CyBaDe :
a relational database and a web interface to help the DEPE* animal facility at IPHC

* Département Ecologie Physiologie et Ethologie

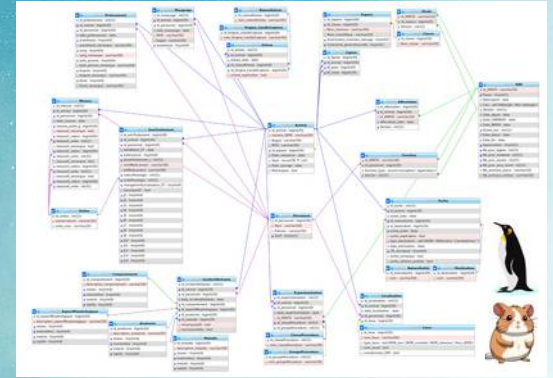5ème rencontre sur les logiciels libres de recherche de l'Unistra, 2024-10-15

IPHC, Service Technique Informatique, Plateforme SCIGNE
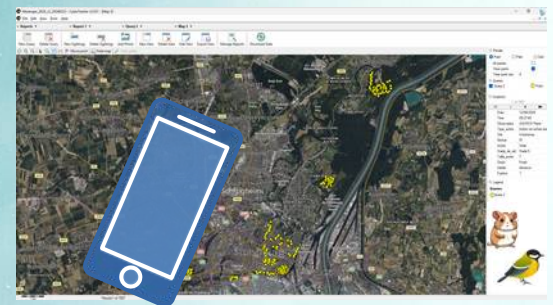
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Overview

- **What was the need ?**

- **What were the existing solutions ?**

- **CyBaDe relational SQL database**

- **The web interface for data collection**

- **Perspectives & sharing**

- **Extra : Open-source IT tool to collect data in the field**

What was the need ?

WHO ? IPHC / DEPE / Animal facility

**WHAT ?** A solution to efficiently manage animal registers

CONSTRAINTS ?

- Reglementation on research projects involving animals (APAFIS number)
- Semestrial DDPP report
(Direction Départementale de la Protection des Populations)
- Wide variety of animal species and accomodation type
- In the lab & in the field

HOW ?

- Animal registers in .xls files
- Accomodation management with AHU (Air Handling Unit)
for temperature monitoring

PROJECT ? Relational database with an associated web interface
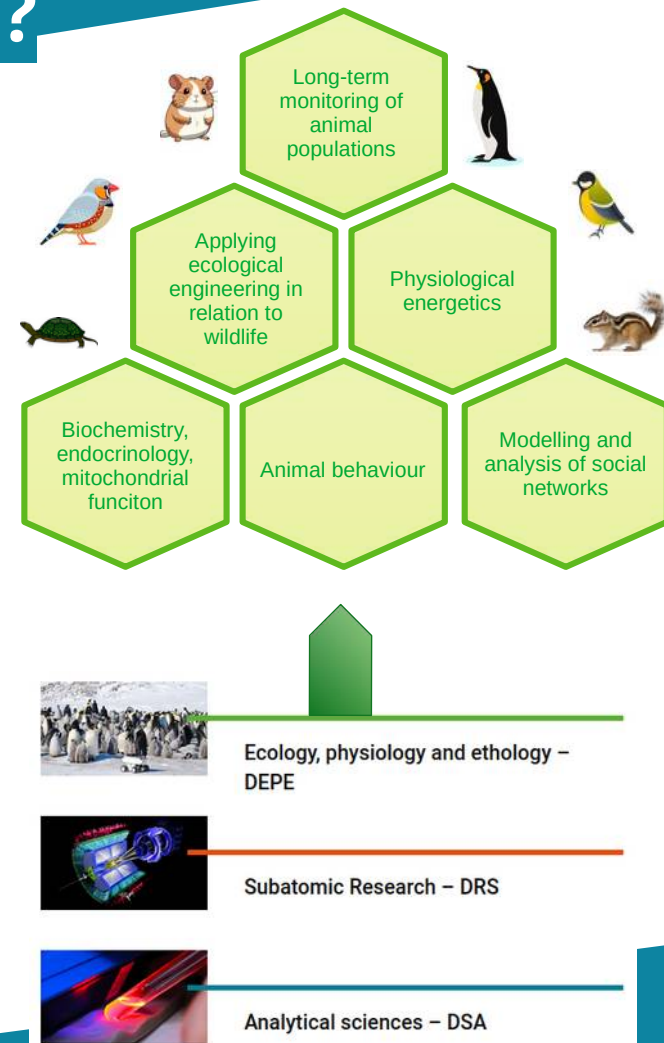
What were the existing solutions ?

