

TOOLS FOR RISK MANAGEMENT

Related to climate change



— CONTENT

- 1 CLIMATE CHANGE AND ENVIRONMENTAL STUDIES
- 2 METHODS AND TOOLS DEVELOPED BY EGIS
 - | For infrastructures
 - | For urban areas
 - | For crisis management

CLIMATE CHANGE AND — ENVIRONMENTAL STUDIES



R&D PROGRAM BY EGIS



They are intended to enrich the existing environmental assessment of programs, plans and projects.
They bring elements to anticipate the management of extreme climate events.

LINK BETWEEN CLIMATE CHANGE AND EIA

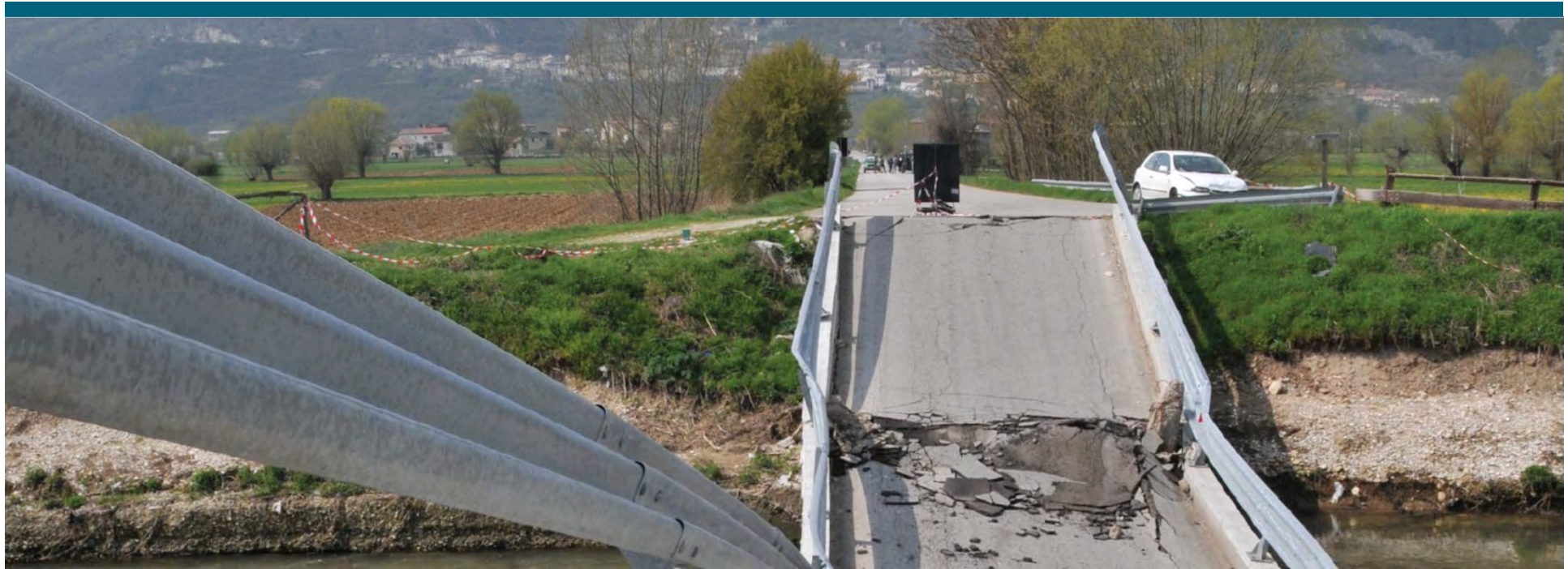
Development of tools to guide and support stakeholders :

To avoid or reduce risk where possible

To transfer risk where feasible

To manage residual risk

— METHODS AND TOOLS



CLIMATE CHANGE AND INFRASTRUCTURE

Two points :



