



**9th International SedNet
Conference 23 - 26 Sept. 2015
Krakow POLAND**



**Solving societal challenges :
working with sediments**

**Concrete achievement containing
dredged sediment carried out under of
« Sédimatériaux » approach
in Nord-Pas de Calais region**

Dr. /Eng. Samira BRAKNI

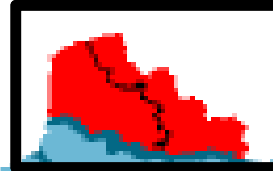


Origin

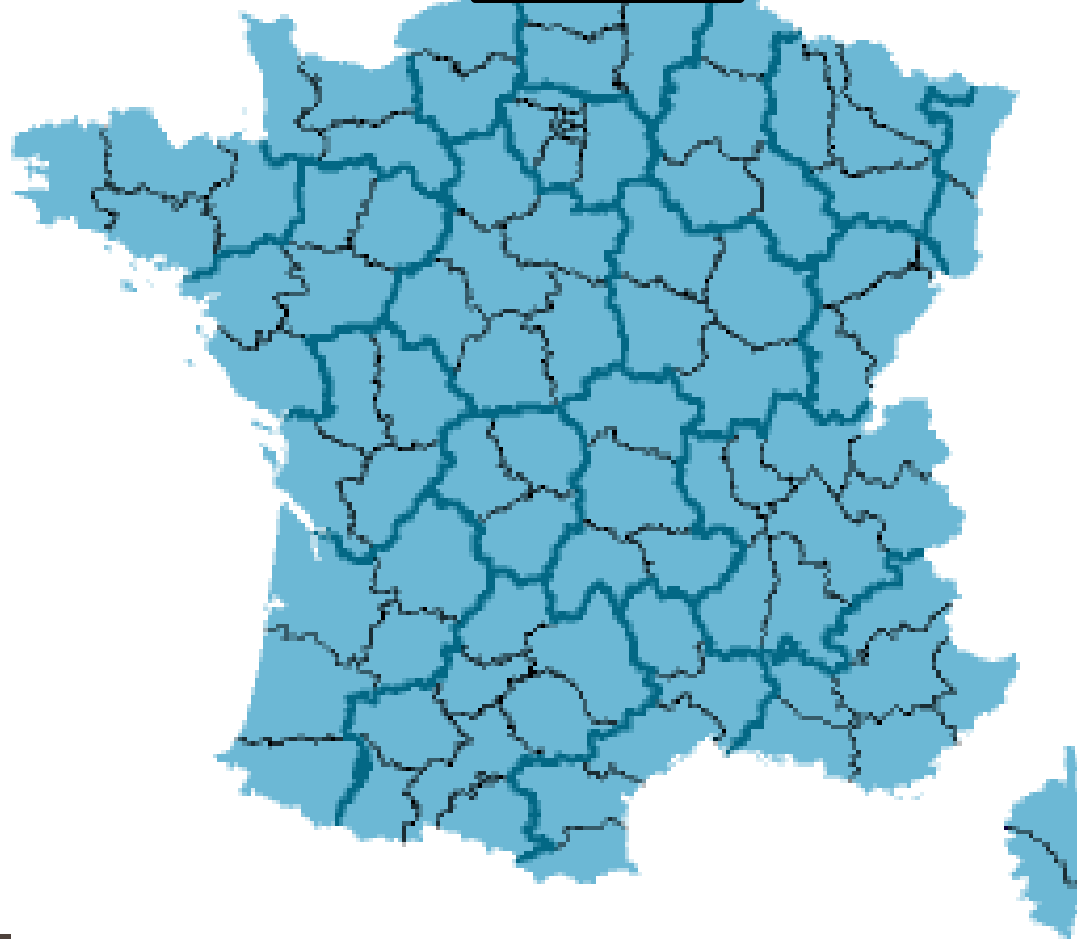
Sédimentaires?

Output

Conclusion



Nord Pas de Calais





R & D
1998 – 2009



**1st Sediment National Days
In Lille 2007**
Prevention and management of port
and waterways dredged sediments



Initiative of Nord-Pas de Calais stakeholders
proposition an appropriate and dimensioned answer to
the problem and to identified issues.



Meetings Ministry of Ecology
in March and Dec. 2008

Study period continued until signing a Charter
June 2009

SÉDIMATÉRIAUX APPROACH

**«Sédimentaires »
approach charter**

Cooperation project on a national scale for the emergence of beneficial fields of harbors and rivers dredged sediment

«SEDIMATERIAUX includes performing in an environmentally controlled framework, **several operational structures**, limited but significant scale, **incorporating port and river dredged sediment**»

Signed in june 2009 by :

**Ministry of Ecology,
Sustainable Development,
Transportation and Housing**



le et de

**Regional Council
Nord-Pas de Calais**



**Prefecture of the
Nord-Pas de Calais**



**«Création Development
Eco-Entreprises»**



Hight School of Mines Douai



Charter- Context on port and river sediment

A problematic inventory:

- *Huge volumes, In France :*
Ports in 50 Mm³,
Rivers 6M m³
Dunkirk Port : 4 Mm³ (1 cm
sedimentation per day)
- *Dredging and dumping
requirements at sea well
regulated legally*
- *Need to clarify the regulatory
framework of on land Sediment
management*

**Therefore, sediment
management currently remains
problematic for contracting
authorities...**

Many and important issues :

- **Environmental Issues** : *transport capacities
by waterways / quality natural aquatic
environments / prevention of floods / alternative
materials*
- **Economic Issues** : *competitiveness of ports /
development courses / activities related to
transport waterways*
- **Social and societal challenges** : *Management
NIMBY phenomenon / employment sectors and
activities...*

All issues determine an interest

Charter- Main objectives (p.6 charter)

«Sédimentaires » approach charter

**Cooperation project on a
national scale for the
emergence of beneficial fields
of harbors and rivers dredged
sediment**

1. To produce operational tools to harbor and river managers,
2. To produce data relevant to the changing regulatory framework to supply the work and investigations of Ministry,
3. To emerge and consolidate the national level of new economic fields treatment and sediment management,
4. To create conditions for sustainable sharing of experiences and the capitalization of knowledge,
5. To encourage innovation and structure the development of R&D.

Productions under Sédimentaires approach

GES

« Sédimentaires » approach charter

Cooperation project on a national scale for the emergence of beneficial fields of harbors and rivers dredged sediment

Label ...