Existing solutions ?

(C) Geranimaux 2.0 (Sigma):

Providers, drugs, premises & cages management, projects planification, lineage, phenotyping, breeding ...

(C) AniBio WEB 5.0 (Noraybio) :

Animal crossing, transgenic lines, drugs, vet follow-up, barcodes for cages, cryo-preservation, facturation, ...

(C) MayaKind 12.0 (FLPG Software – CEA) :

Premises, cages management, labels, protocols, ...

(OS) TopoDB (UCSF) :
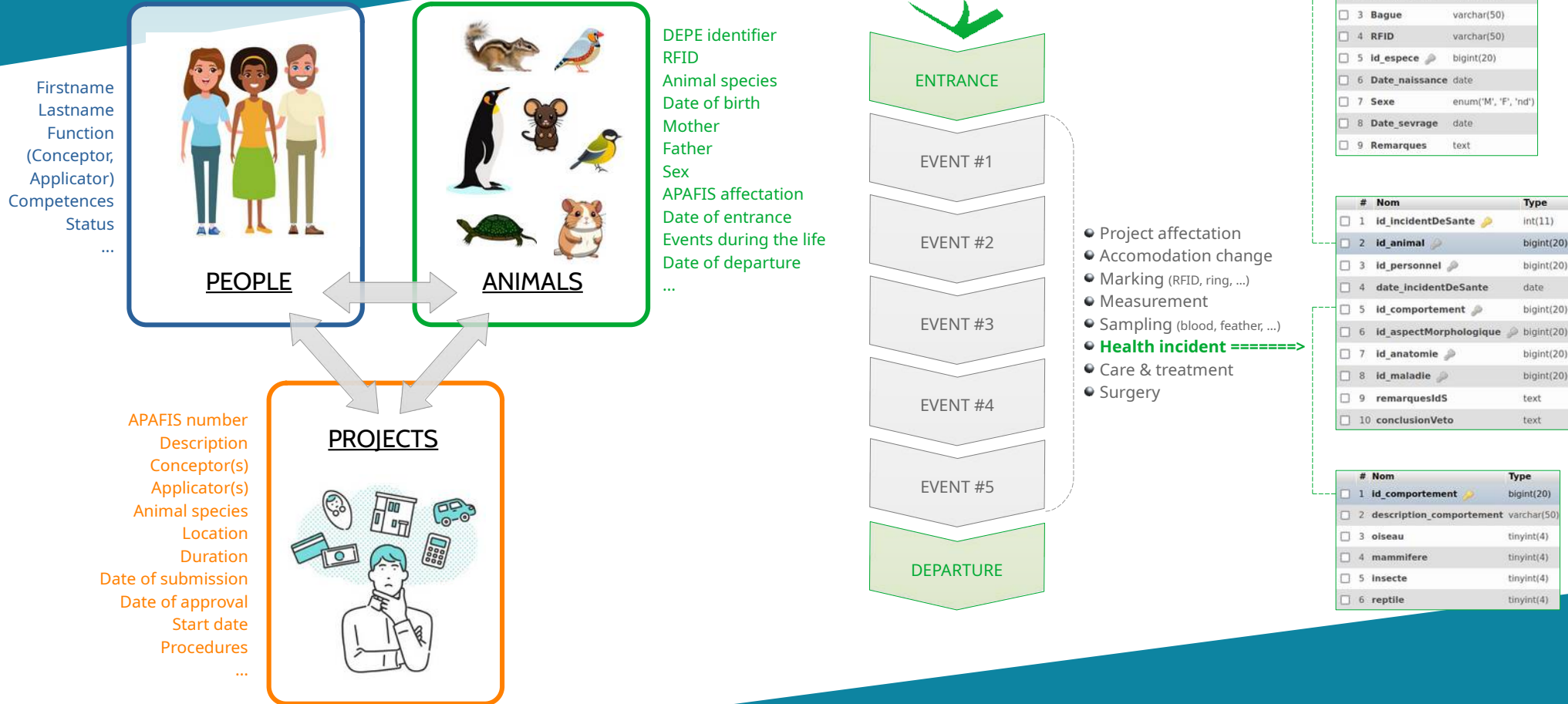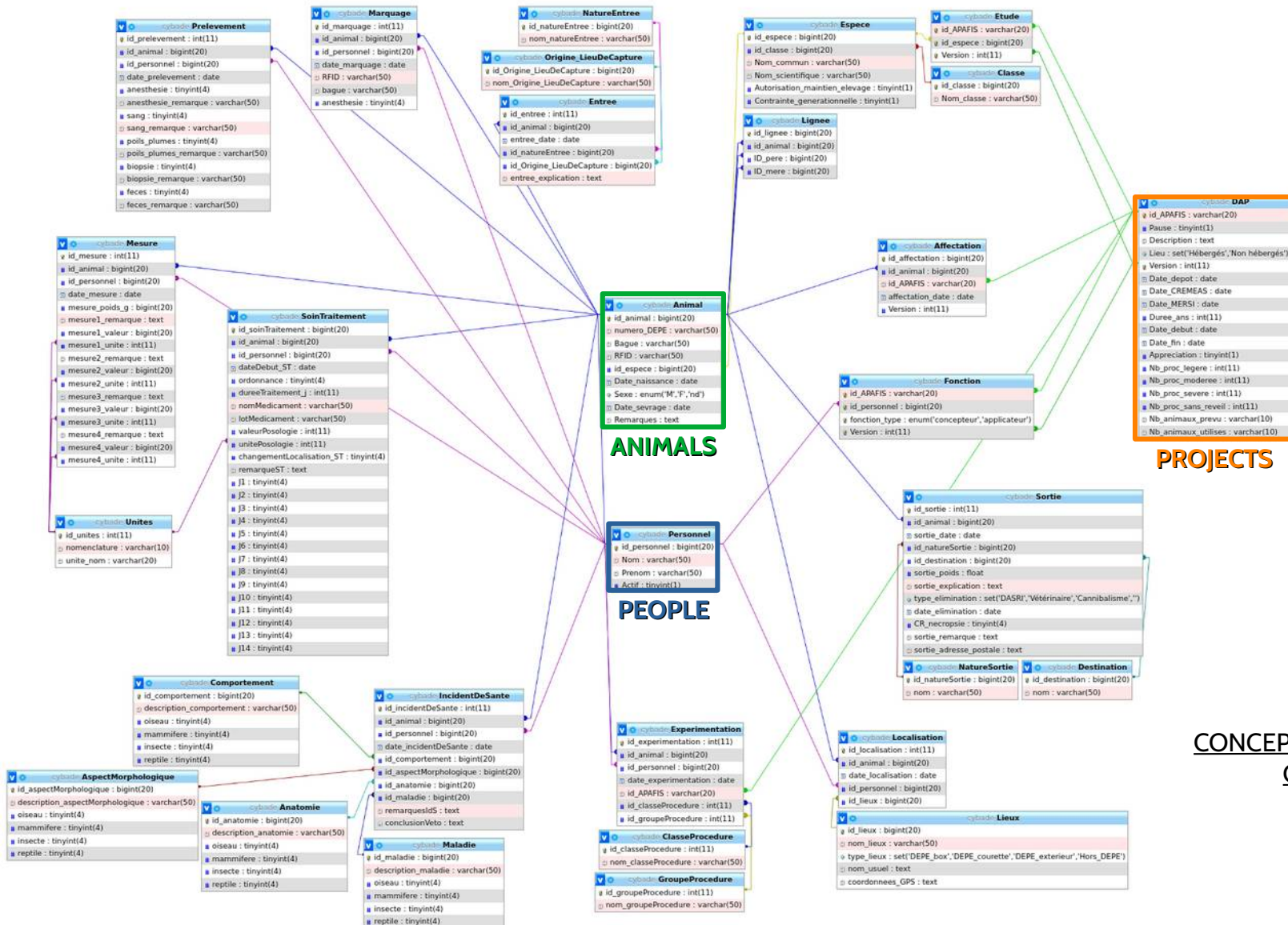
For rodents only, MIT licence, Ruby, MySQL database

Why not ?

