



A strong collaboration with Lille hospital since 2011

M. Figeac

TTATTATAAG

GGATGG
V8 CCTG

N. Duployez

V8 CCTG

A. Caillault

V4 CCTGGGATGGG
V2 CCTGG

S. Sebda

V5 CCTGGGGG
CCTGGGAT

N. Grardel

V8 CCTG
AGG
CTGGGAC

C. Preudhomme

Back of a person's head in the foreground.

Web Application, October 2014 to October 2017

Public test server app.vidjil.org, >100 users, including **30 regular users**

15,000
samples

Web Application, October 2014 to October 2017

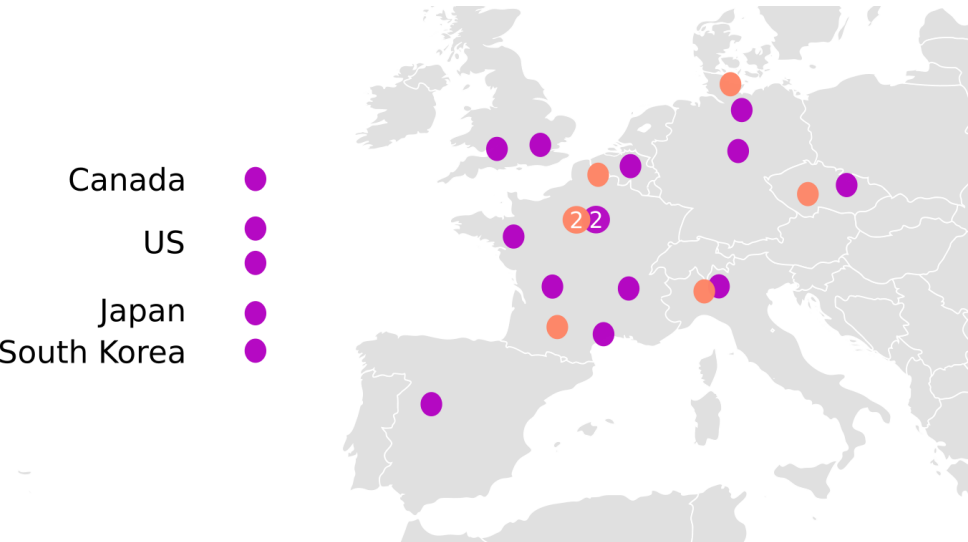
Public test server app.vidjil.org, >100 users, including **30 regular users**

2,000

ALL/CLL patients at diagnosis in 6 hospitals since 2016

Web Application, October 2014 to October 2017

Public test server app.vidji1.org, >100 users, including **30 regular users**



Securing bioinformatics for hospital routine – 1

Lille and other French hospitals using Vidjil for production want to secure the software part of their protocol.

The base service would be always free. A contracted service could include:

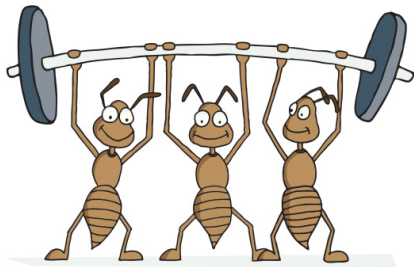
- ▶ upgrade and **one-day support** to hosted instances of the server
- ▶ possibly some custom development
- ▶ possibly certification / CE marking
ISO 9001, ISO 25051, ISO 13485, EN 62304 ?
- ▶ possibly patient-related data agreement

This is **not** the job of a university research team in bioinformatics.

Securing bioinformatics for hospital routine – 2

Ryan, Aurélien and Florian contracts end at Q4 2017.

To sustain Vidjil development, we would need to fund 3-5 people, including 1 developer, 1 support bioinformatician, 1 quality engineer... Between about 70 and 300 K€/ year.



Contracted service for about 10 K€ / hospital / year ?

Goal for 2018: start with 6-7 French labs to *fund 1,5 developer*.

... but this may not be enough to move forward into certification.

March-June 2017: meetings with partners

- ▶ Eurasanté, SIRIC OncoLille
- ▶ Cre'innov Lille 1, SAIC Lille 1
- ▶ SPV CNRS
- ▶ SATT Nord
- ▶ Scop Hauts-de-France
- ▶ Inria Lille, **Inria Foundation and InriaSoft**