1. To produce operational harbor management guidelines, **METHODOLOGICAL GUIDELINES...**
2. To produce data relevant to the changing regulatory framework for the enrichment of work and investigations of Ministry, **10 PROJECTS..**
3. To emerge and consolidate the national level of new economic fields treatment and management, **FIELDS tested...**
4. To create conditions for sustainable sharing of experiences and the organization of knowledge, **SEDILAB Ressource Center**
5. To encourage innovation structure the development of R&D, **EcoSed, THESIS...**

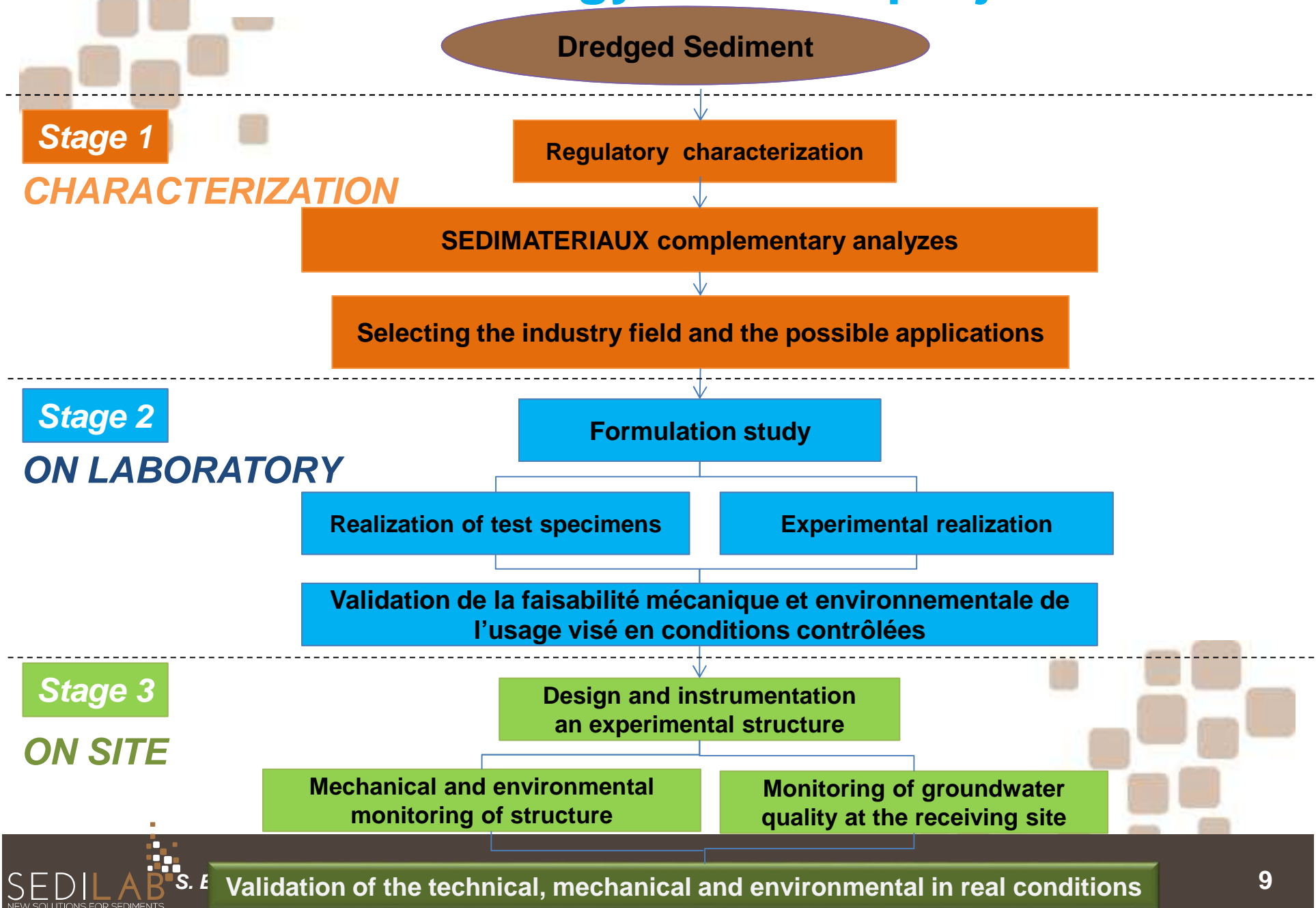
Productions under Sédimentaires approach

1. **Methodological guideline for characterization of dredged sediment**
2. **Methodological guideline for beneficial reuse of dredged sediment in road construction**
3. **Methodological guideline for beneficial reuse of dredged sediment in concrete**
4. **Methodological guideline beneficial reuse of dredged sediment landscaping**

