CASU – Provision of the expertise of INERIS in an emergency situation

Jean-Martin VINCENT
CASU Operations Manager
Toxicologist, Duty Engineer

INERIS
maîtriser le risque
pour un développement durable

Summary

- General overview of INERIS
- Presentation of the CASU and its missions
- Examples of technical support cases
- Post-incident
- Questions

INERIS, a recognized name

Our vocation:
Support in risk assessment and management

Linked to substances, procedures and facilities, from the R&D phase

- Chemical substances, nanoparticles etc.
- Equipment, ATEX products etc.
- Industrial processes
- Industrial facilities
- Transport of materials
- Underground storage, quarries, mines, disposal sites
- Polluted sites and soil

Health and safety for people and the environment





INERIS

INERIS: expertise based on an experimental approach, modelling and knowledge of the industrial world

- **Lengthy experience** in the industrial world
- **Multidisciplinary teams**
- **€70 million** budget
- **600** staff including **350** engineers and researchers
- **Large-scale experimental facilities**
- **50 ha site in** Verneuil-en-Halatte (Oise, France)
- **25,000 m²** of laboratories
- **Over 1,000 clients** every year in France and abroad
- **50 PhD students**

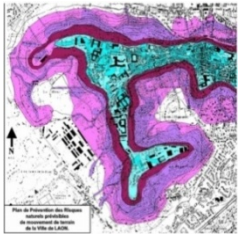
A blend of expert assessment for companies, research activities and public service missions

INERIS

Supporting all those involved in risk assessment and management

Chronic Risks

Soil and Subsoil Risks



Accident Risks

Product and Staff Certification

INERIS

THE CASU MISSION:
Emergency Situation Support Unit

Creation:

Regular requests since 1995 → Established in April 2003
→ ratified by the circular of 15/07/2005

Fields of action and activation: chemical hazards, emergency situations

"[…] in case of a non-nuclear and non-biological, proven or imminent, technological hazard for people or the environment"
(Circular of 15/07/2005)

INERIS

THE CASU MISSION:
Emergency Situation Support Unit

Operation: 24/7

Decision-making: technical information and advice to improve the requester's understanding of the situation

Funding from French Environment Ministry: P181 subsidy for requests in France and from State services

INERIS

Who contacts the CASU?

- Inspectorate of Classified Installations
- Civil protection
- TRANSAID protocol support
- Civil and anti-terrorist defence (Piratox)

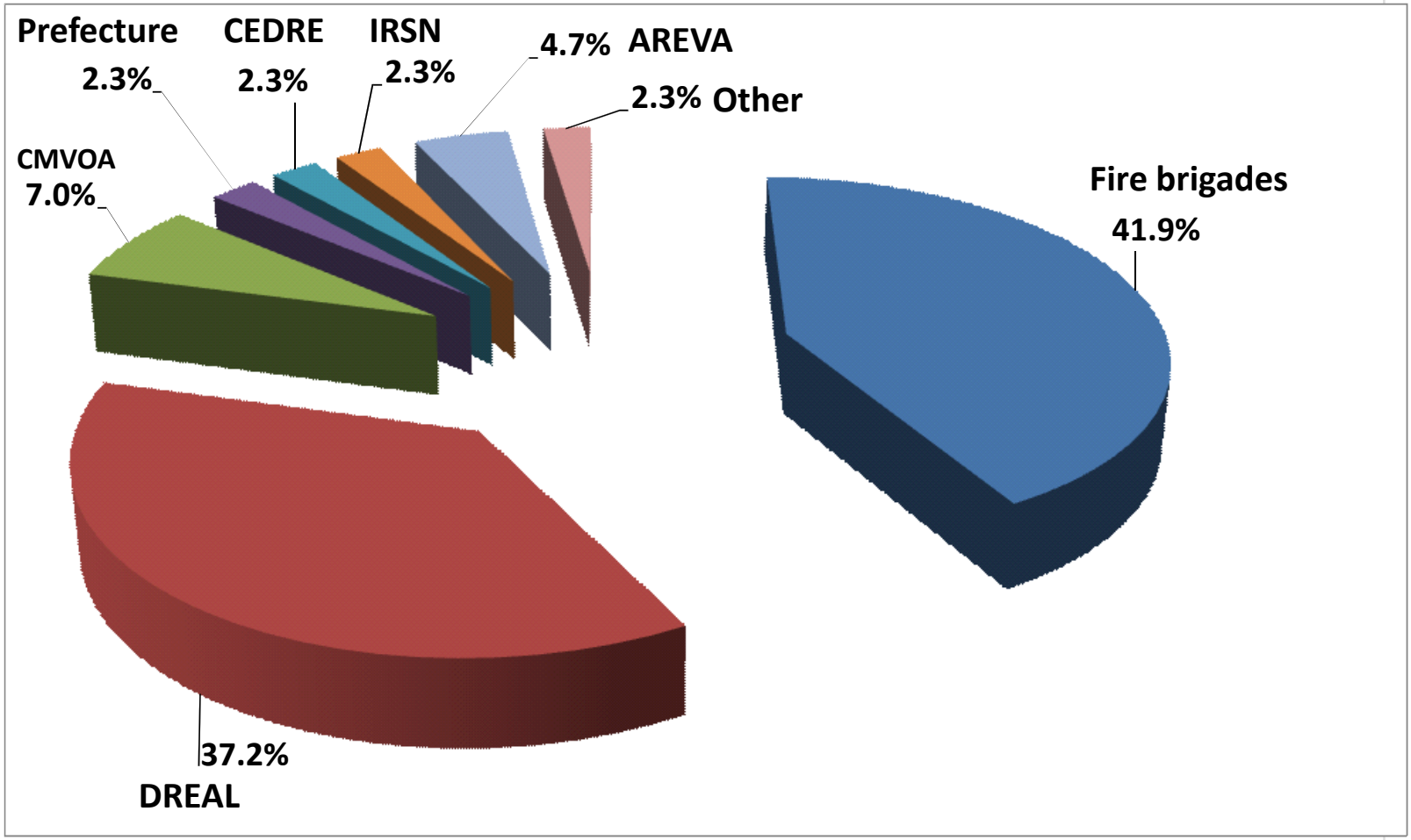
Circular of 15 July 2005

Defence — DGA-MNRBC Contract

- Operators — AREVA Contracts
- Walloon region

INERIS

Who calls us?