1. Existing infrastructure is not generally sized to respond to extreme weather events
 - *Structural design knowledge from the past while changes in the climate system could induce extreme events exacerbated - **increased intensities but also sustained over a longer period** -*
2. The social acceptability towards risk decreases

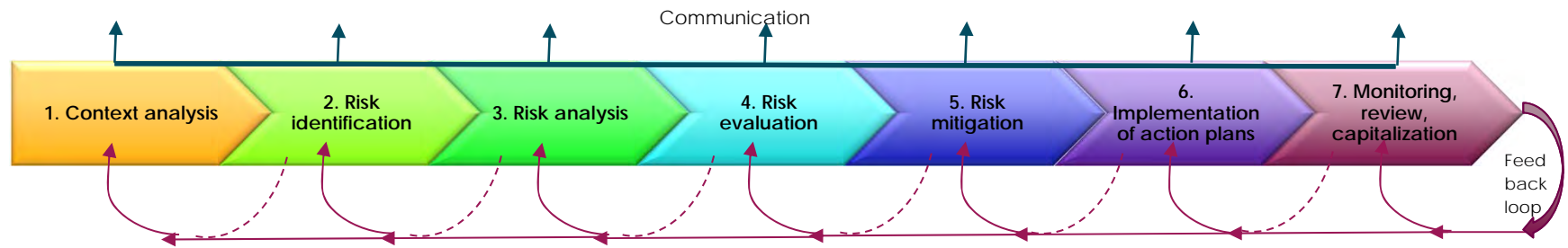
Inclusion of critical weather events in the design, operation and maintenance of infrastructure as well as in land management → **A NECESSITY**

CRITICAL PHENOMENA AND CONSEQUENCES

- | Extreme rainfall → floods, traffic stop, erosion, landslides ...
- | Seasonal annual rainfall → landslide, cracking the pavement
- | Rising sea level → cutting and coastal erosion
- | Maximum temperatures → risk of rutting some asphalt , bridge expansion / concrete / rails , fire
- | Winds → panels falls , trees, power outages

But critical event often combine several risk factors (eg. rain + winds, drought + heat wave ...)

