QR-CODE PROJECT : Towards better traceability of field sampling data

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http://www-iuem.univ-brest.fr/pops/projects/za

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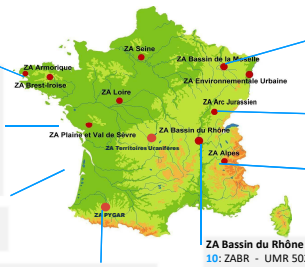

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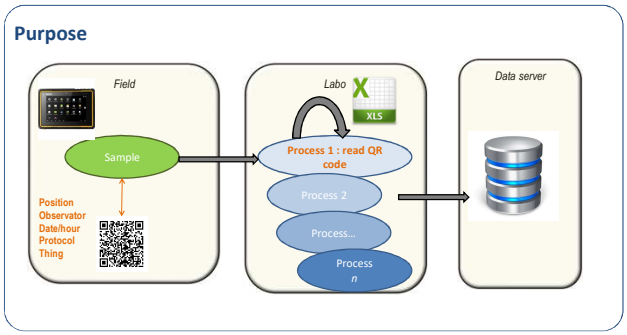
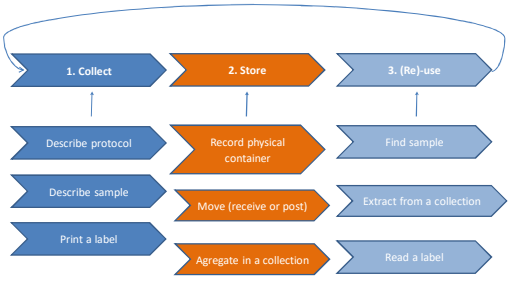
Summary

Ensuring traceability of field experimental data or laboratory sampling data to conduct reproducible research is a challenge at the present time. Between the time when geolocalized specimens (biotic or abiotic) are taken, and the time the resulting data ends up in analysis published within a study, many manual operations take place and may generate errors. The French LTSER have joined forces at the national level to propose a solution as generic as possible to this problem of monitoring of the samples and the data associated with them. Compared to existing solutions (such as *Laboratory Information Management Systems*), we target a robust labeling solution adapted to outdoor working conditions, with the management of stocks and movements of samples. We designed and realized a prototype tested from end to end, using an open source software (**https://github.com/Irstea/collec**), cheap Zebra printers (mobile or not) and raspberries as devices. This solution provides sufficient flexibility for the wide variety of existing protocols. Its strength is the record of all contextual data associated with the samples, which constitute important parameters of the subsequent analyzes. At last, not only traceability is guaranteed, but also a gain of time and a rationalization of the storage of samples that will induce a return on investment.

Purpose





Samples stored in containers.

Labels
- Code machine-readable (QRCode) using a scanner
- Any human can read the label and understand written data
- Resist to hard storage and outdoor conditions
- Data situate the sample in a collection (owner, project, kind of thing)

COLLEC-SCIENCE software

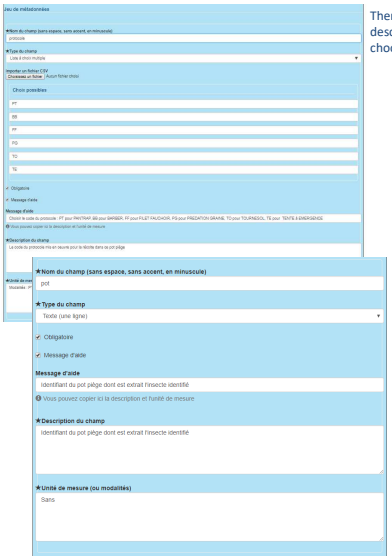
https://www.collec-science.org/

- A Web site to view how to use it:
  https://www.collec-science.org/video-tutorial/
- A manuel describing a use case in details
  https://www-iuem.univ-brest.fr/pops/attachments/1378
- COLLEC-SCIENCE in live
  https://siza.univ-lr.fr/collec/index.php
- 2 mailing lists for users or developers
  https://groupes.renater.fr/sympa/info/collec-dev
  https://groupes.renater.fr/sympa/info/collec-users

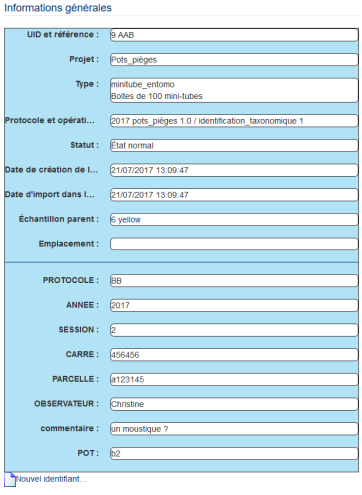
The device can be used anywhere without Internet connexion: the raspberry Pi3 is used as a wifi hotspot, and all the database and Web server is embedded inside a Docker engine. The operator simply uses a tablet, a smartphone or a PC to fill the Web form describing its samples.

Printing device linked by bluetooth with the rapsberry.

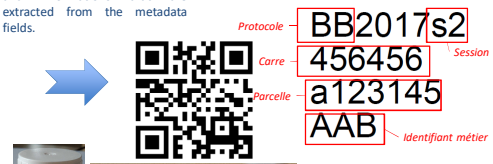
The researcher **can create its own metadata templates** describing the data to be associated with the sample.



Then, operators can fill a form describing the sample using the choosen metadata template.



The labels contains a QRcode, and informations that are extracted from the metadata fields.



Any kind of label formats can be printed, using Apache™ FOP (Formatting Objects Processor) as XML langage integrated within COLLEC to design the shape, size and content of labels.

The Qrcode contains all the required data to find the sample inside the database, (UID, name of the database) as well essential data for ensuring the data traceability (where and when the sample was collected), using the Java Script Object Notation.

This is an **open-source project** (licence AGPL v3). We have made it as **generic** as possible, and we can **interconnect** with different systems of labelling, by importing or exporting metadata schemas and identifiers of external databases.
It can be deployed **anywhere** (indoors/outdoors, centralized/distributed information system).
The total cost for one good thermal transfert printer (like Zebra GX430T for instance) with a professional scanner of labels is of **1000 €**.