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Integrated Care for Complex Chronic Patients

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Background



It is widely accepted that the increasing number of the population aged > 65 years may suffer frequent unexpected hospital admissions or emergency room visits because of clinical or social circumstances triggering adverse outcomes.

The *Complex Chronic Patient (CCP)* is defined as a patient with two or more chronic diseases, comorbidities, frail (due to social, economic and/or clinical factors), usually elderly, and who consumes a very high level of health resources.

Although CCPs comprise about 5% of the general population, their health care needs consume an estimated 40% plus of all hospital admissions.



CONNECARE aims to develop and evaluate a *new organizational model* to enable *integrated care* of CCPs, supported by technological solutions following an *adaptive case management approach*.

The CONNECARE integrated care organizational model will facilitate *collaboration and communication* among healthcare professionals, patients and their carers through integrated technological solutions.

CONNECARE will also support and empower patients for *self-management*, by providing them **recommendations and suggestions** according to continuous monitoring of their activities.

Recommender System (RS)

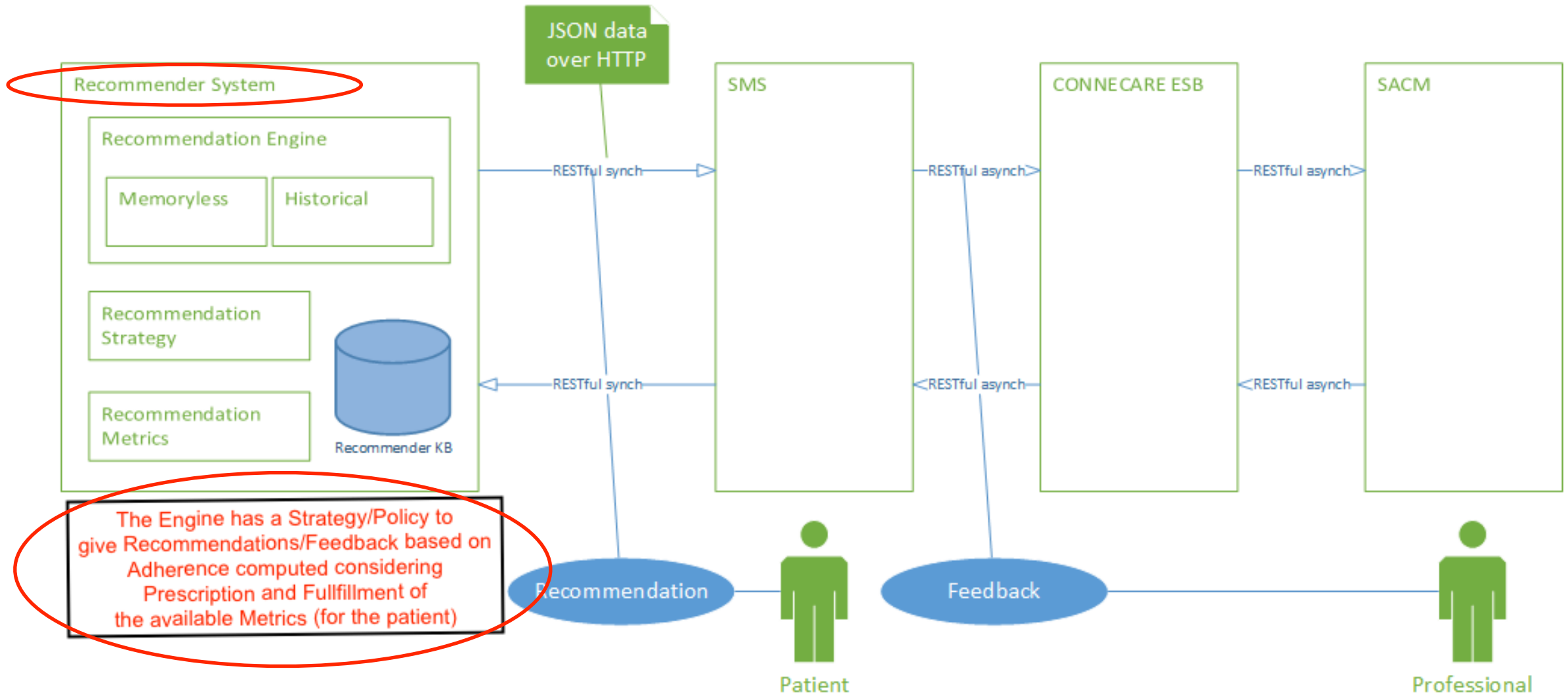


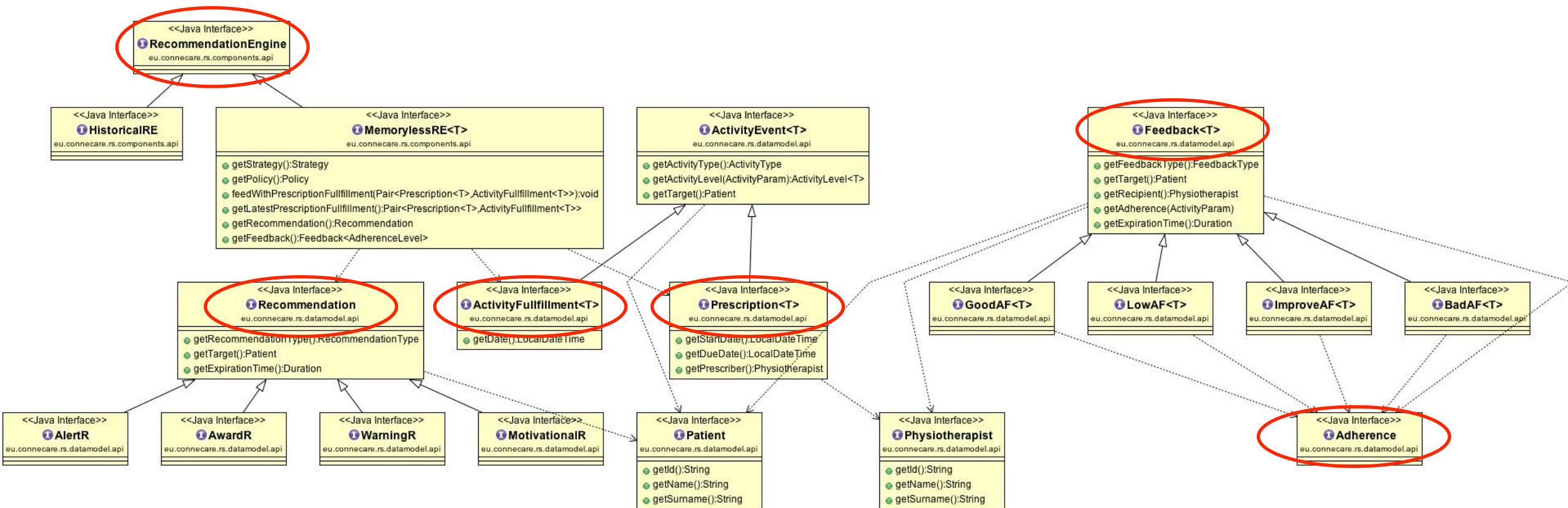
The *Self-Management System (SMS)* is meant to serve 3 primary users: the patient, the carer/family, and the case manager

The SMS will be an app that will be appropriate for mobile phones as well as tablets:

- a main app will house the care plan for the patient including *measureable objectives*