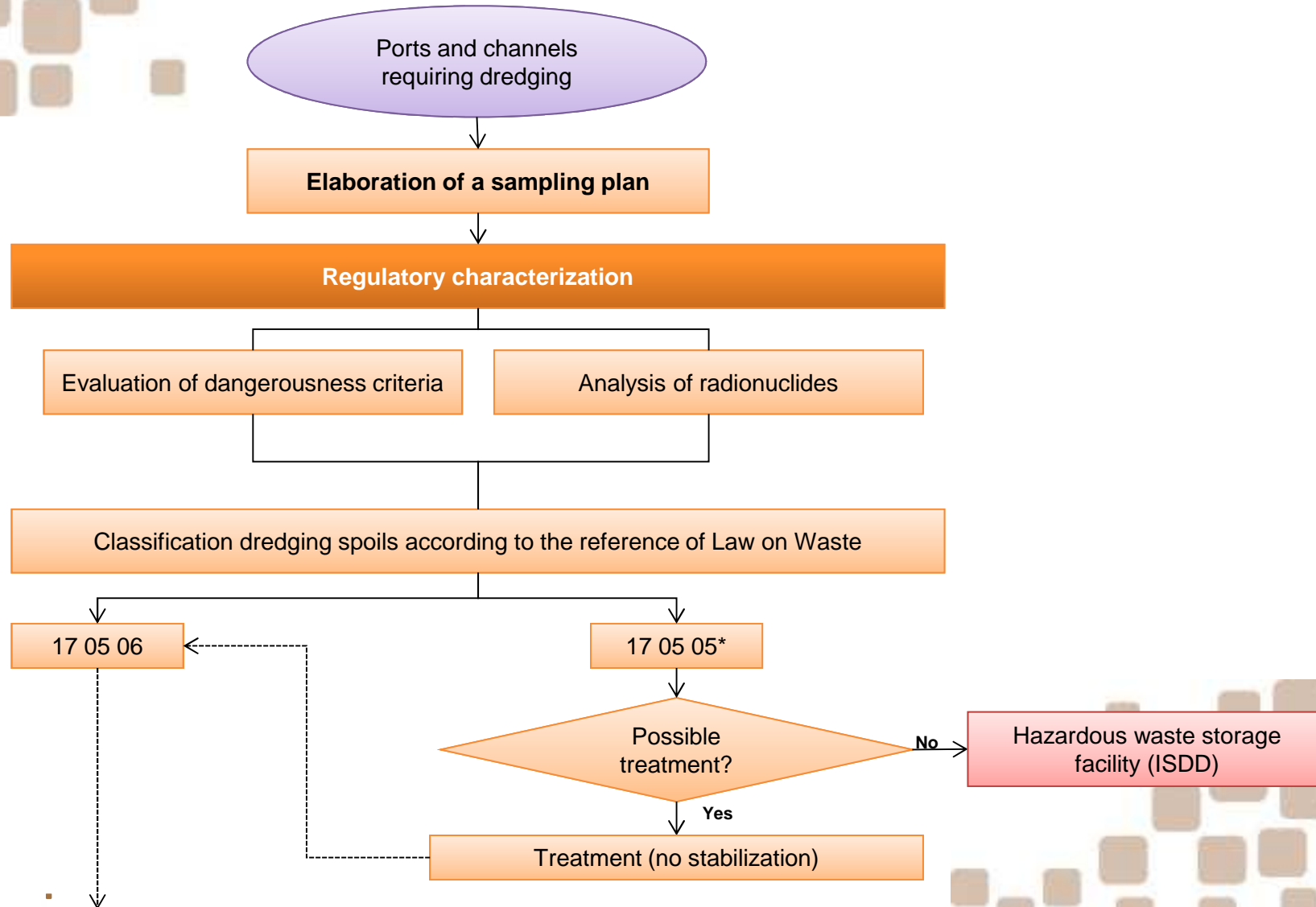
summaries of these guides are available on the website in the section “guides Sédimentaires”

<http://www.sedilab.com/FR/Guides-Sedimateriaux-20.html?PHPSESSID=461scejpilf1m04em06mpsjr2>