INERIS

Why?

- Technical response: accidents
  - information on substances
  - modelling of hazardous events
  - toxicological/ecotoxicological hazards etc.

And also:

- Accidents with a potential post-incident impact

RIPA (network of post-incident partners)

- Indoor Air CSTB Agreement

INERIS

CASU response actions

1) Information on chemical products and available accident data

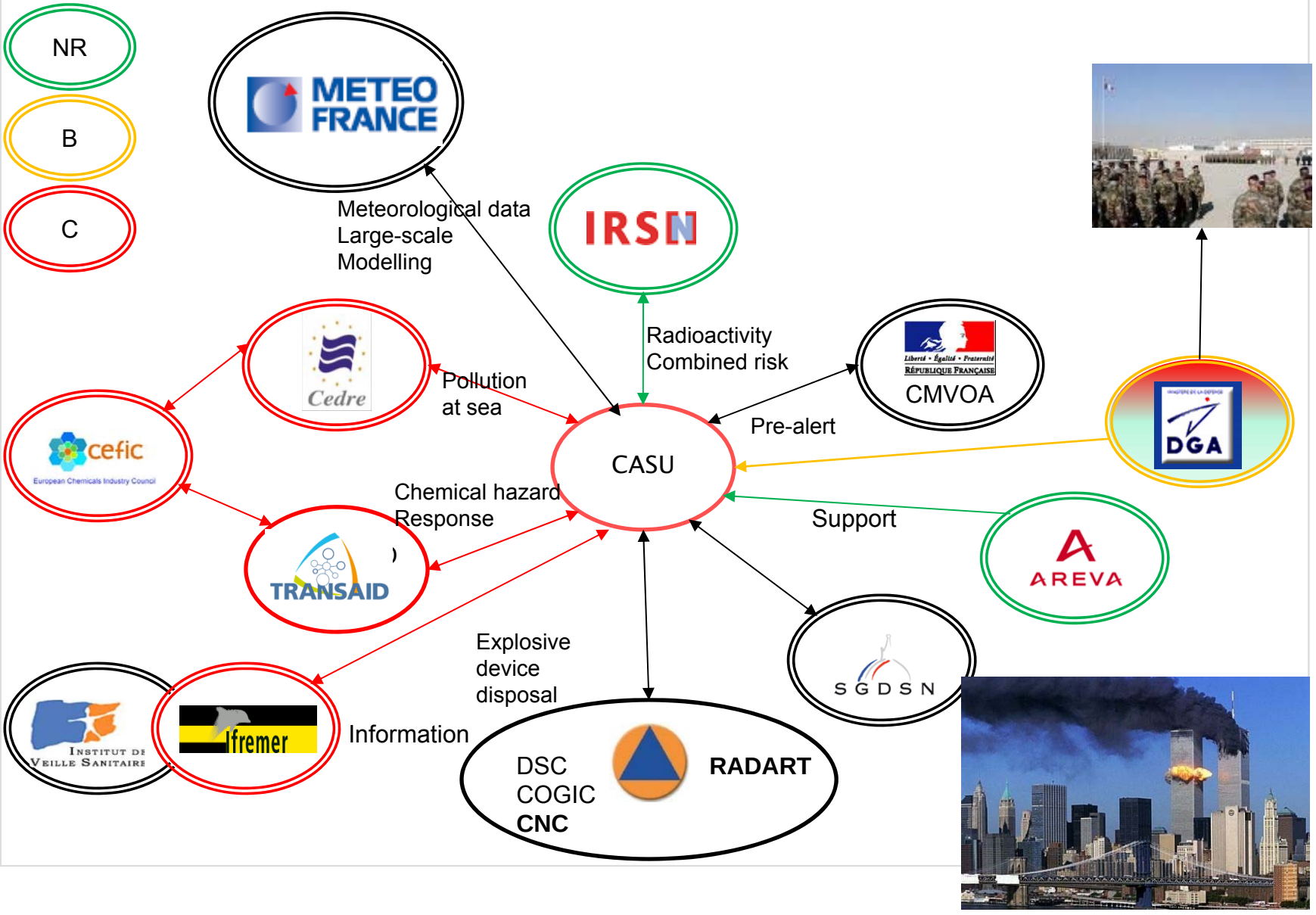
2) Evaluation of potential risks (modelling impact of acute toxicity by atmospheric dispersion)

3) Estimation of the consequences for people and the environment (impact of chronic and delayed effects)

4) Information on the response resources

INERIS

Network of expertise



How the CASU operates

Founding principles of the CASU: Interdisciplinary nature of INERIS professions

→ Broad skills and skill development/initial skills (in very ≠ fields)

→ Based on the experience, background of the engineers / On-duty Operations Supervisor

