

Flood risk management in Toulouse

Philippines delegation meeting

Au cœur de
votre quotidien

toulouse
métropole

15 octobre 2025



June
1875



January
2022

1

Context : Toulouse and floodings

Historical main flooding issues : Garonne overflows

Strong and quite quick floods

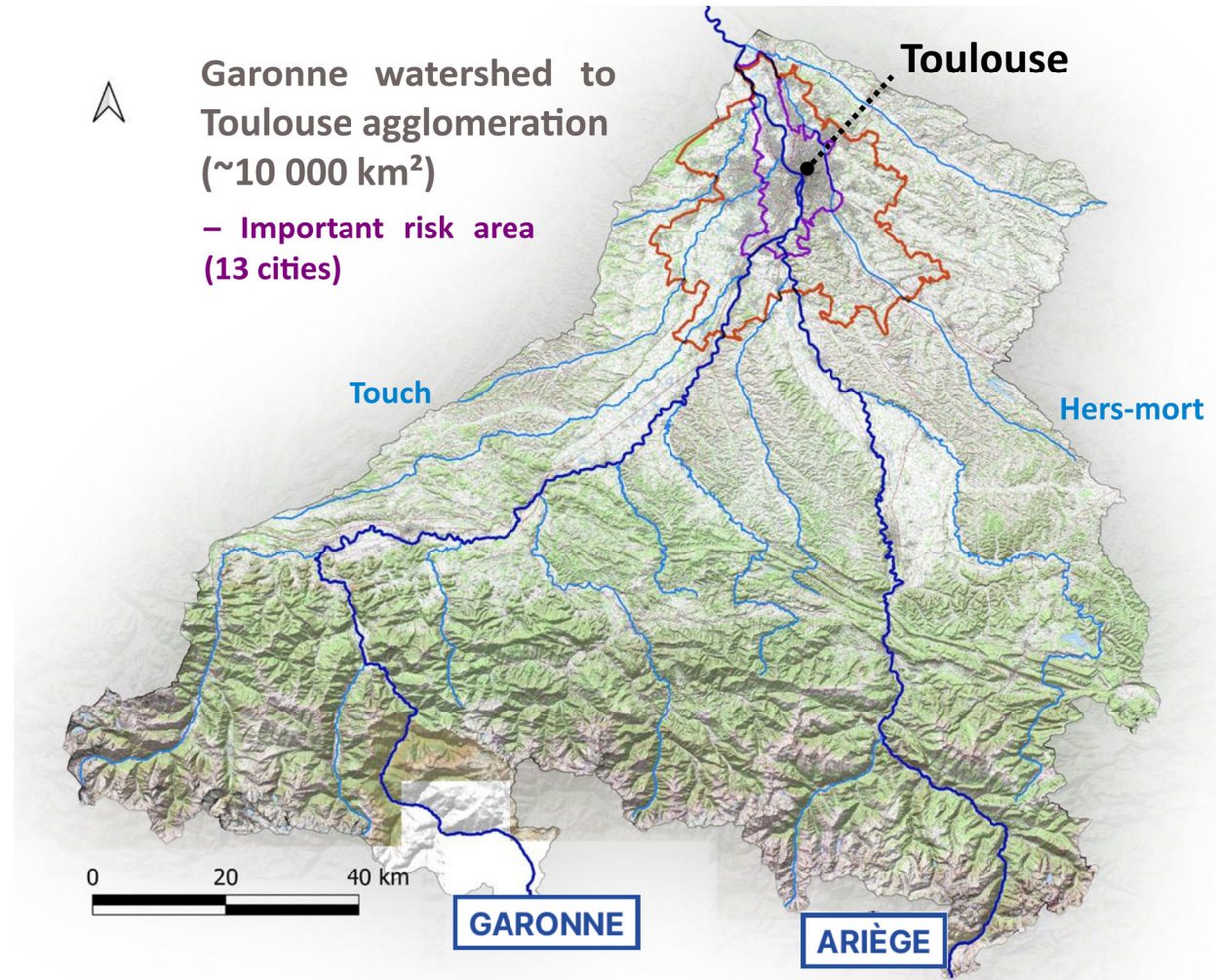
(18 to 48 hours from baseflow to peak) due to :

- **Pyrénées mountains proximity (< 100 km)**
- **Watershed fan shape, concentrating fastly Pyrenean river flows**

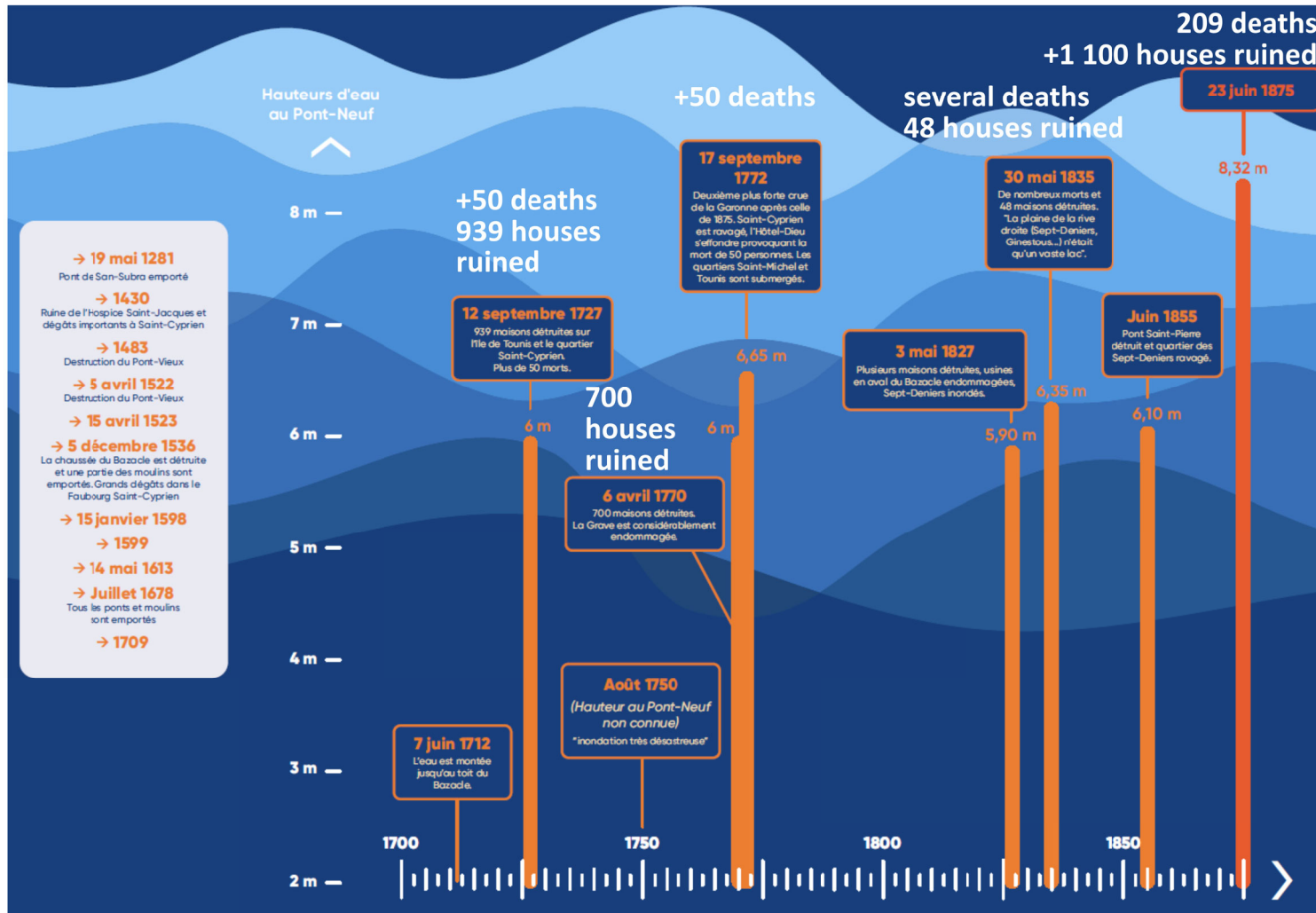
Toulouse agglomeration :

- **1,1 M inhabitants – 0,5 M in Toulouse**
- **~70 000 living in Garonne or Ariège flood zone – 50 000 in Toulouse**

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Historical main flooding issues : Garonne overflows

