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Using Tacit Knowledge in Decision-Making

**Case of the town planning in Kyoto
Prefecture**

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Map of the Kyoto Prefecture



A bustling crossroad in front of the Kyoto station (Kyoto city)



**Housing buildings and rice fields in Kodo
(20km south of Kyoto)**



**Agricultural landscape:
a 10-roads expressway
interchange, and a rice farmer**





**Scenery in Shikoku (Kagawa-ken):
Austere immaculate mountains in the middle of a lake of houses**



**In the suburbs of Nagoya (Aichi-ken):
Rice fields, cars, industries, and houses in the background**



The housing front in Miyamaki (Kyoto Prefecture) ...

Aerial views of 2 suburbs :



- at 20km from Kyoto



**- at 25km from Paris
(near Charles-de-Gaulle Airport)**



Interviewed farmers in Kodo and Miyamaki (Kyoto Prefecture)

I. Standardizing the use of Tacit Knowledge

“Global laws” versus “local procedures”

3 questions :

- How to catch this tacit knowledge?
- How to transmit it? Case-Based Reasoning (CBR)
- Will it be efficiently used by employees? Decision-Support Systems (DSS)

⇒ Coupling between a traditional DSS and a CBR system to obtain an intelligent DSS.

Explicit and Tacit Knowledge

Explicit knowledge : easy to describe quickly, clearly, and by writing.

Tacit knowledge : not materialized, know-how, teams' way of working, "best practices", expertness, not directly workable

4 steps of Knowledge Management :
acquire, store, transmit, and re-use knowledge.

Case-Based Reasoning (CBR)

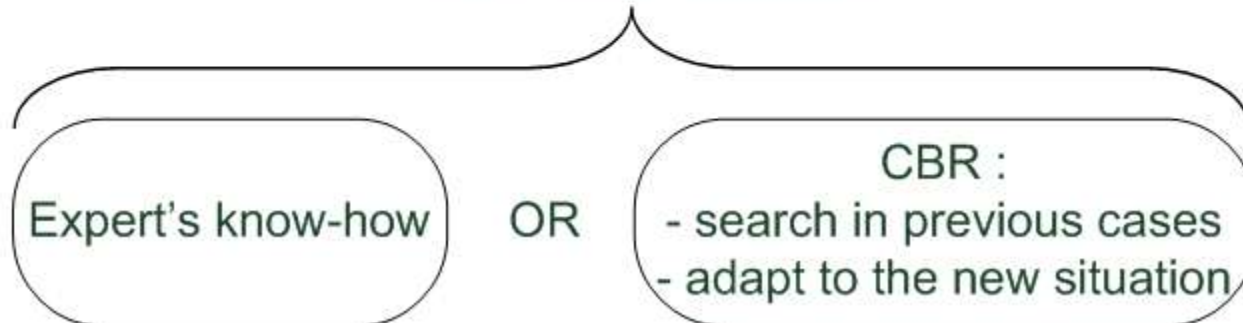
Idea : solving new problems by using previous “close” situations

Process : - stock of previous cases recorded in a library
- link between the actual problem and older ones

Decision-Making steps :



