

The Citizen-Centered Smart Vaccination Record of MesVaccins.net

A holistic approach to personalize and synchronize immunization information

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Reality

Benefits +++

Risks +-

Perception

Benefits +-

Risks +++

General principles

- Transform complexity into simplicity through personalization
- Provide information directly to users
- Share reliable information between citizens and health professionals

Components of the immunization information system of MesVaccins.net

- Knowledge base
- Intelligent System for Immunization (ISI)
- Immunization registry

ISI

Intelligent system for immunization

Modules of the intelligent system for immunization (ISI) of MesVaccins.net

MT Message tailoring

BI Business intelligence

DM Decision-making

ML Machine learning

MT, DM and BI: rule-based, real-time updated, deterministic system.

BI: late-stage development module.

ML: this module is to be developed. Objectives:

- 1) To automate the translation of paper documents into electronic records;
- 2) to assess the relevance of vaccine schedules.

Intelligent system for immunization (ISI)

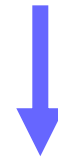
Experts write rules directly*

* Without going through the IT team



User* fills out a personalized form

* Citizen or health professional



User obtains personalized recommendations

Personalization form

- ⊕ General information
- ⊕ Place of residence
- ⊕ My profession
- ⊕ Around me there is...
- ⊕ My living conditions
- ⊕ I have a chronic disease
- ⊕ Treatments
- ⊕ Complementary examinations

Personalization form

- Around me there is...
 - ☐ A pregnant woman
 - ☐ A child under 6 months of age
 - ☐ A person infected by the hepatitis B virus
 - ☐ An immunocompromised person

The two operating levels of ISI*

* ISI: Intelligent system for immunization

ISI-1

By taking into account my individual characteristics (age, sex, health condition, environment, living and working conditions),

What diseases should I be vaccinated against?

ISI-2

Knowing what diseases I should be vaccinated against and the
vaccines I already received,

Am I up to date with my vaccinations?

ISI-2

Vaccine schedule assessment

● According to

- Number of doses
- Intervals between doses
- Vaccine characteristics
- Date of birth
- Age at each dose
- Health profile
- Season
- Travel characteristics

● Actions

- Immunization status
- Personalized vaccine diagnostic
- Calculation of the next dose date
- Recall/reminder by email/SMS
- Personalized messages to persons or health professionals

Immunization Schedule Language

- Domain Specific Language for immunization: an artificial language that enables the system to model any possible immunization schedule that is based on age, sex, dose intervals, past vaccination history and individual characteristics to provide personalized information for the citizens and decision-making elements for the health professionals.
- The Immunization Schedule Language can be used to automate the immunization guidelines of any country (the guidelines are transformed into rules written in the Immunization Schedule Language).

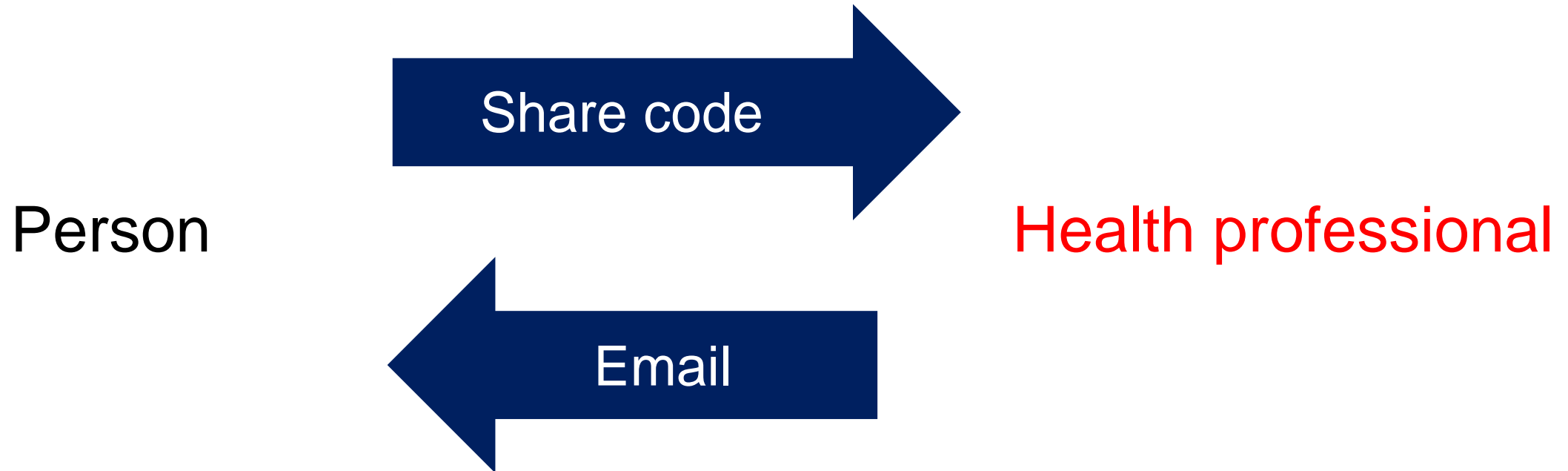
Example: personalized recommendations for a 33 year-old splenectomized man

