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Interreg doet grenzen vervagen

INTERREG IV
France - Wallonie - Vlaanderen

Union européenne :
Fonds Européen de
Développement Régional

GeDSeT: Sustainable Management of Waterways sediments in a Transboundary context 2008-2013

PROGRAMME INTERREG IV
FRANCE - WALLONIE - VLAANDEREN 2007-2013

SedNet Conference Lisbon, November 2013

Union européenne :
Fonds Européen de
Développement Régional

Project partners

Waterways operators and public authorities

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CARTE D'EUROPE DU NORD OUEST DES VOIES NAVIGABLES

NORTH-WEST EUROPEAN WATERWAYS MAP

voies navigables de France

680 km of waterways in Nord - Pas de Calais

460 km of waterways in Wallonia

Common issues
- Stategic location
- large volumes, poor quality
- Existing tools

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Key actions in the project

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- Development of a **methodological decision support tool** for the management of waterways sediments in Belgium and Northern France, taking into account:
  - transboundary know-how and constraints
  - sustainable development issues globally

Action 1

- Collect and improve scientific knowledge applicable to waterways management and feed the tool's database, especially on
  - sediment characterisation,
  - contaminant release from in-situ and dredged sediment
  - treatment methods, from mineral processing and phytostabilisation

Action 2

- Mobilise and consolidate research and expertise activities and networks for the acquisition and transfer of know-how

Action 3

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Project structure

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Action 1

Decision support tool:
conception, data consolidation, scenarii and validation

Sediment characterisation

Mineral processing

Phyto-stabilisation

Emissions under water

Emissions at disposal sites

Action 2

Focused research (pollutant stock and transfer, treatment feasibility)

Operators

Industries

Communities

Authorities

Action 3

Stakeholder involvement

Communication

R&D networks

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Sediments: why dredging ?

Navigability purposes (maintain, restore, develop)

Flood prevention

Environmental purposes

in relation with:
- sustainable transport development
- Water Framework Directive issues
- transboundary issues

al

Sediments: current practice

Belgium: temporary storage until sediment can be reused – but reuse is not encouraged by legislation

France: permanent disposal sites but – no clear boundary with hazardous waste disposal sites
– new scheme under development

In relation with

waste status and directives

national regulatory frame

=> management options cannot be harmonised

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Action 1

Development of a **methodological decision support tool** for the management options for waterways sediments in Belgium and Northern France

Coordination : Pascale Michel

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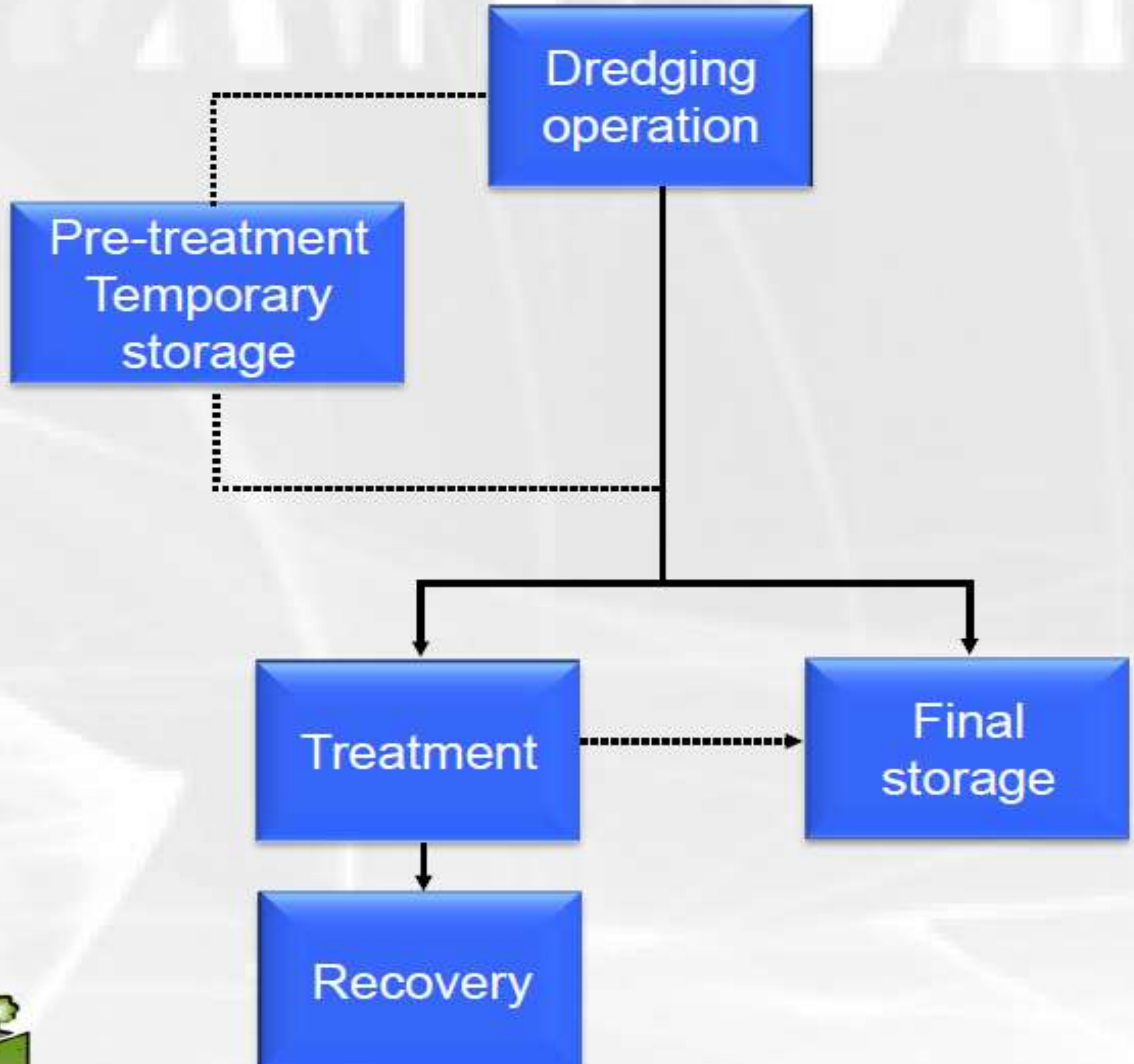
Action 1 - Objectives