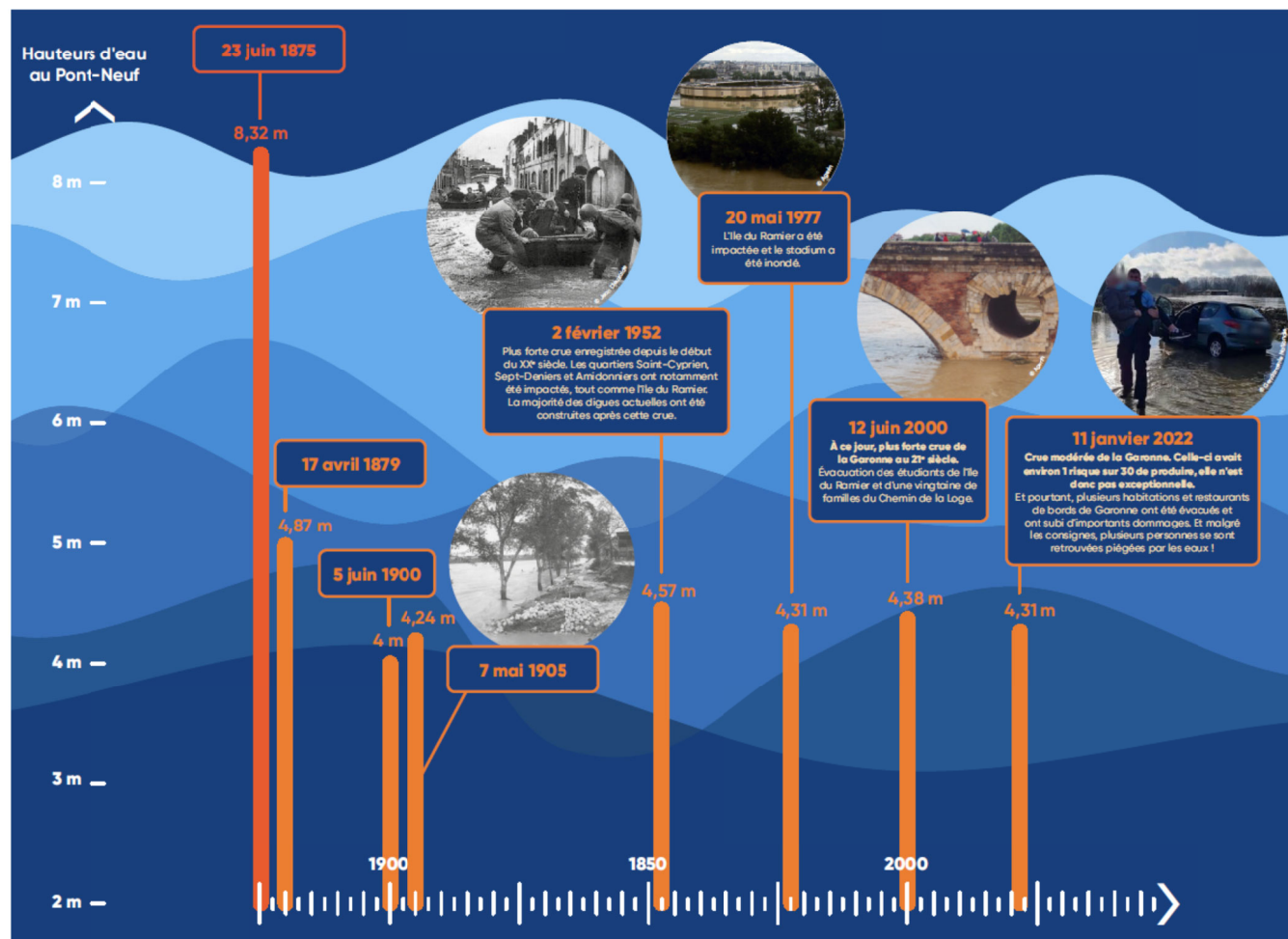


June 1875



19 major floods recorded between XIIIth & XIXth centuries

Historical main flooding issues : Garonne overflows



Only moderate floods recorded since 1875, but a still existing risk

No recent major flood

+

Huge levees

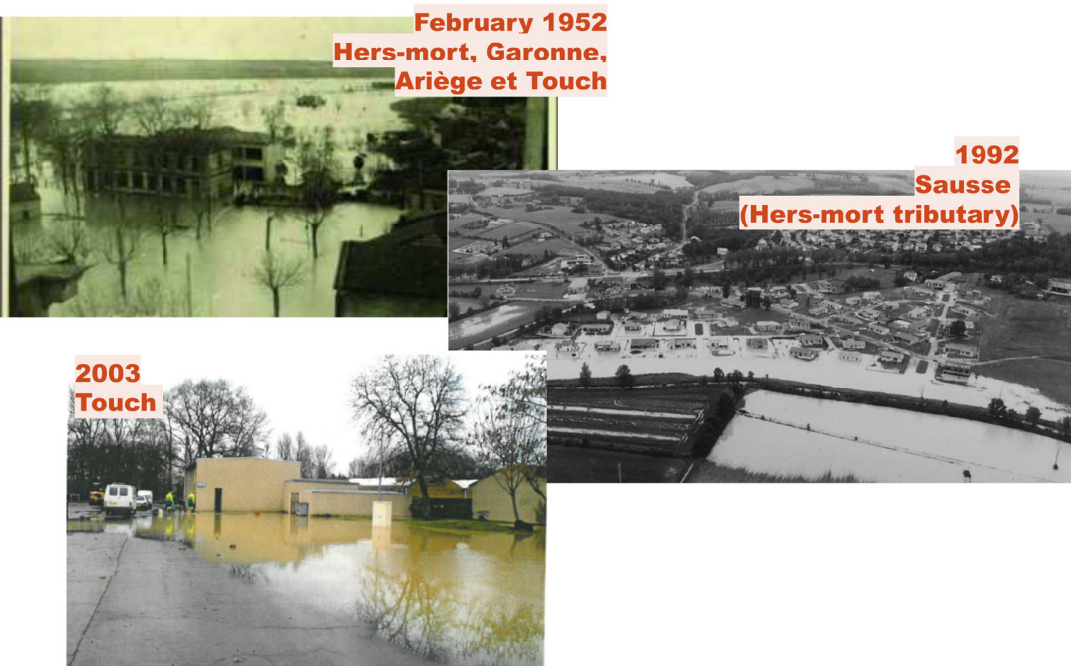
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Risk oblivion / feeling that a new major flood cannot produce

Other flooding issues

Tributaries : Hers-mort, Touch...

- Less powerful, but may affect more assets (than Garonne) during moderate floods
- About 20 000 people exposed at agglomeration scale in case of exceptional flood



Runoff

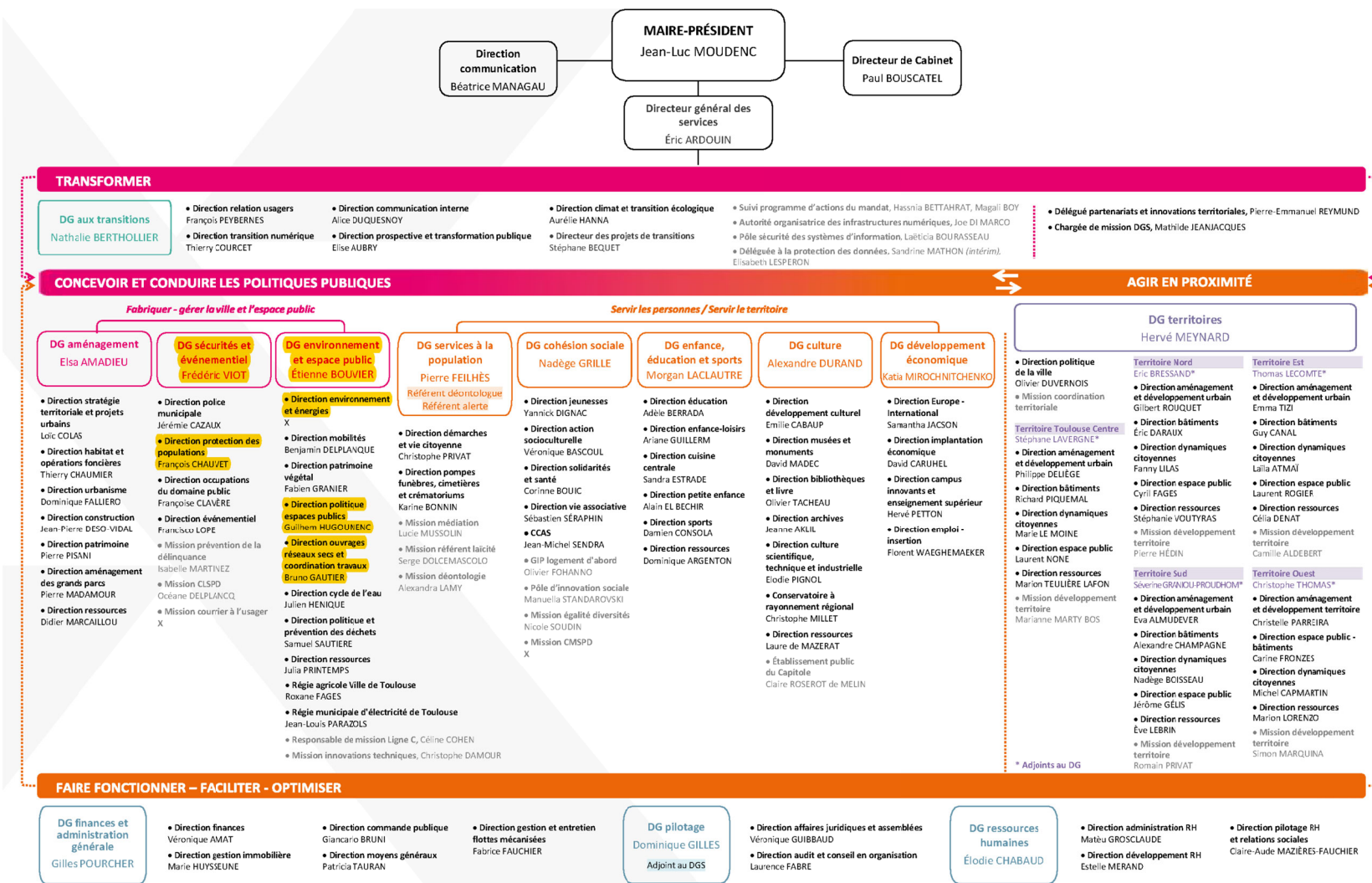
- Very fast and localized floods, difficult to predict
- Mostly in urban areas (land sealing issues) but also in rural areas
- About 360 000 people (1 in 3) exposed at agglomeration scale in case of exceptional rain



