INSTITUT LUXEMBOURGEOIS
DE RÉGULATION

Fédération des hôpitaux luxembourgeois

Healthcare information system cartography

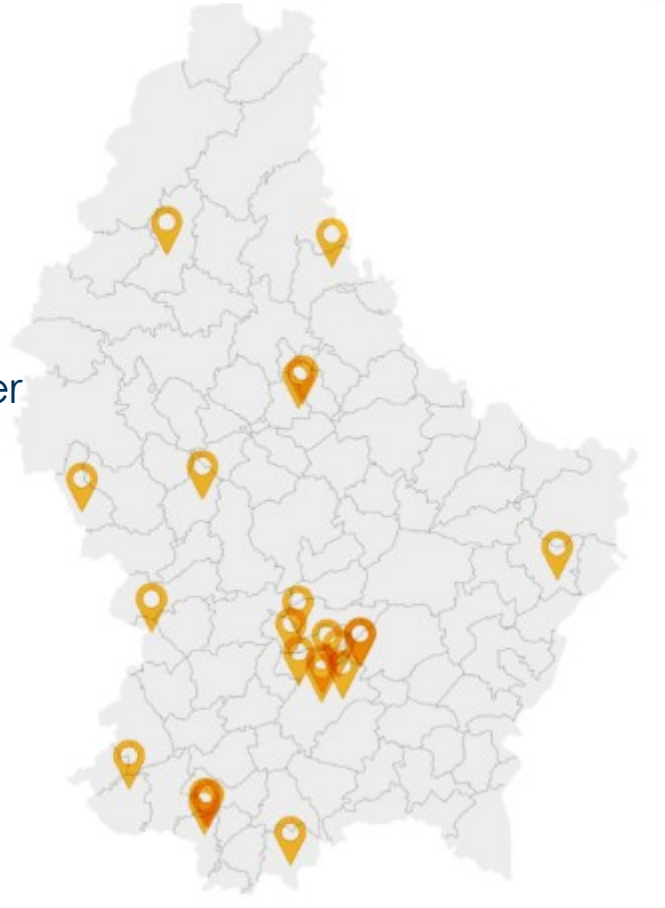
10/05/2022

NISS

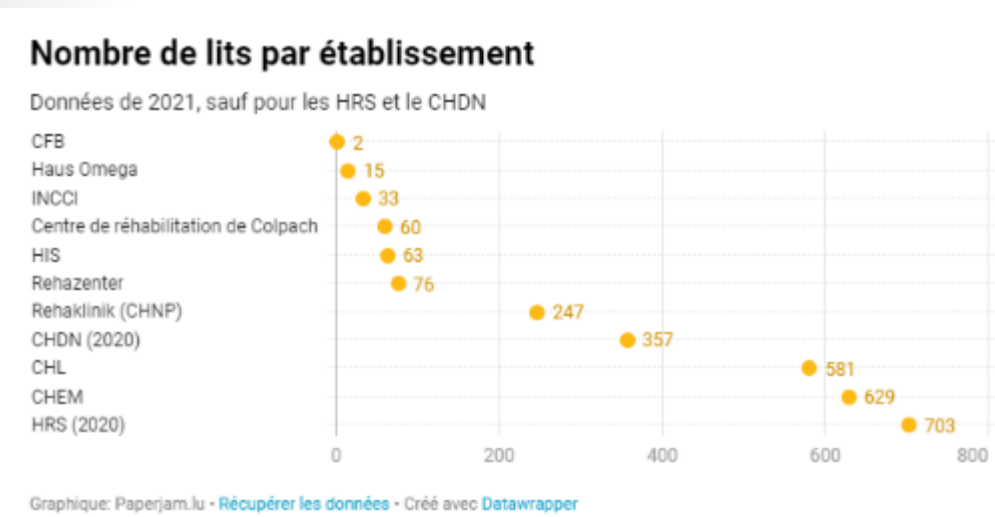
SUMMARY

THE LUXEMBOURG HOSPITAL LANDSCAPE

- 4 General / Acute hospitals (CHL, CHEM, HRS et CHdN)
- 6 Specialised hospitals in:
  - cardiology INCCI
  - radiology the Centre national François Baclesse (CFB)
  - psychiatric rehabilitation the Centre hospitalier neuropsychiatrique (CHNP)
  - functional rehabilitation Rehazenter
  - geriatric rehabilitation Hôpital intercommunal de Steinfort (HIS) in physical and post-oncological rehabilitation
  - Centre de réhabilitation du château de Colpach (CRCC)
- End of life facility (Haus Omega)

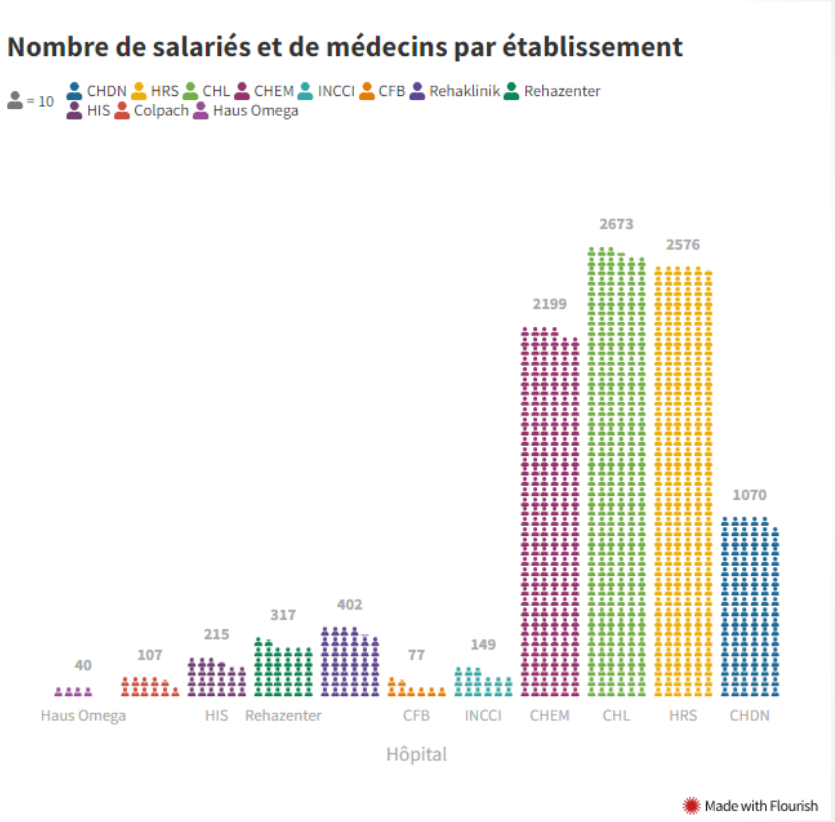


KEY DATA OF THE HOSPITALS



Patient care in 2020 in acute hospitals:

- CHL 172,668
- HRS 153,648
- CHEM 144,600
- CHDN 68,000



FÉDÉRATION DES HÔPITAUX LUXEMBOURGEOIS (FHL)

Main Tasks of FHL:

- Defending the interests of its members
  - Position papers
  - Opinions
- Legal and economic advice, etc.
- Joint committees with the CNS
- The collective labour agreement called CCT-FHL
- Quality control in medical imaging
- Central purchasing and joint procurement
- Occupational health (occupational medicine)
- International relations

ESSENTIAL SERVICES IN THE HOSPITAL SECTOR (OSE)

Hospital Centres

CHEM
Centre Hospitalier
Emile Mavrisch

CHdN
CENTRE HOSPITALIER DU NORD

CHL

Centre Hospitalier
de Luxembourg

HÔPITAUX
ROBERT
SCHUMAN

(3) Pour le secteur « santé » :
1° L'activité hospitalière ;
2° L'activité de laboratoire d'analyse médicale ;
3° La transfusion sanguine ;
4° Le service d'intervention d'urgence ;
5° La distribution pharmaceutique.