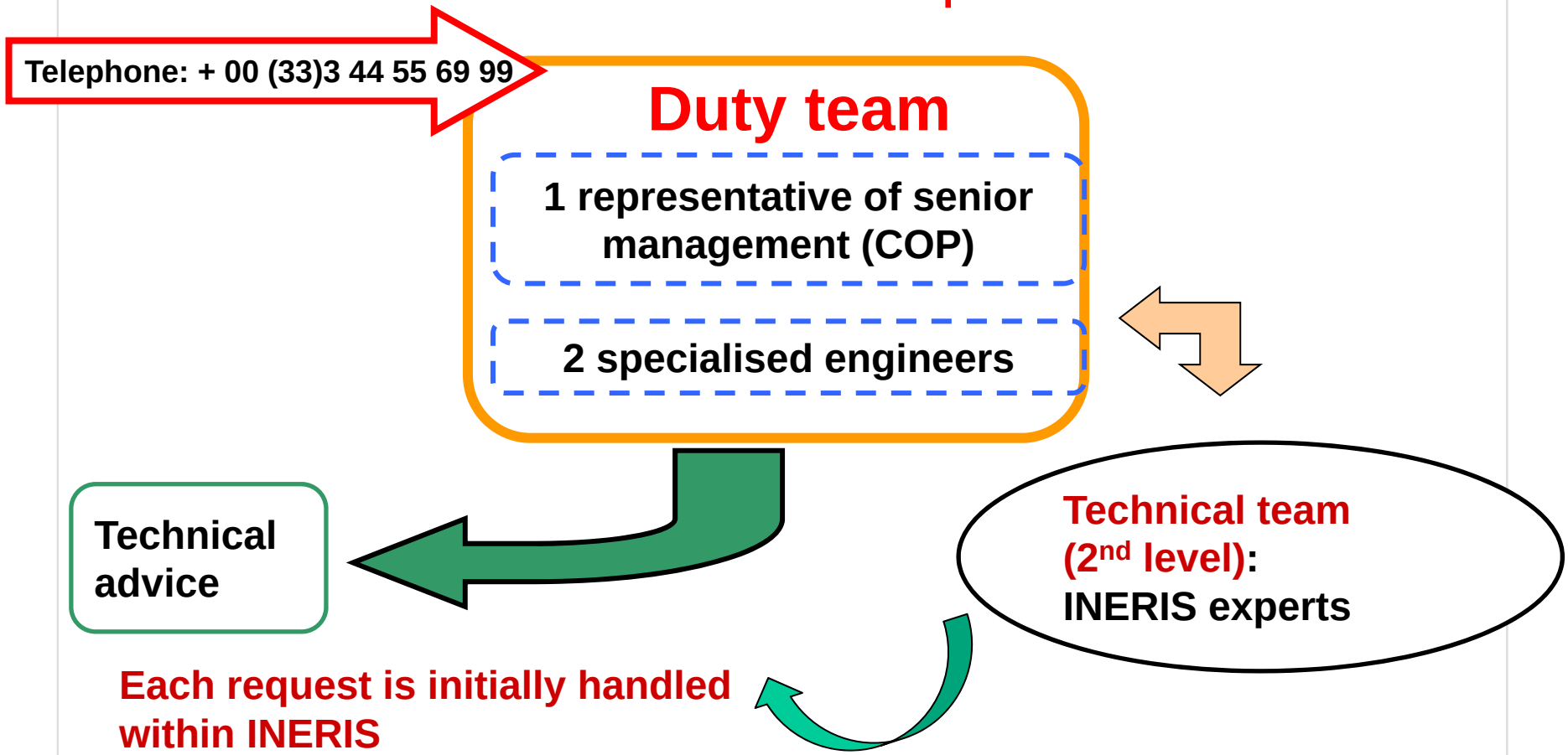
→ Teamwork

→ Availability

→ Stress management

INERIS

How the CASU operates



→Close to 400 support cases (2003-2014) including 190 in the past 4 years (strong growth)

INERIS

Duty Personnel

Operation Supervisors (COP):

E. Chambon (DRC)

M. Ghoreychi (DRS)

P. Hubert (DRC)

Y. Macé (DRA)

F. Marcel (SGX)

C. Michot (DSC)

B. Piquette (DRA)

C. Tauziède (DIR)

Duty Engineers (IA):

J. Bureau (DRC)

B. Debray (DRA)

S. Evanno (DRA)

F. Gautier (DRC)

V. Migné (DRC)

Z. Pokryszka (DRS)

W. Sanchez (DRC)

F. Tognet (DRC)

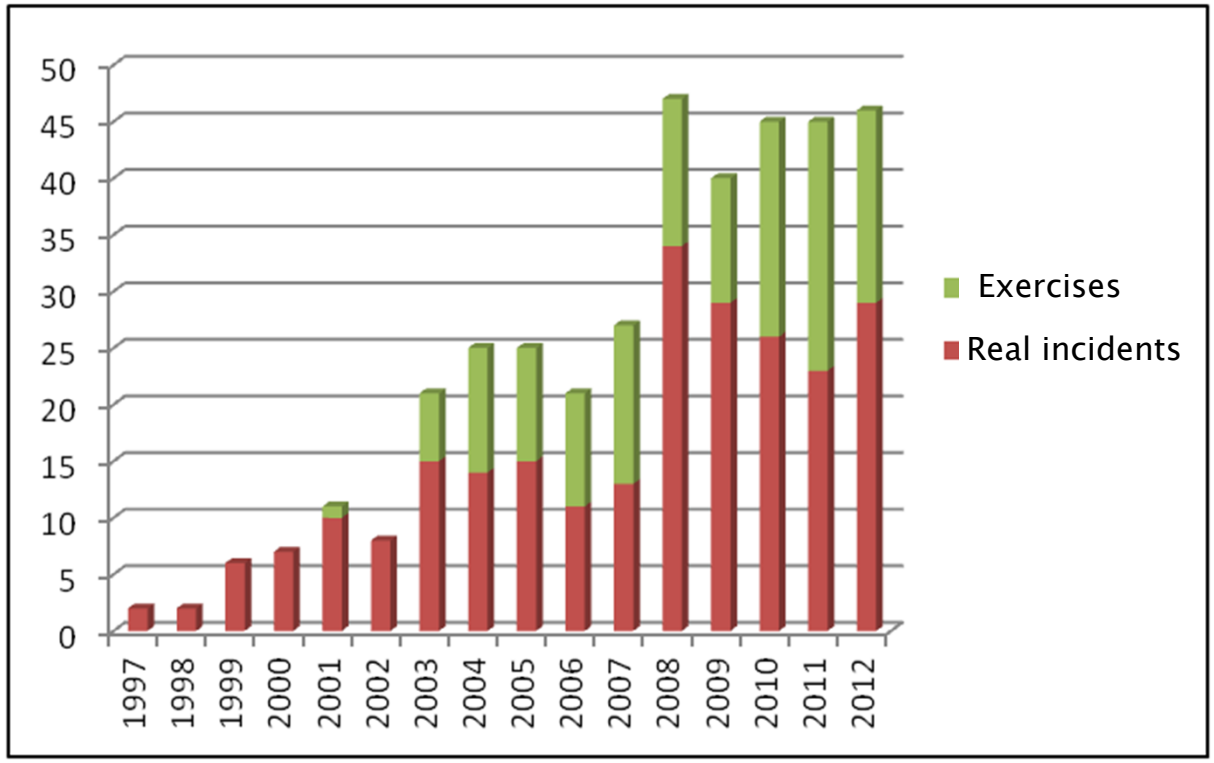
B. Truchot (DRA)

