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Cross-border epidemiological data integration and harmonization

Application to malaria in the cross-border area between French Guiana and Brazil

Emmanuel Roux¹, Raphael Saldanha², Christovam Barcellos², Théophile Mandon¹,
Margarete do Socorro Mendonça Gomes³, Emilie Mosnier⁴, Basma Guarmit⁴, Jean-Christophe Desconnets¹

¹ ESPACE-DEV (IRD, Univ. de Montpellier, Univ. de la Réunion, Univ. de la Guyane, Univ. des Antilles), Institut de Recherche pour le Développement, France
² Fiocruz, Instituto de Comunicação e Informação Científica e Tecnológica em Saúde (ICICT), Rio de Janeiro, Brazil
³ Superintendência de Vigilância em Saúde do Estado do Amapá (SVS-AP), Macapá, Amapá, Brazil
⁴ Centre Hospitalier Andrée Rosemond (CHAR), Pôle des Centres Délocalisés de Prévention et de Soins (CDPS), Cayenne, Guyane française



Context

- Malaria: 216 million cases and 445 thousand deaths worldwide in 2016 (WHO, 2017)
- Between 2000 and 2015, 58% and 37% decreases of the mortality and incidence rates, respectively



Ensure healthy lives and promote well-being for all at all ages
Target: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

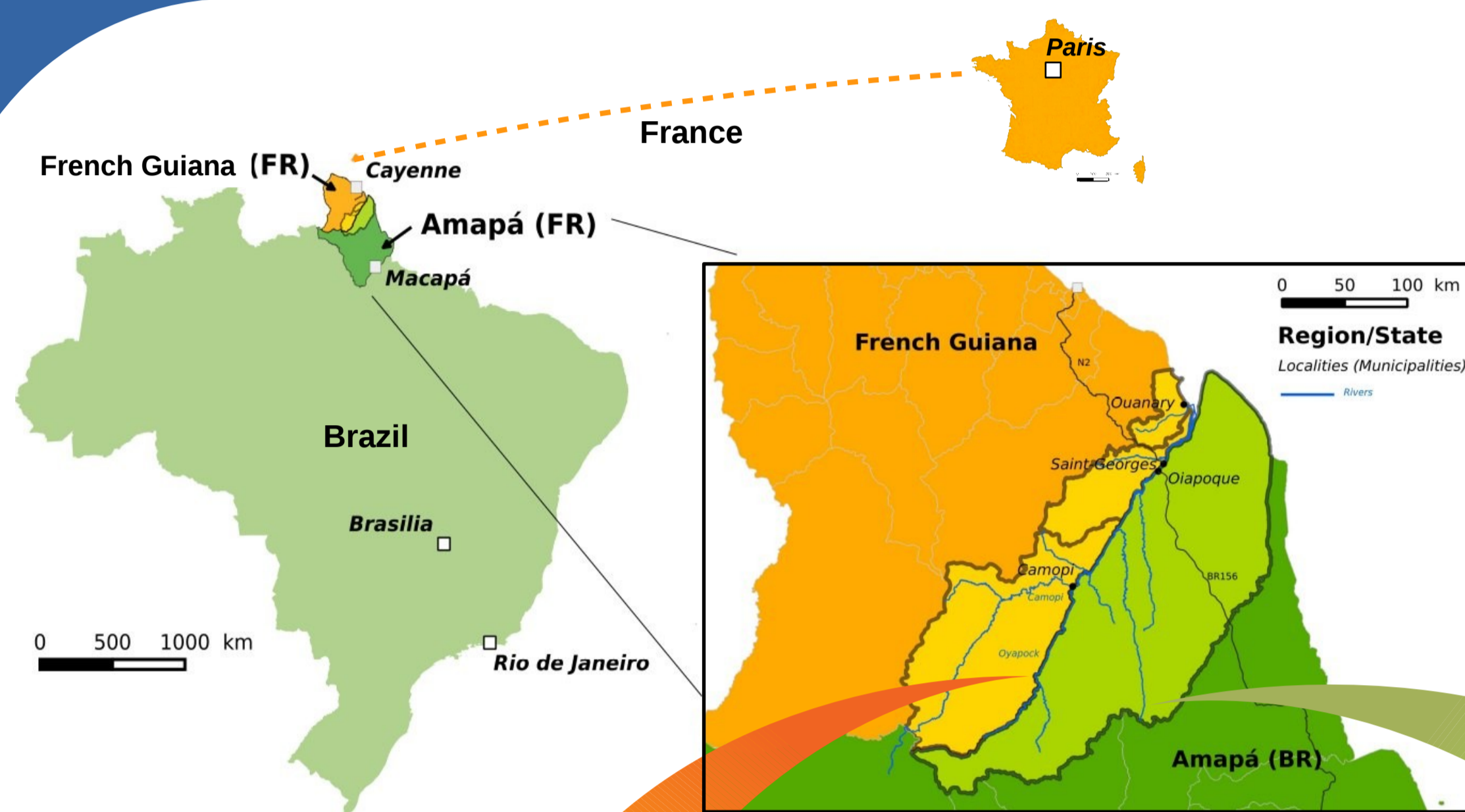
Cross-border malaria considered as a "Major obstacle for malaria elimination" [Wangdi et al., 2015]