Centre François Baclesse

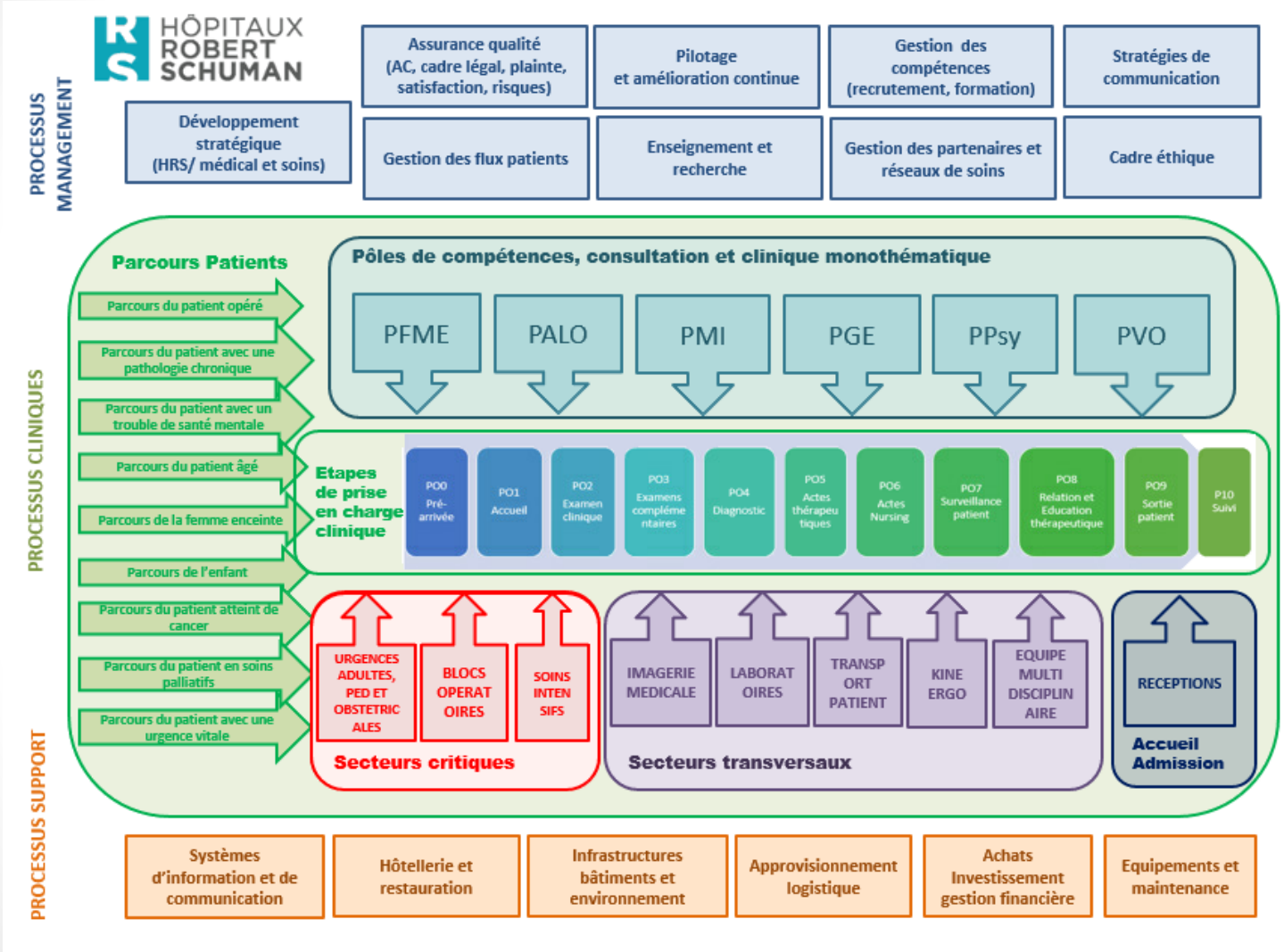
INCCI
HAERZ
ZENTER

institut national
de chirurgie
cardiaque et
de cardiologie
interventionnelle

Specialised Hospitals

Regulation ILR/N19/1 of 5 November 2019 on the determination of essential services.

OPERATIONS OF A HOSPITAL (EXAMPLE HRS)

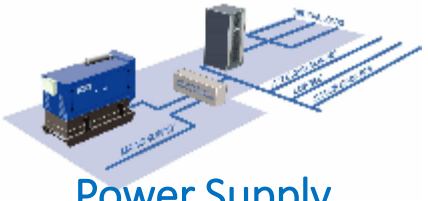


Services (High Level)
Reception / admission
Exams & diagnostics
Therapeutic (Medical nurse) & administrative acts
Hospital discharge

SUPPORTING ASSETS FOR PATIENT CARE

Biomedical Assets

IT Assets



Power Supply

Water Supply

Network - Cloud

HOSPITAL IT SERVICES

AGENCE eSanté LUXEMBOURG | Agence nationale des informations partagées dans le domaine de la santé

- The whole Health National sector
- Main mission
  facilitate the **sharing and exchange of patient health data** between health professionals involved in the patient's health care;
- Achieve this through the implementation of:
  - a platform for sharing and exchanging data in the health sector including the electronic health record (DSP **Dossier de Soins Partagé**)
  - a **Master Plan for Health Information Systems (SDSI) defining a national strategy for the interoperability of health information systems** which will thus allow the different health systems to interact smoothly.

LUXITH

- For hospital sector only
- Context :
  - rationalization of resources and means: patient data exchange: NATIONAL DPI;
  - development of the necessary expertise for complex IT applications;
- Approach : Creation of an Economic Interest Grouping (EIG) which evolves at the same pace as the IT projects it will take on. Its mission is to:
  - To control IT costs;
  - To have a common IT master plan in line with that of the Agence e-Santé;
  - To constitute a single hospital entry point for the e-Health Agency;
  - Pool our IT resources and infrastructures;
  - Skills - human resources;
  - Service and software contracts;

LUXITH GIE – OBJECTIVES AND MISSIONS

- **Objective**
  - the implementation and the operations of shared services, software and IT infrastructures of its members;
  - also responsible for implementing the strategic IT plan for the hospital sector, which plans a progressive pooling of IT skills in hospitals.

