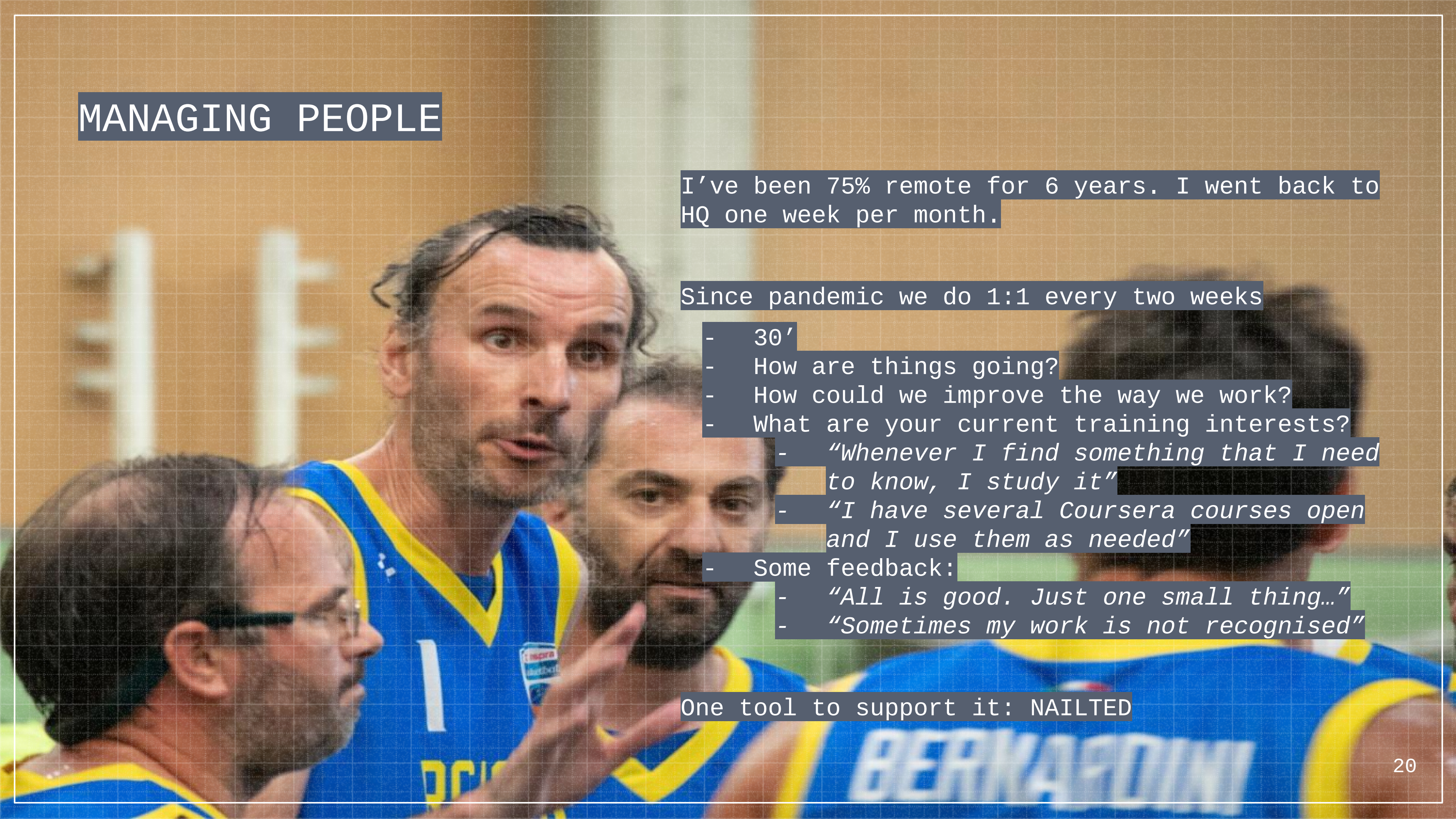
TEAM ORGANISATION

We do dailys from 9 to 9:30 (9:15-9:30-9:45). We only started with pandemic.From that moment on, each individual is independent.

Many times they call each other. Sometimes, I have to remind them not to spend too long troubleshooting one issue without asking for help.

Some months ago we switched the Wednesday daily for a 1-hour team meeting, to work together on something. I’d like to arrive to mob programming, but we’re not there yet.

We did retros. We don’t do them anymore. We don’t do sprints.



MANAGING PEOPLE

I’ve been 75% remote for 6 years. I went back to HQ one week per month.