Cross-border related issues

- Socio-demographical and environmental contexts that vulnerabilize local populations
- High mobility of pathogen-carrying populations
- Patient follow-up difficulties (situations of illegality, auto-medication, ...)
- Different strategies and means of surveillance, prevention and control of diseases between countries
- Lack of international cooperation: Few regular exchange of comparable data and information between countries
⇒ **Heterogeneous data types and formats, nomenclatures and concepts**

How to ensure cross-border epidemiological data interoperability on an ongoing basis?

Study Region

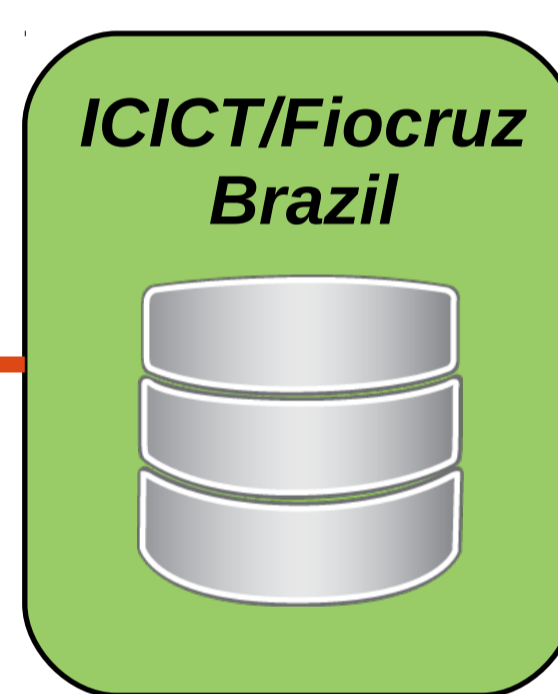
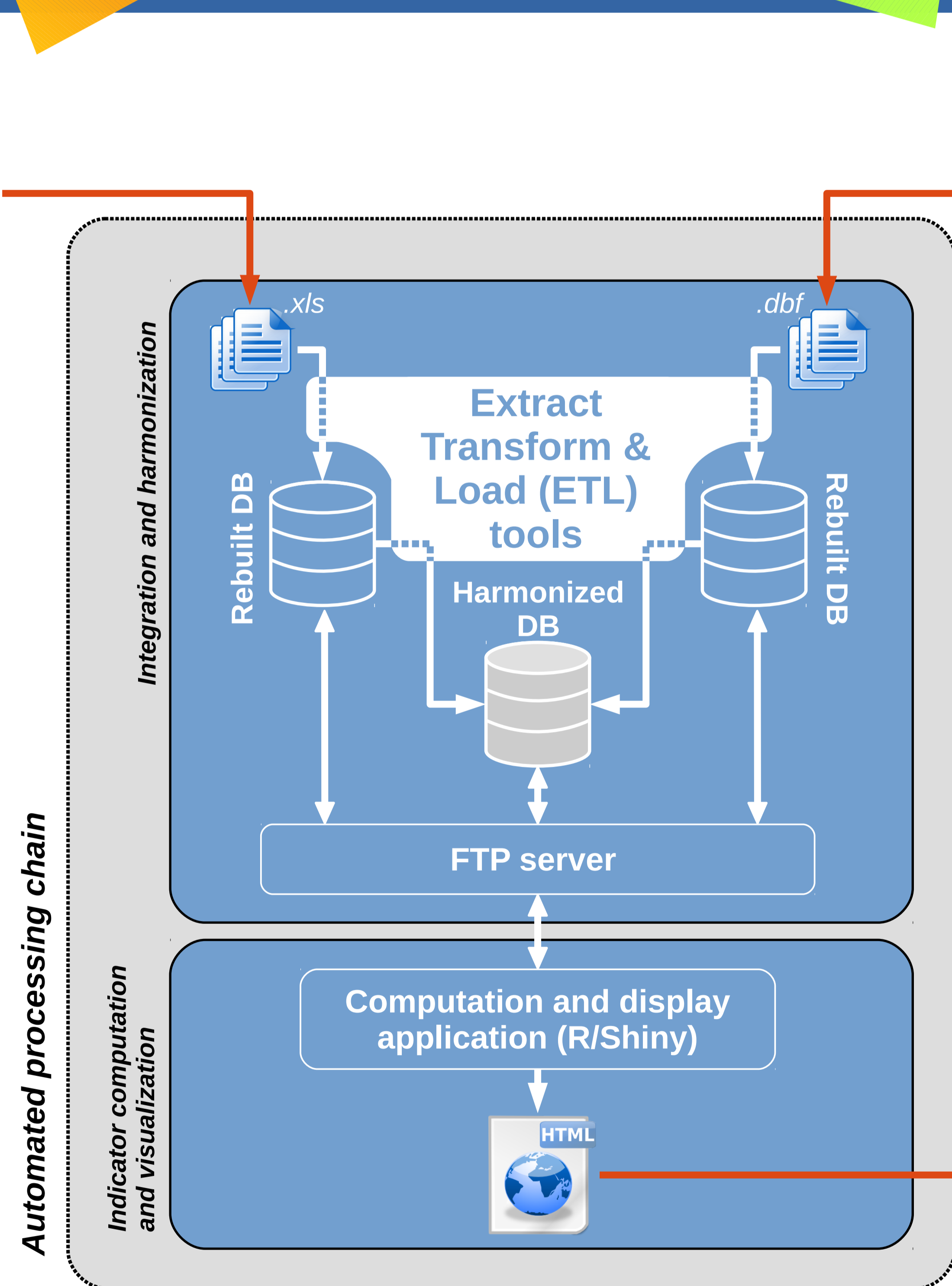
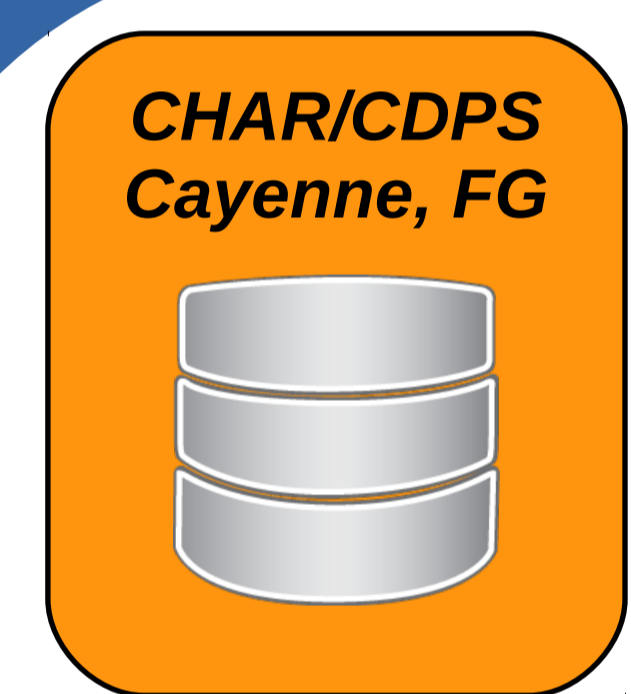


Objectives and challenges

- **Integrate and harmonize** automatically and regularly malaria cross-border epidemiological data
- **Disseminate** indicators and data in an interpretable way for specialists, health actors and population