- **Missions**
  - 1. Infrastructure
  - 2. Human resources
  - 3. Medical Imagery
  - 4. Interoperability
  - 5. Hospital Invoicing
  - 6. Security and Data Protection

LUXITH GIE - MEMBERS

Centre National de Radiothérapie Grand-Duché de Luxembourg

www.baclesse.lu

Le CHEM Centre Hospitalier Emile Mayrisch

www.chem.lu

Le Centre Hospitalier de Luxembourg

www.chl.lu

Le Centre Hospitalier Neuro-Psychiatrique

www.chnp.lu

Institut National de Chirurgie Cardiaque et de Cardiologie Interventionnelle

www.incci.lu

Hôpital Intercommunal de Steinfort

www.his.lu

La Fédération des Hôpitaux Luxembourgeois

www.fhlux.lu

Hôpitaux Robert Schuman

www.hopitauxschuman.lu

Centre de Réhabilitation du Château de Colpach

rehabilitation.lu

Centre National de Rééducation Fonctionnelle et de Readaptation

www.rehazenter.lu

Le Centre Hospitalier du Nord

www.chdn.lu

MERCATOR
MAPPING THE HEALTHCARE INFORMATION SYSTEM

INFORMATION SYSTEM MAPPING

Why mapping?

Mapping is an essential tool for the control of the information system.

Allows you to have knowledge of all the components of the information system and to obtain a better understanding of it by presenting it under different views.

Control of the information system: mapping allows you to have a common and shared vision of the information system within the organization.

Protection of the information system: mapping enables the identification of the most critical and most exposed systems, anticipating possible attack paths on these systems and implementing adequate measures to ensure their protection.

Defense of the information system: mapping makes it possible to react more effectively in the event of an incident or digital attack, to qualifier the impacts and to predict the consequences of the defensive actions carried out

Resilience of the information system: mapping makes it possible to identifier the organization's key activities to define a business continuity plan and is a key tool for crisis management, whether digital or not.

INFORMATION SYSTEM MAPPING

Mercator

Mercator is a web application that allows you to manage the mapping of an information system as described in the guide “Mapping the information System” from ANSSI.

What is a cartography?

Mapping is a way to represent the information system of an organization as well as its connections with the outside world. The term "mapping" refers to a schematic representation of a set of information.

Mapping <-> Inventory

Who is Mercator?

Mercator is a cartographer. He is the author of the Mercator projection is a conformal projection, that is, it retains the angles (very useful in sailing in the 16th century).

INFORMATION SYSTEM MAPPING

Views of the information system

1. **Business view**
   - The ecosystem view presents the different entities or systems with which the IS interacts to fulfill its function.
   - The business view of the information system represents the IS through its main processes and information.
2. **Application view**
   - The application view describes the software components of the information system, the services they provide, and the flux of data between them.
   - The administration view lists the scopes and privilege levels of users and administrators.
3. **Infrastructure view**
   - The logical infrastructure view illustrates the logical partitioning of networks, including the definition of IP address ranges, VLANs, and filtering and routing functions;
   - The physical infrastructure view describes the physical equipment that makes up or is used by the information system.

INFORMATION SYSTEM MAPPING

Granularity levels

Each view has its own level of granularity.

Level 1 - Minimum granularity: First elements essential to digital security operations

Level 2 - Intermediate granularity: Mapping focused on digital security. Vital information systems (VIS) must have a mapping with this level of maturity at least.

Level 3 - fine granularity: exhaustive and detailed mapping, which integrates digital security needs.

Objets/Attributs concernés	Démarche de cartographie orientée sur la sécurité numérique		Démarche globale de cartographie
	Maturité de niveau 1	Maturité de niveau 2	Maturité de niveau 3
Vue de l'écosystème			
Granularité 1	●	●	●
Granularité 2			●
Vue métier du système			
Granularité 1	●	●	●
Granularité 2		●	●
Granularité 3			●
Vue des applications			
Granularité 1	●	●	●
Granularité 2			●
Vue de l'administration			
Granularité 1		●	●
Vue des infrastructures logiques			
Granularité 1	●	●	●
Granularité 2		●	●
Vue des infrastructures physiques			
Granularité 1		●	●
Granularité 2			●