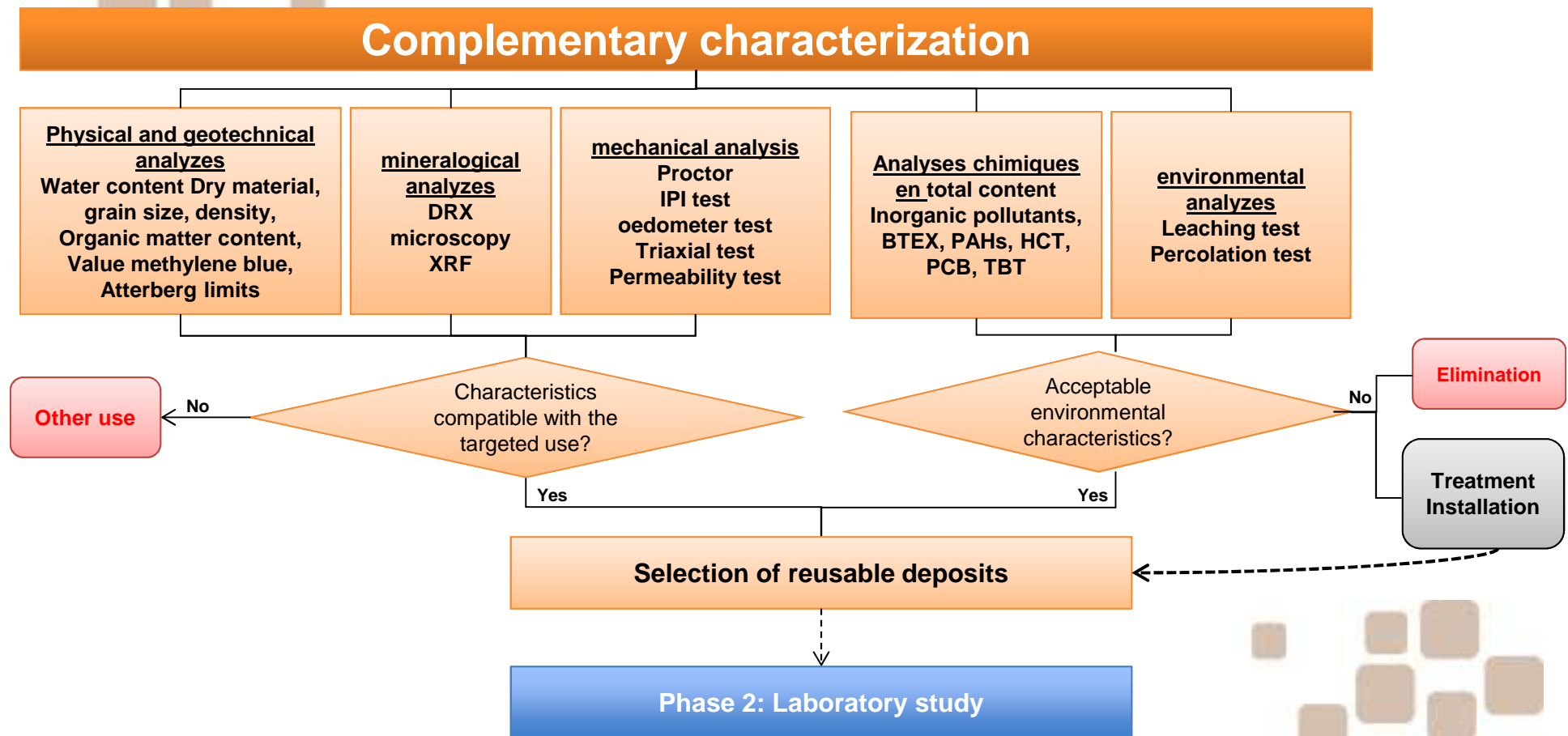
Methodology used for projects



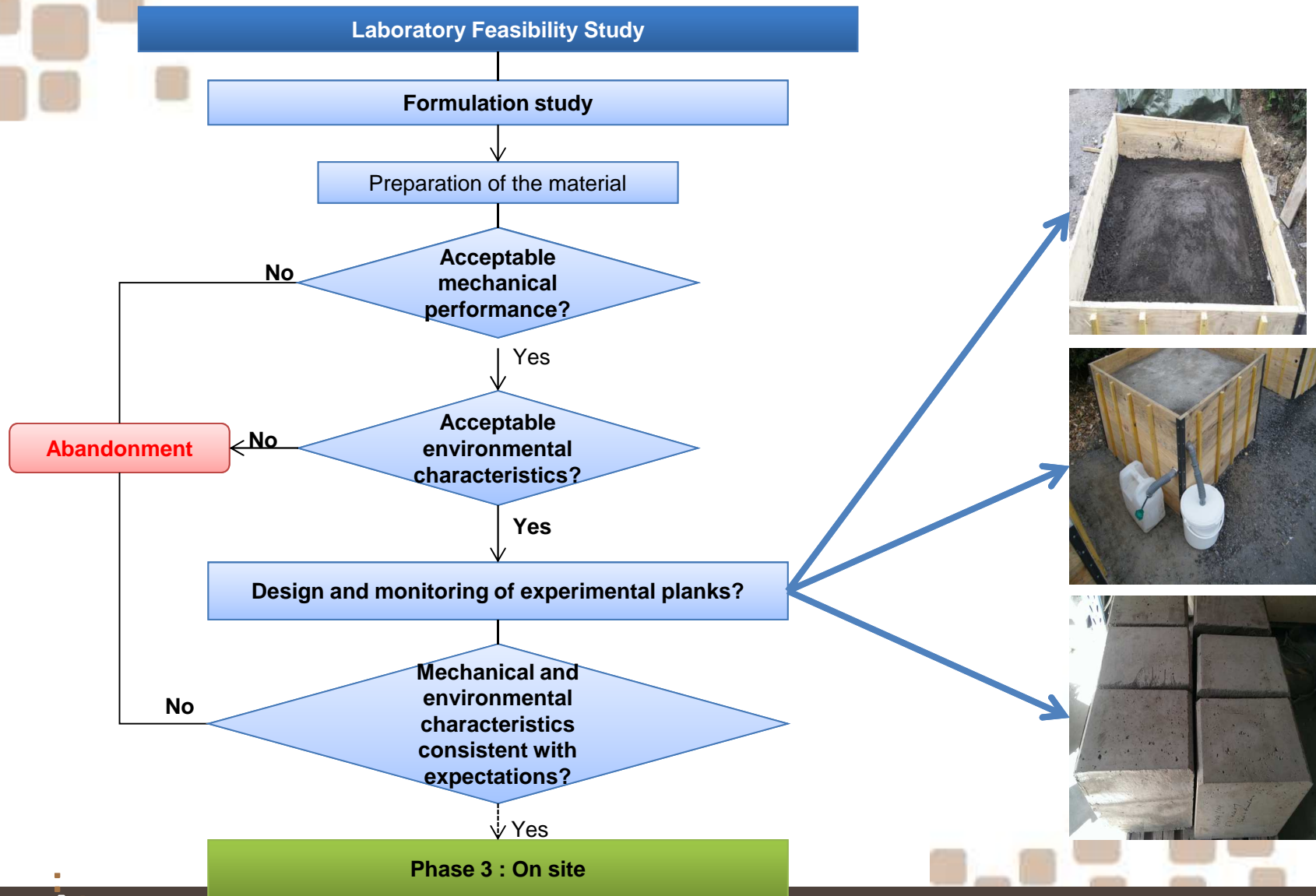
Stage 1 : Characterization (1/2)



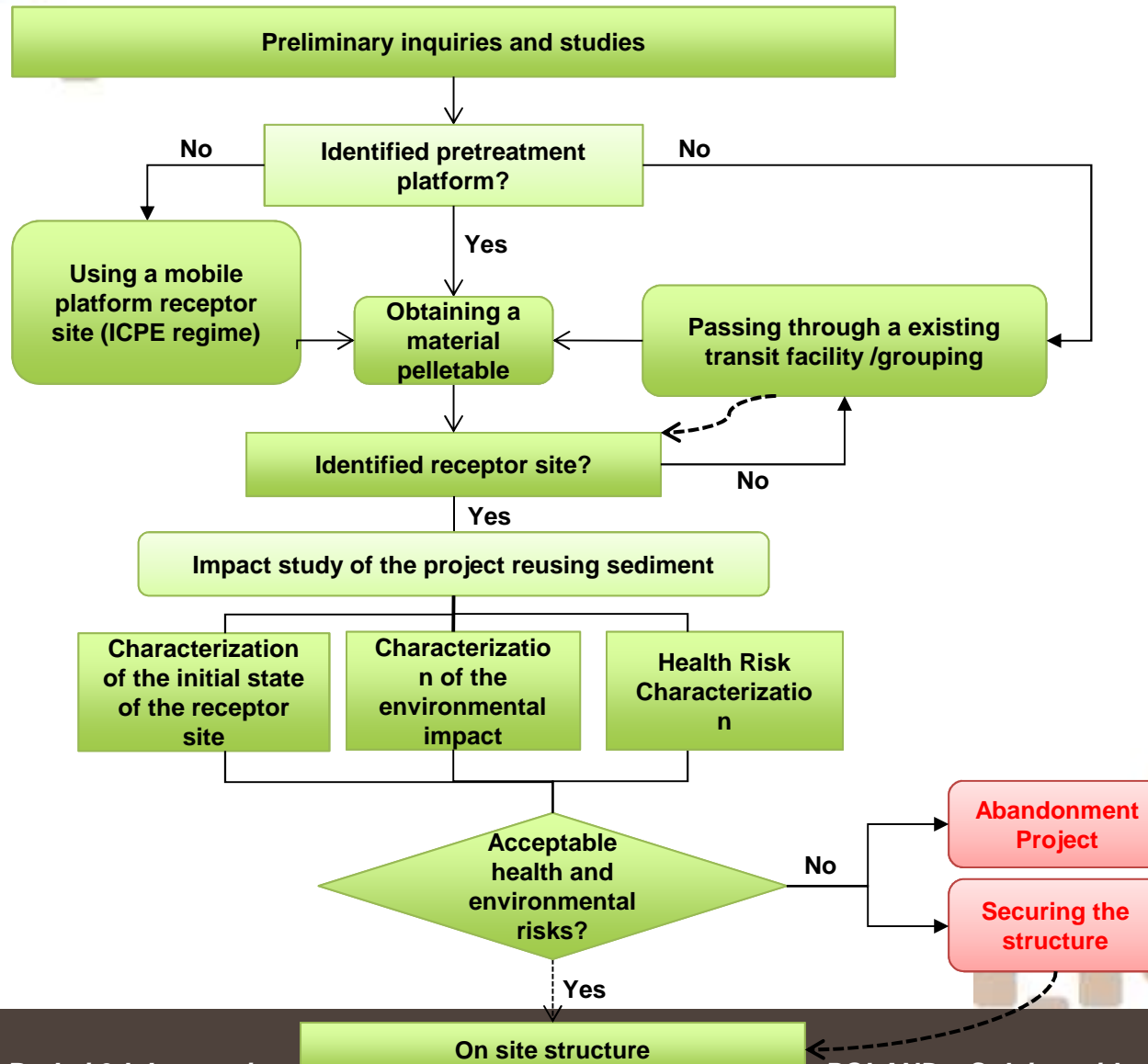
Stage 1 : Characterization (2/2)