TACIT KNOWLEDGE



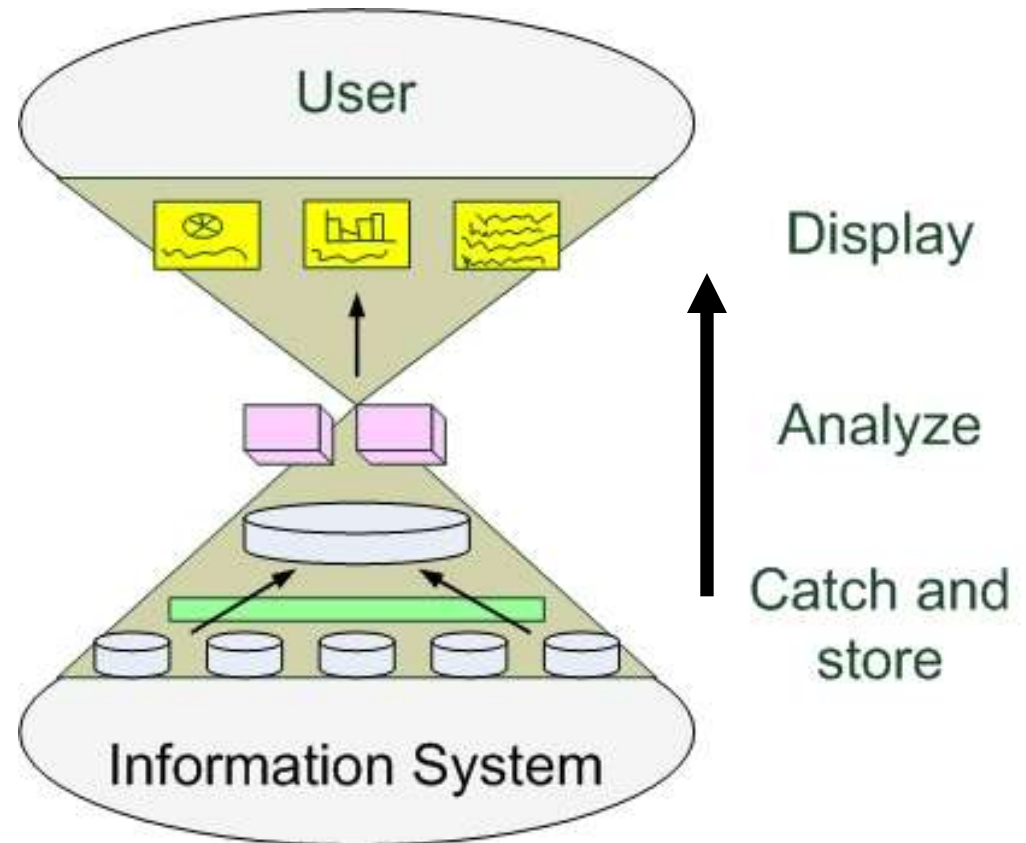
Decision-Support Systems (DSS)