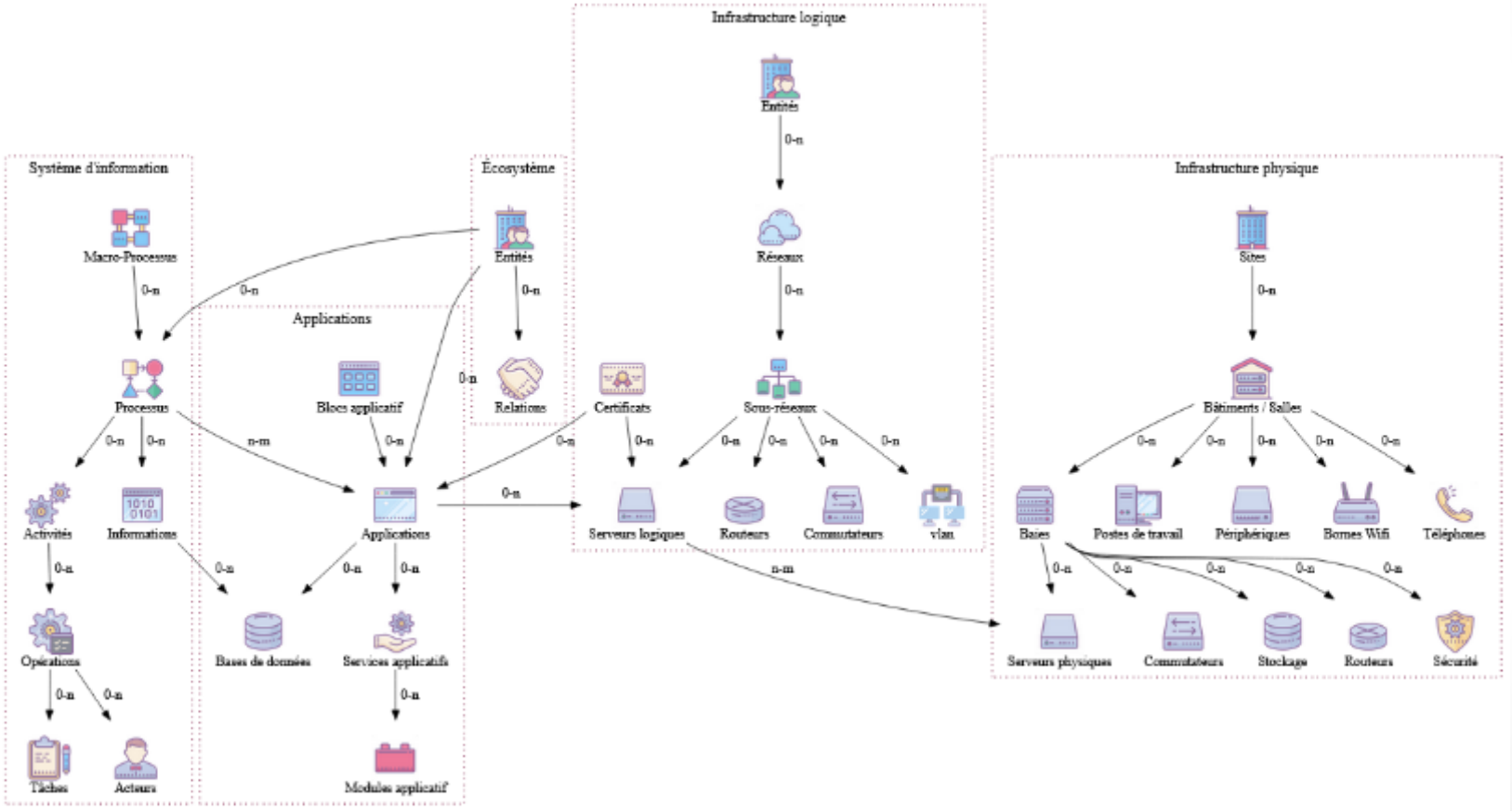
INFORMATION SYSTEM MAPPING

Application

- View management (ecosystem, information system, administration, logical, applications, and physical)
- Calculation of compliance levels
- Drawing of mapping diagrams
- Generation of the information system architecture report
- Extraction in Excel, CSV, PDF ... of all lists
- Multi-user with role management
- Multilingual
- Active Directory / LDAP connection
- REST API with JSON

INFORMATION SYSTEM MAPPING

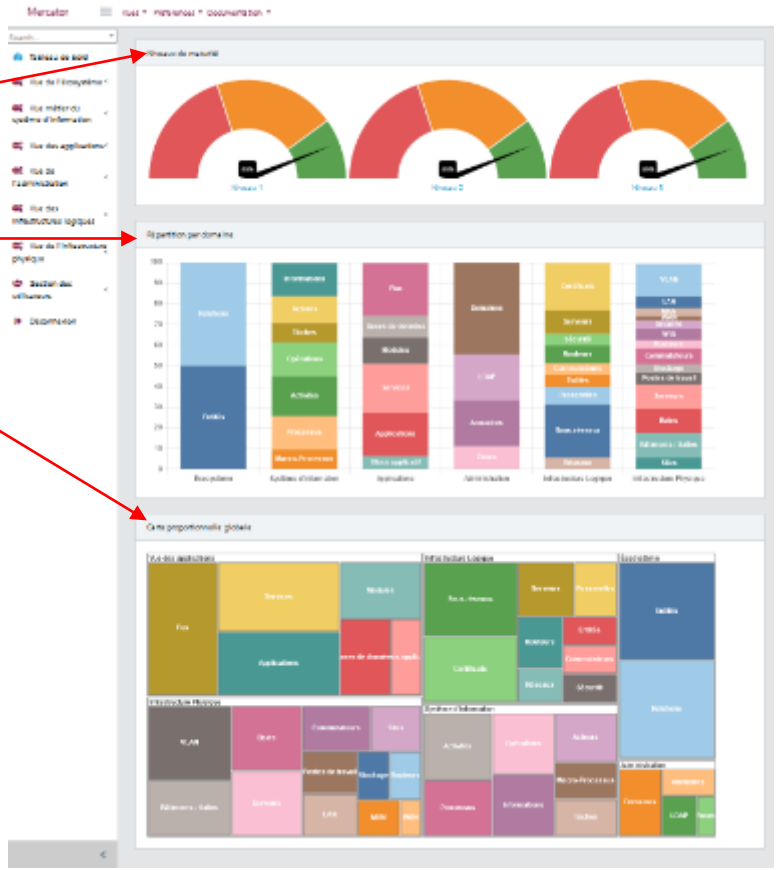
Data Model



INFORMATION SYSTEM MAPPING

Main screen

- Maturity levels
- Distribution of objects by domains
- Overall proportional distribution



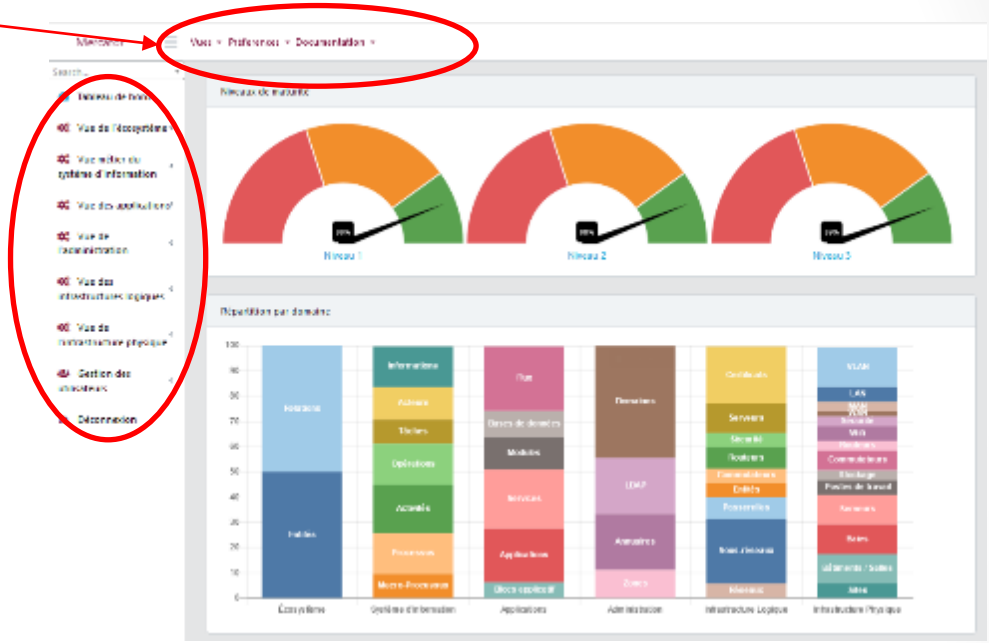
INFORMATION SYSTEM MAPPING

Top panel

- Views
- Preferences
- Documentation / reporting

Left panel

- Data entry



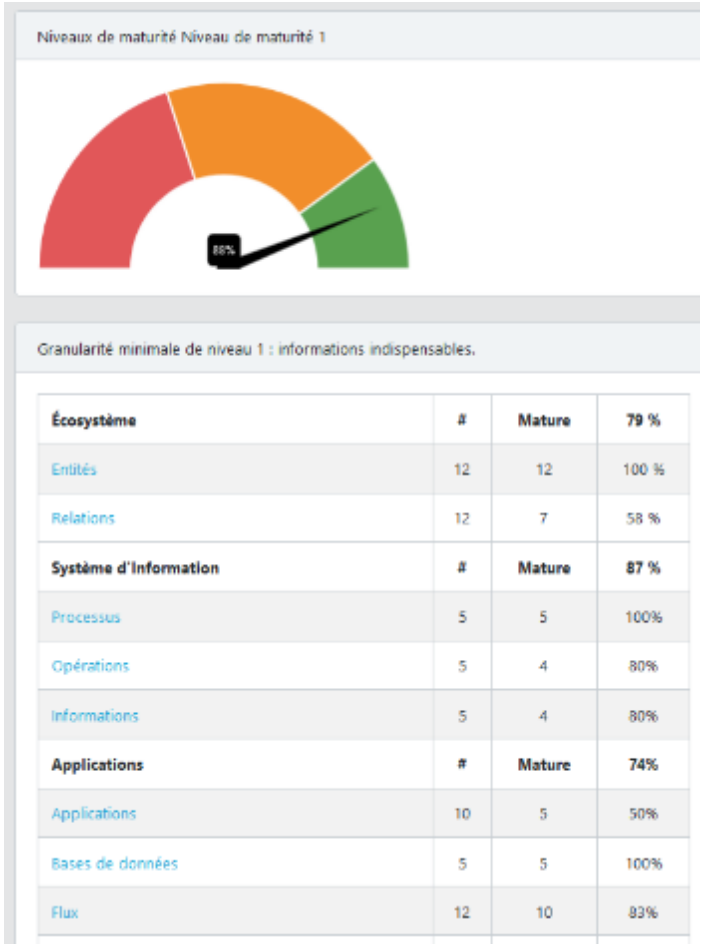
INFORMATION SYSTEM MAPPING

Maturity level calculation
Presence of information:
- no description
- no manager
- no type ...