- Rodents breeding & phenotyping -*VS*- Monitoring & wild animals
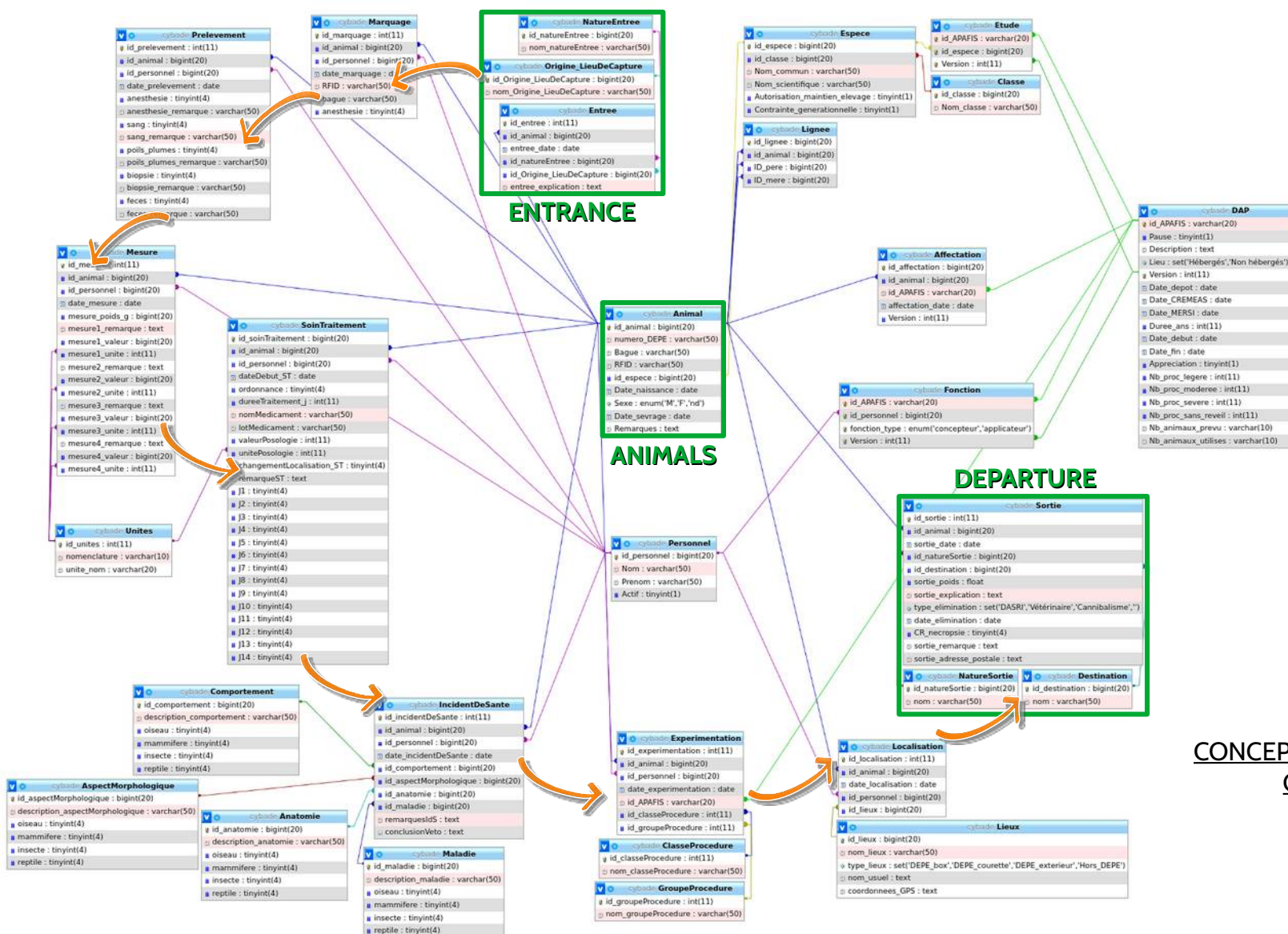- Cost (~ 25k€ licence, + support)

CyBaDe relational SQL database

PEOPLE

Firstname
Lastname
Function
(Conceptor,
Applicator)
Competences
Status
...