JM. Vincent (DRC)

Duty → combining complementary skills of the 2 engineers and the supervisor

INERIS

Overview of CASU support cases

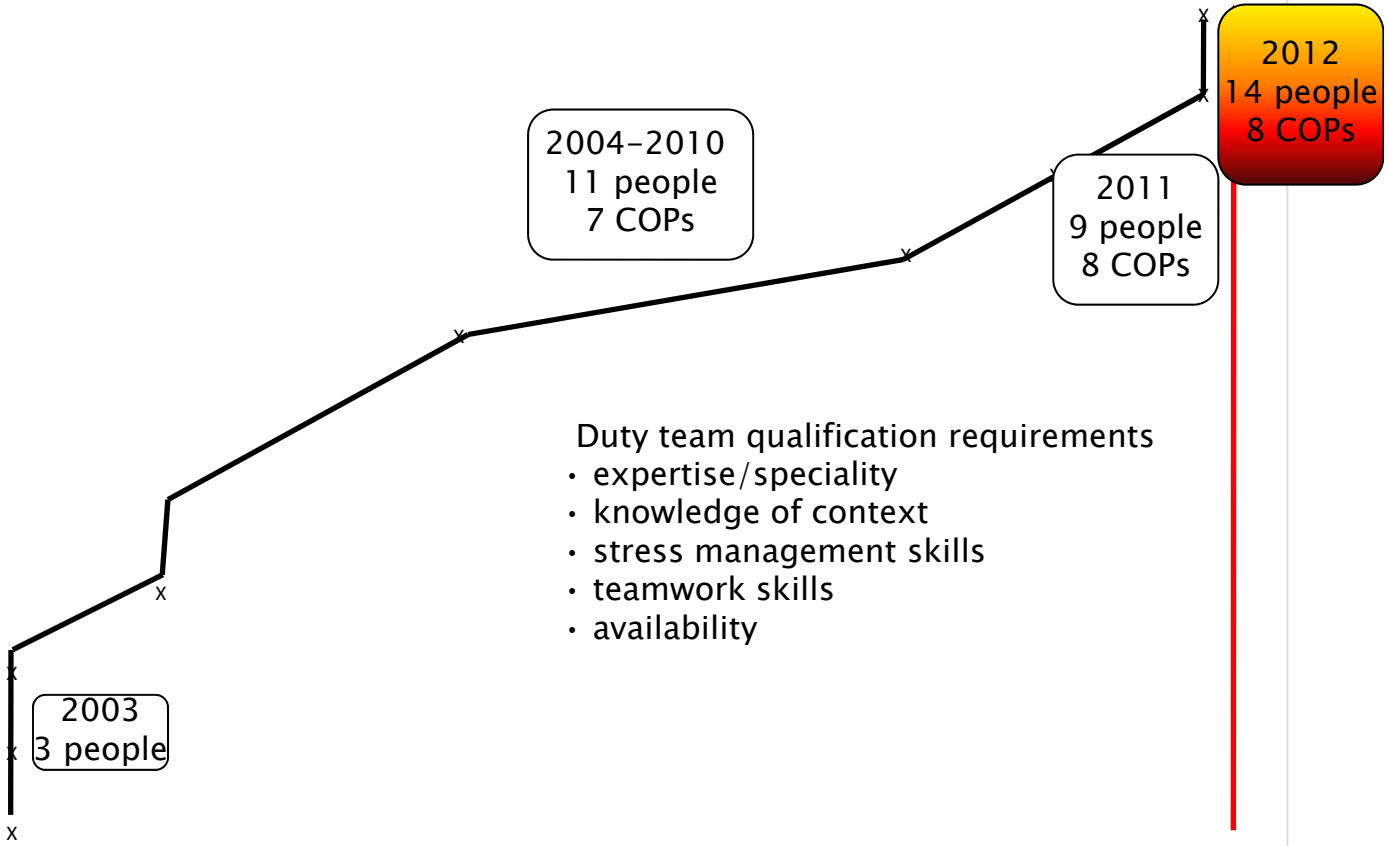


→Over 350 support cases (1997-2012)

INERIS

Issues

Piratox Chemical Analysis
Indoor Air
Post Emergency
Defence Issues (few h to few dozen h)
Air Quality (Volcanic activity)
Mine sweeping and chemical weapons (few mn)
Combined risk rad/chem
Piratox
Civil protection
Tpt DG
Industrial Accidents



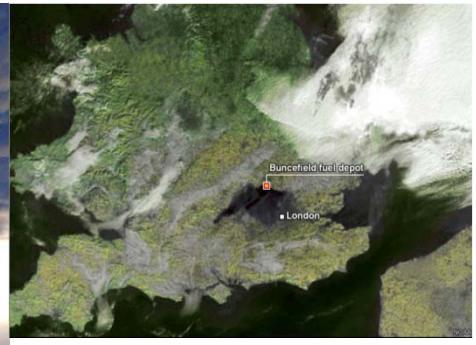
2003	2004	2005	2006	2007	2008	2009	2010	2011

Development of the kinds of requests

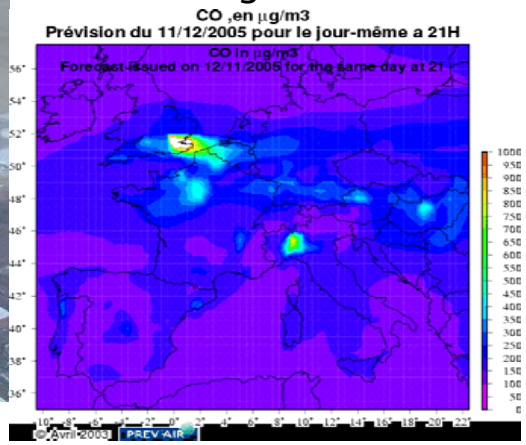
INERIS

Example of a response
Fire at an oil depot in the UK

BUNCEFIELD (2005)



Satellite image



Modelling

Situation: fire generating a smoke cloud on a continental-wide scale

Issue: potential impact of the smoke on national territory

INERIS

Example of a response

Self-heating of a cargo of DRI (Direct Reduced Iron)