Disease	Dose count	Expertise	Next dose
Pneumococcus Splenectomy	0	M0: Prevnar 13 M2: Pneumovax	ASAP
Meningococcus ACWY Splenectomy	0	To do	ASAP
Meningococcus B Splenectomy	0	To do	ASAP
MMR	1	To do	ASAP
Influenza Splenectomy	1	Next influenza season	Oct. 1, 2018
dTPolio	1	To do at age 45	Mar. 1, 2025

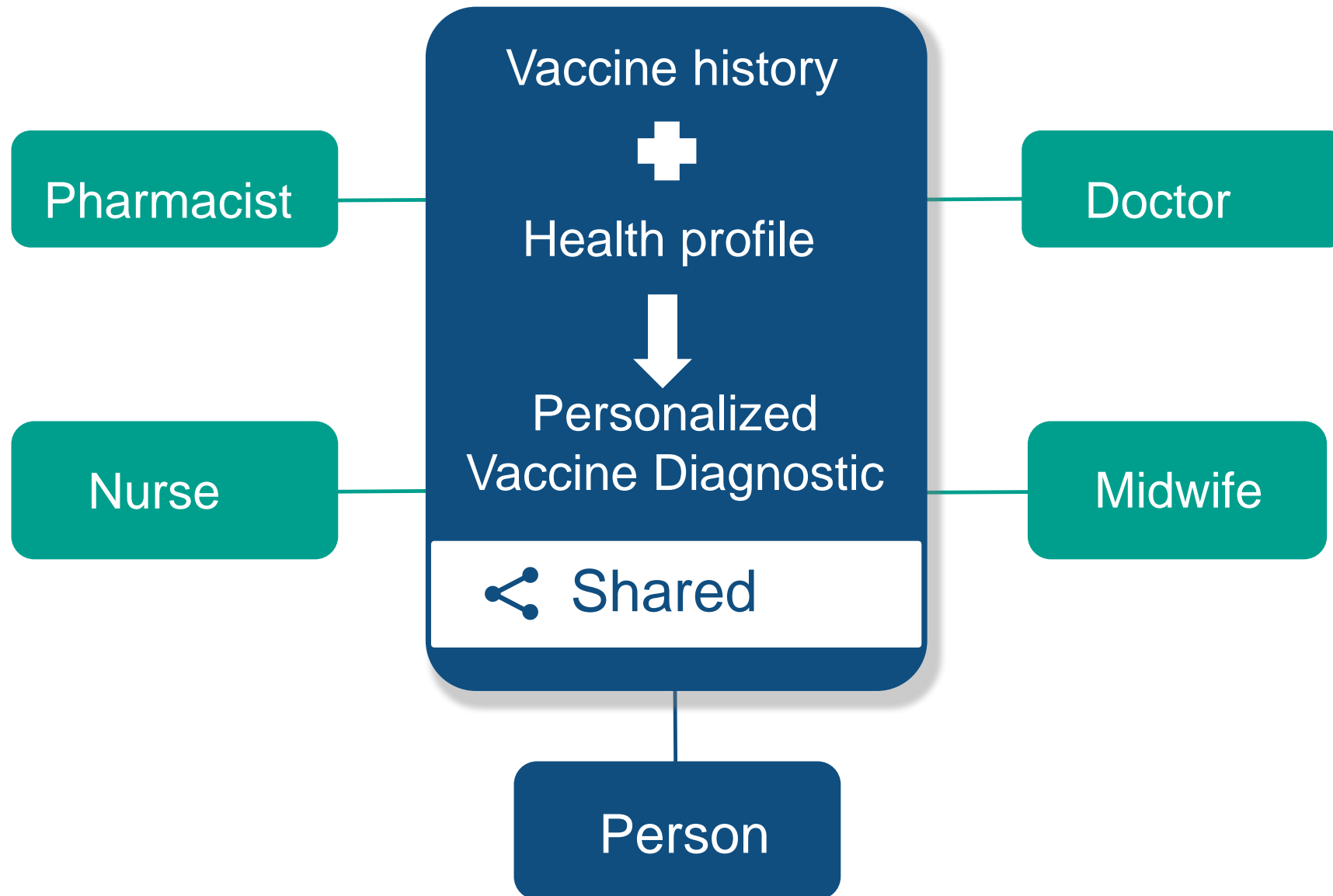
Example: personalized recommendations for a 33 year-old splenectomized man