- the main app will receive data from a few sub-apps in order to compare them with the objectives to determine to what extent the objectives are being met

*The main app will provide **recommendations** to the patient/carers and the case manager about the extent to which care plan objectives are being met.*







Several examples of recommendations:

	Based on event	For patient	For clinician
Based on historical data	The average number of steps improves (last week, month, etc.)	Awards for patient ("Very good!", "Keep it up!")	Feedback: e.g. update prescription
	The average number of steps decreases (last week, month, etc.)	Alert/Motivational message for patient ("Try to do it better!", "Yes you can!")	Alert: compliance gets worse, detect the problem and adjust prescription or motivate the patient.
Based on real-time data	Today's number of steps fulfilled	Awards for patient ("Very good! What a wonderful day!", " <u>Better</u> than yesterday!")	Feedback: punctual compliance
	Today's number of steps not fulfilled	Alert/Motivational message for patient ("You can do it better and you know it!", "Last week you did it better", " It's 18:00 and you've only done 50% of the steps.")	

Clinical Decision Support System (CDSS)



Integrated care services are defined as *clinical processes* composed of a set of well-standardised tasks to be carried out on a patient on the basis of his/her health condition and social circumstances.

Compared to processes in industry, clinical processes need to be more *flexible* as a treatment process varies for each individual patient and its execution depends on the health state of the patient; therefore, needs to be *adapted* dynamically.