Links between object:
- entity without relations
- process without operations
- application that does not support any process
- server without applications

Calculation:
compliant objects / total objects

% represents the effort to be compliant

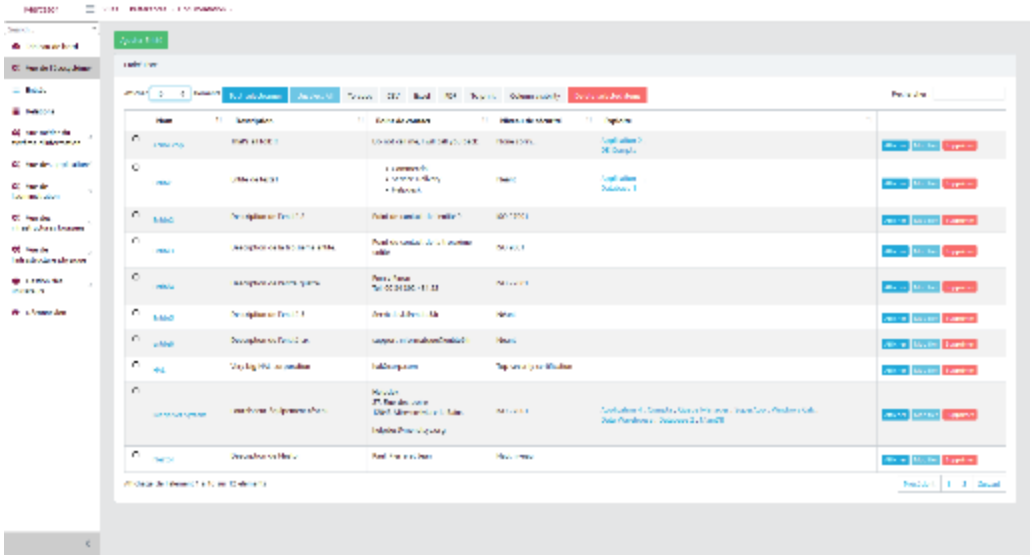


Écosystème	#	Mature	79 %
Entités	12	12	100 %
Relations	12	7	58 %
Système d'information	**#**	**Mature**	**87 %**
Processus	5	5	100%
Opérations	5	4	80%
Informations	5	4	80%
Applications	**#**	**Mature**	**74%**
Applications	10	5	50%
Bases de données	5	5	100%
Flux	12	10	83%

INFORMATION SYSTEM MAPPING

Lists

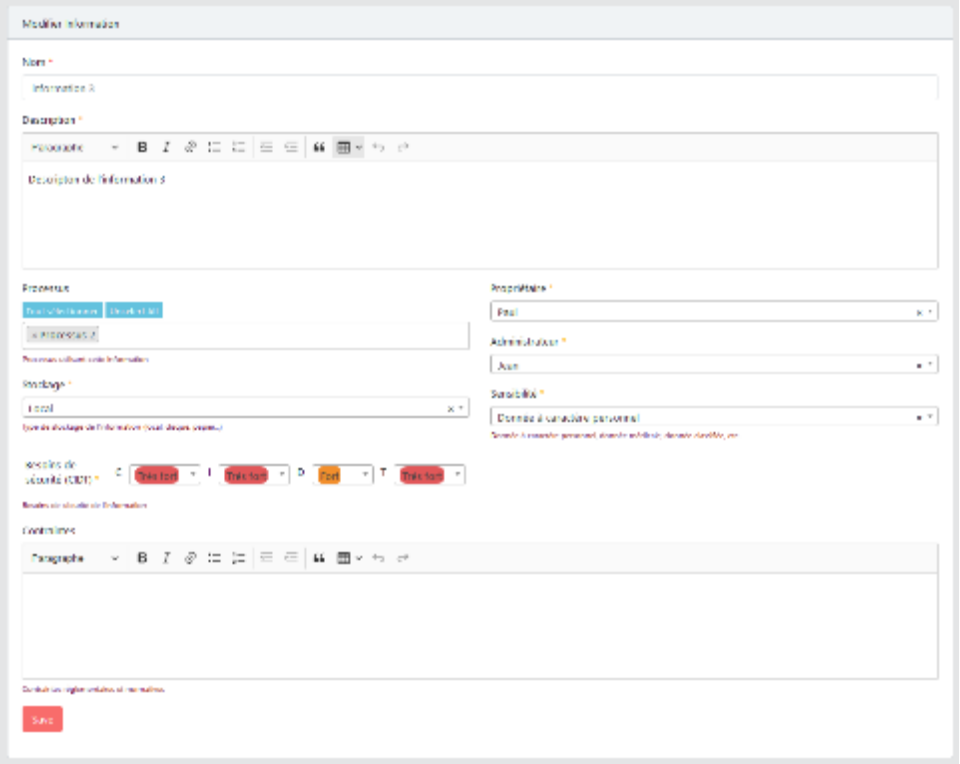
- Sort on each column
- Search
- Hide a column
- View / Modify / Delete
- Copy
- Print
- Export : Excel, PDF, CSV,
- …



INFORMATION SYSTEM MAPPING

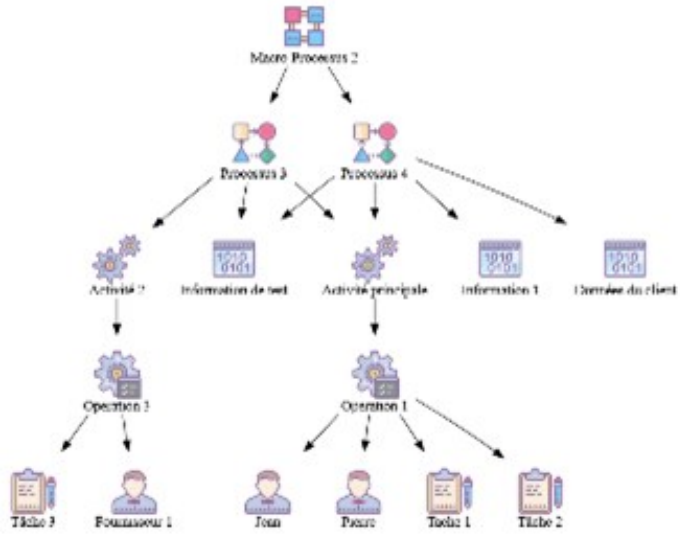
Forms

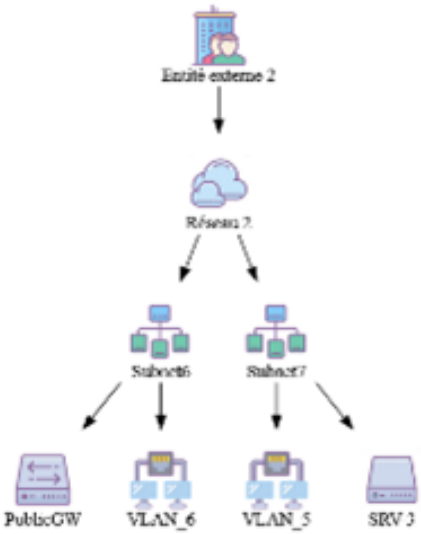
- RFT Editor
- Drop-down list
- Links between objects
- Security needs
- History of changes

