



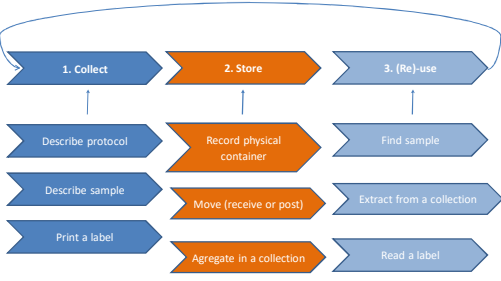
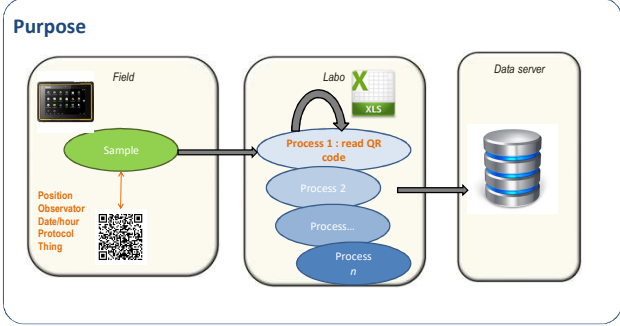
- ZA Armorique**
12: Ecobio, UMR 6553 CNRS
Avenue Général Leclerc, 35042 Rennes - France
13: ZAAr "Zone Atelier Armorique", LTER ZA Armorique
UMR 6553-Ecobio, Avenue Général Leclerc, 35042 Rennes - France
- ZA PVS**
1: Littoral Environnement et Sociétés (LIENS) - UMR 7266 CNRS & Université de La Rochelle
Bâtiment ILE 2, rue Olympe de Gouges 17 000 La Rochelle - France
2: LTER "Zone Atelier Plaine & Val de Sèvre", (LTER ZA PVS) - LTER
CNRS-CEBC, F-79360, Beauvoir sur Niort, F-79360, France - France
6: Domaine Expérimental de Saint Laurent de la Prée (INRA DE de Saint Laurent de la Prée) - INRA
545 Rue du Bois Mâche, 17450 Saint-Laurent-de-la-Prée - France
16: Centre d'Études Biologiques de Chizé (CEBC) - UMR 7372 CNRS et Université de La Rochelle
CNRS UMR 7372 - 79360 VILLIERS-EN-BOIS - France
- IRSTEA**
5: Unité de recherche "Écosystèmes aquatiques et changements globaux" (EABX) - IRSTEA
50, avenue de Verdun, Gazinet, F-33612 Cestas Cedex - France
- ZA PYGAR**
7: UMR INRA DYNAFOR - INRA, INP-T ENSAT, EI PURPAN,
Centre INRA Occitanie Toulouse 24 Chemin de Borde Rouge - Auzeville CS 52627 31326 Castanet Tolosan cedex - France

- ZA Moselle**
14: Laboratoire Interdisciplinaire des Environnements Continentaux (LIEC), UMR 7360 CNRS & Université de Lorraine,
Avenue du Charmois, 54500 Vandœuvre-lès-Nancy - France
15: LTER Zone Atelier Moselle (LTER Zone Atelier Moselle) LTER
LTER Zone Atelier Moselle, UMR 7360 CNRS-Université de Lorraine, 15 avenue du Charmois, 54500 Vandœuvre-lès-Nancy, France
- ZA Arc Jurassien**
8: Chrono-environnement - UMR 6249 - CNRS & Université de Franche-Comté
La Bouloie - UFR Sciences et Techniques 16 route de Gray 25030 Besançon cedex - France
9: LTER "Zone Atelier Arc Jurassien", (LTER ZAAJ) - LTER
La Bouloie - UFR Sciences et Techniques 16 route de Gray 25030 Besançon cedex - France
- ZA Alpes**
3: Environnements, Dynamiques et Territoires de la Montagne (EDYTEM) - UMR 5204 CNRS & Université de Savoie Mont Blanc,
Campus scientifique, 73376 Le Bourget du Lac cedex - France
4: LTER "Zone Atelier Alpes" Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, Irstea,
LTER Zone Atelier Alpes. 38000 Grenoble. France
- ZA Bassin du Rhône**
10: ZABR - UMR 5023
Domaine scientifique de la Doua 66 bd Niels Bohr CS 52132 69603 Villeurbanne Cedex - France
11: Ecole des Mines de Saint Etienne (ZABR) Groupe des Écoles des Mines (GEM)
158 cours Fauriel - CS 62 362, 42023 Saint-Etienne Cedex 2 - France



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 LTER 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.



- 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 manual 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>



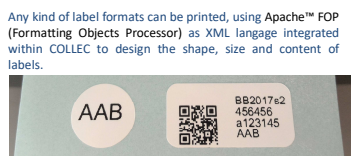
The device can be used anywhere without Internet connexion: the raspberry PI3 is used as a wifi hotspot, and all the database and Web server is embedded inside a Docker engine. The operator simply uses a tablet, a smartphone or a PC to fill the Web form describing its samples.



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.



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 €**.