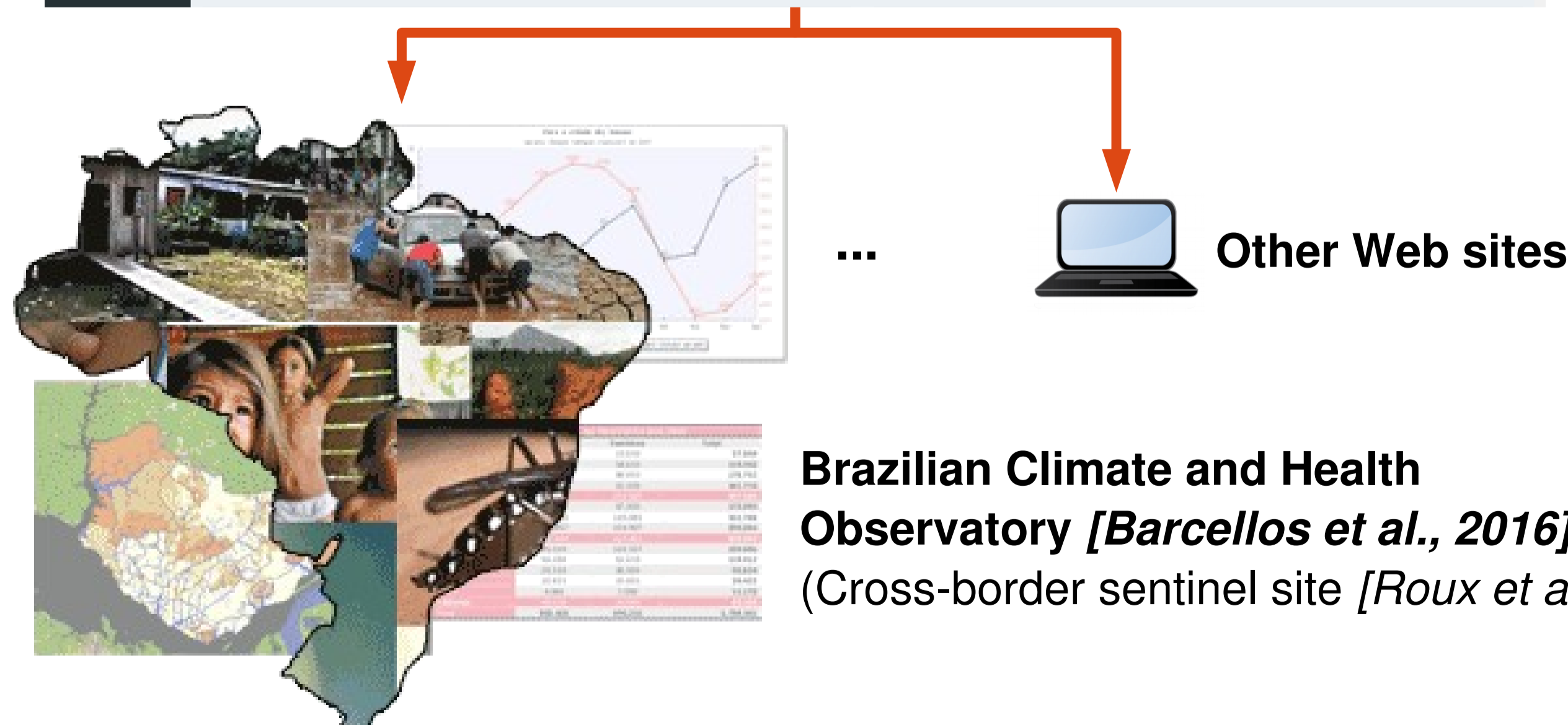
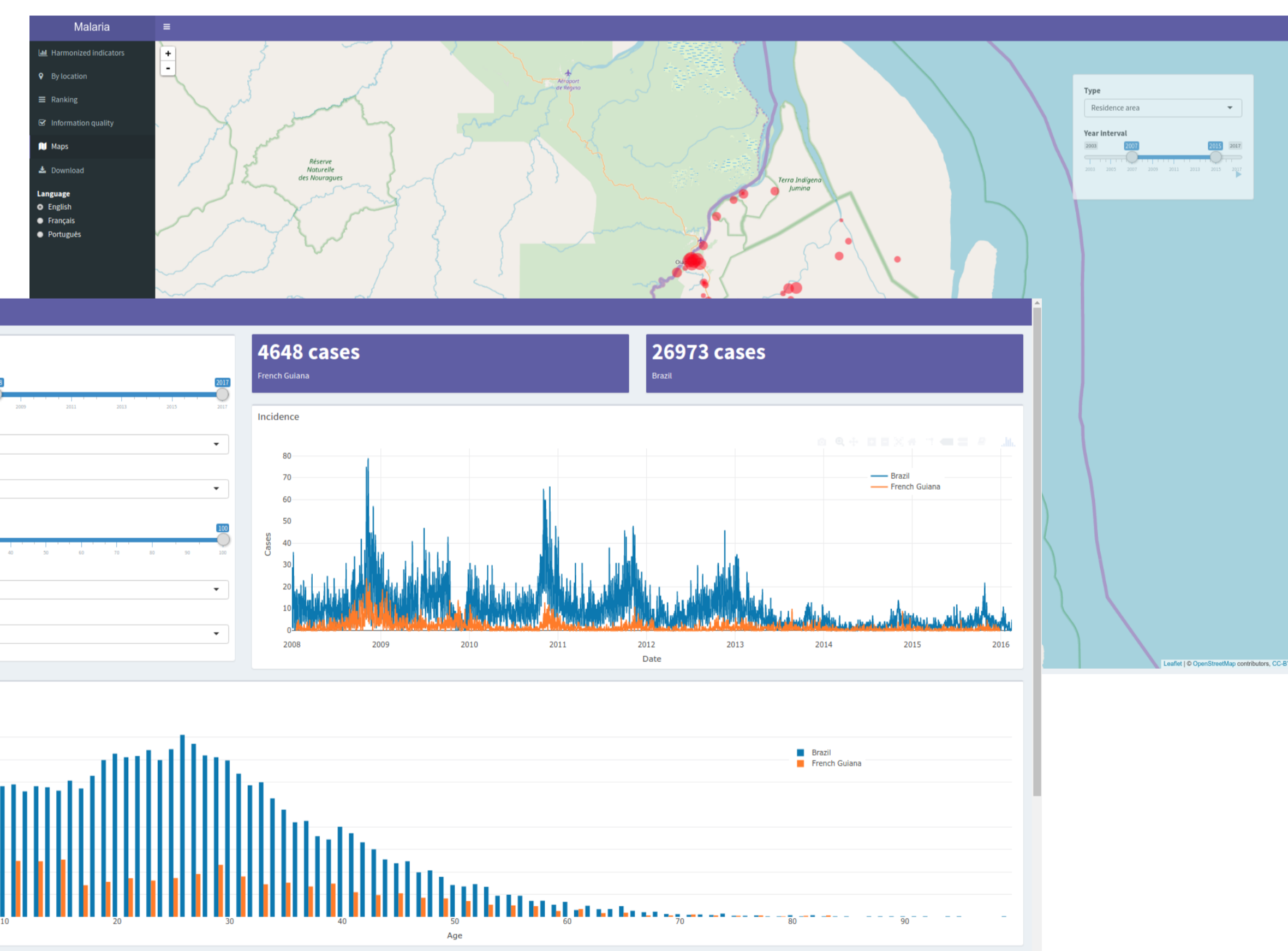
In fine, this should conduct to
• Provide a **unified vision of the epidemiological cross-border situations**
• Participate to define **concerted, targeted and effective control actions for disease elimination**

Data flow



Technological choices

- Multi-platform **Extract Transform Load (ETL)** tools (TALEND®)
- **Harmonization rules** based on expert knowledge in epidemiology and parasitology
- **Web services** for data online publication
- **Web application (R-Shiny)** for online data visualization



Ethical considerations

- Exploitation and dissemination of anonymized data
- Temporal and spatial aggregation of the data for public user profile
- Authorization of the *Commission Nationale de l'Informatique et des Libertés* (CNIL) for personal data automatic processing and data transmission to a foreign country (ongoing request No. 2135463)

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Wangdi K. et al. Cross-border malaria: A major obstacle for malaria elimination. Adv. Parasitol. 2015, 89, 79-107
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Roux E. et al. Un "site sentinelle" à la frontière franco-brésilienne pour comprendre et suivre les relations entre climat et santé. In Proceedings of the ENVIBRAS (Environnement et géomatique – approches comparées France Brésil) conference. Rennes: 2014:1-8