DSS : observation and description tool

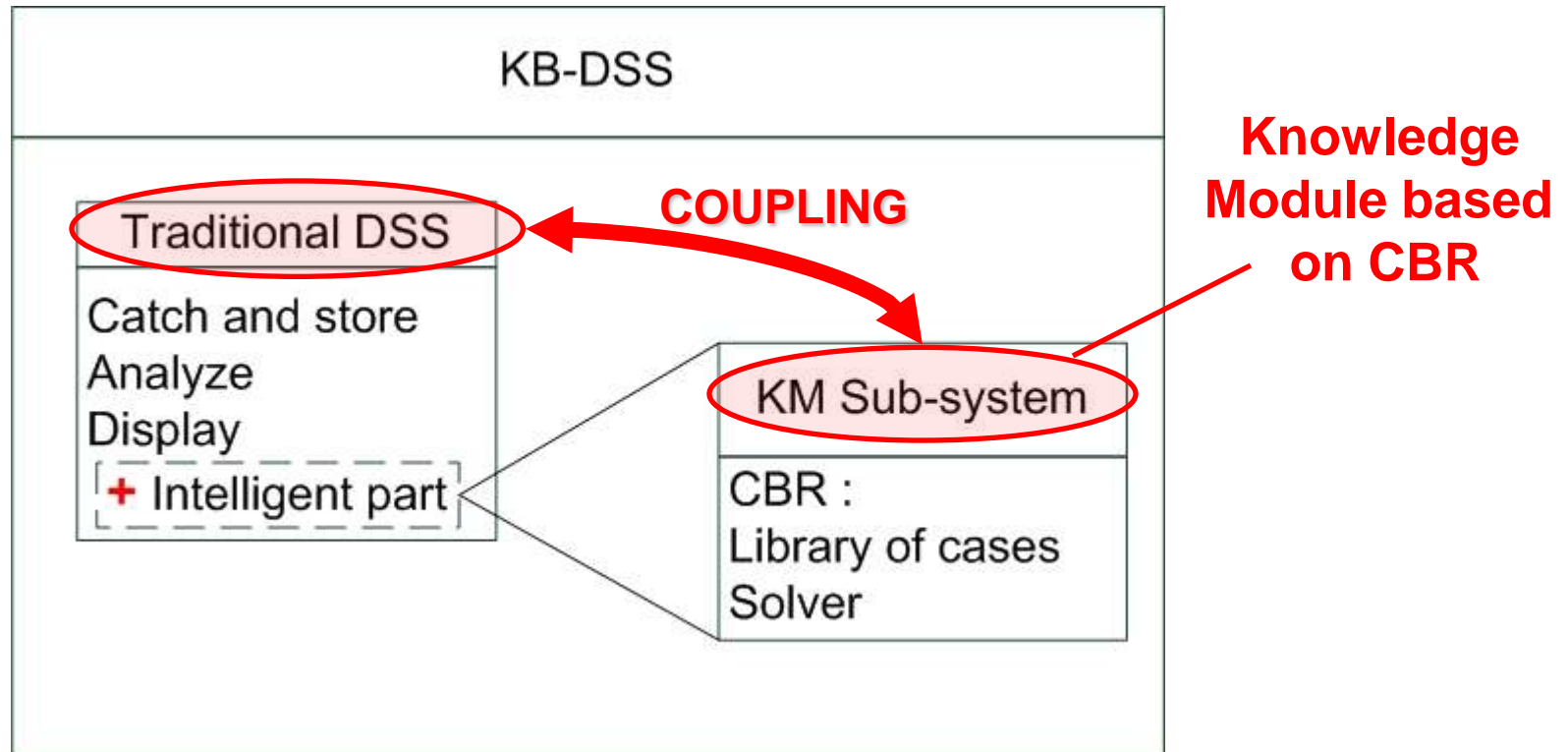
3 main parts :

- catch and store data
- work on the data
- give results to the user

DSS + Expert Systems
=
Intelligent DSS
(Knowledge-Based DSS)