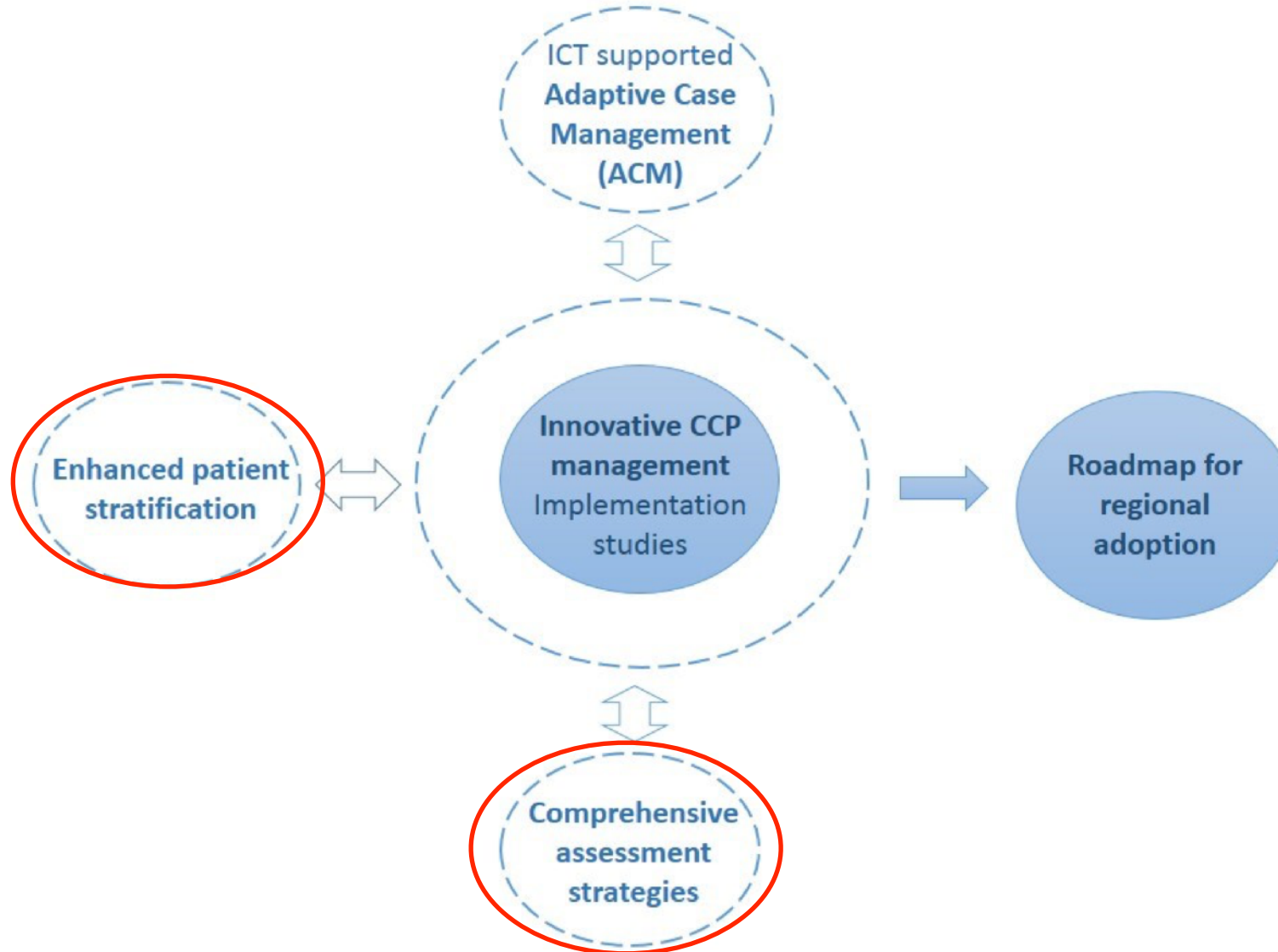
*To this end, Adaptive Case Management (ACM) is being promoted as a new paradigm allowing case managers to adapt well-structured clinical processes to the continuously evolving needs of the patients to facilitate **clinical decision making**.*



Home Hospitalization and Early Discharge (HH/ED) is a widespread practice that provides a home-based individualized care plan aiming at substituting hospitalization and implementing transitional care strategies for optimal HH/ED discharge.