2

Current flood management

Toulouse Métropole : territory and organization

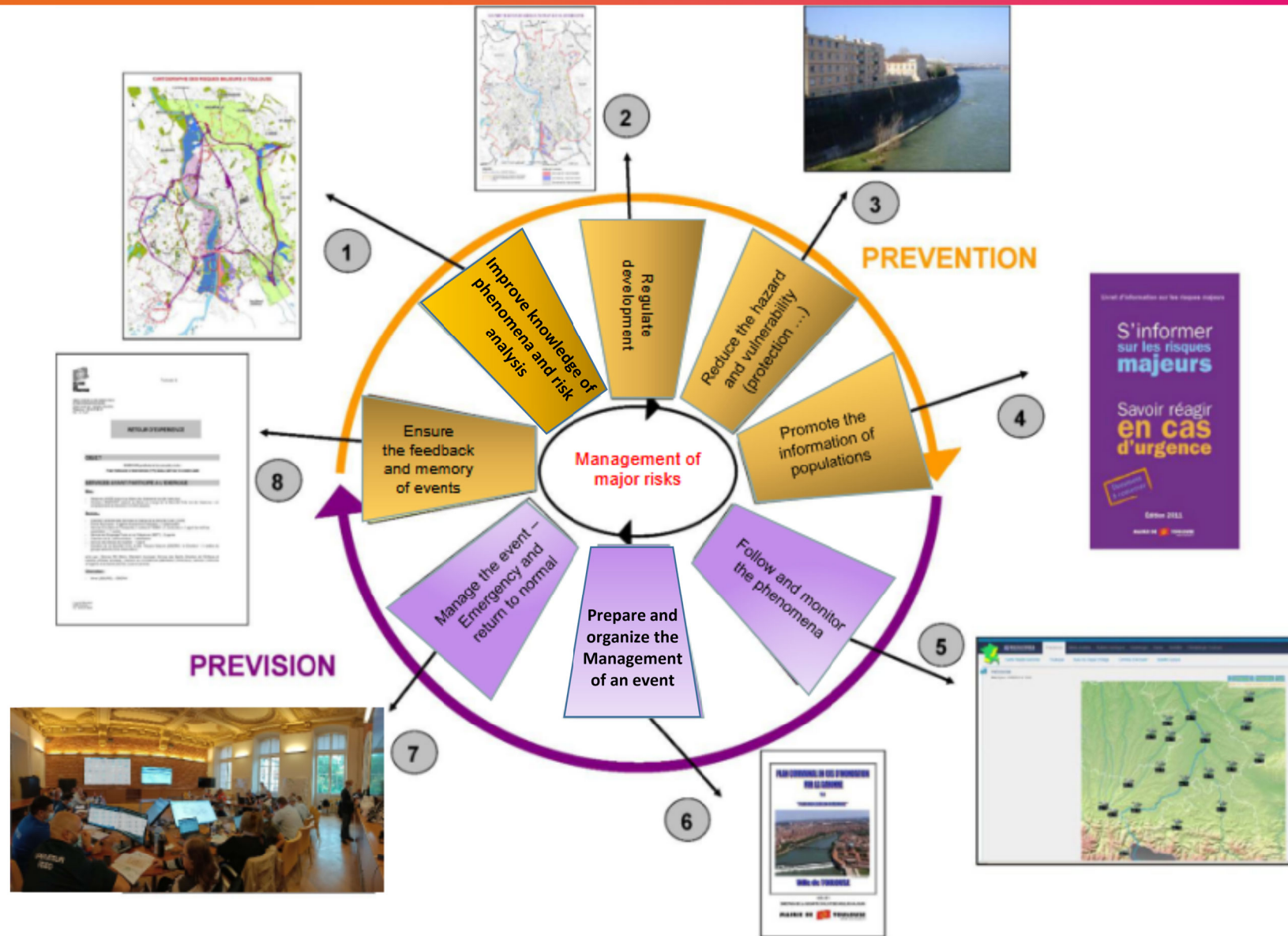


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Current flood management

Toulouse flood risk management overview



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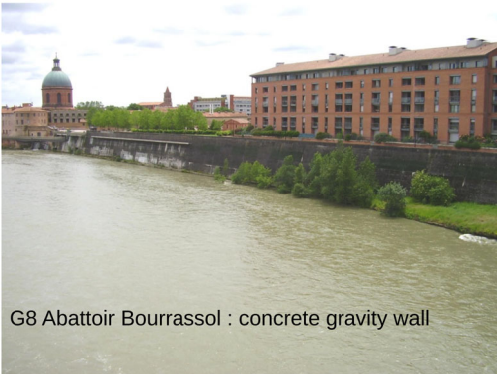
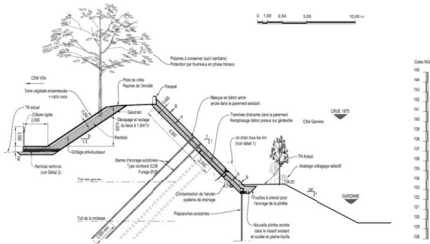
Levees system : the most visible

System	Toulouse
Length	16,5 km
People Protected	~50,000 (16,100 residents)
Classification in accordance with French regulations	Class A
Historical Protection Level	1875 flood level (7.55 m)
Current Effective Protection	5,6 m, 6.0 m, 7.55 m (Pont-Neuf ladder)
Typical Flood	June 2000: 4.38 m
Ownership	Multiple : DDT31, DIRSO, Hôpitaux de Toulouse, VNF, SNCF, Toulouse Métropole, EDF, Privés, inconnus
Different Structure Types	earth embankment dike, historical buildings, earthfill dike with concrete facing, retaining walls, concrete gravity walls, etc

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D12 Amidonniers : earthfill dike with concrete facing and piles



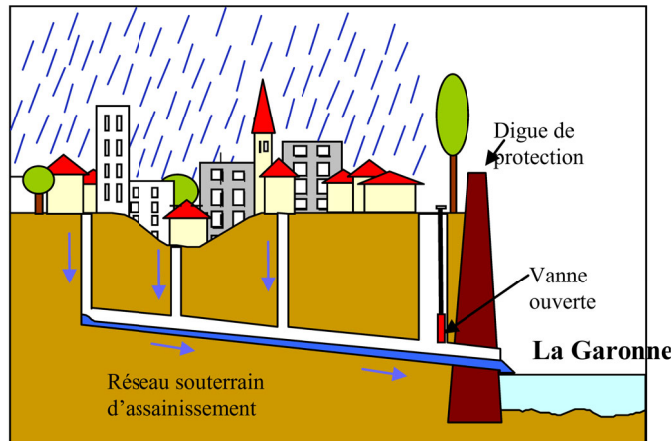
G8 Abattoir Bourrassol : concrete gravity wall



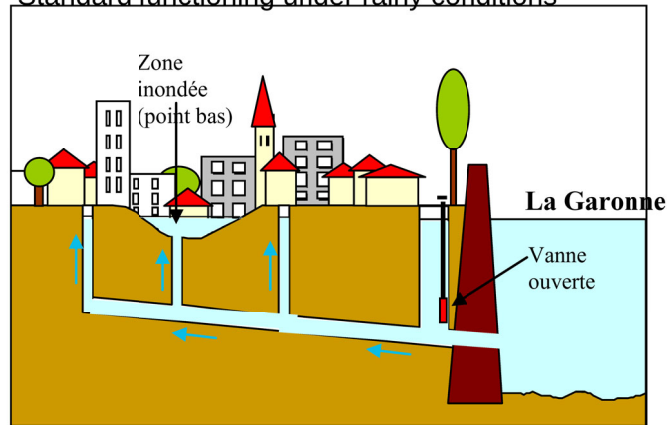
D15 Ginestous and G1 Langlade : earth embankment dike