Stage: Laboratory (1/1)



Stage 3 : On site (1/2)



Stage 3 : On site (2/2)



Origin

Sédimentaires?

Output

Conclusion

Groupe Experts Scientifiques (GES)

<u>Expert</u>	<u>Skills</u>	<u>Institution</u>
Nor Edine ABRIAK	Méthodologie de caractérisations et de traitements des sédiments	Mines Douai
Rémi BARBIER	Aspects sociétaux, sociologie	ENGES Strasbourg
Christelle BONNEMASON-CARRERE	Contaminations, ultra-traces, environnement	Université de Pau
Jean-Pierre GOURC	Sciences des déchets, géotechnique	Université de Grenoble
Pascal GREGOIRE	Expérimentation opérationnelle, environnement maritime	GMP Dunkerque
Bernard HUSSON	Durabilité, valorisation, environnement	Université de Toulouse 3
Isabelle CHARLES	Matériaux routiers- Essais vraie grandeur	CEREMA Rouen
Daniel LEVACHER (Chair)	Aspects matériaux, unités techniques, valorisation	Université de Caen
Muriel MAILLEFERT	Sciences humaines et sociales, économie de l'environnement, risques, politiques publiques	Université de Lille 3
Françoise QUINIOU	Ecotoxicologie, dangerosité, évaluation des risques	CEREMA Brest
François GARRIDO	Bio-géochimie, risques, dangerosité, contamination	BRGM Orléans

The Scientific Experts Group, called GES, is constituted for scientific questions, technical, socio-economic and legal under the Sédimentaires approach.

Projects reusing dredged sediment

- First thesis supported under **SEDIMATERIAUX Raouf ACHOUR**
- Length: 700 m Width: 7m, thickness = 41 cm (including 30cm treated sediment)
- Sub-base: harbor sediments + dredged sand + hydraulic lime binder)
- Environmental monitoring with piezometer
- 15 years
- Constructed in 2012 by: Colas
- 100 trucks per day

Freycinet 12 road



Origin

Sédiments? Sédimentaires?

Output

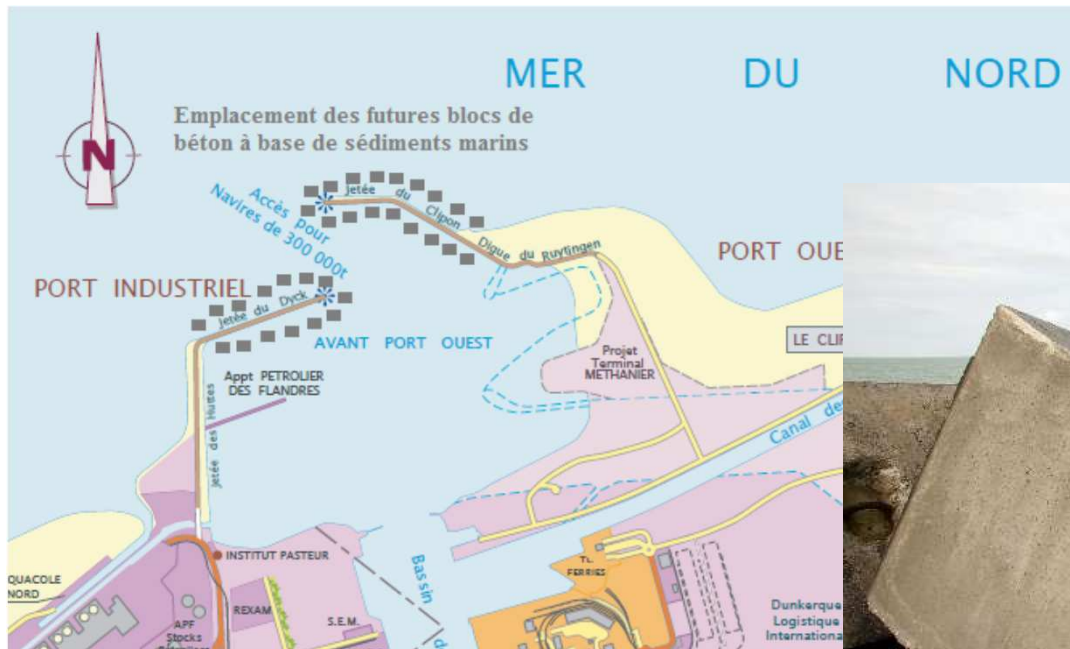
Conclusion

Projects reusing dredged sediment

Blocks to strengthen dikes



- Raouf ACHOUR thesis (2013)
- Manufacture of a hundred blocks of 10 tons (12 to 20% of sediment)



Origin

Sédimentaires?