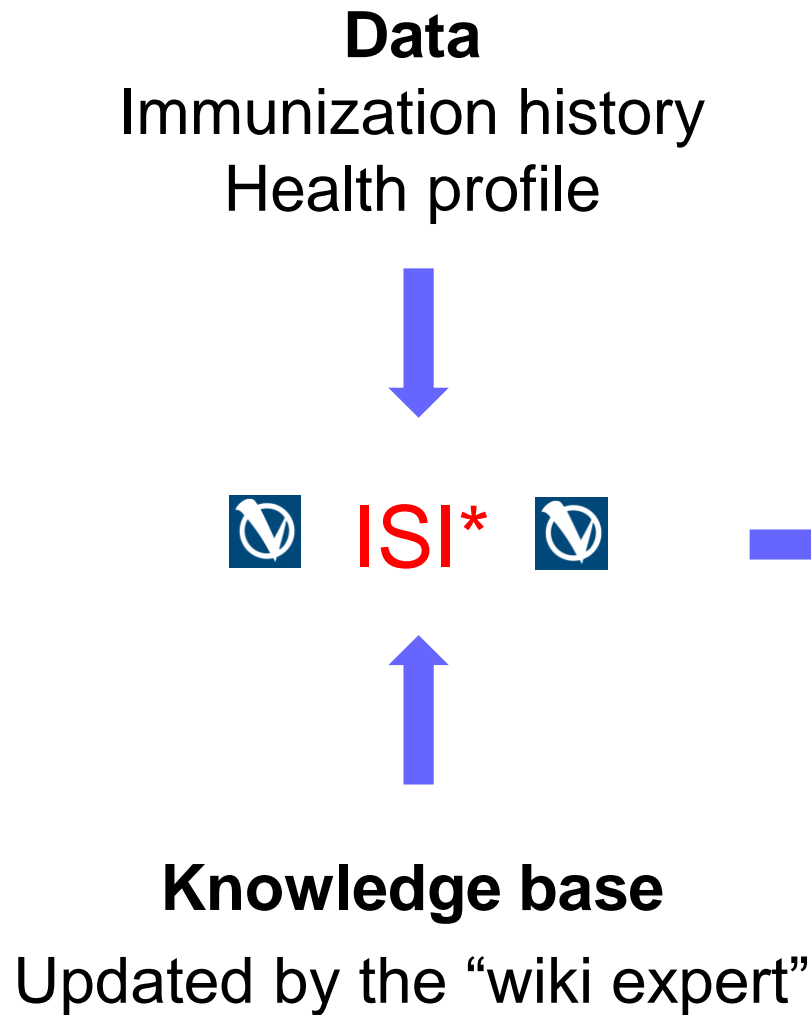
Disease	Dose count	Expertise	Next dose
Pneumococcus Splenectomy	0	M0: Prevnar 13 M2: Pneumovax	ASAP
<p>Recommended: Immunization + antibiotic prophylactic treatment.</p> <p>Justification: the bacteria are difficult to eliminate, and the risk of severe disease is 50 to 100 times higher than in the general population.</p> <p>Reference <u>French National Immunization Technical Advisory Group.</u></p>			