- A « what-if » decision support environment
  - to simulate the various consequences of available management options
    - =>ranking action priorities for canals
  - to take into account possible options in Belgium and in France
  - Indirect benefits for options that would not be retained in a local tendering process (widened system boundaries)

=> Exchange and sharing for return on experience between French and Belgian pratice

First step : Identification of key factors from the decision flowchart (simplified)



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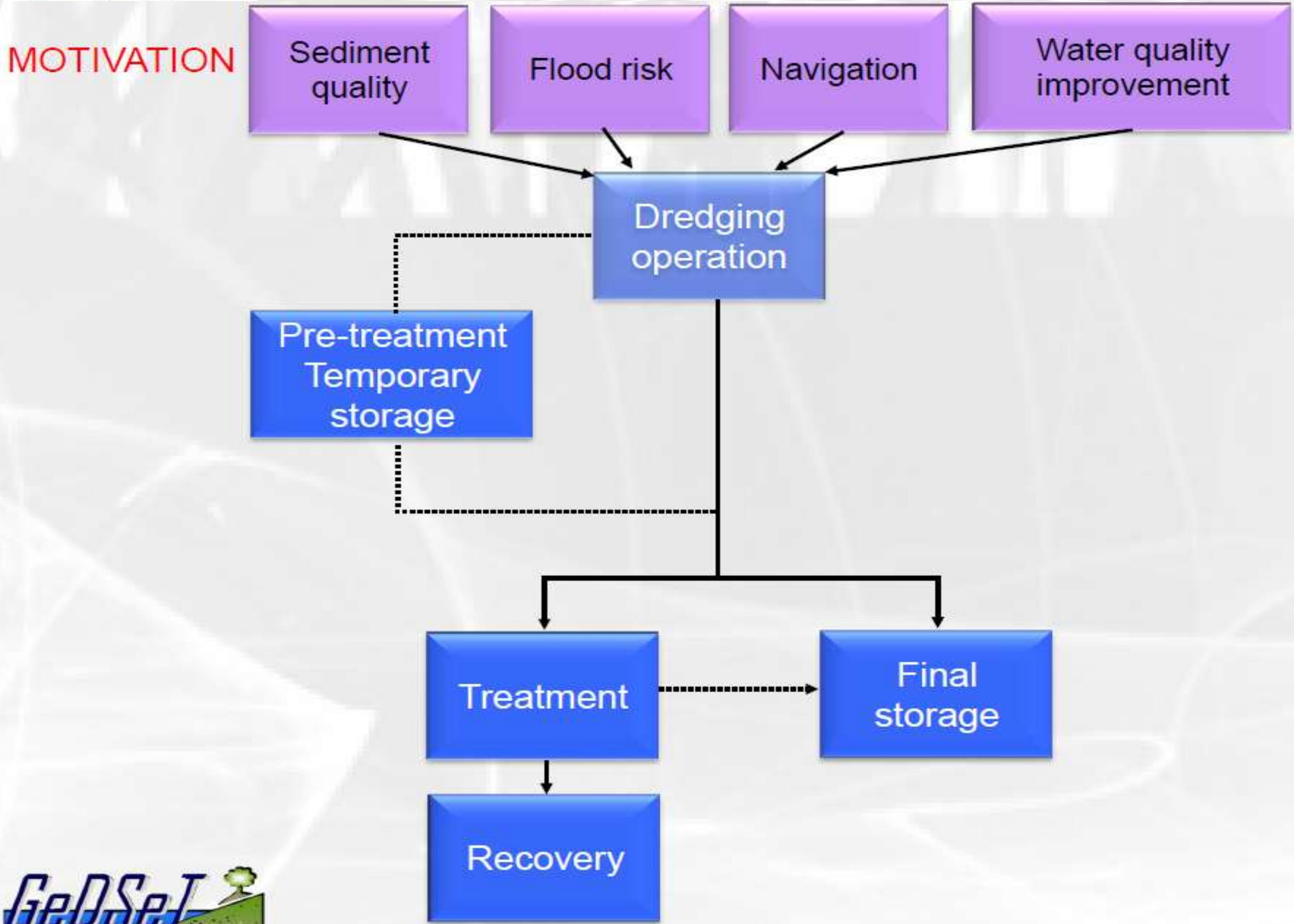