Levees system : mobile devices

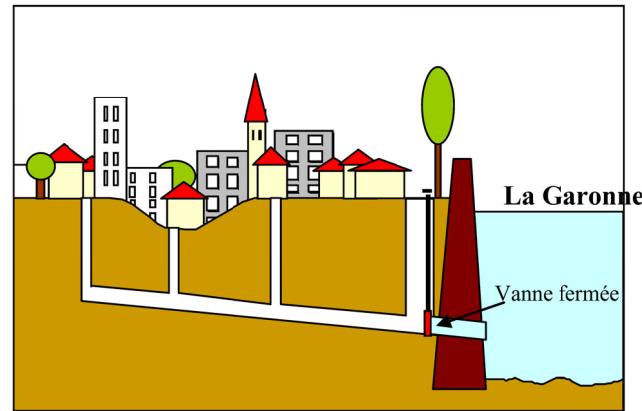
mobile systems for handling simultaneous flood and rainfall events



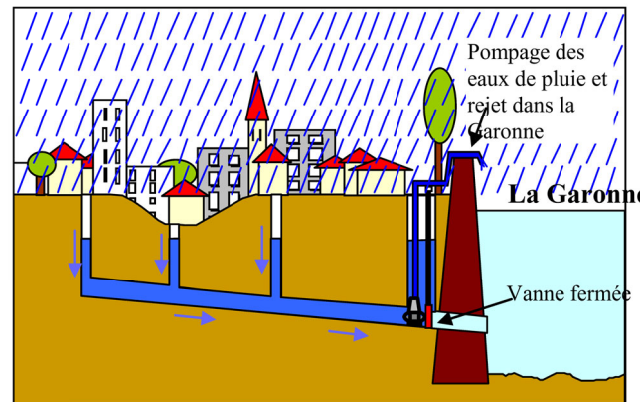
Standard functioning under rainy conditions



Flood period with open valve



Flood period with closed valve



Flood period with closed valve and pump

Management of stormwater during flood events to prevent flooding behind the levees

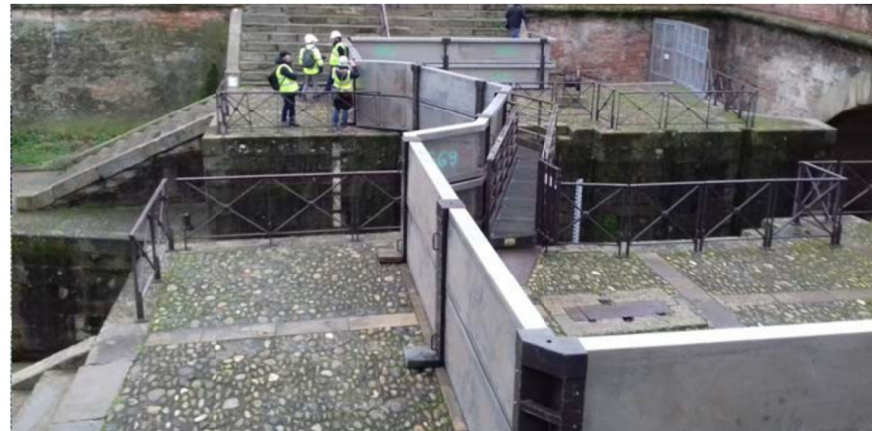
- 68 double valve chambers in Toulouse
- 27 pumping stations in Toulouse (maximum flow rate: 7,200 m³/h)
- Multiple operators during flood events: Toulouse Metropole and the delegated operator in Toulouse;
- Need a lot of significant monitoring, regular maintenance and multiple exercises

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Levees system : mobile devices

FLOODGATE DOORS AND COFFERDAMS

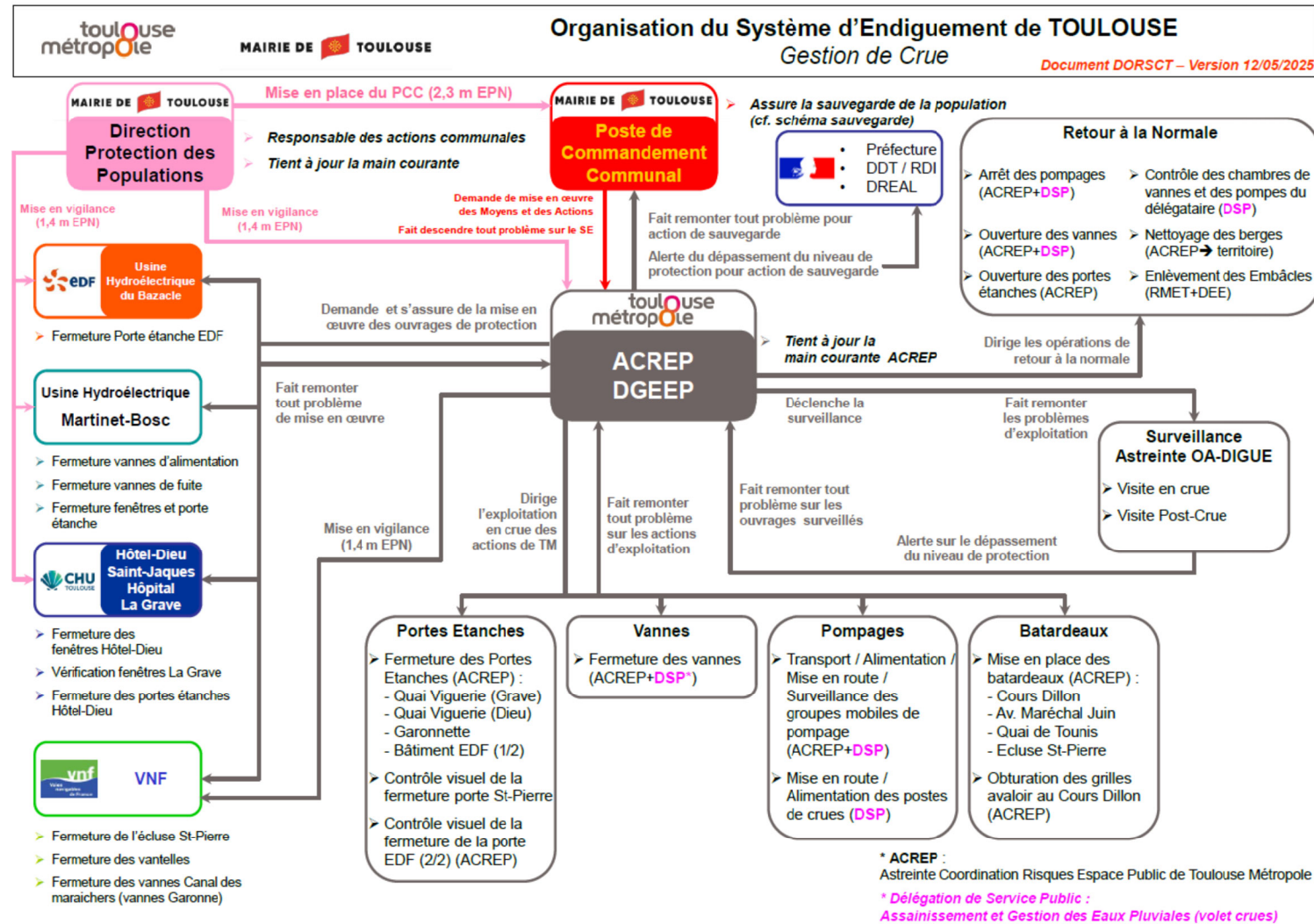
- 4 Floodgate doors (2 at Port Viguerie, 1 at La Garonnette, and 1 at Bazacle)
- 4 cofferdams : Cours Dillon, Boulevard Maréchal Juin, Quai de Tounis, Canal de Brienne
- Multiple operators during flood events
- Requires extensive monitoring, regular maintenance and exercises during the year



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Levees system : a multiple and complex organisation during flood events

- Multiple operators : Toulouse Métropole, Mairie de Toulouse, delegate operator, different owners of part of the Levees system
- A lot of actions to do during the event
- Emergency response duty requiring a team of over 50 people