The smart vaccination record (SVR) is created by the person or by the health professional



Smart vaccination record (SVR)





Personalized Vaccine Diagnostic

Empowering people and HPs**

Reminder-recall Sending System

Decision Support

Continuing Education / Training

Real-time Immunization Coverage

Reinforced Pharmacovigilance

Vaccine supply Monitoring

Vaccine Forecasting

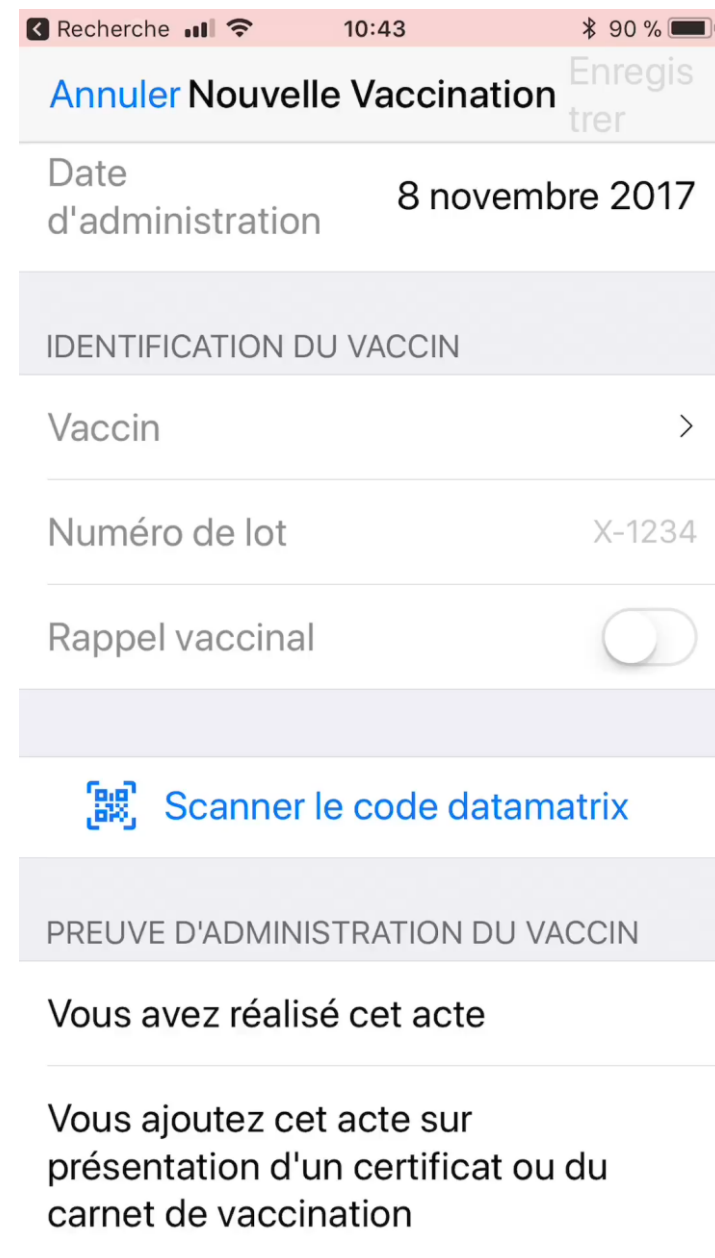
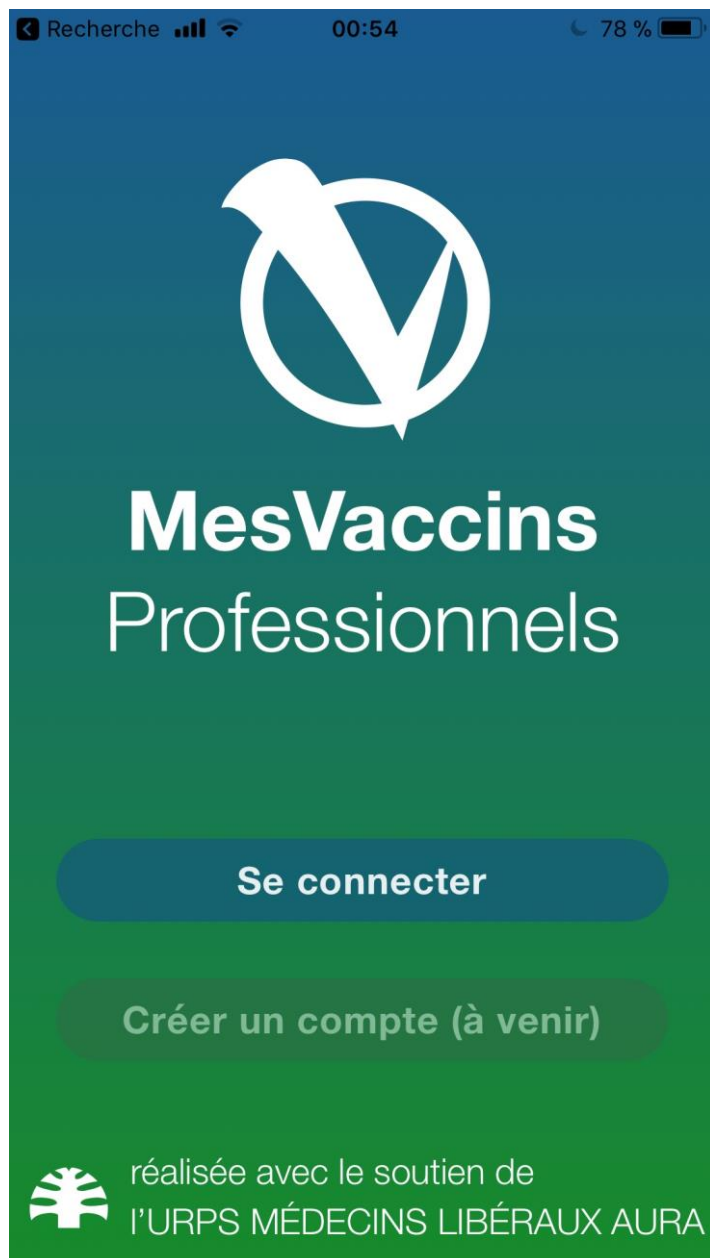
Research