METHODS

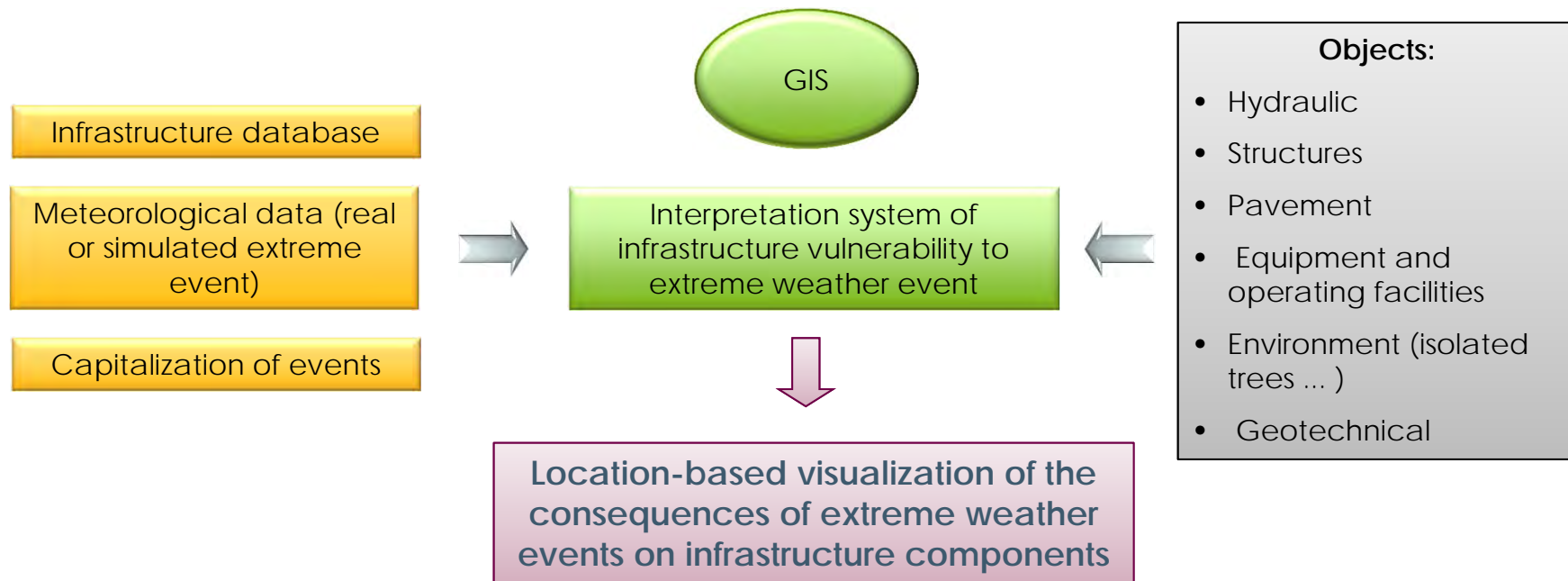


GERICI - RESILIENCE

GERICI (gestion des risques liés au changement climatique pour les infrastructures routières) was developed in 2007 to assess risks caused by climate change to road infrastructures and then adapting infrastructure management to it.

In the same way, **RESILIENCE** was developed to assess risks caused by climate change to rail infrastructure. They are both suitable at the infrastructure scale only.