Since pandemic we do 1:1 every two weeks

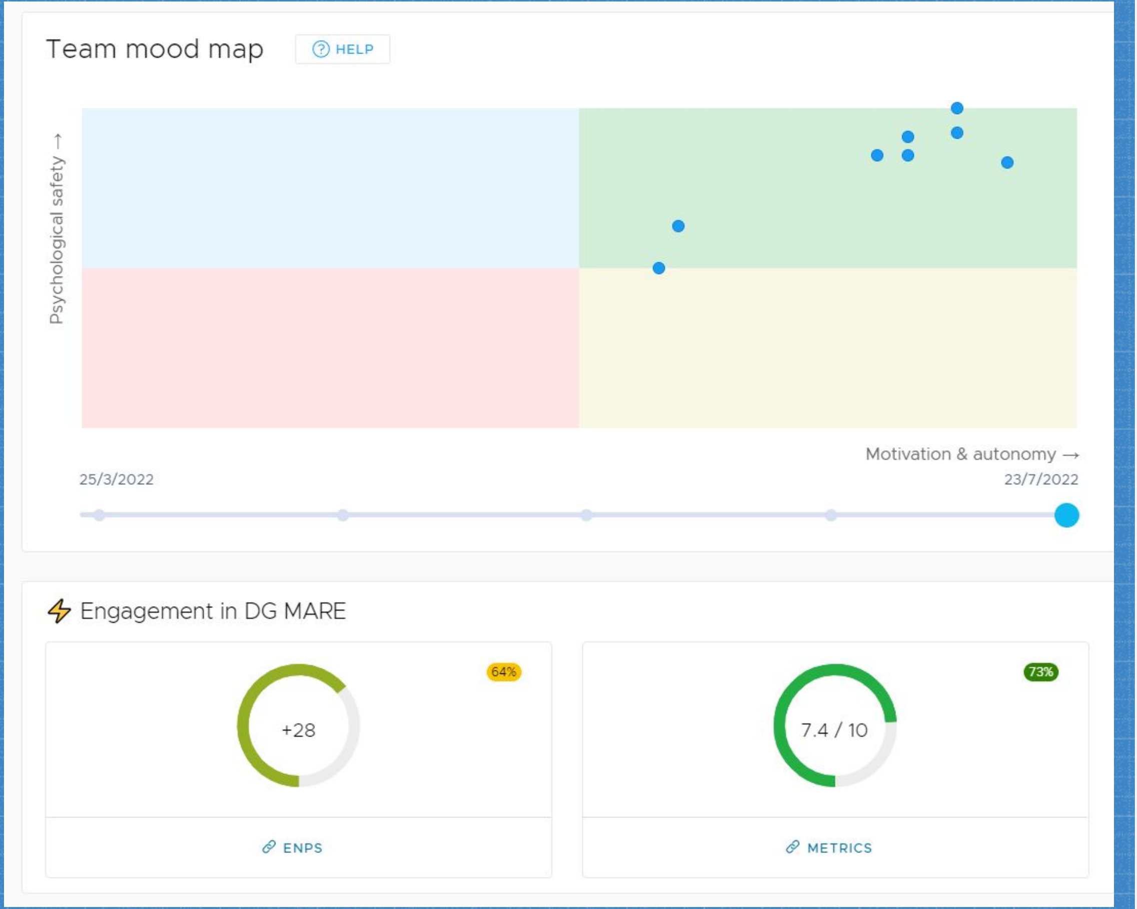
- 30’
- How are things going?
- How could we improve the way we work?
- What are your current training interests?
  - *“Whenever I find something that I need to know, I study it”*
  - *“I have several Coursera courses open and I use them as needed”*
- Some feedback:
  - *“All is good. Just one small thing…”*
  - *“Sometimes my work is not recognised”*

One tool to support it: NAILTED

TEAM MOOD

- **Psychological safety.** Are you afraid of telling me what’s wrong?

- The science of **motivation:** Autonomy, Mastery and Purpose



HOW TO GROW FROM HERE

The system needs to stay up-to-date technologically, otherwise it will start to become legacy.

These are features required by the business unit, but with low priority.

The system is in a good place now. But it can slide easily.

This whole codebase is now yours, Simba.
But what's that shadowy place over there?
That's legacy code. We don't go there.

HOW TO QUIT

On 15/02 I left the project and started a sabbatical year. Family reasons combined with lack of flexibility from my employer for remote work.

Gaps when I leave:

- Division between Development and Operations (I covered both)
- Conflict resolution
- Vision

Farewell:

I have been as good a manager as you have made me.