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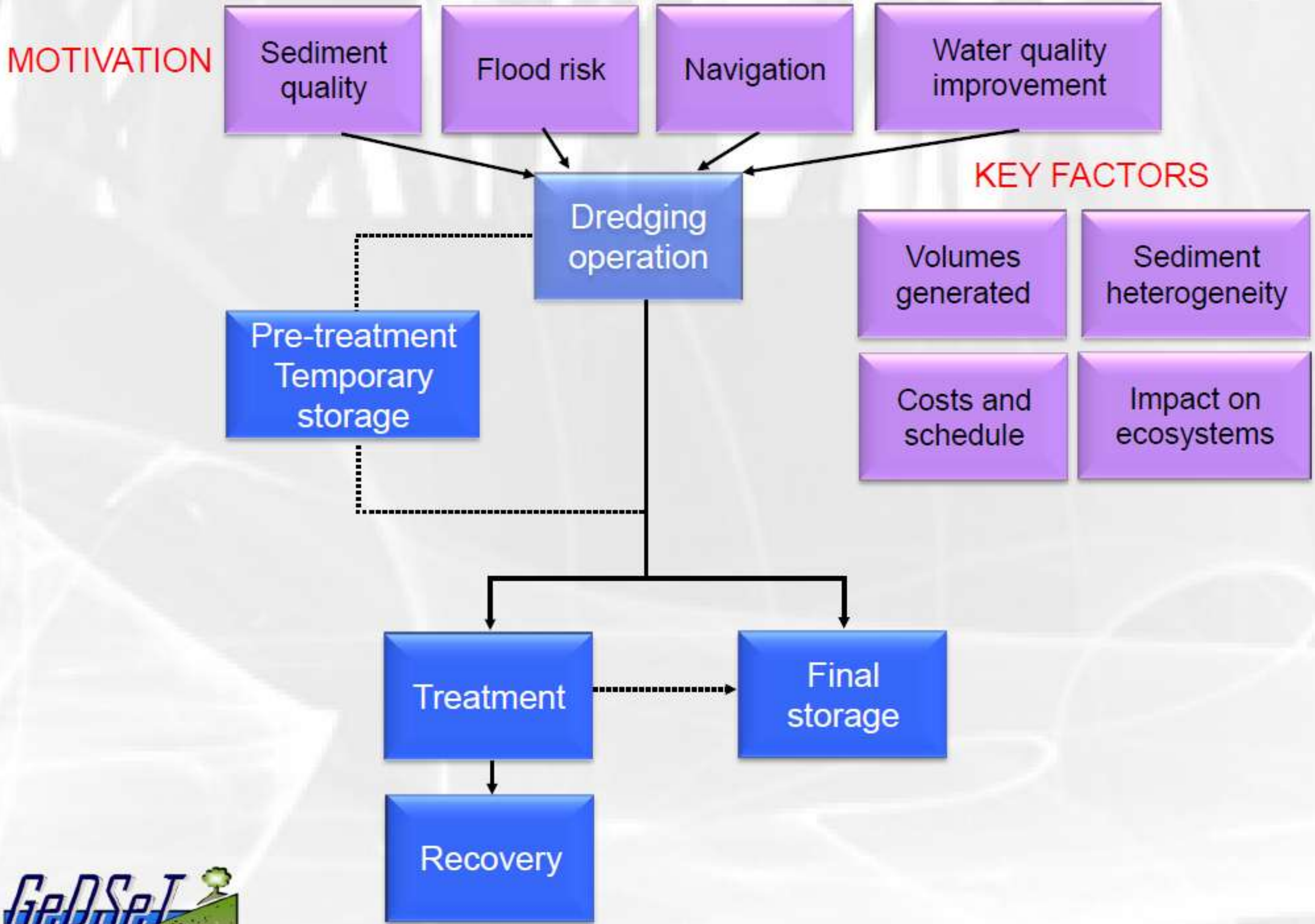