Recently, initiatives involving HH/ED like *enhanced patient stratification* were approved as part of the Protocol for Regional Implementation of Community-based Collaborative Management of Complex Chronic Patients (CCP).

*Enhanced clinical prediction will feed **clinical decision support systems (CDSS)** displayed in the professional workstation.*





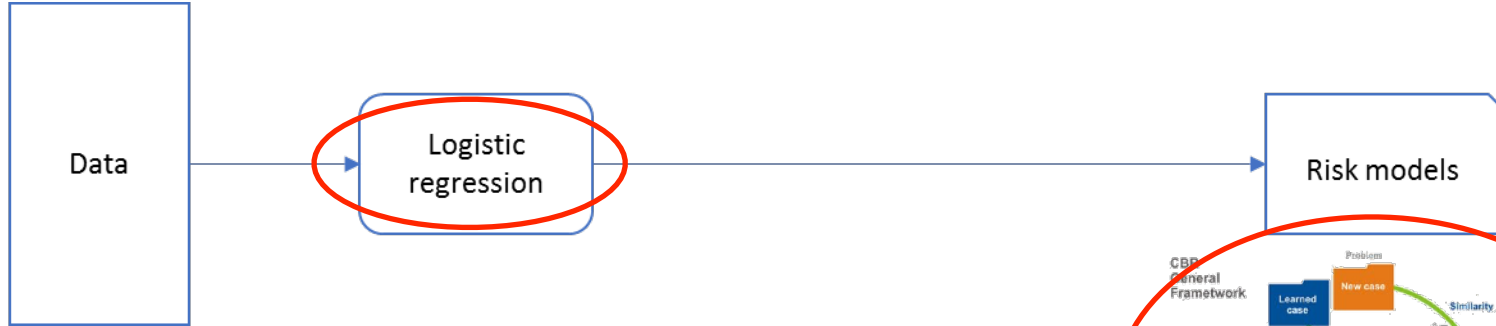
To assess patient related risks for (i) early readmission (< 30 days), (ii) late readmission (> 30 days), and (iii) mortality, different predictive modelling approaches will be assessed

- **Logistic Regression** analysis to evaluate the predictive power introduced by novel variables extracted from electronic medical data over existing population-based models
- **Patients Similarity** for quantifying the degree of similarity between a given patient and past patients recorded in electronic medical data
- **Fuzzy c-Regression Models** to simultaneously perform optimization of clusters generation and linear regression prediction
- **Case Based Reasoning** to exploit experiential knowledge to analyze the correlation between past cases and new ones so as to adapt and propose a similar solution

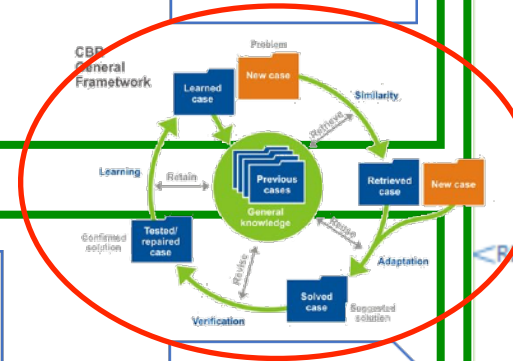
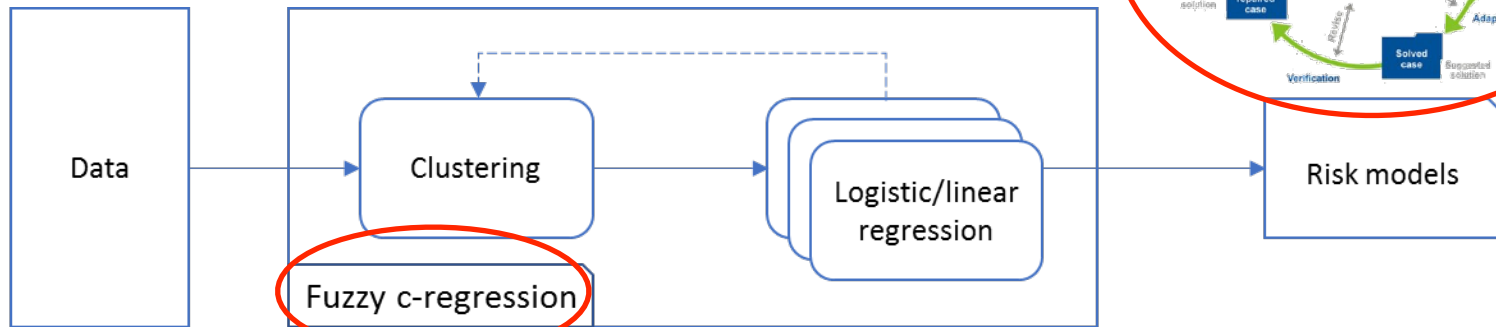