ANIMALS

DEPE identifier
RFID
Animal species
Date of birth
Mother
Father
Sex
APAFIS affectation
Date of entrance
Events during the life
Date of departure
...

PROJECTS

APAFIS number
Description
Conceptor(s)
Applicator(s)
Animal species
Location
Duration
Date of submission
Date of approval
Start date
Procedures
...

ENTRANCE

EVENT #1

EVENT #2

EVENT #3

EVENT #4

EVENT #5

DEPARTURE

● Project affectation
● Accomodation change
● Marking (RFID, ring, ...)
● Measurement
● Sampling (blood, feather, ...)
● **Health incident =======>**
● Care & treatment
● Surgery

#	Nom	Type
1	id_animal 🔑🔑	bigint(20)
2	numero_DEPE	varchar(50)
3	Bague	varchar(50)
4	RFID	varchar(50)
5	id_espece 🔑	bigint(20)
6	Date_naissance	date
7	Sexe	enum('M', 'F', 'nd')
8	Date_sevrage	date
9	Remarques	text

#	Nom	Type
1	id_incidentDeSante 🔑	int(11)
2	id_animal 🔑	bigint(20)
3	id_personnel 🔑	bigint(20)
4	date_incidentDeSante	date
5	id_comportement 🔑	bigint(20)
6	id_aspectMorphologique 🔑	bigint(20)
7	id_anatomie 🔑	bigint(20)
8	id_maladie 🔑	bigint(20)
9	remarquesIdS	text
10	conclusionVeto	text

#	Nom	Type
1	id_comportement 🔑🔑	bigint(20)
2	description_comportement	varchar(50)
3	oiseau	tinyint(4)
4	mammifere	tinyint(4)
5	insecte	tinyint(4)
6	reptile	tinyint(4)

ANIMALS

PEOPLE

PROJECTS

CONCEPTUAL SCHEMA FROM THE CyBaDe DATABASE

CONCEPTUAL SCHEMA FROM THE CyBaDe DATABASE

CyBaDe relational SQL database

PROJECTS :
* dashboard with active projects
* number of days until project previsional end with corresponding conceptors
* total number of animals affected to a project
* status for each project (pause)
* ...

ANIMALS :
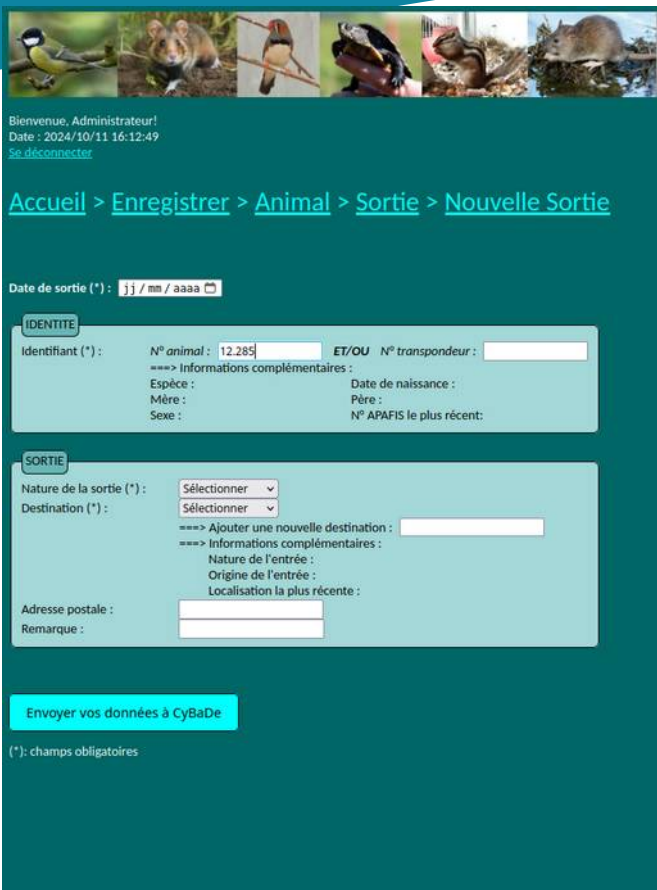* animal logbook with all events (entrance-departure)
* care & treatment (#days & monitoring)
* breeding (lineage table and birth = entrance)
* accomodation management
* behavior / illness / anatomy according to animal class (mammal, bird, insect, reptile)
* ...