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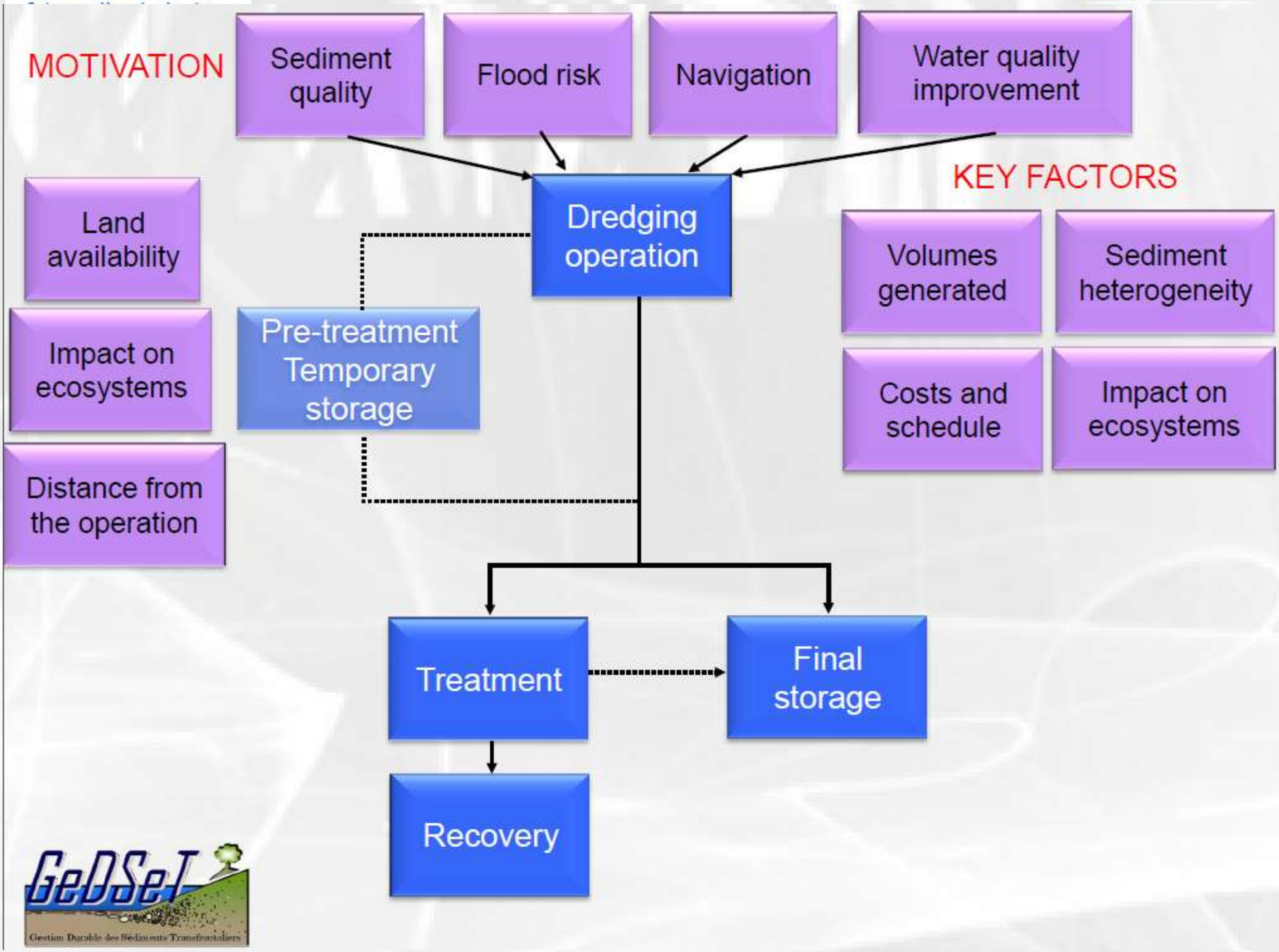
MOTIVATION
Sediment quality
Flood risk
Navigation
Water quality improvement
KEY FACTORS
Land availability
Impact on ecosystems
Distance from the operation
Dredging operation
Pre-treatment Temporary storage
Volumes generated