Output

Conclusion

Projects reusing dredged sediment

Landscaped bund



Second under Sédimentaires thesis of Issamedine KHEZAMI (2014)

Length: 500m

50 000 m³ of dredged sediments

Specialized vegetation: *Salix repens*, *Sambucus nigra*, *Hippophae rhamnoides*, *Acer campestre*

Cover with topsoil of 25 cm

Environmental monitoring: 5 piezometers

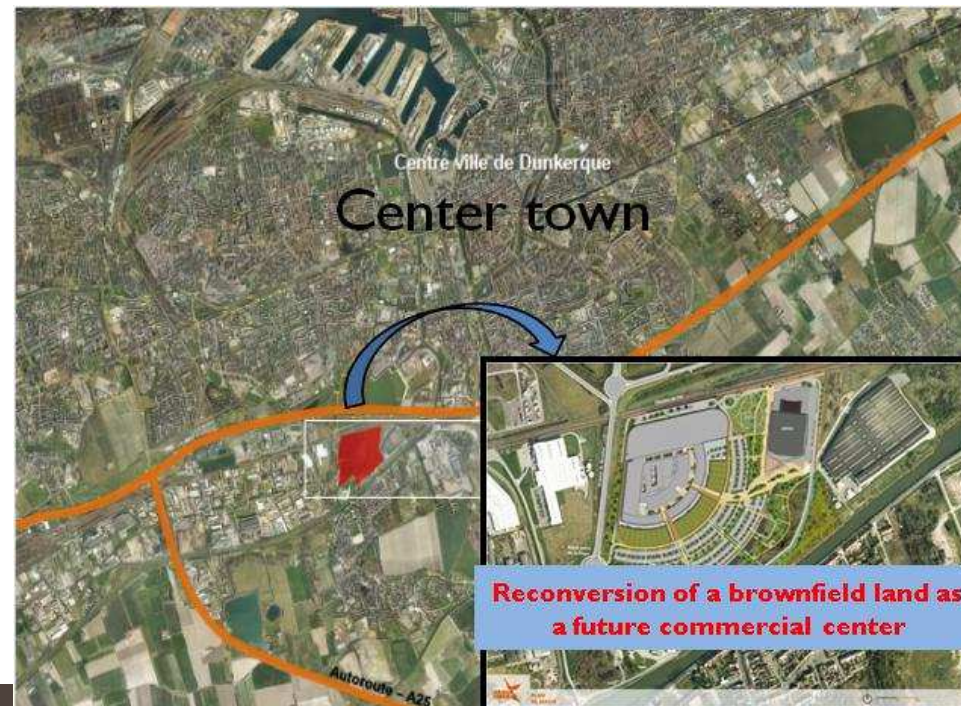
Mechanical monitoring



Projects reusing dredged sediment

SEDICYCLE

- Realisation of concrete bike path formulated with harbour sediment from Dunkirk port
- Development project with a strong territorial dimension



Reconversion of a brownfield land as a future commercial center

Origin

Sédiments?

Output

Conclusion

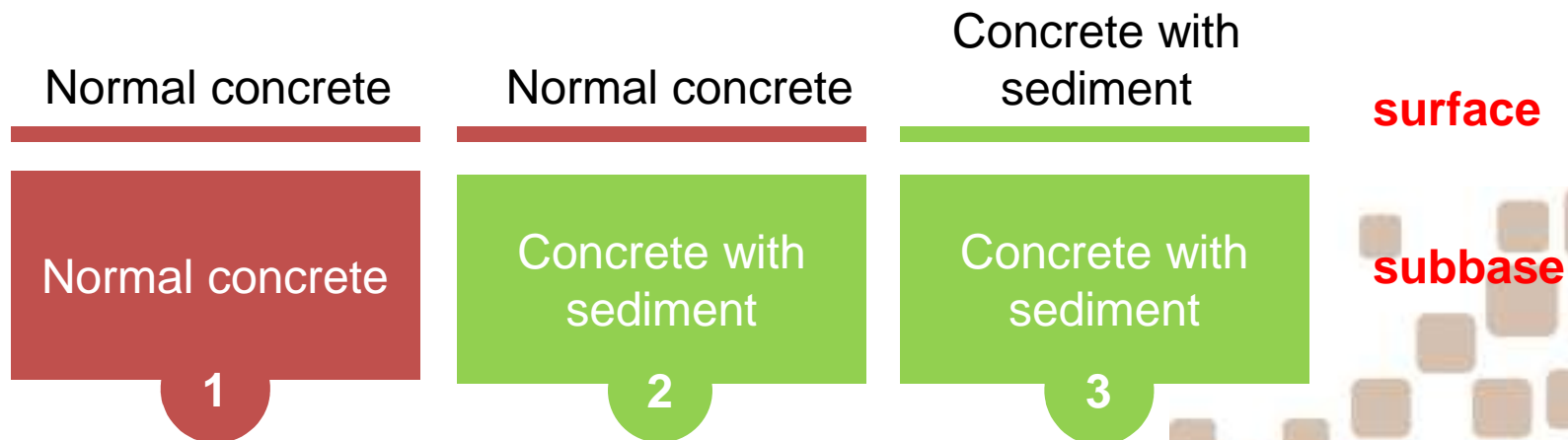
Projects reusing dredged sediment

SEDICYCLE

- What properties of studied sediment compared to granular materials usually used in concrete ?
- What compatibility for concrete formulation ?

Fundamental objectives:

Find a compatible formulation (economic and sustainable) +
Durability + Physical/Mechanical/Environmental monitoring on site



Origin

Sédiments? Sédiments?

Output

Conclusion

Projects reusing dredged sediment

SEDICYCLE

3 experimental pilot of cycle path Containing the sediment
SEDICYCLE project



Origin

Sédiments?

Output

Conclusion

Projects reusing dredged sediment

Reuse of dredged sediment on coastal engineering



Coastal engineering application will be studied in the project

Aggregate

Concrete

backfill

Acropodes

Grout

Origin

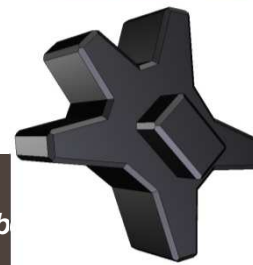
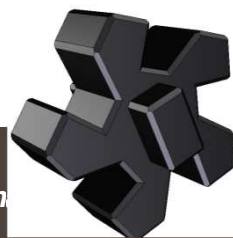
Sédiments?

Output

Conclusion

Projects reusing dredged sediment

Concrete rockfill for riverbank stabilization



Origin

Sédiments?