MELILLA (July 2007)
Spanish enclave in Morocco

Precedent: ADAMANDAS in the waters of Reunion Island (2003)

Situation:

- Increase in temperature of the DRI cargo (11/09/2003)
- Formation of hydrogen
- During unloading of the ship

Issue: options for securing the unloading operation

Solution: destruction and scuttling (21/09/2003)

INERIS

Example of a response

Fire at a battery recycling plant

DIEUZE (August 2010)
Fire at storage depot (source: *Le Républicain Lorrain*)

Situation:

Violent fire, destruction of the storage facility in a battery recycling plant

Issues:

-Chemical composition of smoke cloud

-Acute and delayed impact of smoke cloud

INERIS

Example of a response
Explosion of a chemical reactor

MIRECOURT (December 2006)
Facility after the vertical ejection of the reactor
(source: INERIS)

Situation:

Product involved:
Chrome VI
(carcinogenic)

Request the following day: health issue

Issue: estimation of the areas affected by the cloud generated by the explosion of the reactor

INERIS

Example of a response
Polymerisation of a tank of divinylbenzene

A26 motorway

August 2006

(Source: COGIC)

4 requests in 2 days

Issues:

- intrinsic risks of divinybenzene
- options for securing the cargo

INERIS

Example of a response
Cylinder of acetylene in a fire

A4 motorway (July 2010) (source: COGIC)

Potential impact (USA) (source: internet)

Situation: fire in a van transporting a cylinder of acetylene, fire extinguished

Issue: could the cylinder of acetylene be handled without risk? (no)

INERIS

Example of a response

Fire in St Maximin

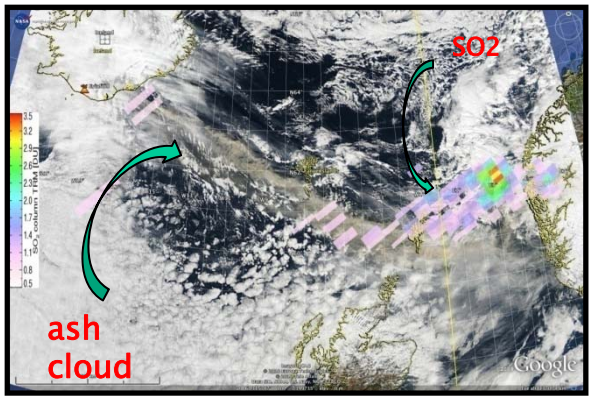
July 2012

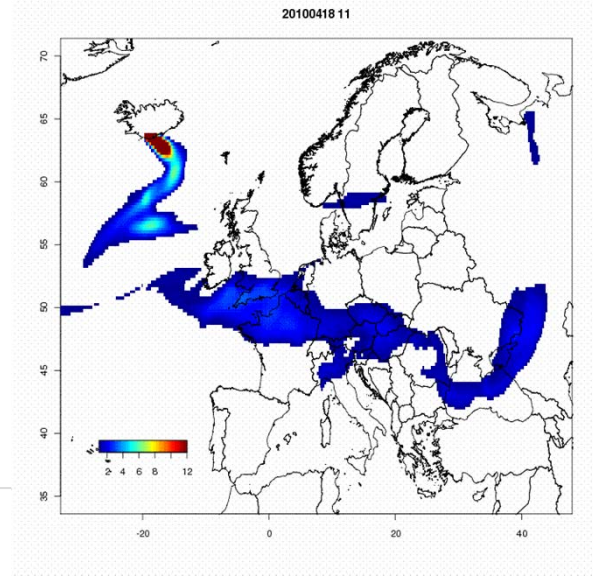
Situation: explosion followed by a fire (industrial lubricants)

Issue: risks for vulnerable population: crèches and a hospital in the vicinity → Distance of impact

CASU= first contact before transfer to an operational department at INERIS

Eyjafjallajökull eruption





Situation: Major volcanic eruption (ashes, gas)
→ Transferred to DRC (DECI, CARA)

Issue: Risks linked to volcanic eruption: health, climate, aviation

Modelling (DRC/DECI/MOCA): 3D modelling of cloud

April 2010

INERIS

CASU = first contact + CASU and DRC response

LUBRIZOL incident

Situation: runaway reaction: thermal decomposition of a tank of zinc dialkyldithiophosphate (ZDDP) and release of mercaptans.
Measures: action from DRC (MILI, MOCA)

→CASU Issue:

- modelling of toxic effects (H_2S – MeSH)

- advice on protocol for inerting the tank

INERIS

CASU, advice on pre-incident situation

Wallonia

Situation: following the explosion of a silo, spreading of a powder containing nitrocellulose

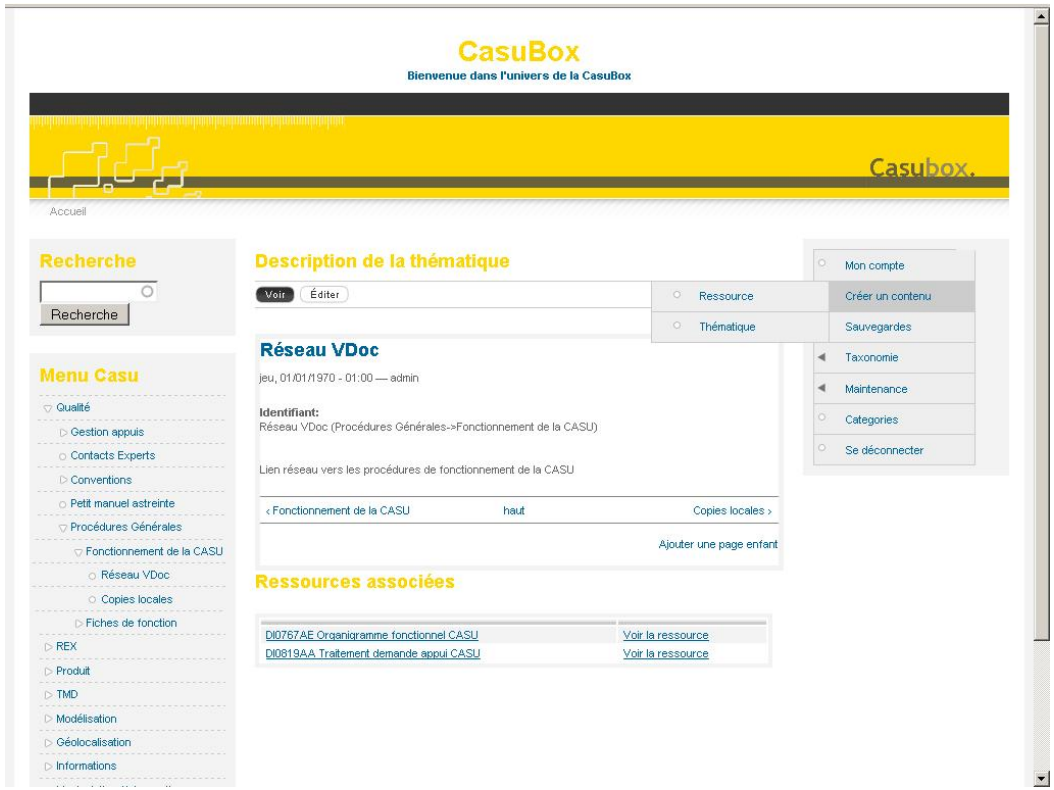
CASU Issue:

- risk generated by the explosive powder
- modelling possible explosion scenarios
- proposals for response methods and treatment of the powder

March 2014

INERIS

Development of dedicated tools
Intranet-type resource portal



Standardisation of the resources used

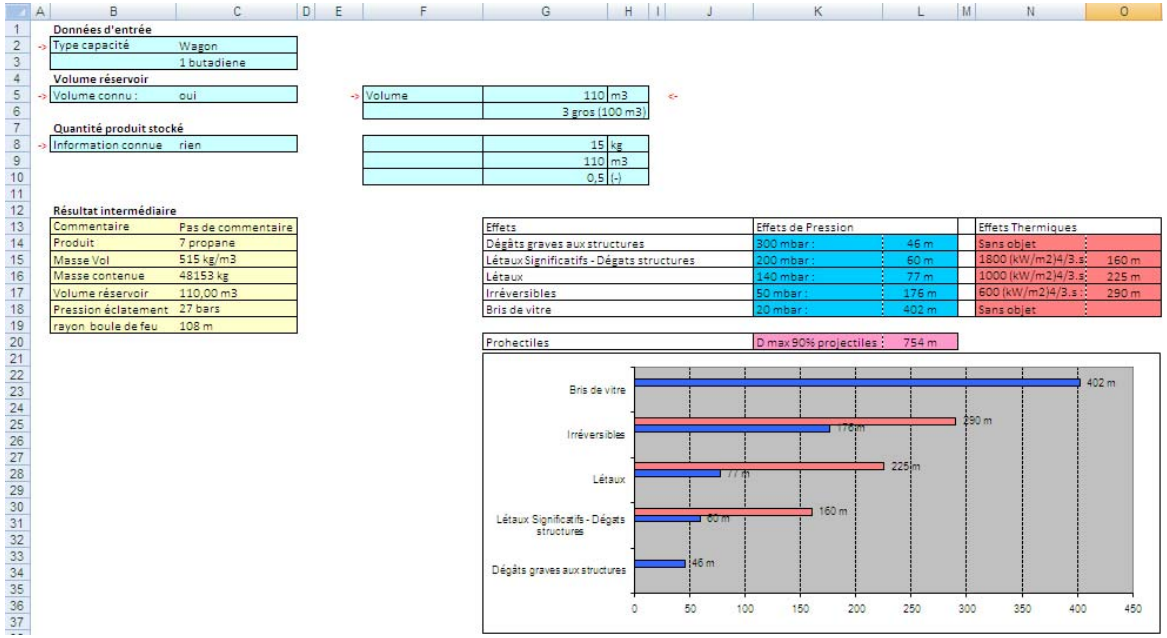
Centralised and simplified access

Stored on a USB device

CASUBox (v 2010)

INERIS

Development of dedicated tools
Dedicated Modelling Tools



Données d'entrée

Type capacité	Wagon	
	1 butadiene	
Volume réservoir		
Volume connu :	oui	
Quantité produit stocké		
Information connue	rien	

Volume	110	m3
	3 gros (100 m3)	
	15	kg
	110	m3
	0,5	(-)

Résultat intermédiaire

Commentaire	Pas de commentaire
Produit	7 propane
Masse Vol	515 kg/m3
Masse contenue	48153 kg
Volume réservoir	110,00 m3
Pression éclatement	27 bars
rayon boule de feu	108 m

Effets	Effets de Pression		Effets Thermiques	
Dégâts graves aux structures	300 mbar :	46 m	Sans objet	
Létaux Significatifs - Dégats structures	200 mbar :	60 m	1800 (kW/m2)4/3.s:	160 m
Létaux	140 mbar :	77 m	1000 (kW/m2)4/3.s:	225 m
Irréversibles	50 mbar :	176 m	600 (kW/m2)4/3.s :	290 m
Bris de vitre	20 mbar :	402 m	Sans objet	