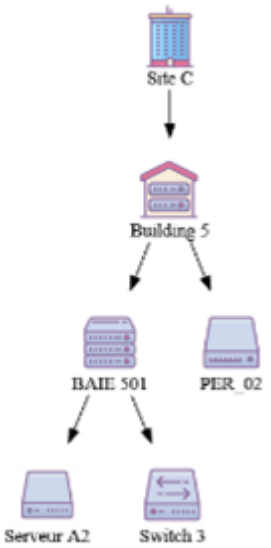


INFORMATION SYSTEM MAPPING

Domain view

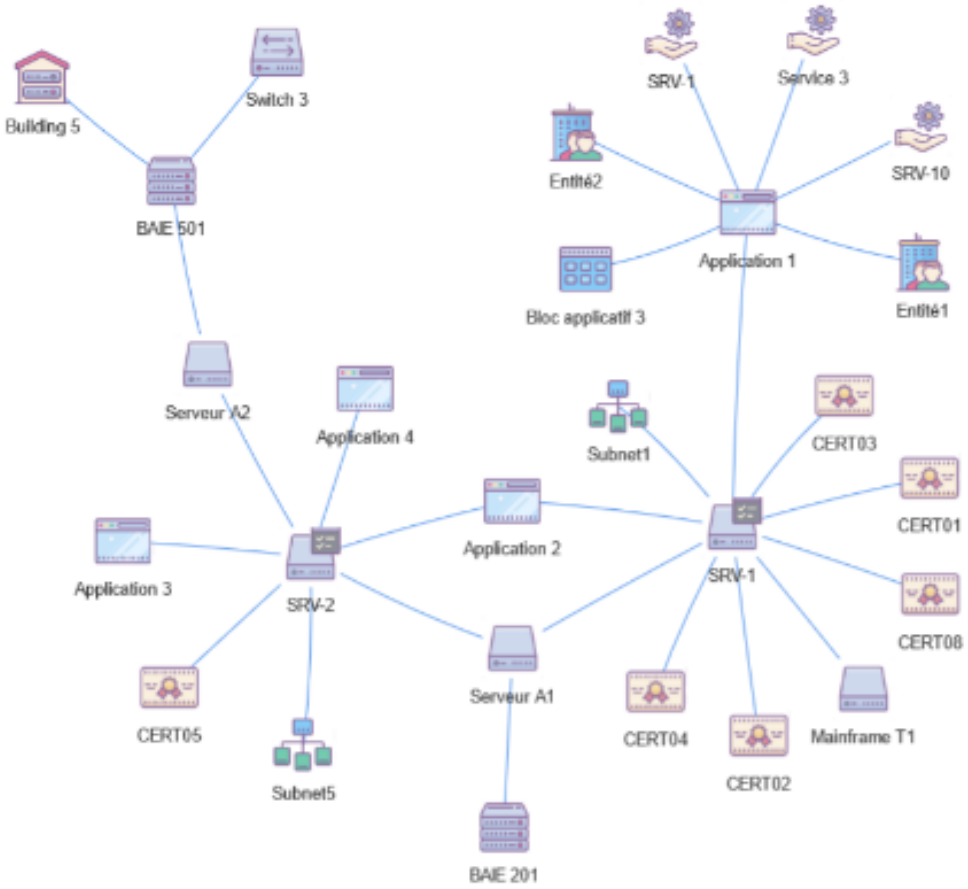






INFORMATION SYSTEM MAPPING

Multi-domains view



INFORMATION SYSTEM MAPPING

Reporting
Information System Mapping Report

Lists
Supported entities and applications
List of information system entities and their supported applications

Applications by application group
List of applications by application group

Logical servers
List of logical servers by applications and managers

Analysis of security needs
List of security needs between macro-processes, processes, applications, database and information.

Logical servers configuration
List of logical servers configuration

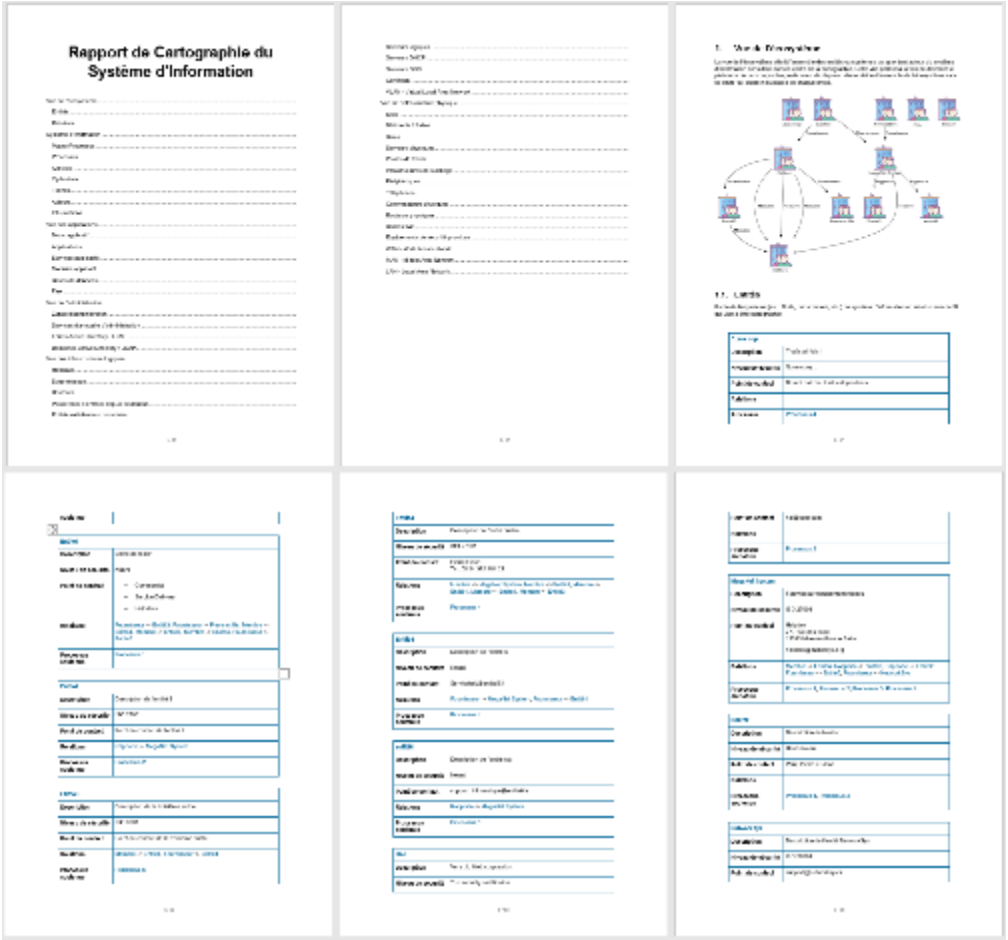
Inventory of the physical infrastructure
List of equipment by site/location