Output

Conclusion

Projects reusing dredged sediment

- Selfcompacting grout
- Non structural concrete for roadway reservoir



neo-eco
Recycling
PROCESS ENGINEERING



Selfcompacting grout



Non structural concrete for roadway reservoir

Origin

Sédiments?

Output

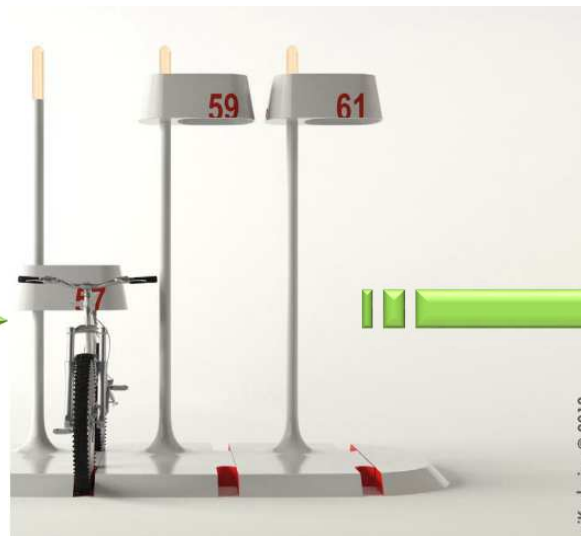
Conclusion

Projects reusing dredged sediment

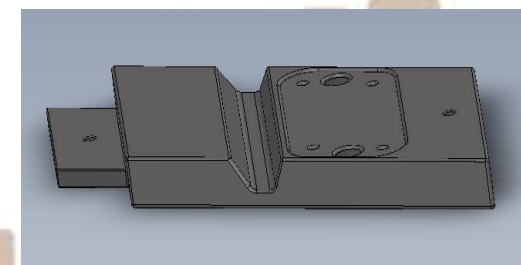
Urban furniture- C'URBAN



Association of 3 wastes



terminal for bike
OCTAVE



Origin

Sédiments? Sédiments?

Output

Conclusion

Projects reusing dredged sediment

Feasibility study of reuse lake sediment of Parc Barbieux



- No dredging for 100 years
- Total sediment volume: 10,760 m³
- Very humic sediments



Localisation des points de sondage

Origin

Sédiments? Sédimentaires?

Output

Conclusion

Projects reusing dredged sediment



CO-VALORIZATION of SEDIMENTS



⇒ Eco-innovation program : ECOTECH

⇒ Accredited by the Ministry of Industry and productive recovery

⇒ Future recycling platform of sediments in France :

⇒ Dehydrated

⇒ Valorization of uncontaminated sediments



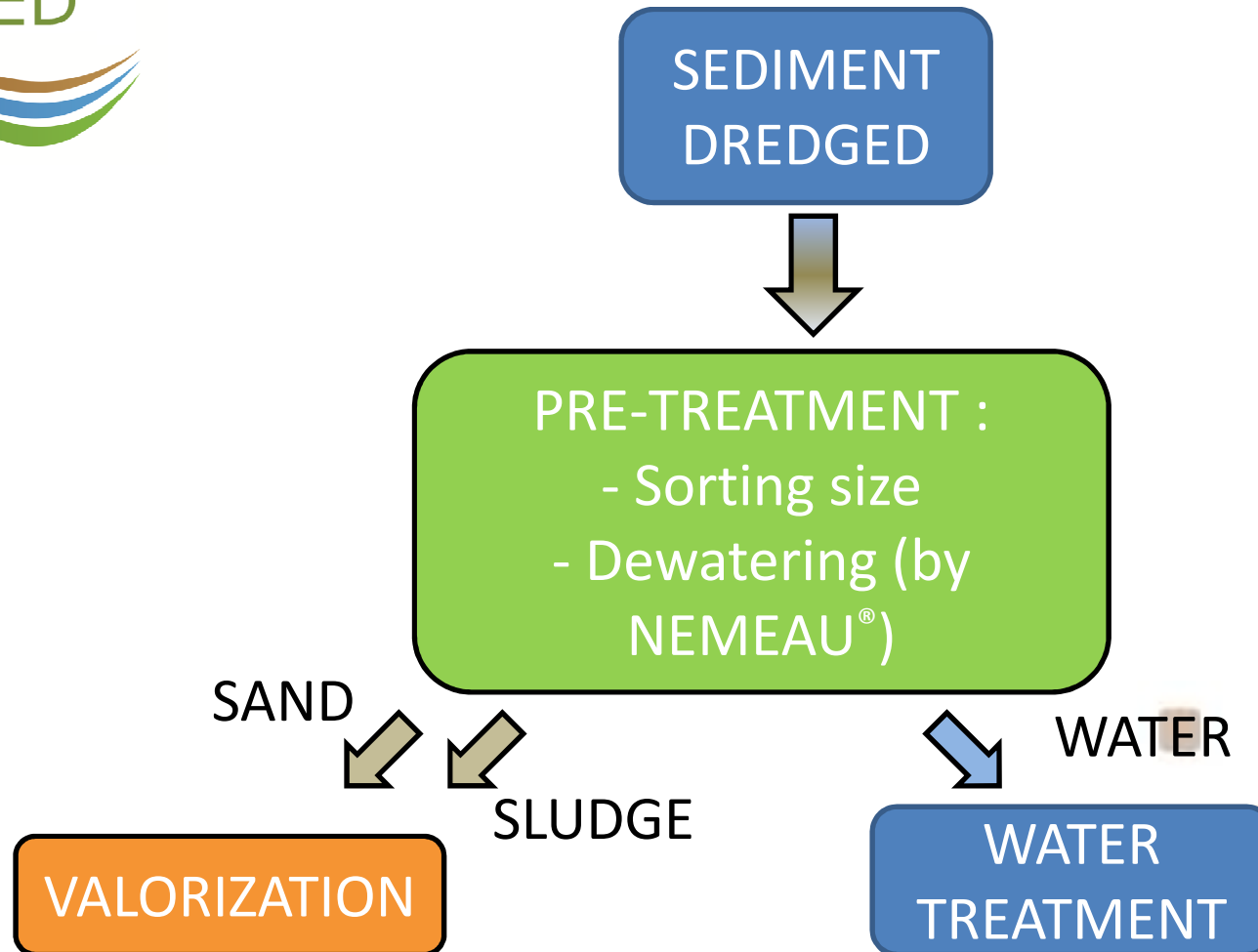
Origin

Sédiments? Sédimatériaux?