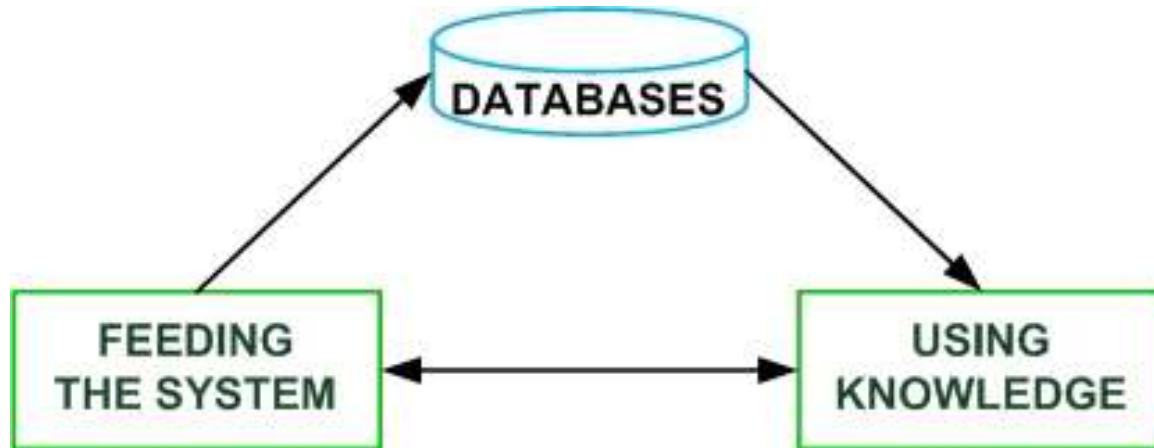


Proposed system



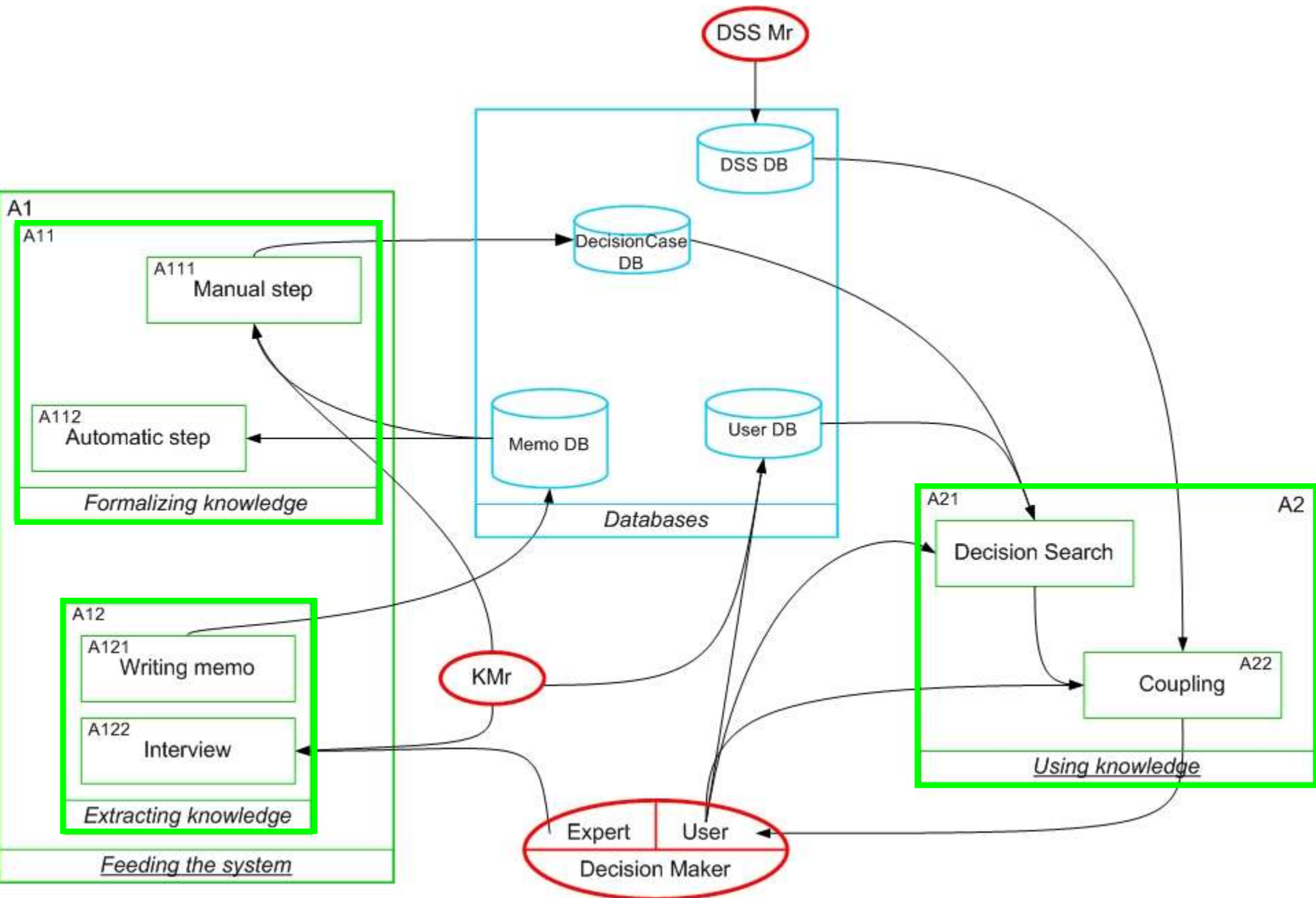
II. Modeling the system

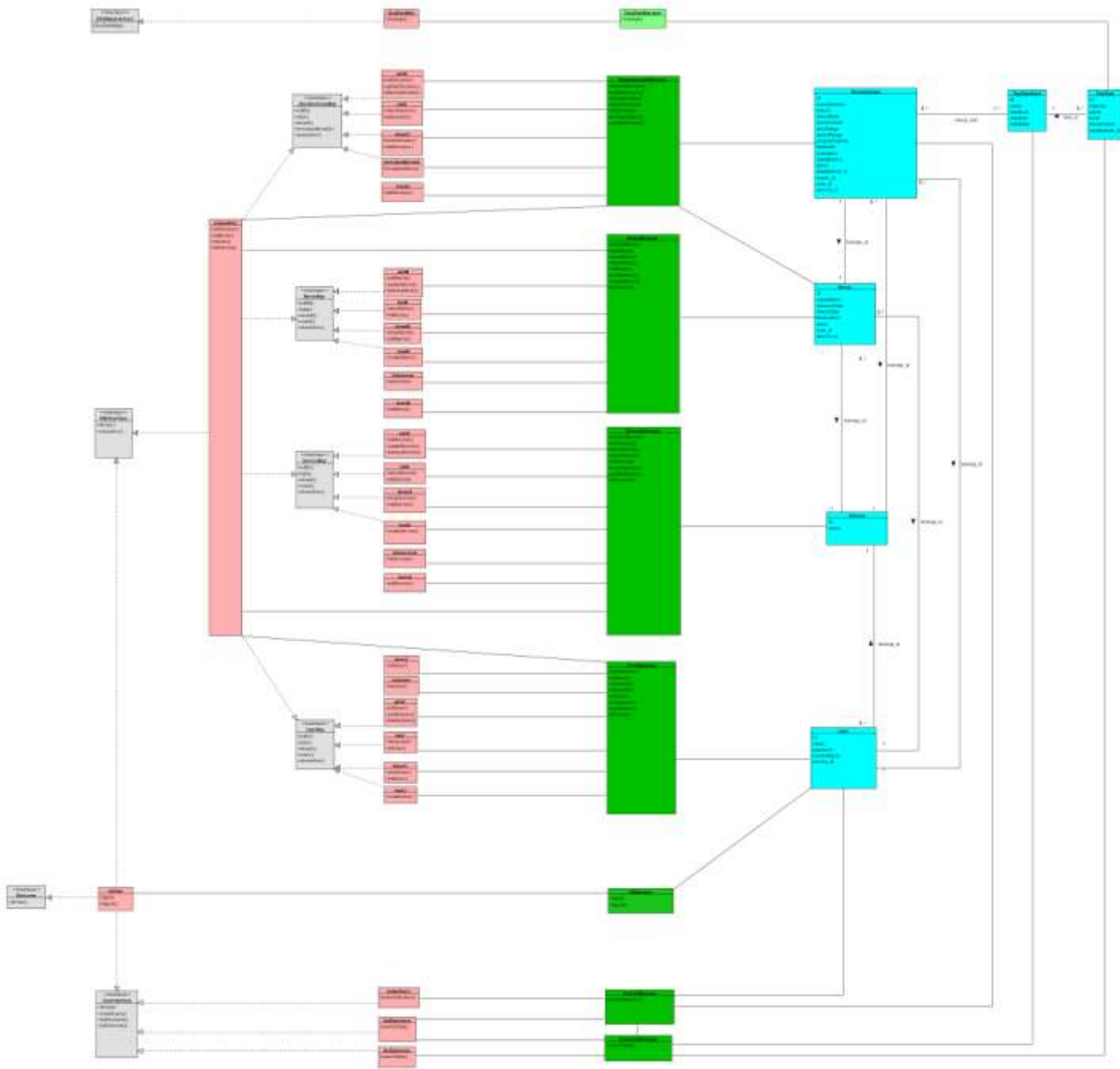
Functional modeling of the system



Basic principle of the system

Complete functional modeling (a bit spaghetti - looking...)