GERICI - RESILIENCE



GERICI - RESILIENCE

Simulation

Autoroute: A7 - PK de départ: 157.00 - PK d'arrivée: 177.00

Type d'évènement climatique: Vent
Intensité maximale de l'évènement: Vent Km/h

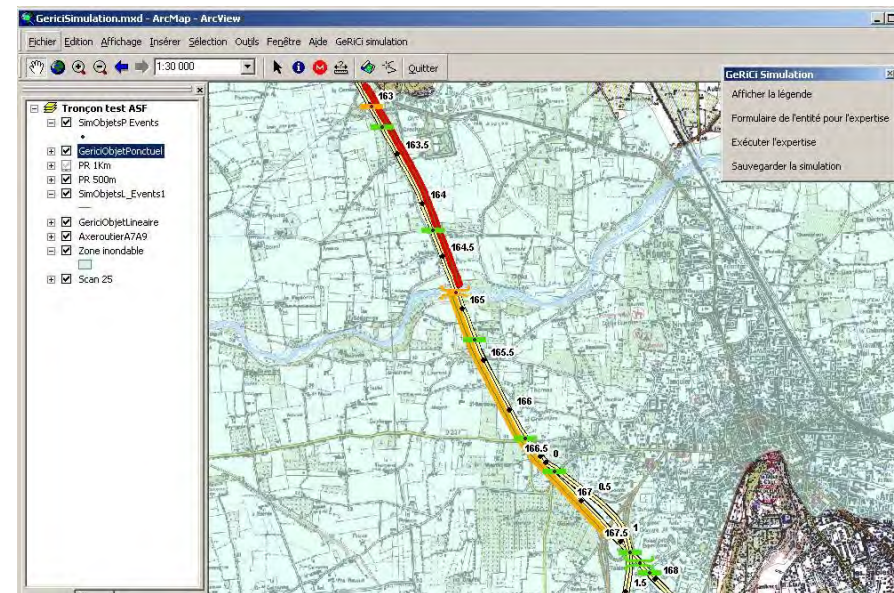
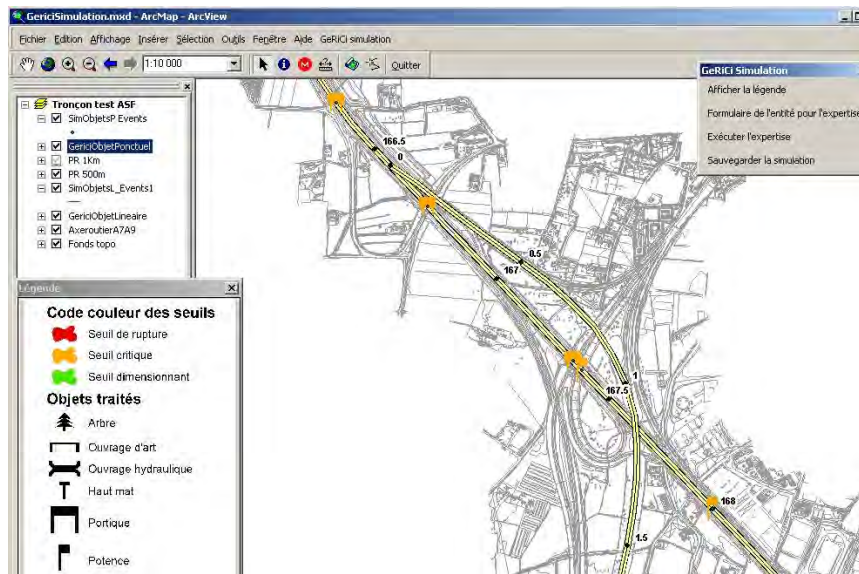
Cumul de pluie en 24 h (mm)		Pluie	mm/h	Température (°C)	
Nom du cours d'eau		Crue	m3/s	Vitesse du vent (m/s)	
		Neige	cm		
		Gel	°C		
		Canicule	°C		