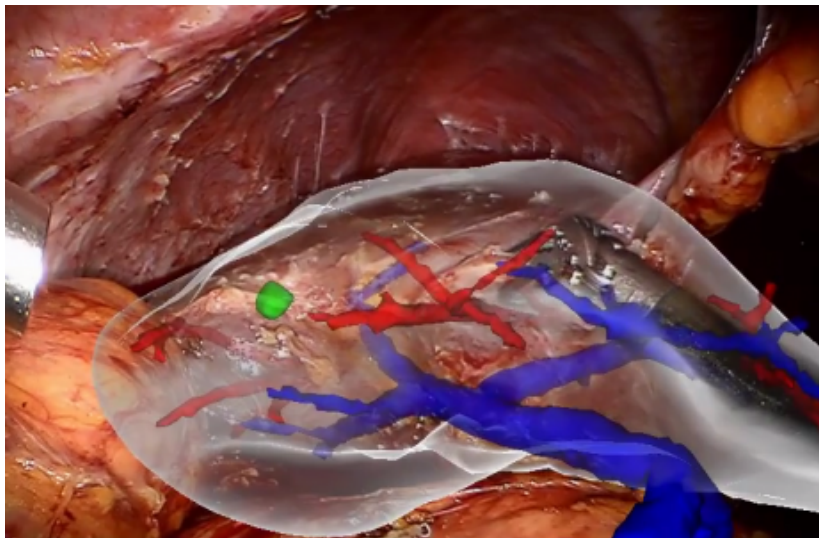
Towards a “VidjilNet” non-profit consortium at InriaSoft

- ▶ Inria: national institute in computer science
- ▶ Non-profit Inria Foundation (charity in Rennes, France)
- ▶ Supports “major open-source software from research at Inria’

Why did we choose the Inria foundation?

- ▶ Environment around software developemnt
- ▶ Kicks off support, both human and financial (80 K€)

SOFA: realtime physics simulation



50 users, 300+ downloads/month, 30 active developers
Consortium: 4 SMEs, 7 industrials, 7 academics

Coq: proof environment

```
Lemma compare_lt_iff n m : (n ?= m) = Lt <-> n < m.
```

```
Proof.
```

```
revert m; induction n; destruct m; simpl; rewrite ?IHn; split; try easy.  
- intros _. apply Peano.le_n_S, Peano.le_0_n.  
- apply Peano.le_n_S.  
- apply Peano.le_S_n.
```

```
Qed.
```

```
Lemma compare_le_iff n m : (n ?= m) <> Gt <-> n <= m.
```

```
Proof.
```

```
revert m; induction n; destruct m; simpl; rewrite ?IHn.  
- now split.  
- split; intros. apply Peano.le_0_n. easy.  
- split. now destruct 1. inversion 1.  
- split; intros. | now apply Peano.le_n_S. now apply Peano.le_S_n.
```

```
Qed.
```

```
Lemma compare_antisym n m : (m ?= n) = CompOpp (n ?= m).
```

```
Proof.
```

```
revert m; induction n; destruct m; simpl; trivial.
```

```
Qed.
```

ACM Software System Award 2013

8 SMEs + 20 academics outside France

VidjilNet: Why?

Any member of the VidjilNet consortium

- ▶ **participate to a community of members**, showing interest in the Vidjil platform and potentially other tools, deciding, the development priorities collectively
- ▶ **benefit from contracted services** for clinical or research work, including remote maintenance of in-hospital servers or data hosting through accredited partner

no biological or sequencing service, no bioinformatics services outside hematological/immunological studies

VidjilNet: How?

- ▶ **Standard membership “laboratory” : 10 K€/year**
(< 300 samples per year, one group of users)
- ▶ **Group membership : 25 K€/an**
(< 1000 samples per year, several groups)
- ▶ **Minimal membership : 3 K€/an**
(restricted support, < 50 samples)
- ▶ **Donations from members**

Contracts for additional services: 3 K€ for 100 more samples, ad-hoc developments to be discussed. Limits in sample numbers are flexible and indicative.

Consortium expenses

- ▶ **engineers**, support and developemnt. In 2018:
 - ▶ 1 bioinformatician, user support and web development (F. Thonier, Rennes, 50%)
 - ▶ 1 software engineer, web, front and back development (R. Herbert, 100%)
- ▶ InriaSoft administrative fees (13 %)
- ▶ other expenses (15 K€)
- ▶ medical data hosting through accredited partner (15 K€)
- ▶ teaching hours 20% compensation for MS (4 K€)
- ▶ software **certification** (ISO 9001, ISO 25051) or quality for medicine (ISO 13485) (around 100 K€).
- ▶ does not support any research activity, but may collaborate with R&D teams on bioinformatics algorithms

Governance

Executive committee: Consortium operating, allocation of resources

1 InriaSoft representative, 1 to 4 from funding member organisms, 3 among developers and 3 among members

Scientific and Technical committee: development priorities, commit permissions

3 developer representatives (2 architects + 1 engineer), 3 member representatives, 1 InriaSoft

Mathieu (30%): chief tech officer, leaves Bonsai, still paid by CNRS

Mikaël (20%): committee representative, leads research within Bonsai

Q4 2017

- ▶ Many meetings with Inria foundation and the first members
- ▶ Go/no-go decision: 11 December

2018

- ▶ Tentative set-up on January 1st, hiring FT then RH
- ▶ Support from INCa, GBMHM, and Inria
- ▶ First French members: APHP (group membership), Lille, Rennes, Toulouse
- ▶ Any interested lab can join

2019-2020

- ▶ more labs, more pathologies
- ▶ goal: sustainable, without initial funding

Vidjil will remain **open-source**, basic access and support are free.

Members participate to decisions on the evolution and have access to contracted support, professional maintenance or data hosting.