Sediment heterogeneity
Costs and schedule
Impact on ecosystems
Treatment
Final storage
Recovery
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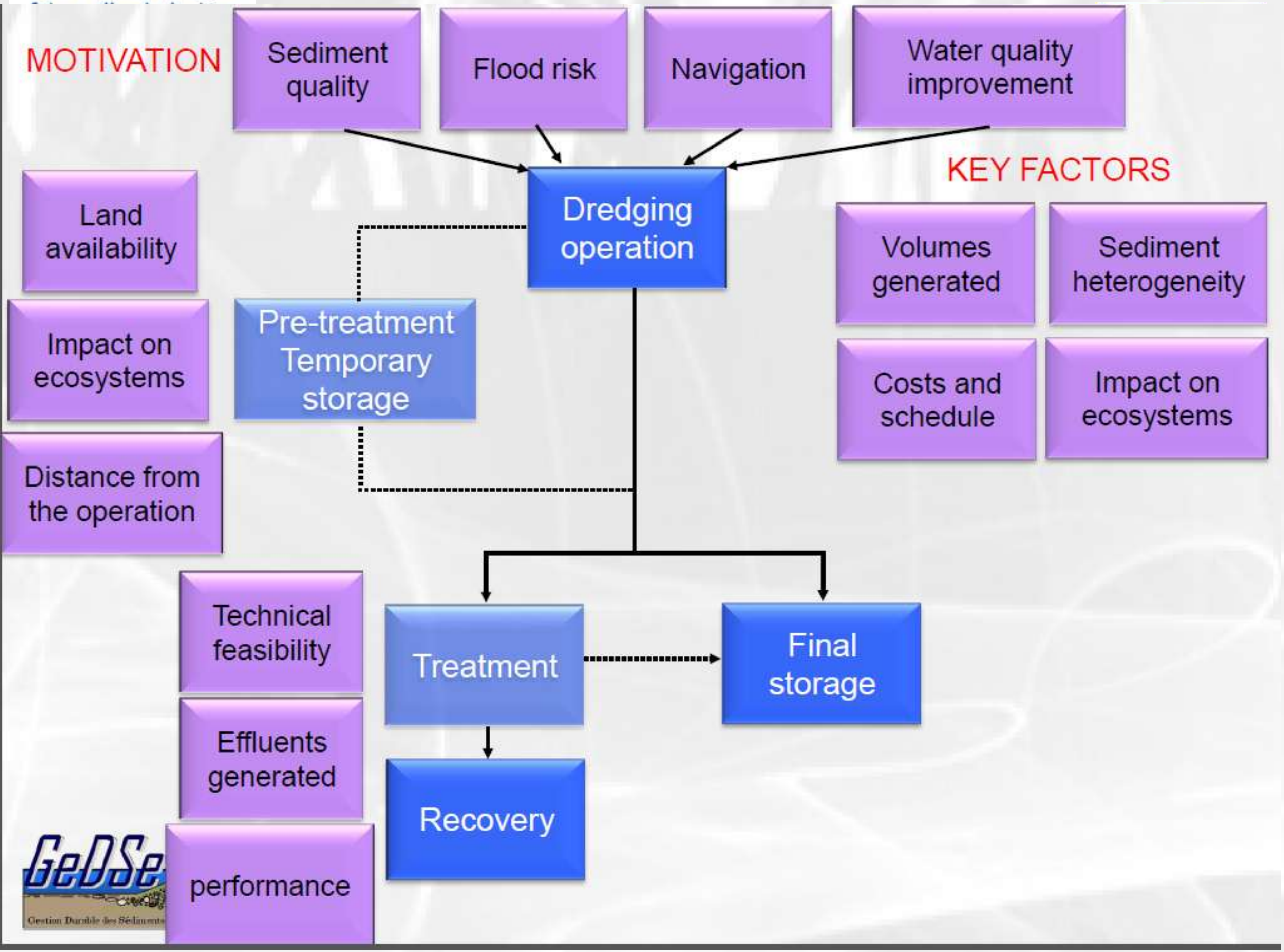
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performance
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GeDSe