Ouvrages d'art
 Equipement
 Environnement
 Géotechnique

Grande hydraulique
 Petite hydraulique
 Assainissement
 Chaussée

Exécuter la simulation

GERICI - RESILIENCE

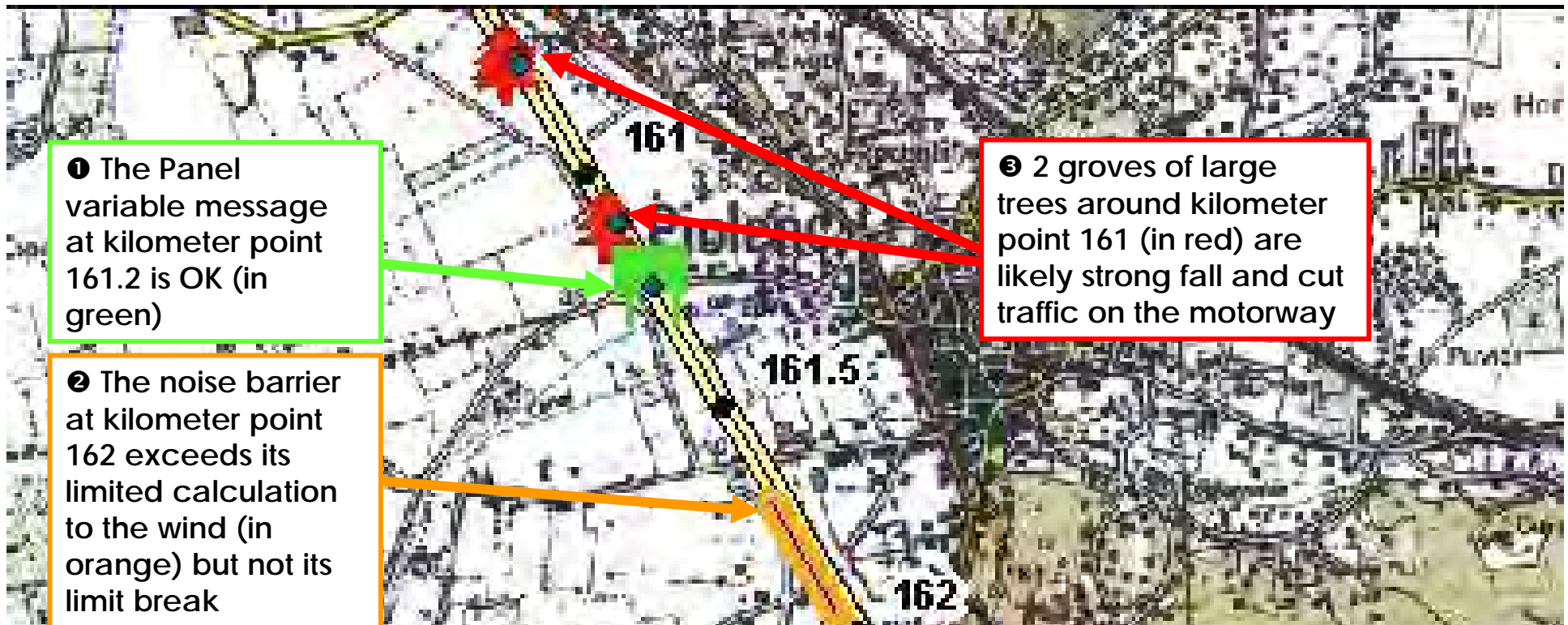


Simulations at a section or a network

Risk map

GERICI

Meteo-France has launched an alert 'storm' forecast at 24 hours with winds around 160 km/h. The simulation by GERICI Section warns that:



CLIMATE CHANGE AND URBAN AREAS

A specific method for vulnerable urban areas :

- Developed and implemented between 2009 and 2011 for three coastal towns (Alexandria / Egypt, Tunis / Tunisia and Casablanca / Morocco) in North Africa.
- Funded largely by the World Bank



SPECIFIC METHOD FOR VULNERABLE URBAN AREAS

Vulnerable to extreme weather events exacerbated by climate changes to come

- Location of these 3 cities
- Densely populated areas
- Growing urbanization



Methods

- Understand the risks
- Identify and locate vulnerabilities
- Measure the degree of risk exposure :
 - *Flooding and storm surges*
 - *Earthquakes and tsunamis*
 - *Other extreme weather events*
- Evaluate the costs of potential losses



1. Simulations at a district level
2. Risk map

ESPADA : FOR CRISIS MANAGEMENT

Tool for the prediction and management of actual floods in urban areas :



To **avoid human disasters when floods appear**.

Developed by Egis after large-scale flooding in the south of France in 2002 and 2003 which caused the death of 22 people.

ESPADA means "Evaluation and monitoring of rain in urban areas for anticipating the alert" (Évaluation et Suivi des Pluies en Agglomération pour Anticiper l'Alarme)

ESPADA : FOR CRISIS MANAGEMENT

- | Monitoring and hydro meteorological forecasting for the anticipation of stormy events