Output

Conclusion

Projects reusing dredged sediment



Origin

Sédimentaires?

Output

Conclusion

Projects reusing dredged sediment

- Findings and achievements of Sédimentaires approach at the origin of project
- The interest of cross-border cooperation



Introduction to CEAMaS and the European Resources Center

SEDILAB

SEDiment LABoratory (Resource Center)

SEDILAB? resource center in Europe for the management and beneficial use of sediment.

- Created in the Nord-Pas de Calais region.
- Relies on field actions and concrete achievements made over the last ten years in the Nord-Pas de Calais region.
- Intensifies the work done by the SEDIMATERIAUX approach during 4 years.
- It will function as a laboratory of ideas, research and practical achievements. It will make its resources available to all managers in France and Europe.

5 missions :

1. Monitoring and economic intelligence

2. Support for research and development

3. Development and diffusion of the work of Sedimateriaux approach

4. Training and awareness of institutional and economic actor

5. Communication through web : methodologies and results in France and Europe

Origin

Sédiments?

Output

Conclusion

EcoSed (Economie circulaire Sediment)

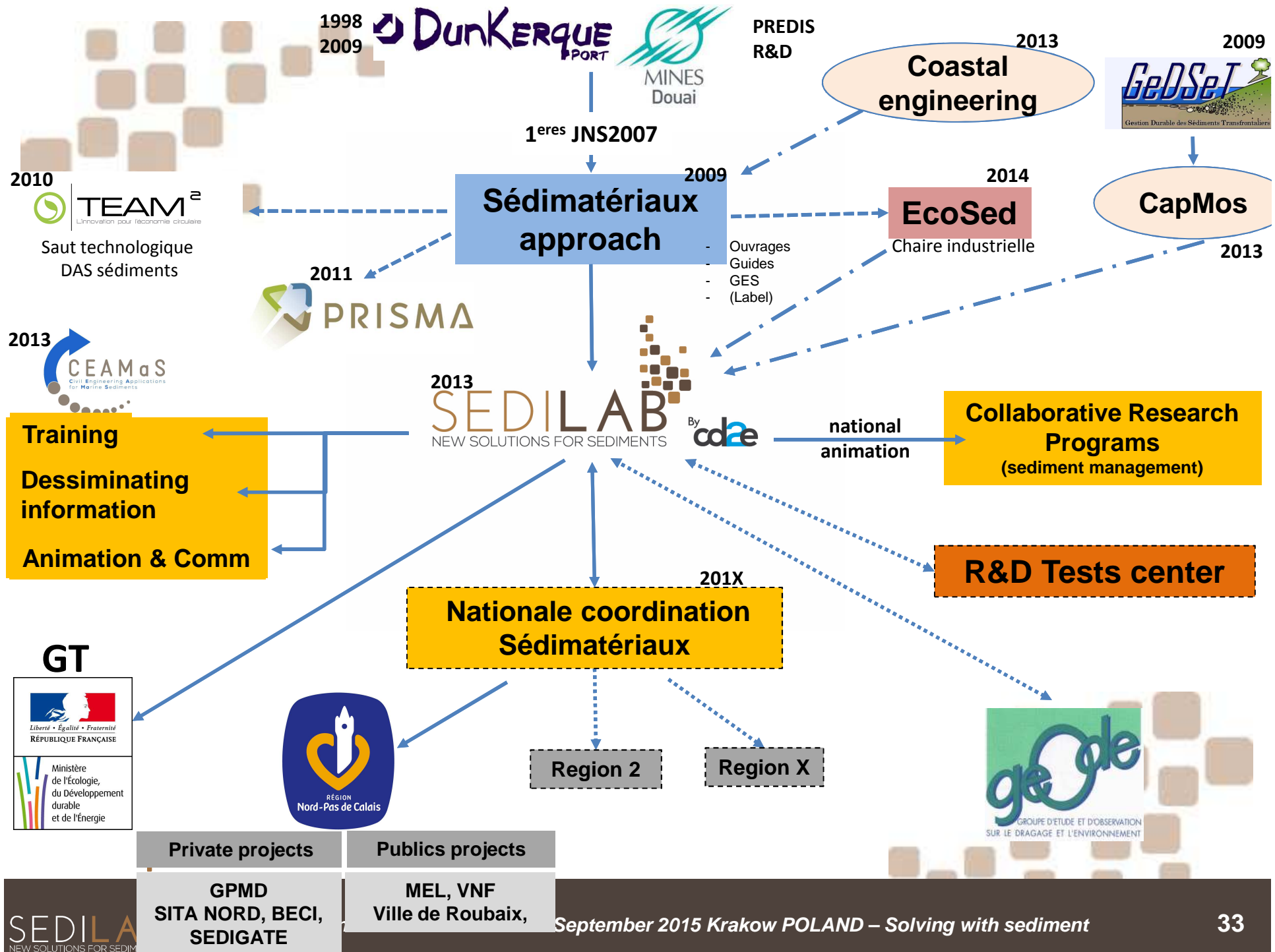
This industrial chair is based on work carried out under SEDIMATERIAUX



- On April 2nd 2014, School of Mines Douai signed the founding act of a research chair with 6 partners
- The aim this chair is to create a dynamic scientific, technological and partnership around the management of port and river sediments for recycling in road construction or concrete products.

A regional dynamic around sediment management ...

- A cluster TEAM² (2010), one of the 3 (specific area of activity) is specifically dedicated to sediment
- A Euro-regional and national resource center on beneficial use and land sediment management referred SEDILAB (2013), carried by CD2E and one of the 5 main missions concerns the national coordination of SEDIMATERIAUX approach
- An Industrial Research Chair dedicated to the valuation of sediment, called EcoSed (2014) and leaded by the Ecole des Mines of Douai,
- European and international dimension of the regional dynamic through many Interreg projects (€ 15.7 million to € 7.7 million operations for European aid) GedSet (2009), PRISMA (2011) and CEAMaS (2013).





SEDILAB
NEW SOLUTIONS FOR SEDIMENTS



By **cd2e**

s.brakni@cd2e.com

www.sedilab.com



RÉGION
NORD-PAS DE CALAIS

cd2e
ACTEUR DE L'ÉCO-TRANSITION