We have grown together, we have learned together, we have fought together, and we have always confronted the challenges coming our way

You have all the elements you need to be successful in your jobs and in your careers.

WORKING FOR THE EU

- **As an official.**
    - Contract Agent. 3+3 years, non-renewable.
    - Permanent Staff.
    - After passing an EPSO competition: **https://epso.europa.eu/en**

- **As an external contractor**
    - On site, Near Site, Far Site
    - Through an intermediate company
    - In a framework contract. E.g., **DIGIT TM 2.**

- **As a trainee**
    - European Parliament (link).
    - European Commission “Blue Book”: **https://traineeships.ec.europa.eu/**

Thanks!

WHO HAS THE FIRST QUESTION?

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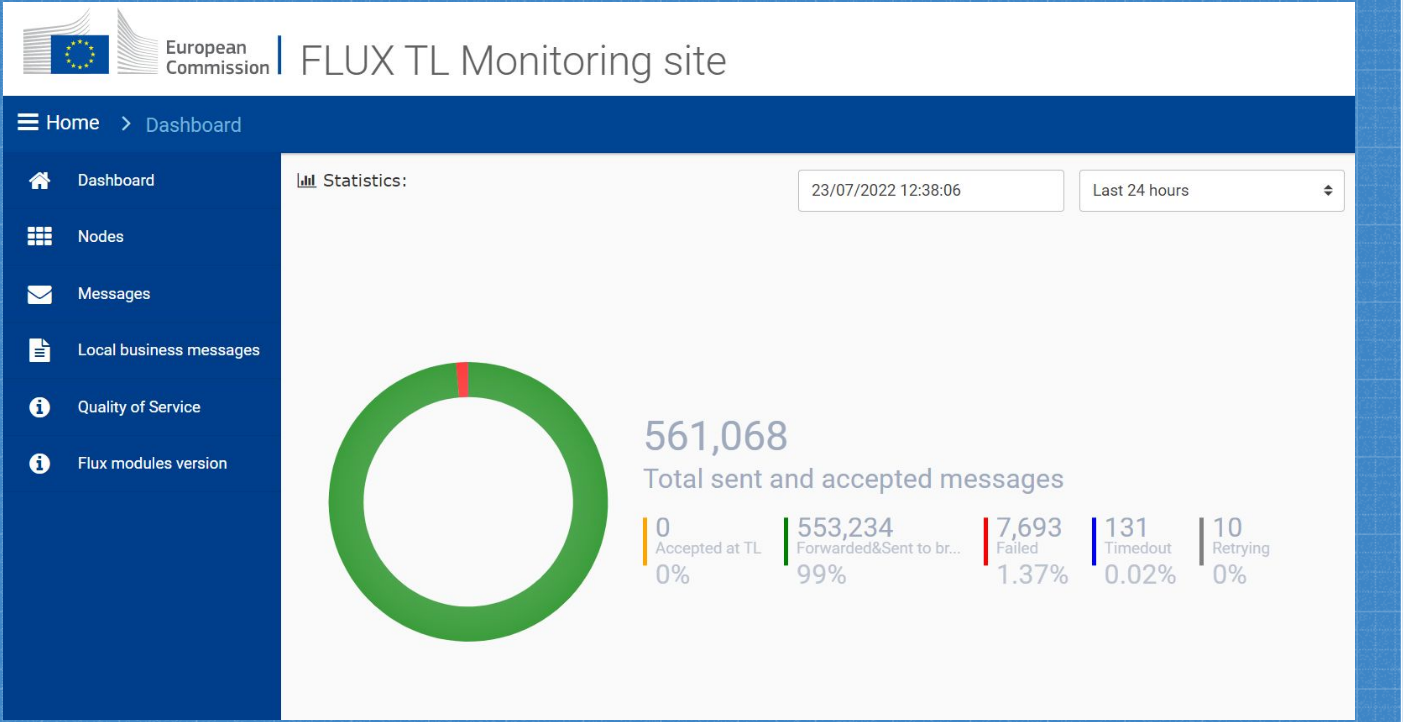
ARCHITECTURE OF THE APPLICATION - QUALITY OF SERVICE

Our system should deliver 99.9% of the messages on time



FLUX TL Monitoring site

Statistics:

23/07/2022 12:38:06

Last 24 hours

561,068
Total sent and accepted messages

0
Accepted at TL
0%

553,234
Forwarded&Sent to br...
99%

7,693
Failed
1.37%

131
Timedout
0.02%

10
Retrying
0%