Complete diagram of the UML model

III. Software

Screenshots :



Welcome **Elia**, choose your action :

Access the user manager

Access the memo manager

Access the decision case manager

Access the service manager

Logout

Knowledge Manager (KMr) Interface :

The KMr can manage the different entities (user, memo, decision case, and service)

New memo

Name memo
plants cutting

Decision date
2007 May 5

Memo date
2007 May 16

Place
Mukaijima

Text content

When plants must be cut?
Problem : inhabitants are angry when they find insects in growing trees so we should cut plants before insects arrive.
But the Central Office does not accept it, they want us first to receive complaints from citizens to avoid too early cutting!
Possibility: estimate insects arrival with previous years, but with global warming it's difficult.
Decision : follow the arrival of insects with warm weather from Okinawa until it arrives at Fukuoka and then start the cutting.
Difficulties: to obtain up-to-date data from Okinawa and Kyushu; get the trust of the Central Office.
Solution: for first time, test in only small parts of Mukaijima. Address Mr. Terada, nice guy.

Expert ID
2 [List Experts](#)

Service ID
2 [List Services](#)

[Back](#)

Creation of a new memo :

The KMr fills in the fields using the interview.

Here is a possible example for the plants cutting.



The screenshot shows a web browser window with the address bar displaying "http://localhost:3000". The main content area features a purple header with a white radiation symbol. Below the header, the text reads "Here is the list of existing services :". A table with two columns, "Service ID" and "Service Name", lists three services: "1 roads", "2 plants", and "3 administration". At the bottom of the window, there are two buttons: "Terminé" and "Barcode".

Service ID	Service Name
1	roads
2	plants
3	administration



Here is the list of obtained decisions for the **decision** search:

Decision ID	Name	
2	decision birthday	coupling
3	decision plants cutting	coupling



To start the coupling with DSS data, click "coupling".

New Search

Logout



Results of the decision search :

List of the recorded decisions containing the keyword in their title

To describe the **decision plants cutting** (ID = 3) decision-case, there is a need of data of **weather** kind.

Description of the decisioncase :

ID	Namedecision	Nature	Recorddate	Decisiondate	Place	Timerange	Linked_data
3	Decision plants cutting	operational	2008-01-12	2007-05-05	Mukaijima	1 month	weather (ID = 1)

Spacerange	Prog.	Feedback	Usedmethod
Middle to high if considering the contact with the other prefectures	middle	<p>Problem : inhabitants are angry when they find insects in growing trees so we should cut plants before insects arrive. But the Central Office does not accept it, they want us first to receive the complaints from citizens to avoid too early cutting.</p> <p>Possibility : Estimate insects' arrival with previous years, but with global warming it is difficult.</p> <p>Difficulties : to obtain up-to-date data from Okinawa to Kyushu, and to get the trust of the Central Office. In case of big areas?</p> <p>Contact Mr. Terada : good guy.</p>	<p>Geographical follow-up of the temperatures from Okinawa to Fukuoka and start the cutting.</p> <p>For the first time, test only on a small area (Mukaijima).</p>

The corresponding **weather** is :

ID	Daydate	Place	Wind	Rain	Temperature
3	2007-05-05	Mukaijima	8 knots	5%	12

Results of the coupling between the decision-case (including tacit knowledge) and the DSS data linked to it.

CONCLUSION

Model of a knowledge-based Decision Support System by coupling :

- a traditional Decision-Support System
- an expert system grounded on Case-Based Reasoning which allows dealing with tacit knowledge.

Software for town planning developed, based on this model.

Future :

Media are currently too weighty and uninviting

⇒ Look at current experiences in companies : games or recreational tools