Audit
Maturity levels
List of the maturity levels reached by the different objects of the mapping

Update / changes
Traces the changes made on the map in the last 12 months

INFORMATION SYSTEM MAPPING

Mapping report



INFORMATION SYSTEM MAPPING

Physical inventory

	A	B	C	D	E	F	G
1	**Site**	**Room**	**Bay**	**Asset**	**Name**	**Type**	**Description**
2	Site A	Building 0		Workstation	Workstation 1	ThinThink 460	Station de travail compta
3	Site A	Building 0	BAIE 101	Server	Mainframe 01	Type 404	Central accounting system
4	Site A	Building 0		Workstation	Workstation 1	ThinThink 460	Station de travail compta
5	Site A	Building 0	BAIE 101	Switch	Switch 2	Alcatel 430	Description switch 2
6	Site A	Building 0	BAIE 101	Router	R1	Fortinet	Routeur prncipal
7	Site A	Building 0	BAIE 101	Sécurité	Magic Gate	Gate	BIG Magic Gate
8	Site A	Building 1		Phone	Phone 01	MOTOROAL 3110	Téléphone de test
9	Site A	Building 1		Wifi	WIFI_02	ALCALSYS 3001	Borne Wifi 2
10	Site A	Building 1	BAIE 102	Storage	Oracle Server	Oracle Server	Main oracle server
11	Site A	Building 1		Phone	Phone 01	MOTOROAL 3110	Téléphone de test
12	Site A	Building 1		Wifi	WIFI_02	ALCALSYS 3001	Borne Wifi 2
13	Site A	Building 1	BAIE 103	Server	Serveur A3	System 840	Serveur mobile
14	Site A	Building 1	BAIE 103	Storage	DiskServer 1	DiskServer 1	Description du serveur d stockage 1
15	Site A	Building 1		Phone	Phone 01	MOTOROAL 3110	Téléphone de test
16	Site A	Building 1		Wifi	WIFI_02	ALCALSYS 3001	Borne Wifi 2
17	Site A	Building 2		Peripheral	PER_01	IBM 3400	important peripheral
18	Site A	Building 2		Wifi	WIFI_01	Alcatel 3500	Borne wifi 01
19	Site A	Building 2	BAIE 201	Server	Mainframe T1	HAL 340	Mainframe de test
20	Site A	Building 2	BAIE 201	Server	Serveur A1	System 840	Description du serveur A1
21	Site A	Building 2	BAIE 201	Switch	Switch de test	Nortel A39	Master test switch.
22	Site A	Building 2		Wifi	WIFI_01	Alcatel 3500	Borne wifi 01
23	Site B	Building 3		Workstation	Workstation 2	ThinThink 410	Station de travail accueil
24	Site B	Building 3		Phone	Phone 02	IPhone 2	Description phone 02
25	Site B	Building 3		Sécurité	Sensor-1	Sensor	Temperature sensor
26	Site B	Building 3	BAIE 301	Server	Serveur A4	Mini 900/2	Departmental server
27	Site B	Building 3		Workstation	Workstation 2	ThinThink 410	Station de travail accueil
28	Site B	Building 3		Phone	Phone 02	IPhone 2	Description phone 02
29	Site B	Building 3	BAIE 301	Switch	Switch 1	Nortel 2300	Desription du premier switch.
30	Site B	Building 3	BAIE 301	Router	R2	CISCO	Routeur secondaire
31	Site B	Building 3	BAIE 301	Sécurité	Magic Firewall	Firewall	The magic firewall - PT3743
32	Site B	Building 4		Workstation	Workstation 3	ThinThink 420	Station de travail back-office
33	Site B	Building 4		Peripheral	PER_03	HAL 8100	Space device
34	Site B	Building 4		Phone	Phone 03	Top secret red phne	Special AA phone
35	Site B	Building 4		Wifi	WIFI_03	SYSTEL 3310	Borne Wifi 3
36	Site C	Building 5		Peripheral	PER_02	IBM 5600	Description
37	Site C	Building 5	BAIE 501	Server	Serveur A2	System 840	Description du serveur A2
38	Site C	Building 5	BAIE 501	Switch	Switch 3	Alcatel 3500	Desciption du switch 3
39							
40							

INFORMATION SYSTEM MAPPING

Security needs

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	**Macro-Processus**	**C**	**I**	**A**	**T**	**Processus**	**C**	**I**	**A**	**T**	**Applications**	**C**	**I**	**A**	**T**	**Bases de données**	**C**	**I**	**A**	**T**	**Informations**	**C**	**I**	**A**	**T**
2	Macro-Processus 1	4	3	2	1	Processus 1	3	2	3	1	Application 1	1	1	1	1										
3	Macro-Processus 1	4	3	2	1	Processus 1	3	2	3	1	Application 2	2	2	2	2	Database 2	1	1	1	1	information 2	2	1	1	1
4	Macro-Processus 1	4	3	2	1	Processus 1	3	2	3	1	Application 2	2	2	2	2	Database 2	1	1	1	1	information 3	4	4	3	4
5	Macro-Processus 1	4	3	2	1	Processus 1	3	2	3	1	Queue Manager	4	4	4	4	Database 1	1	2	3	4	Information 1	1	3	2	2
6	Macro-Processus 1	4	3	2	1	Processus 1	3	2	3	1	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 2	2	1	1	1
7	Macro-Processus 1	4	3	2	1	Processus 1	3	2	3	1	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 3	4	4	3	4
8	Macro-Processus 2	1	2	3	4	Processus 3	3	2	3	1	Application 4	2	2	3	2	Data Warehouse	2	2	2	2	information 2	2	1	1	1
9	Macro-Processus 2	1	2	3	4	Processus 3	3	2	3	1	Application 4	2	2	3	2	Data Warehouse	2	2	2	2	information 3	4	4	3	4
10	Macro-Processus 2	1	2	3	4	Processus 3	3	2	3	1	Application 4	2	2	3	2	DB Compta	2	2	2	2	Données du client	2	2	2	2
11	Macro-Processus 2	1	2	3	4	Processus 3	3	2	3	1	Application 4	2	2	3	2	DB Compta	2	2	2	2	Information 1	1	3	2	2
12	Macro-Processus 2	1	2	3	4	Processus 3	3	2	3	1	Queue Manager	4	4	4	4	Database 1	1	2	3	4	Information 1	1	3	2	2
13	Macro-Processus 2	1	2	3	4	Processus 3	3	2	3	1	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 2	2	1	1	1
14	Macro-Processus 2	1	2	3	4	Processus 3	3	2	3	1	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 3	4	4	3	4
15	Macro-Processus 2	1	2	3	4	Processus 4	4	2	2	2	Queue Manager	4	4	4	4	Database 1	1	2	3	4	Information 1	1	3	2	2
16	Macro-Processus 2	1	2	3	4	Processus 4	4	2	2	2	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 2	2	1	1	1
17	Macro-Processus 2	1	2	3	4	Processus 4	4	2	2	2	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 3	4	4	3	4
18	Macro-Processus 2	1	2	3	4	Processus 4	4	2	2	2	SuperApp	1	1	1	1										
19	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Application 2	2	2	2	2	Database 2	1	1	1	1	information 2	2	1	1	1
20	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Application 2	2	2	2	2	Database 2	1	1	1	1	information 3	4	4	3	4
21	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Application 3	1	2	3	3	Database 1	1	2	3	4	Information 1	1	3	2	2
22	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Application 3	1	2	3	3	Database 1	1	2	3	4	information 2	2	1	1	1
23	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Application 3	1	2	3	3	Database 1	1	2	3	4	information 3	4	4	3	4
24	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Application 3	1	2	3	3	MainDB	2	2	2	2	information 2	2	1	1	1
25	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Queue Manager	4	4	4	4	Database 1	1	2	3	4	Information 1	1	3	2	2
26	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 2	2	1	1	1
27	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 3	4	4	3	4
28	Macro-Processus 3	2	2	2	2	Processus 2	3	4	2	4	Windows Calc	2	0	0	0										
29	Macro-Processus 3	2	2	2	2	Processus 5	4	3	2	3	Queue Manager	4	4	4	4	Database 1	1	2	3	4	Information 1	1	3	2	2
30	Macro-Processus 3	2	2	2	2	Processus 5	4	3	2	3	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 2	2	1	1	1
31	Macro-Processus 3	2	2	2	2	Processus 5	4	3	2	3	Queue Manager	4	4	4	4	Database 1	1	2	3	4	information 3	4	4	3	4