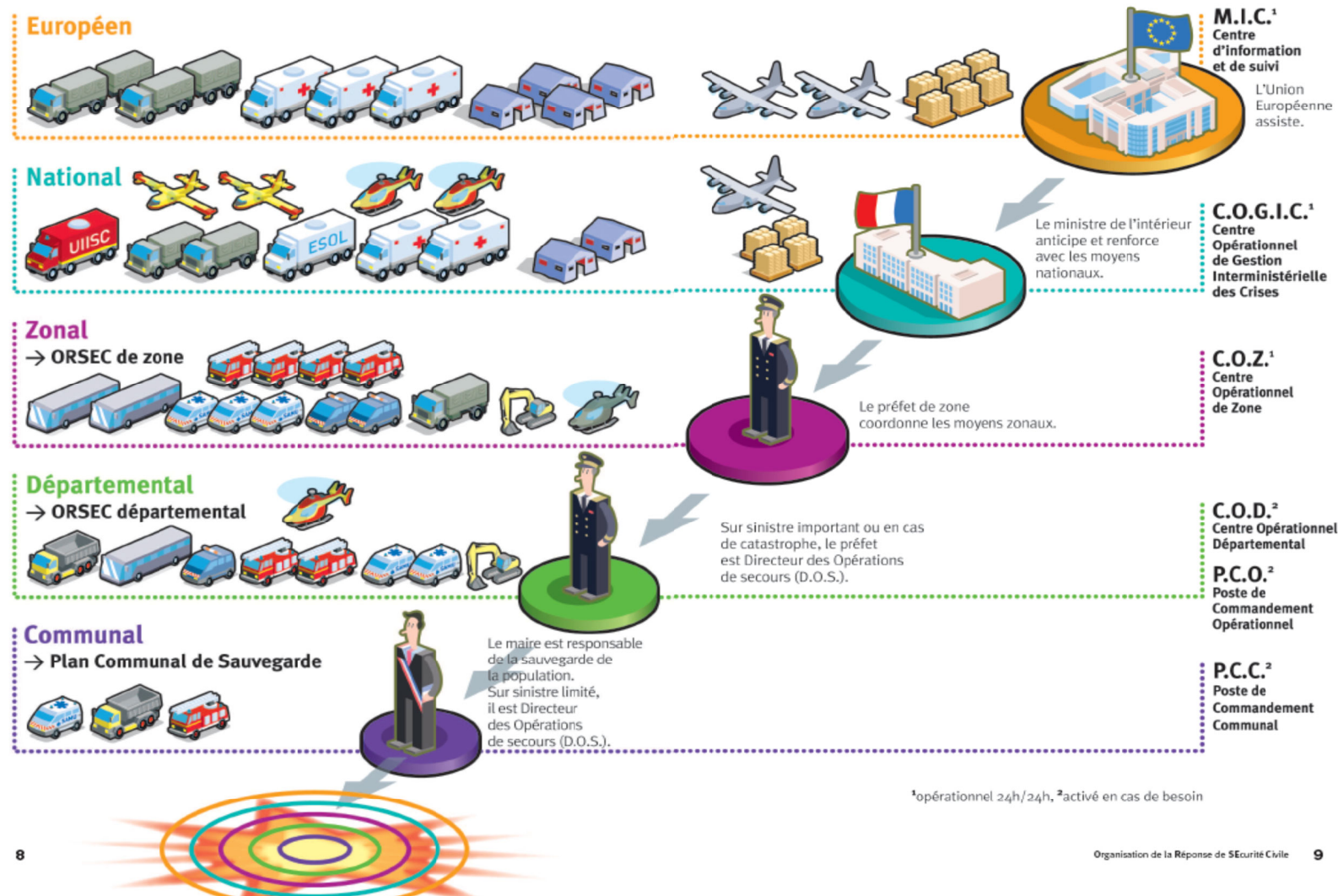


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French organization for civil protection

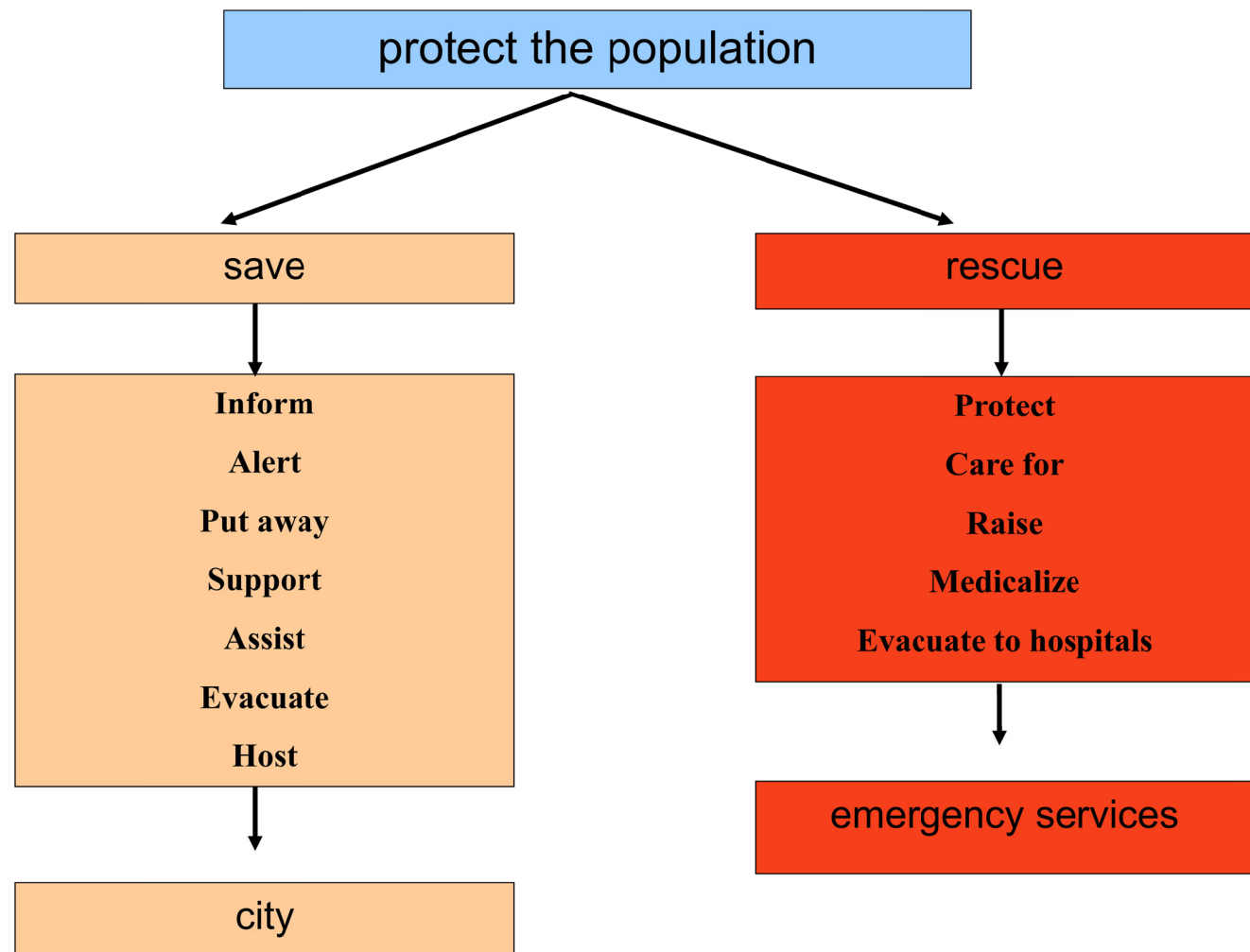
Municipality = first level of response in case of threat for people

Mayor = responsible for safeguarding the population



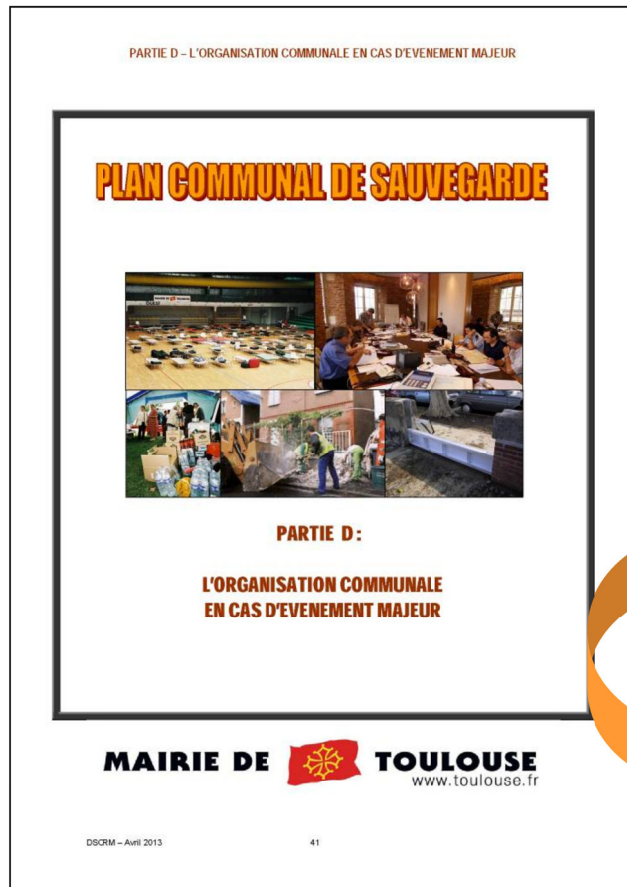
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The Mayor's responsibility for civil protection



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The municipal crisis organization



REMINDER OF THE SKILLS of the City and Toulouse Métropole, PRESENTATION OF THE ORGANIZATION OF SERVICES

THE WATCH AND THE AVAILABILITY OF SERVICES: THE CONSTRAINTS

- of the DPP, in charge of monitoring any civil security event (notably flood risk, weather risk with a market for meteorological services) that could impact the territory of Toulouse, the population, ...
- other communal or shared services (DSS, CCAS, Municipal Police, Territories, Sports,...)
- metropolitan services (including the on-call duty "Public Space Risks" of DG Environment and Public Space for the coordination of metropolitan actions, "flood" teams...)