* ISI: Intelligent system for immunization

** HP: health professional

Dissemination of the use

- Desktop
- Mobile applications: public and health professionals
- Any internet website, health professional software or pre-existing immunization registry



Mobile apps for the general public

Vaccine history available anywhere anytime





Julie TEST

Femme de 29 ans



HISTORIQUE
VACCINAL

PROFIL SANTÉ

M-M-RVAXPRO

25 Juillet 2014



M-M-RVAXPRO

20 Mars 2015



REVAXIS

20 Mai 2016



REVAXIS

20 Avril 2017

BOOSTRIXTETRA

25 Août 2017



Vaccinations en retard



Julie TEST

Femme de 29 ans



HISTORIQUE
VACCINAL

PROFIL SANTÉ

Modifier le profil santé

ANTÉCÉDENTS DE MALADIES INFECTIEUSES

Varicelle

PROFESSION OU ACTIVITÉ

Infirmier(ère)

Cabinet libéral

Professionnel de santé en activité



Vaccinations en retard

← Julie TEST
Femme de 29 ans



▼ Vaccinations en retard

Julie (29 ans) est en retard de ses vaccins

Vaccins en retard

Ces vaccinations n'ont pas été réalisées à temps.

Hépatite B

Vaccins à faire plus tard

Dès le 15/10/2017 Grippe saisonnière

En 2033 DTP (Diphtérie - Tétanos - Poliomyélite)

Prochain rappel : à 45 ans

En 2033 Coqueluche

Prochain rappel : à 45 ans

Application programming interfaces (APIs)