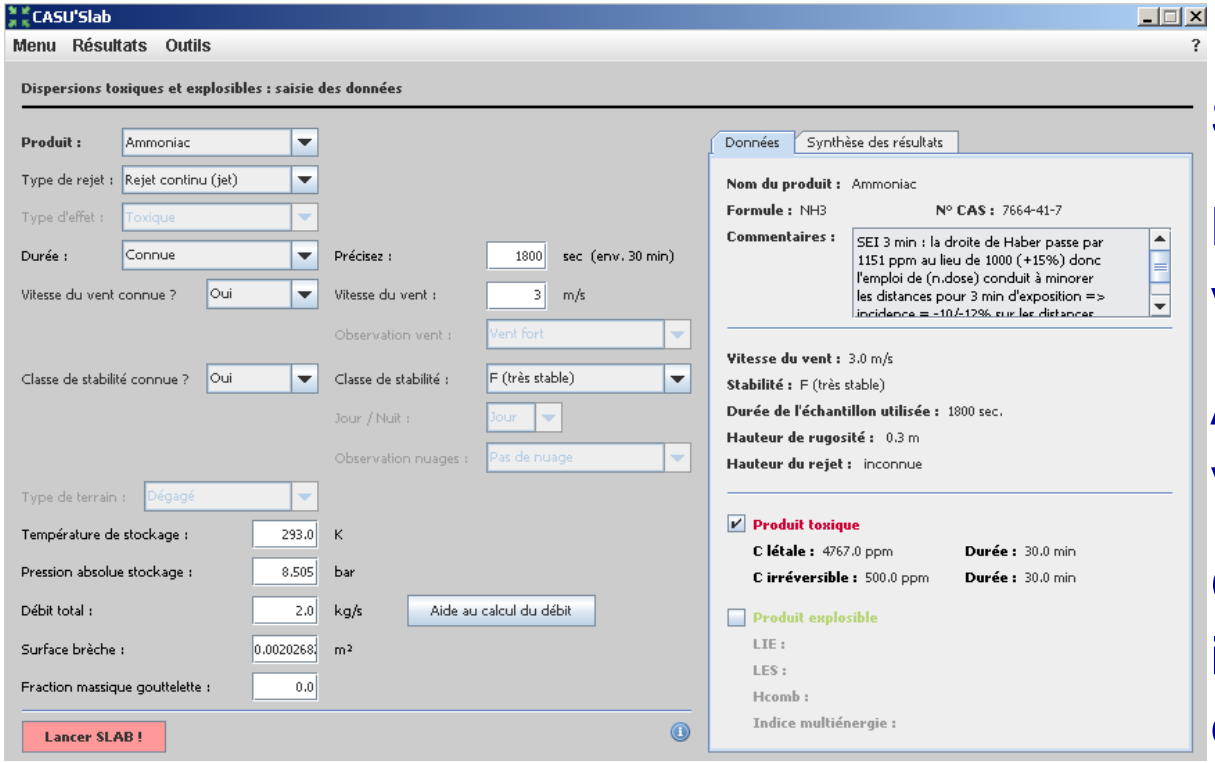
Prohectiles	D max 90% projectiles	754 m

- Rapid calculation
- Little information
- No superfluous information
- Can be used by non-experts

Example: evaluation of spread after a BLEVE (1 to 3 questions to outline the situation)

INERIS

Development of dedicated tools
Atmospheric dispersion: CASUSlab



- Integral open model: SLAB
- Based on observable variables
- Always has a default value
- Output: spread of impact (not a concentration)

INERIS

Post-accident or post-incident responses

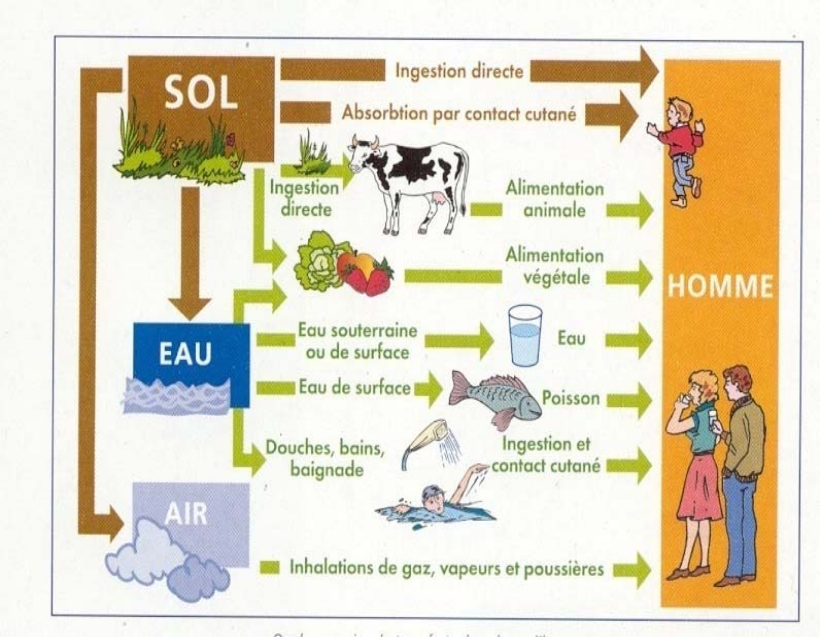
Lessons learnt from "environmental catastrophes": not including rescue, emergency first aid and repair of the most visible environmental and health-related damage

→ **be mindful of delayed consequences on human health and the environment**

Accident of technological origin: fire, explosion, loss of containment of liquid or gaseous effluents, serious malfunction of a recovery system.

Consequences:

→ Dissemination of **persistent dangerous** substances (Dioxins, PCB, PAHs etc.)



All natural environments can be affected: air, water, soil, vegetation

Numerous routes of exposure for humans:

→Direct

→Indirect

INERIS

Action to be taken (1)

Act as quickly as possible when the event occurs:

→ **Fine-tuned characterisation and evaluation** of the environmental and health-related impact of the incident,

→ Taking **measures of control** to be implemented to **limit delayed impact** of the incident.

→Involve the industrial firm in the implementation as soon as possible (polluter pays principle)

Action to be taken (2)

When to act: From the emergency phase or immediate monitoring (as long as there is an environmental input)

→Anticipate the set-up of a post-incident response (The first investigations are determining factors in the evaluation of potential effects, in the medium and/or long-term after a technological incident)

What to do and why: Have samples collected and conserved for subsequent analysis (according to the nature of the accident, source, response time, routes of exposure taken into account)

- → Characterise the potential impact area/control area
- → Identify any immediate risks for the population (contamination of fruit and vegetables)
- → Identify any delayed risks for the population (contamination of forage crops and grasses which may be passed on to milk or eggs)
- → Characterise the pollution prior to the incident (high local background noise)

INERIS

Action to be taken (3)