An essential organization to ensure the implementation of Toulouse Métropole's resources

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Anticipating levees failure : a specific organization in case of flood event

Unprotected Garonne flood zone*

About 5,000 people living or working there

Protected Garonne flood zone*, **

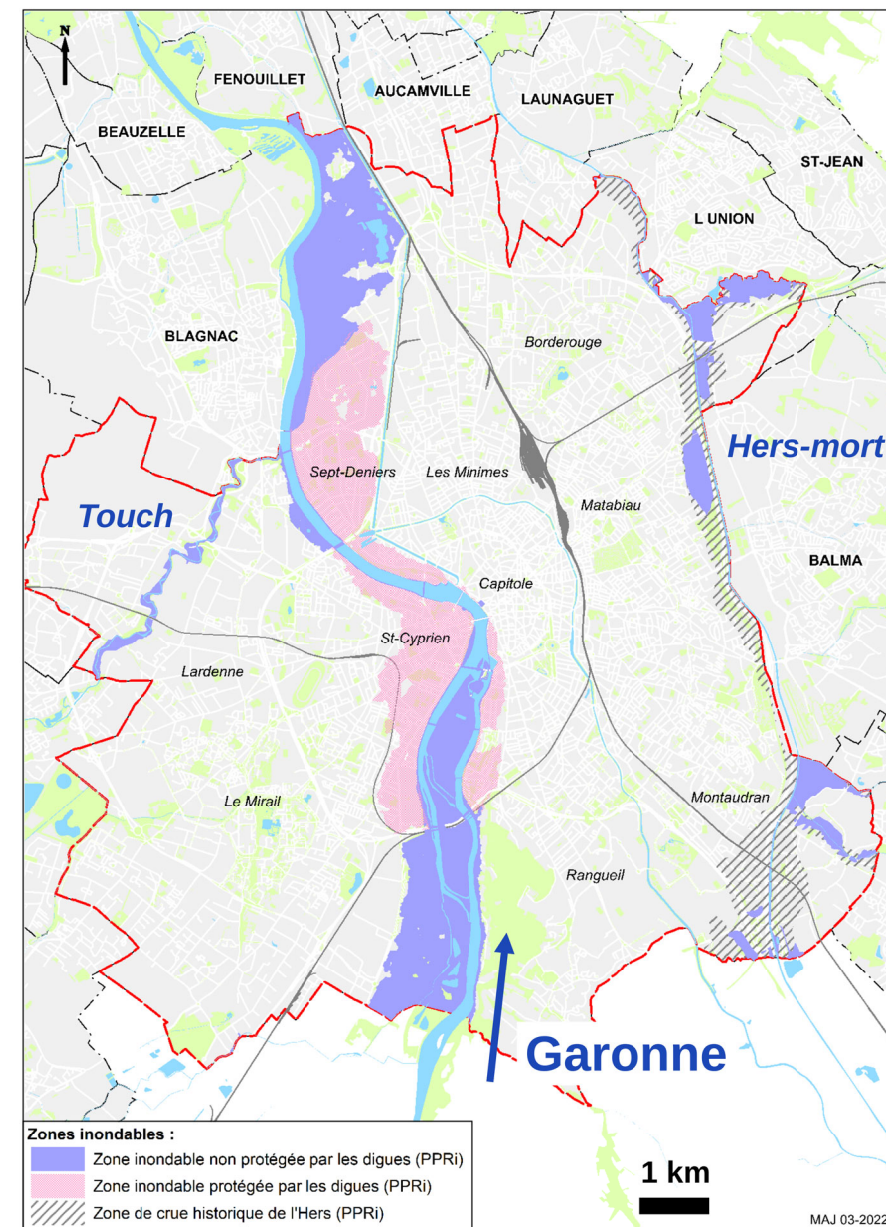
About 60,000 people living or working there

** in case of exceptional flood, as June 1875*

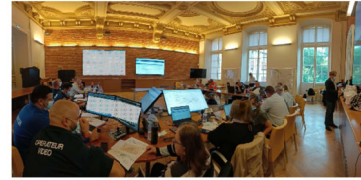
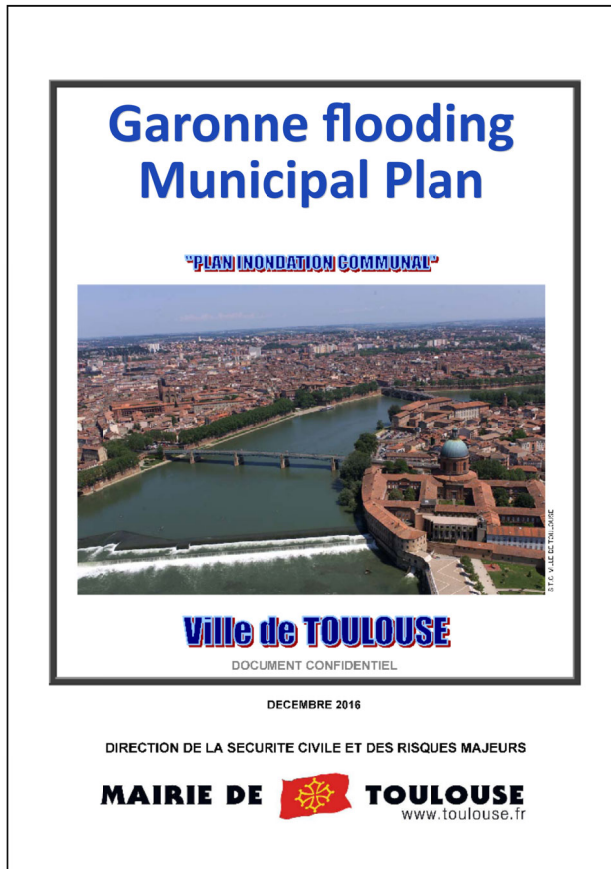
*** estimated considering no levees*

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Anticipating levees failure : a specific organization in case of flood event



1. Different alert levels : vigilance, pre-alert and alert likely to trigger **the opening of the Communal Command Post**

2. Maneuvering on the valves and pumps at the outlets of stormwater collectors

3. The closing of the gate valves and the installation of cofferdams

4. The evacuation of populations located in flood-prone areas, **after prohibiting access to the affected areas**

5. The alert of a certain number of establishments and the population

6. The shelter or evacuation of populations located behind the Levees

7. The return to normal

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Safety in unprotected areas in case of flood event

1. The prohibition of access,...



... 2. the alert,...



Véhicule équipé de haut-parleur

...3. the evacuation,...



... and 4. the accommodation (sheltering), depending on the rise of the Garonne and the forecast



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Safety in protected areas in case of flood event

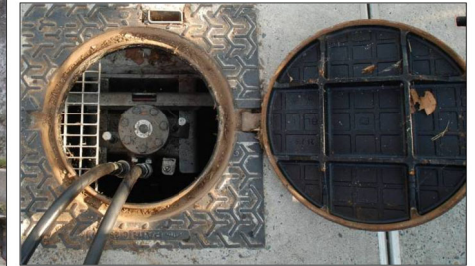
Finalize the protection behind the levees by closing the remaining openings



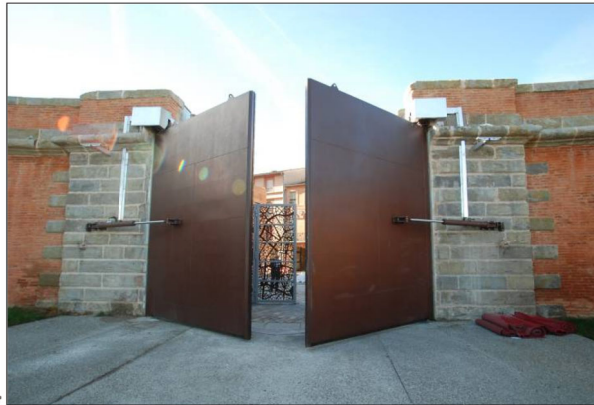
Watertight door
La Garonnette



Stormwater collector outlets and hydraulic valve closure, pump actuation



Watertight door
Viguerie



Cofferdam
Ecluse Saint Pierre

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Safety in protected areas in case of flood event