PEOPLE :
* involvment and role in each project
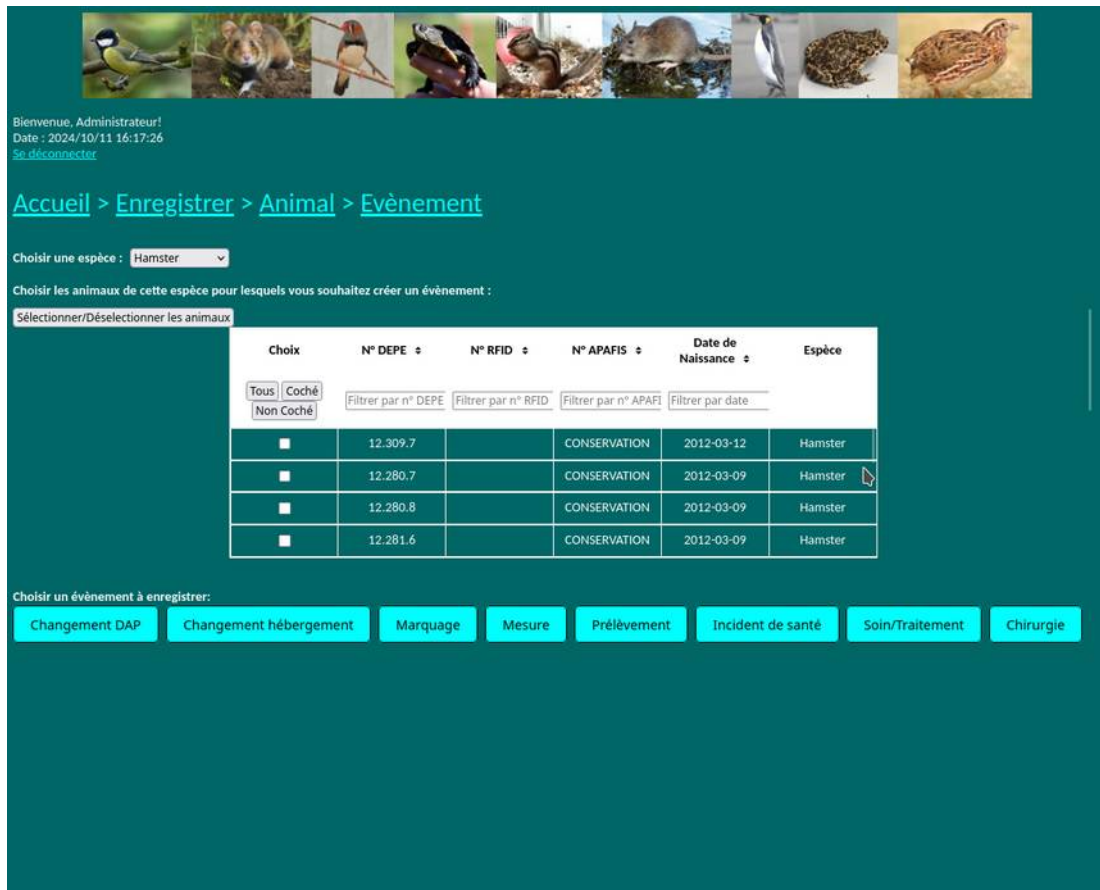* association with an event during animal life
* ...