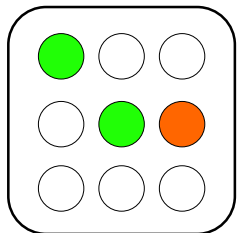
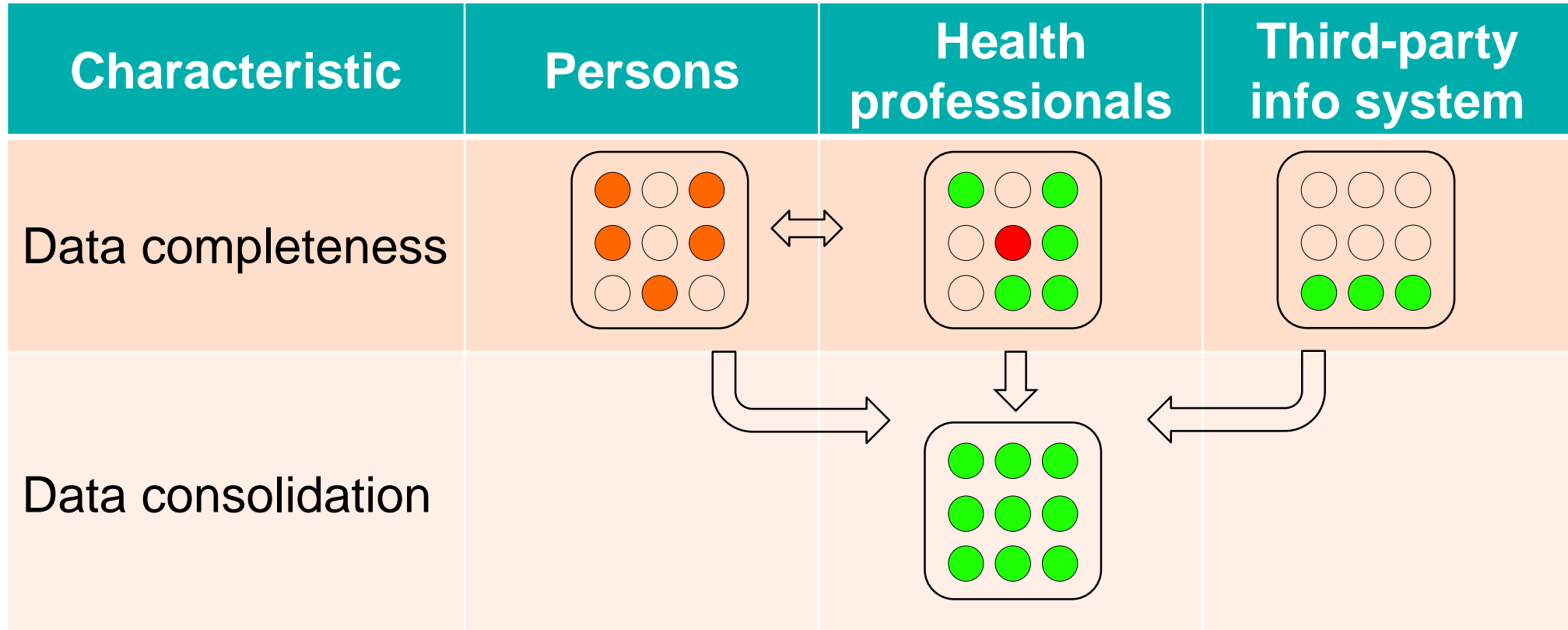
MesVaccins

- Two APIs: for citizens and for health professionals
- Integration in any third-party information system
 - Internet website - Mobile application
 - Health professional software - Hospital information system
 - Pre-existing immunization registry
- Automated creation and updating of electronic records

API documentation:

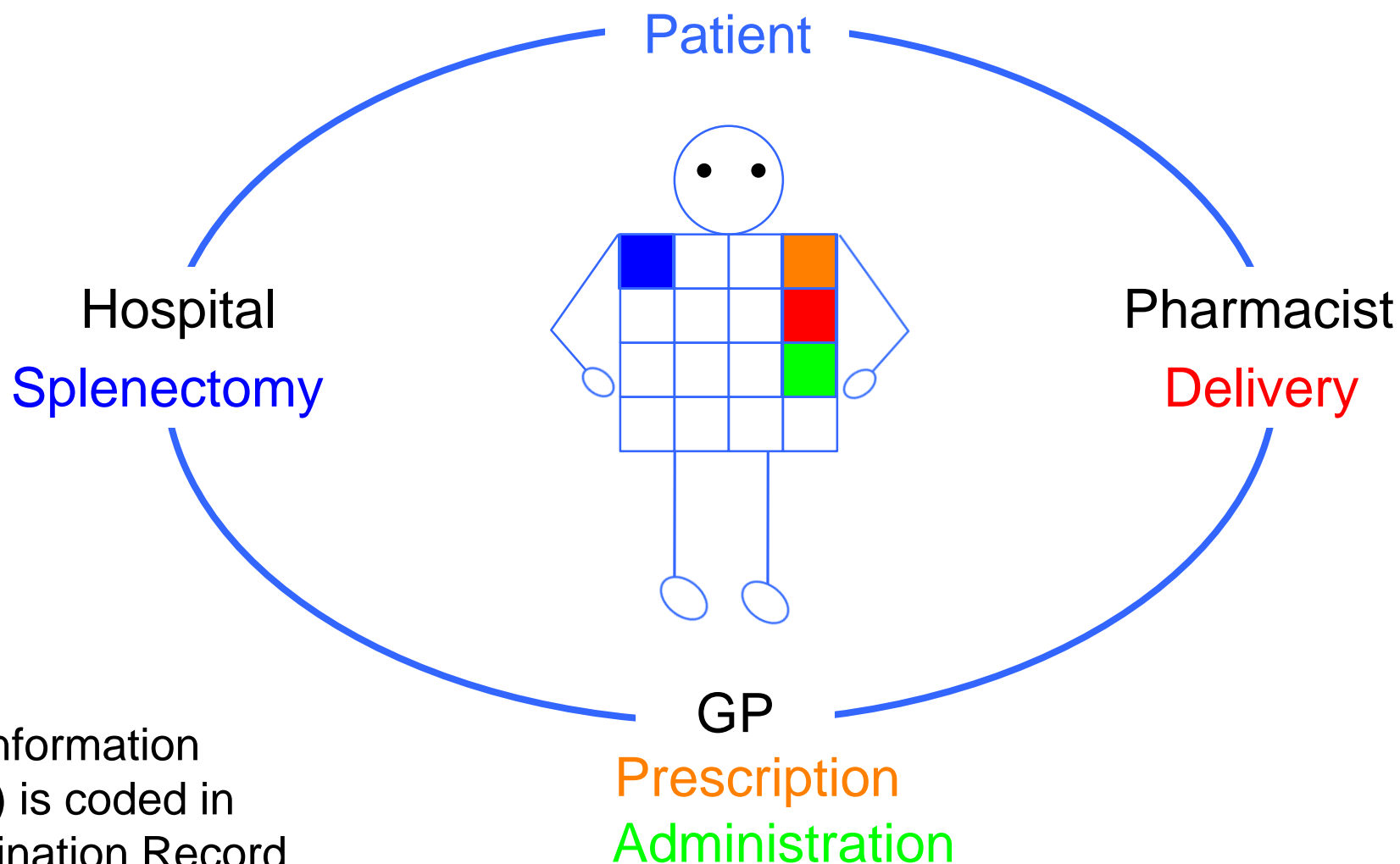
<https://www.mesvaccins.net/documentation/professional>

Data collection and consolidation



Disk empty: data not present; in green: data present; in orange: data present but not validated; in red: incorrect data; all disks in green: complete data.

Improve the health pathway



Each piece of information
(specific colour) is coded in
the Smart Vaccination Record

MesVaccins services

Service	Input	Output
ISI-1	Health profile	List of VPDs against which vaccination is recommended, with personalized information
ISI-1 + ISI-2	Health profile + vaccine history	Idem + personalized vaccine diagnostic
ISI-1 + ISI-2 + SVR	Idem	Centralized vaccine registry + reminder-recall system

- VPD: Vaccine preventable disease
- ISI: Intelligent system for immunization
- SVR: Smart vaccination record

Internationalization

- MesVaccins as a fully international platform
- Fast Healthcare Interoperability Resources (FHIR)
- Three pillars
 - Global vaccine database
 - Wiki Expert
 - APIs

Conclusion

MesVaccins.net is useful:

- For people
 - Empowerment
 - Adhesion to recommendations
 - Getting the best protection
- For health professionals
 - Decision support
 - Message consistency
 - Continuous training
- For public health
 - Increase in vaccine coverage and reduction in mis-vaccination
 - Efficient communication
 - Real-time data for evaluation and action