Anticipating levees failure : a specific organization

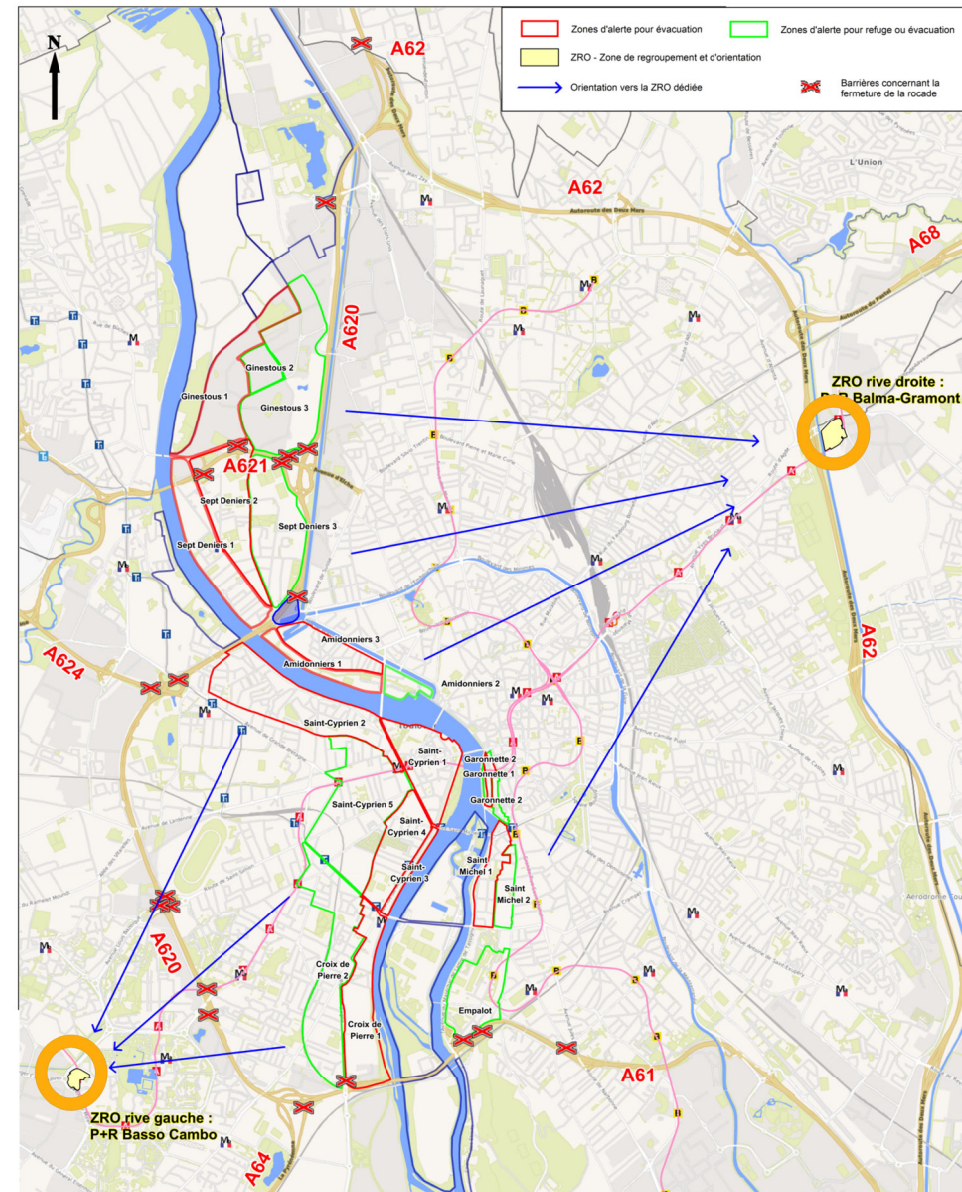
Unless visible signs,
impossible to predict the risk of failure, where and when ?

Regrouping and orientation areas : Z.R.O in french

- to facilitate the announcement at the time of the alert and facilitate reorientation towards the sheltering centers.
- but new structures need to be set up and armed (material and human resources).

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Anticipating levees failure : a specific organization in case of flood event

Example of a Regrouping and Orientation Zone



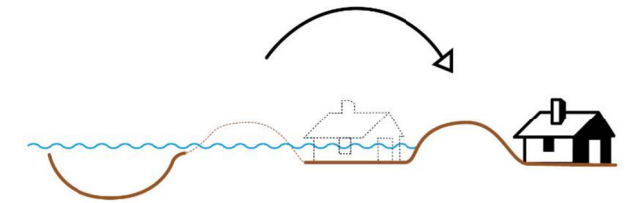
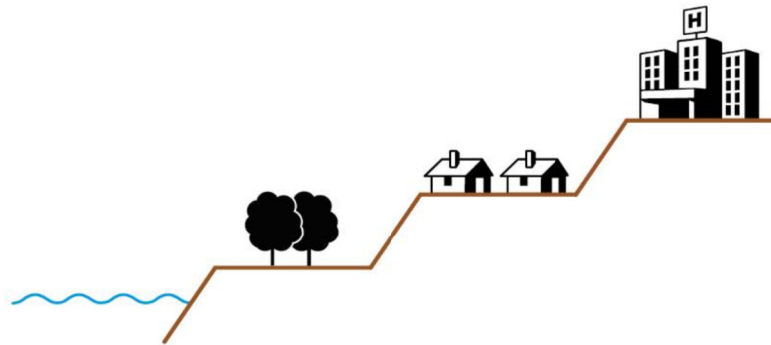
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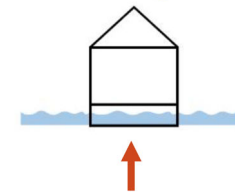
Urban planning in flood zones

4 key planning principles for flood zones (national doctrine)

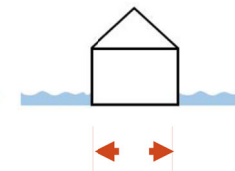
1. Prohibiting construction in high flood risk zones and behind the levees
– *except for justified exceptions in urban areas*
2. Strictly preserving flood expansion areas and wetlands
3. Adapting construction to reduce their vulnerability
4. Restricting sensitive facilities siting



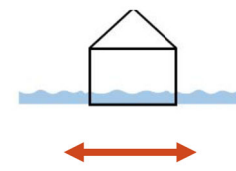
Dodge



Resist



Let pass



Urban planning in flood zones

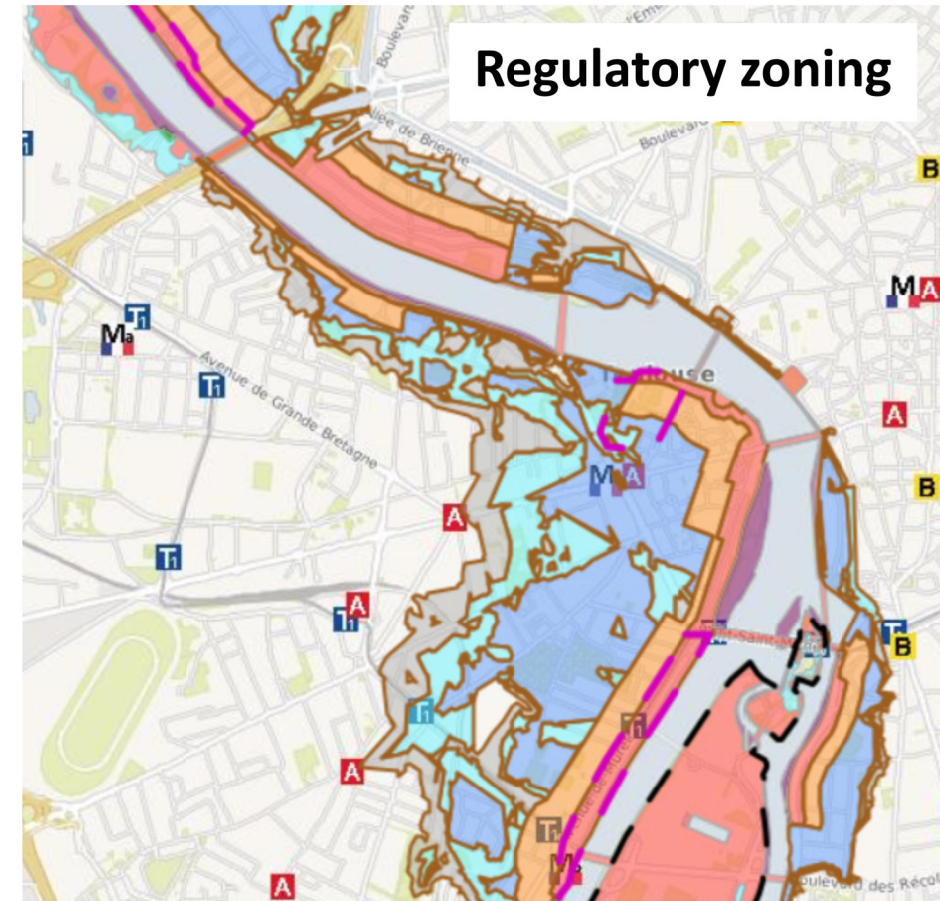
French main tool : Flood Risk Prevention Plan (“PPRi”)