The web interface for data collection

PHP
Javascipt

2 modes :
* Consultation
* Modification

3 sections :
* Project
* Animal
* People

Export :
* csv
* pdf

Autorization &
authentification

The web interface for data collection

Perspectives & sharing

RELATIONAL SQL DATABASE :
~ Audit (insert, delete, update queries)
✗ Skills booklet with expiry dates

CyBaDe WEB INTERFACE :
~ Beta-test since 2024-10-01 !
✗ Symfony framework
✗ UX / UI evolution (mobile device, …)
✗ Interactive structural view from the facility (rooms, birdcages, …)
✗ Animal PDF logbook

Make things different ?
UML conception (use case / activity / sequence) as a 1st important step
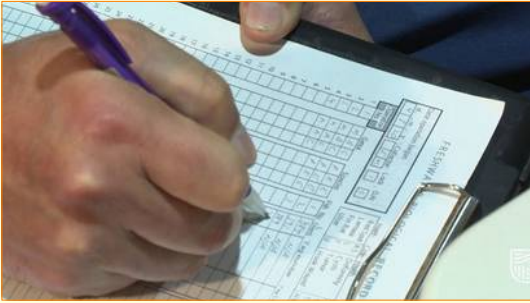« Ah, but I didn't tell you that … » syndrom

Open Science / FAIR :
√ Production & test servers
√ Use of Git and IN2P3 GitLab
~ Will be released under GNU GPL v3 licence
✗ Moove to a public repository

CyBaDe

La base de données CyBaDe a pour objectif la gestion des projets et des animaux (hébergés et non-hébergés) au DEPE.

CONSULTER / EXPORTER   ENREGISTRER / MODIFIER

Data collection in the field with digital tools

By hand

In the field:

Back to the lab: re-writing in xls

Mix hand / digital tools

Using digital tools

In the field:

Back to the lab: csv/xls export

👍
- *Global view on all parameters*
- *Double backup (hand + numeric)*
- *Cheap*

👎
- *Time-consuming (re-writing)*
- *Notepad, pencils ...*
- *Weather / night conditions ...*
- *Multiple instruments (GPS, ...)*

👍
- *Data structure & quality*
- *All-inclusive (GPS, pictures, ...)*
- *No need to re-write*
- *Easy to handle / transport*

👎
- *Segmentation in several screens*
- *Data sending errors*
- *Training*
- *More expensive (material)*

Data collection in the field with digital tools

Best practices for data collection:

- Don't do it on paper
- Make it location smart
- Plan it on a map
- Make it easier for the field team
- Do it in real-time
- Referenced in a DMP

Some tools dedicated to collect data:

https://cybertracker.org/

Cyber Tracker   SMART   Earth Ranger   QGIS QField   ESRI   KoBo ToolBox   ODK
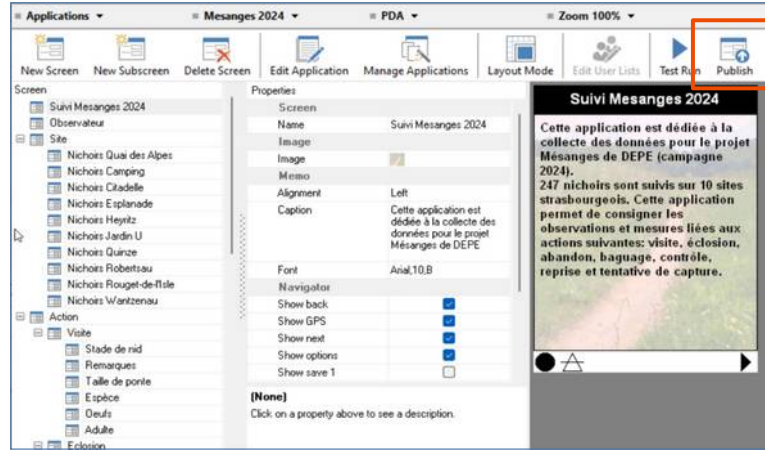
Data collection in the field with digital tools

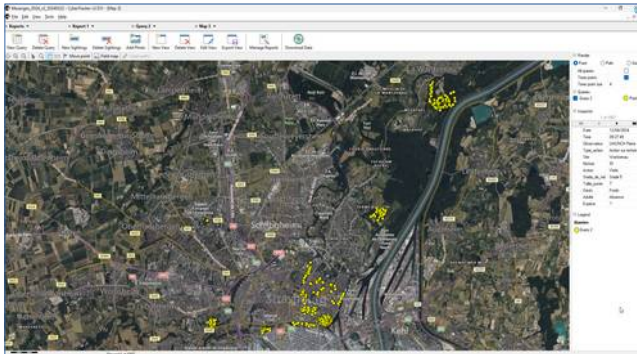**1.** Install CyberTracker from the App store