CDSS Engine

Strategy 1



Strategy 2



RESTful asynch

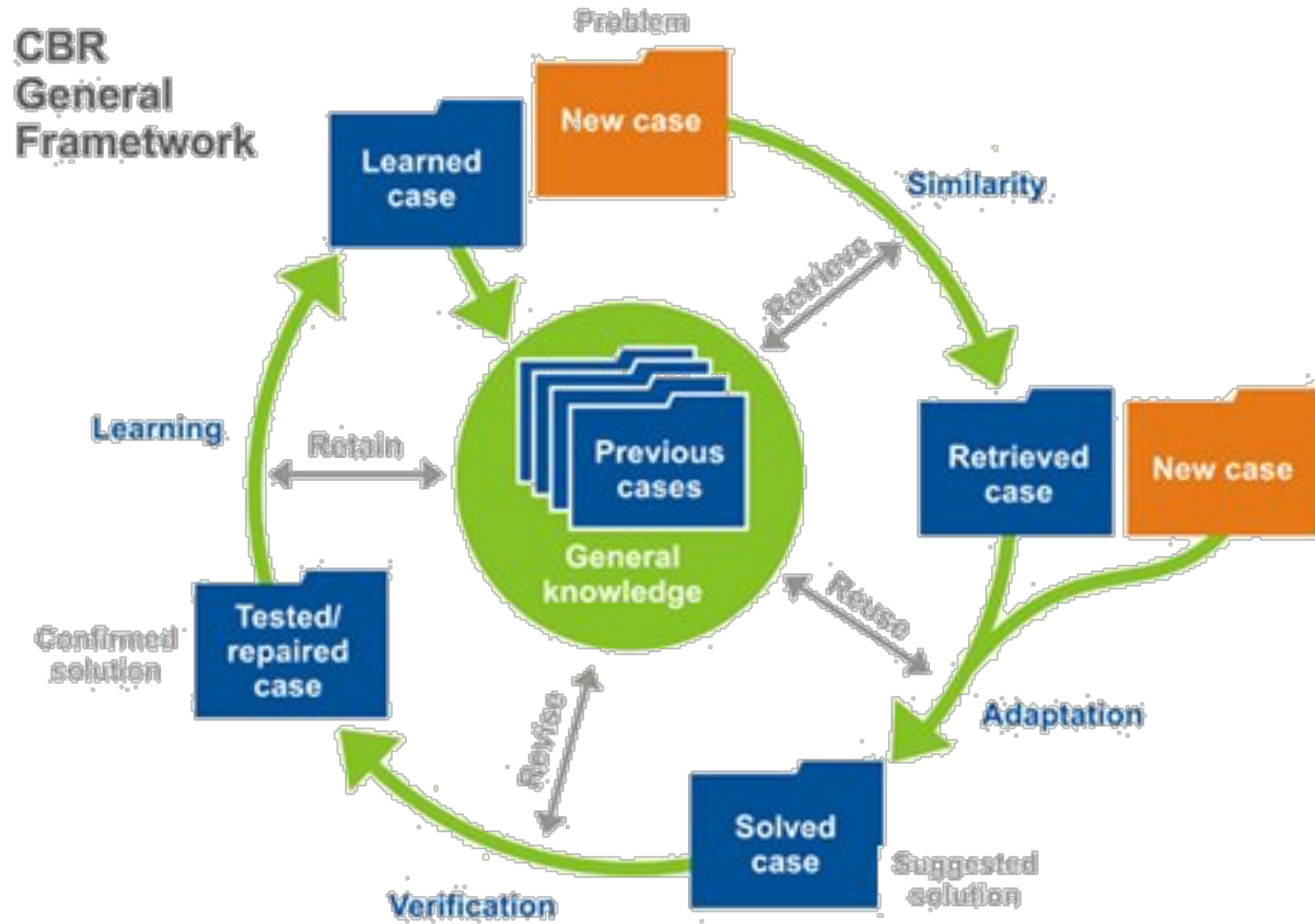
RESTful asynch



suggested clinical pathway



Professional





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Thanks
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eWave

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