- | Management of alarms and flood alerts

- | Management of alternative plans

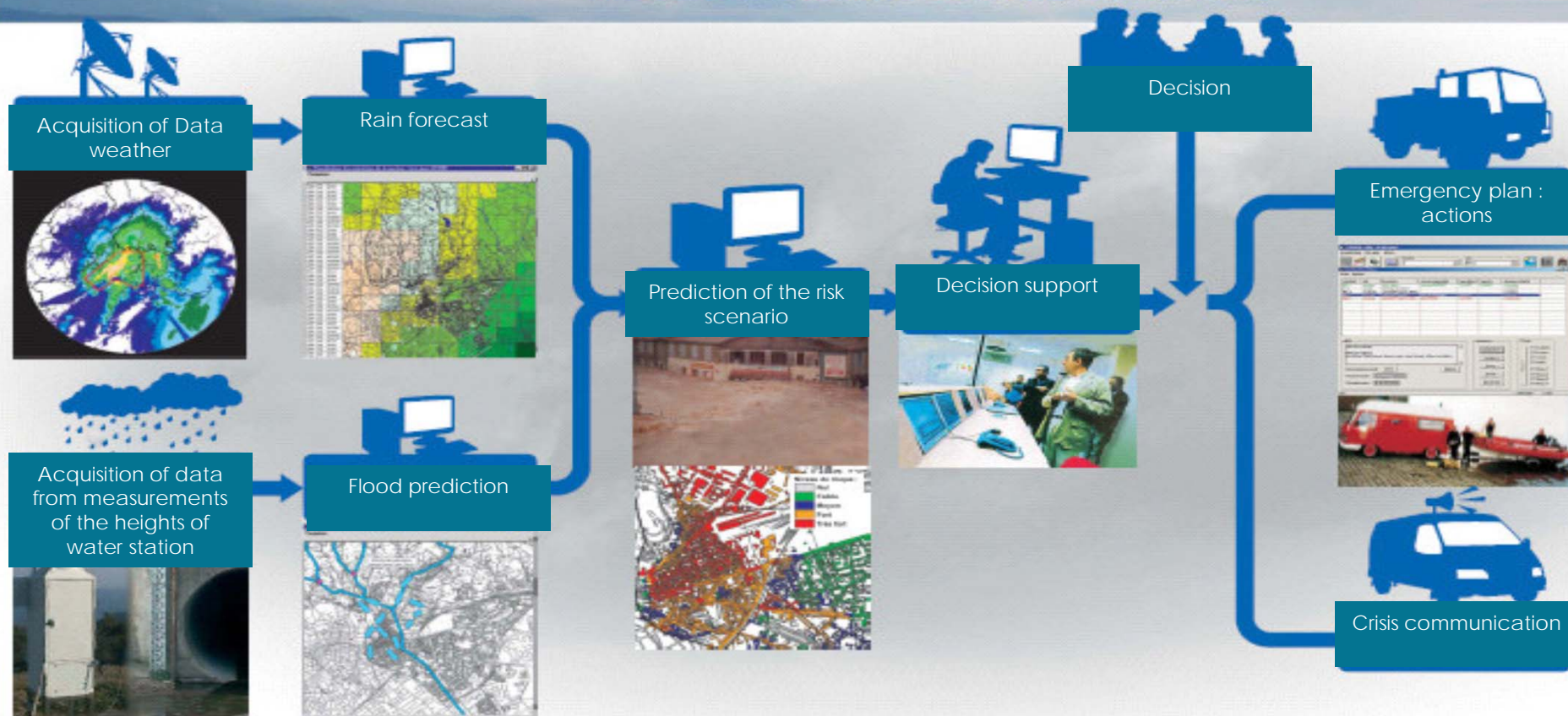
➔ Turnkey system (PC crisis, hardware computer furniture and communication, software, video surveillance cameras, warranty and maintenance)

- *developed by BCEOM, CS - SI, Meteo-France*



Le système ESPADA

un outil de prévision et de gestion en temps réel des inondations en milieu urbain



Thank you for your attention.

— CONTACT —

Virginie DEFROMONT

| *Operational Performance Manager*

| *+33 437724829*

| *+33 603394601*

www.egis-group.com



EGIS GROUP

TURNOVER BREAKDOWN

BY ACTIVITY

881 M€
Turnover in 2013

20 %

Road and Airport
Operation



80 %

Engineering



12 000 EMPLOYEES

Present in over
100 COUNTRIES

25 OPERATING
COMPANIES

17 OVERSEAS
SUBSIDIARIES

More than
40 OFFICES
IN FRANCE

OUR SERVICES

- > Engineering
- > Architecture, Town planning and Landscaping
- > Consulting
- > Opération and user services
- > Project structuring and turnkey solutions

A CREATIVE COMPANY

Egis takes a proactive stance on innovation, helping it to meet socio-economic, energy related and environmental challenges wherever the company operates. All of the creative talent of Egis' engineers is brought into play to offer our clients tools that will assist them in their decision making and to provide effective operational solutions.

60 % OF R&D ACTIVITY
IS RELATED TO SUSTAINABLE
DEVELOPMENT

OUR WORLDWIDE PRESENCE

Turnover breakdown by geographical zone