2. Design the different screens from the App

3. Flash the QR code with the mobile device
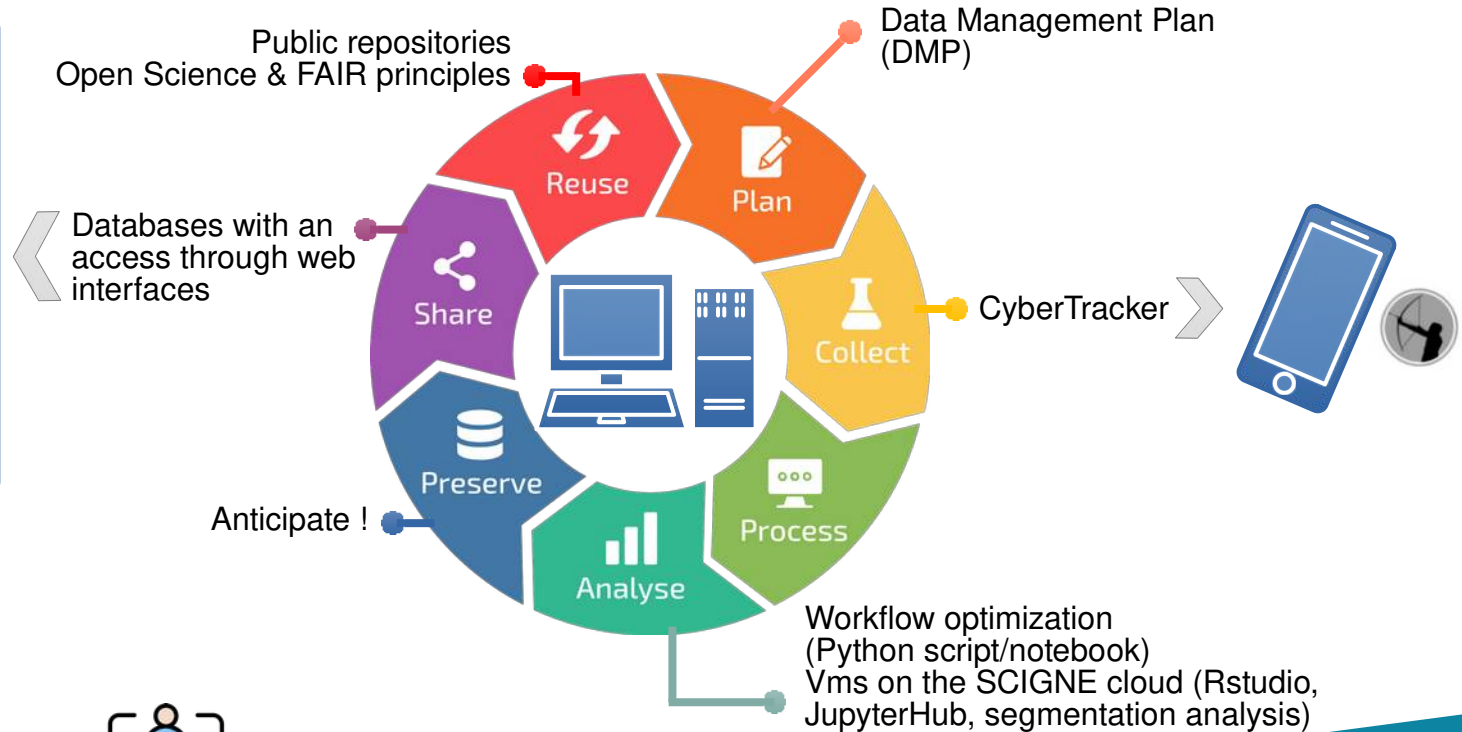

5. View the field observations in the MySQL database and use GPS coordinates to build maps

4. Collect your data in the field and send them to the database (here tits and hamsters)

To summarize ...

Public repositories
Open Science & FAIR principles

Data Management Plan
(DMP)

Databases with an
access through web
interfaces

CyberTracker

Anticipate !

Workflow optimization
(Python script/notebook)
Vms on the SCIGNE cloud (Rstudio,
JupyterHub, segmentation analysis)

Reuse

Plan

Share

Collect

Preserve

Analyse

Process