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

Christine Plumejeaud-Perreau, Hector Linyer, Cécile Pignol, Sébastien Cipiere, Eric Quinton, Julien Ancelin, Wilfried Heintz, Sylvie Damy, Francis Raoul, Anne Clemens, et al.

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The researcher describing the data to be associated with the sample. Compared to existing solutions (such as 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 analyses. 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.

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 analyses. 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.

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

The device can be used anywhere without Internet connection: 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 QR-Code contains all the required data to find the sample inside the database, (UDD, name of the database) as well as essential data for ensuring the data traceability (where and when the sample was collected), using the new 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 transfer printer (like Zebra GX430T for instance) with a professional scanner of labels is of 1000 €.