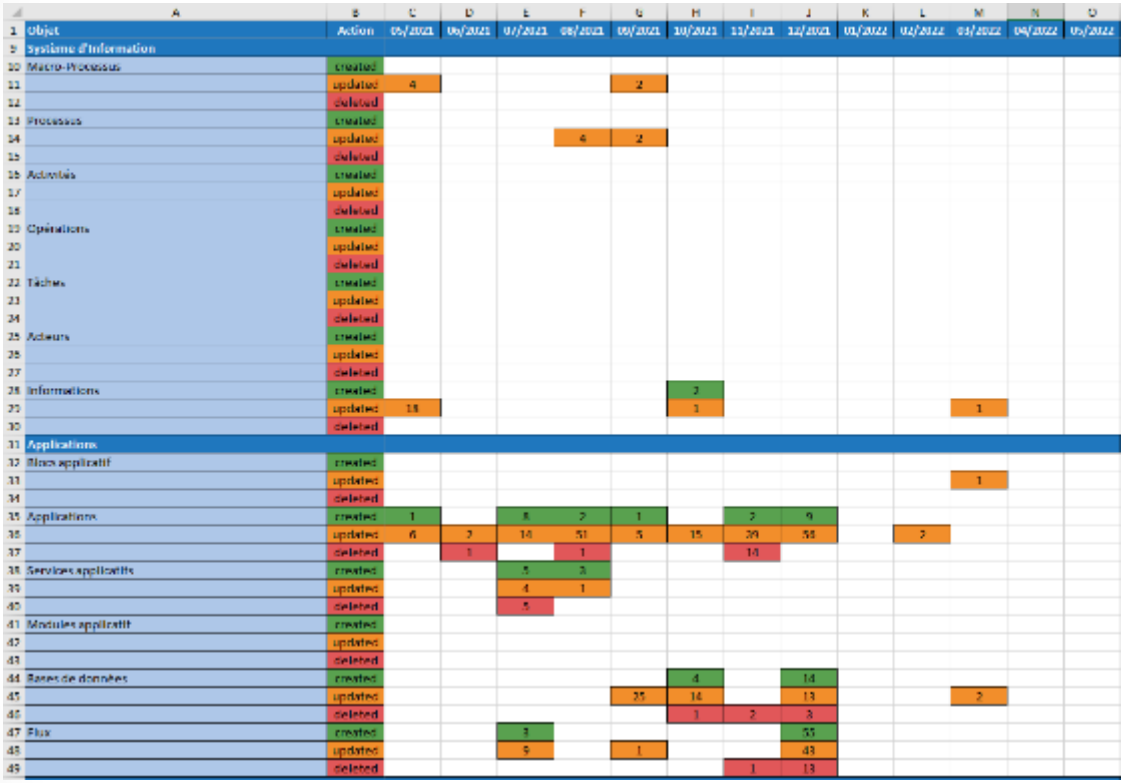
Security needs analysis

Denormalize the links between macro-processes, processes, applications, databases and information

Analyze the differences between security needs of objects.

INFORMATION SYSTEM MAPPING

Mapping update



Objet	Action	05/2021	06/2021	07/2021	08/2021	09/2021	10/2021	11/2021	12/2021	01/2022	02/2022	03/2022	04/2022	05/2022
Système d'information														
Macro-Processus	created													
	updated	4				2								
	deleted													
Processus	created													
	updated				4	2								
	deleted													
Activités	created													
	updated													
	deleted													
Opérations	created													
	updated													
	deleted													
Tâches	created													
	updated													
	deleted													
Acteurs	created													
	updated													
	deleted													
Informations	created						2							
	updated	18					1					1		
	deleted													
Applications														
Bloc applicatif	created													
	updated											1		
	deleted													
Applications	created	1		8	2	1		2	9					
	updated	6	2	14	51	5	15	39	58		2			
	deleted		1		1			14						
Services applicatifs	created			5	3									
	updated			4	1									
	deleted			5										
Modules applicatif	created													
	updated													
	deleted													
Bases de données	created						4		14					
	updated					25	14		13			2		
	deleted						1	2	3					
Flux	created			3					55					
	updated			9		1			48					
	deleted							1	13					

Track mapping changes made over the last 12 months

Track mapping updates

Demonstrate that the mapping is updated regularly

INFORMATION SYSTEM MAPPING

Mercator and ISO 27001:2013

Section	Titre
A8.1.1	Inventory of assets
A.8.1.2	Ownership of assets
A.8.2.1	Classification of information
A.11.2.1	Equipment siting and protection
A.12.1.2	Change management
A.12.1.3	Capacity management
A.12.6.1	Vulnerability management
A.13.1.3	Segregation in networks
A.15.1.2	Addressing security within supplier agreements
A.16.1.4	Assessment of and decision on information security events
A.17.2.1	Availability of information processing facilities

INFORMATION SYSTEM MAPPING

Application available on GitHub
under Open Source License

Usage
3 hospitals in Luxembourg
5 hospitals in France
3 french municipal administrations

Contributions
9 contributors including one hospital in France

Roadmap
Links with the CVEs


fhl
Fédération des hôpitaux
luxembourgeois