- Created by a national law in 1995
- Developed by state authorities at the municipal level
- It establishes :
 - **Official flood risk map** – *based on an exceptional flood scenario*
 - **Regulatory zoning** – *depending on flood risk level and land use type* – and associated **rules to reduce risks for future developments**
 - Complementary rules to reduce existing assets vulnerability
- Overrides the Local Urban Plan (“PLU”) – *but PLU can establish complementary rules*

Urban planning in flood zones

Flood Risk Prevention Plan (“PPRi”) in Toulouse (approved in 2011)

- 16 regulatory zones to consider local characteristics
- Includes an adapted regulation in protected areas (9 regulatory zones)
 - allow many types of construction – *considering historical urbanization* –, but with major adaptations as :
 - Housing above known higher water level
 - Refuge area for each unit
 - Reinforced concrete structures for buildings close to the levees



A program to help enhancing prevention

Flood Risk Prevention Action Plan (“PAPI”)

- Created in 2002 by Environment Ministry
- Helps local authorities to fund various prevention actions, working on all kinds of solutions
- Complement and allow to enhance existing prevention tools
- Toulouse Agglomeration’s PAPI :
 - Led by Toulouse Métropole
 - Initiated in 2018
 - Involves more than 100 municipalities

7 key action areas :



1. Knowledge and Awareness



2. Monitoring and Forecast



3. Alert and flood event management



4. Urban planning adaptation



5. Vulnerability reduction



6. Flow management



7. Protection structures management

4

Evolution prospects

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toulouse
métropole

Future tools to enhance flood event management

Today (2026): JAGUARDS management of civil security events and guidance for victims



Ajouter **ANGLAIS**

Status: Stricken, Victim, Other

Household contact
This data will only be accessible by accredited persons

☐ Male ☐ Female

Last name: First name: Age:

Phone numbers:

☐ Tenant ☐ Owner

Insurance:

Owner: + Add another contact

Household composition

0 to 3 years 4 to 17 years 18 to 75 years > 75 years

Total number of people take in charge: Number:

Number of people currently absent: Number:

☒ People not supported

☒ Animals: Small dog Big dog Cat Exotic pets

☒ Vegetarian diet: Number:

☒ Dependency due to disability: Motor Visual Auditory Cognitive / mental / psychique

☒ Specific medical support: Medical care Refrigerated storage of medication

Housing location

Address: Floor:

Housing solution

☐ Personal ☐ Assurance ☒ Shelter center

☐ Hotel by Tlse

Beginning: 12/03/2025 End:

Total of X night(s):

The shelter location will be automatically defined when the file is created

Transport solution

☐ Independent

☐ Toulouse city hall

Description. Be careful not to enter any personal data.

Color Annuler

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Future tools to enhance flood event management

Tomorrow : Hi5 Future radio communication with a sovereign 5G network

Use case: Critical Communication

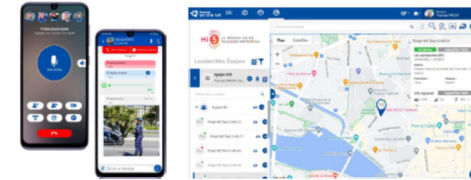
Equipment of field agents and the command center of a multimedia communication solution

Smartphone hardened in operation walkie talkie + interface web pc

voice usage, group call, ambiance listening, chat, photo and video sharing, location, distress calls

User services: safety, security and rescue

Experimentation: Rugby World Cup, festivities, civil security exercise



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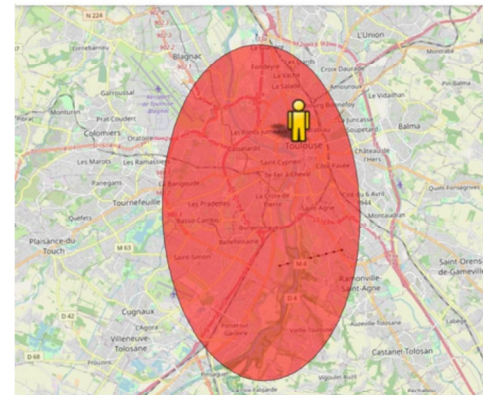
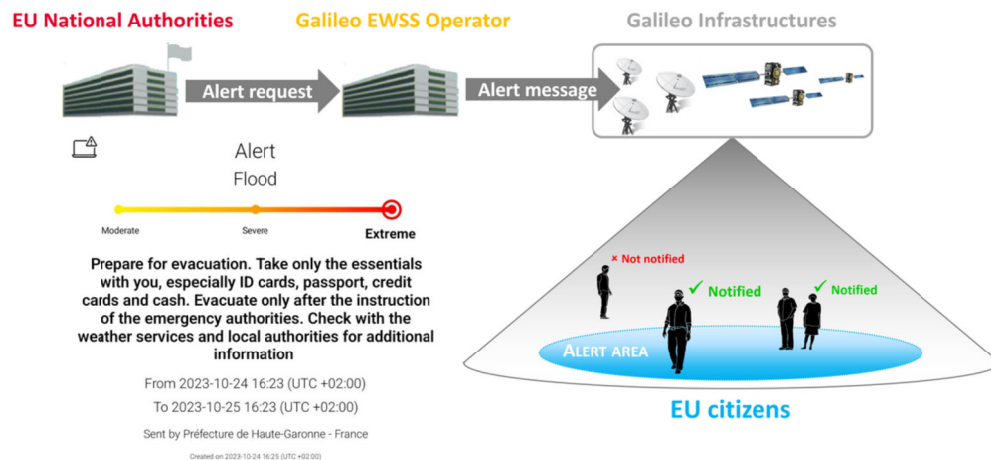
5G Tactical Standby Bubble

Future tools to enhance flood event management

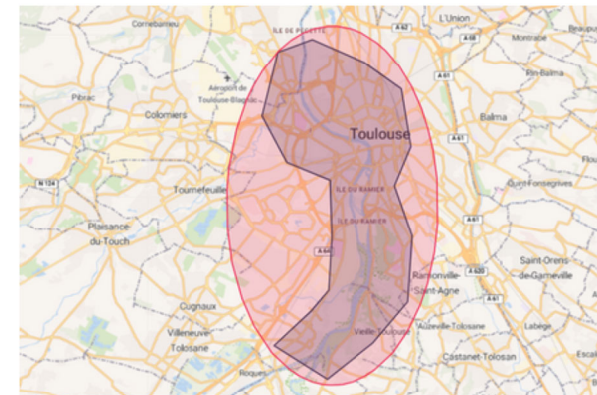
- **Tomorrow** : Satellite alert to mitigate the risks of power supply failure

Toulouse, France

On June 5th, 2023, the STELLAR project began its first demonstration in Toulouse, France, in collaboration with the French Ministry of Interior, Prefecture of Haute-Garonne, Toulouse Town Hall and SAMU 31. The demonstration scenarios were based on the AZF Factory explosion, which occurred in 2001. This event was chosen due to its relevance to the local context in Toulouse and because a CBRNe (chemical, biological, radiological, nuclear and high yield explosive) hazard such as this is deemed critical by civil protection authorities for an alert to be delivered via a satellite link.



The alert message as it will appear to end users

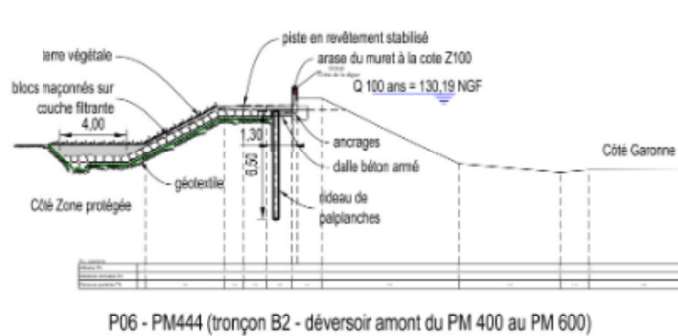


Generation of an ellipse by national authorities from a crisis room based on a polygon.

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Prospects for dikes system

- Future project on Blagnac dike system : restore the flood protection level to a 100-year return period event



• Future tools to facilitate operational flood management

- Possibility of automatisisation of certain mobile devices (like valves, flood pumping stations, etc)
- Facilitate the monitoring and inspection of structures by integrating optical fiber into them (temperatures and deformations measurements)

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