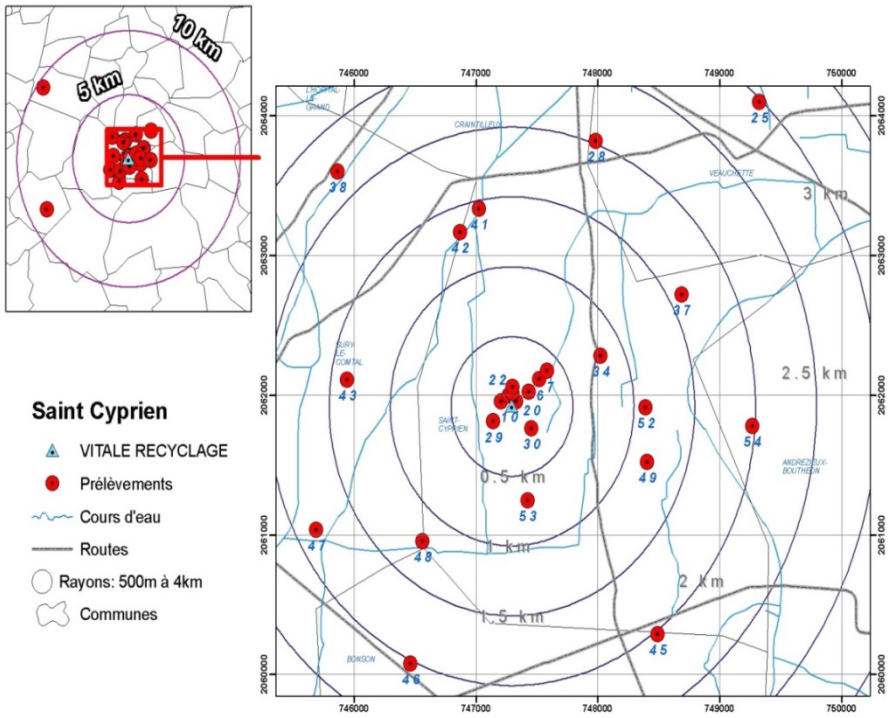
How to proceed:

Emergency situation or immediate monitoring: Call the CASU (+ 33 (0)3 44 55 69 99) for technical support on: what to sample, where to sample, which matrices, which pollutants, who can take samples etc.

Post-accident phase: The CASU may be the first point of contact before INERIS and redirection to the competent DRC services to:

→ Fine-tuned characterisation of the scope of the impact area
→ Interpreting the state of the environments
→ Evaluating health risks
→ Identifying liability

Example: St Cyprien case
Determination of the scope of consequences



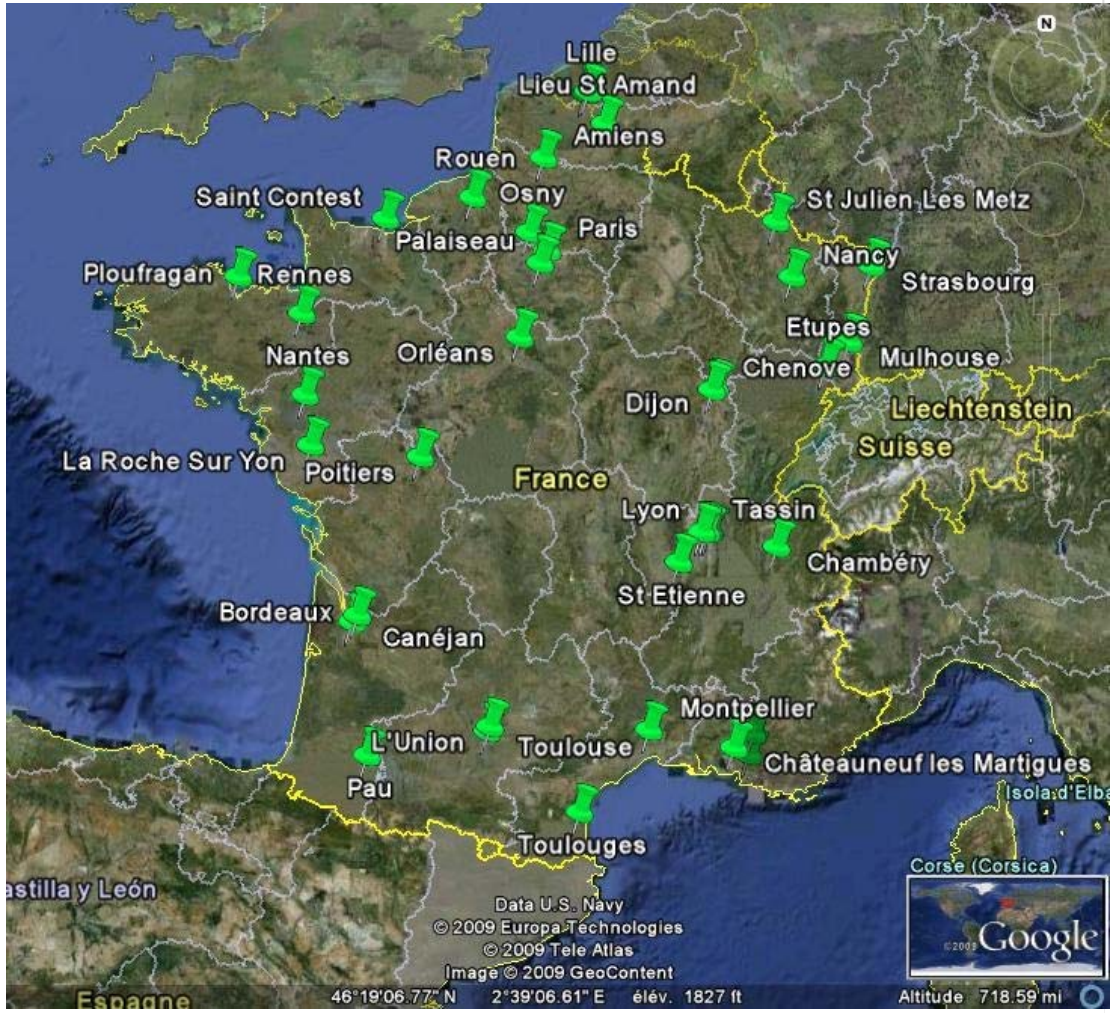
Post-incident players (sample-takers and analysts)

-256 organisations contacted through a questionnaire

-Selection according to the COFRAC list and the number of matrices analysed

-Network of Post-accident Partners (**RIPA**): acceptance of a charter

-Names of the organisations indicated by the CASU



Questions?

Thank you for your attention

Jean-Martin VINCENT, CASU Operations Manager

jean-martin.vincent@ineris.fr

INERIS