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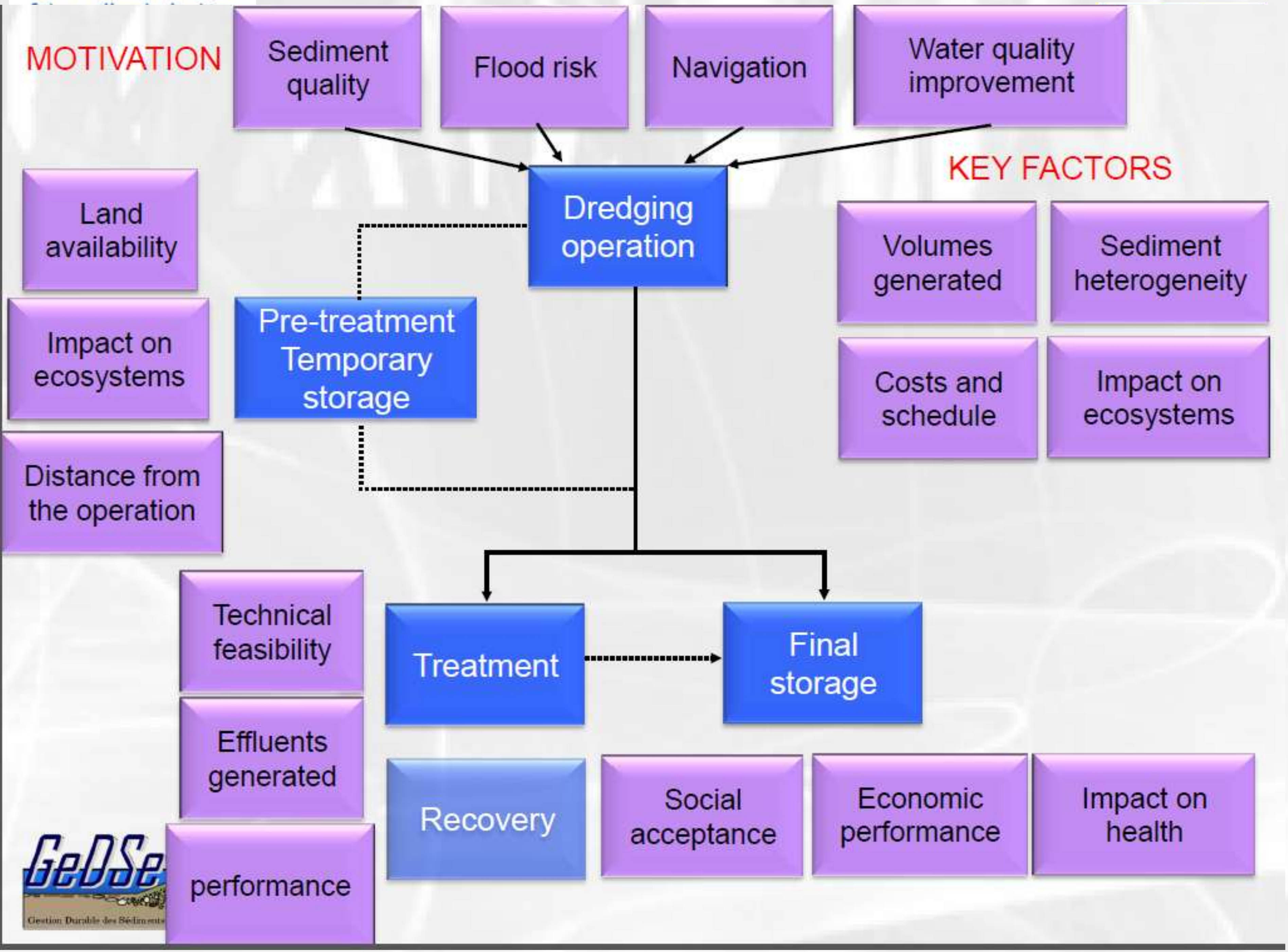
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Technical feasibility
Effluents generated
performance
Treatment
Final storage
Recovery
Social acceptance
Economic performance
Impact on health
GeDSe
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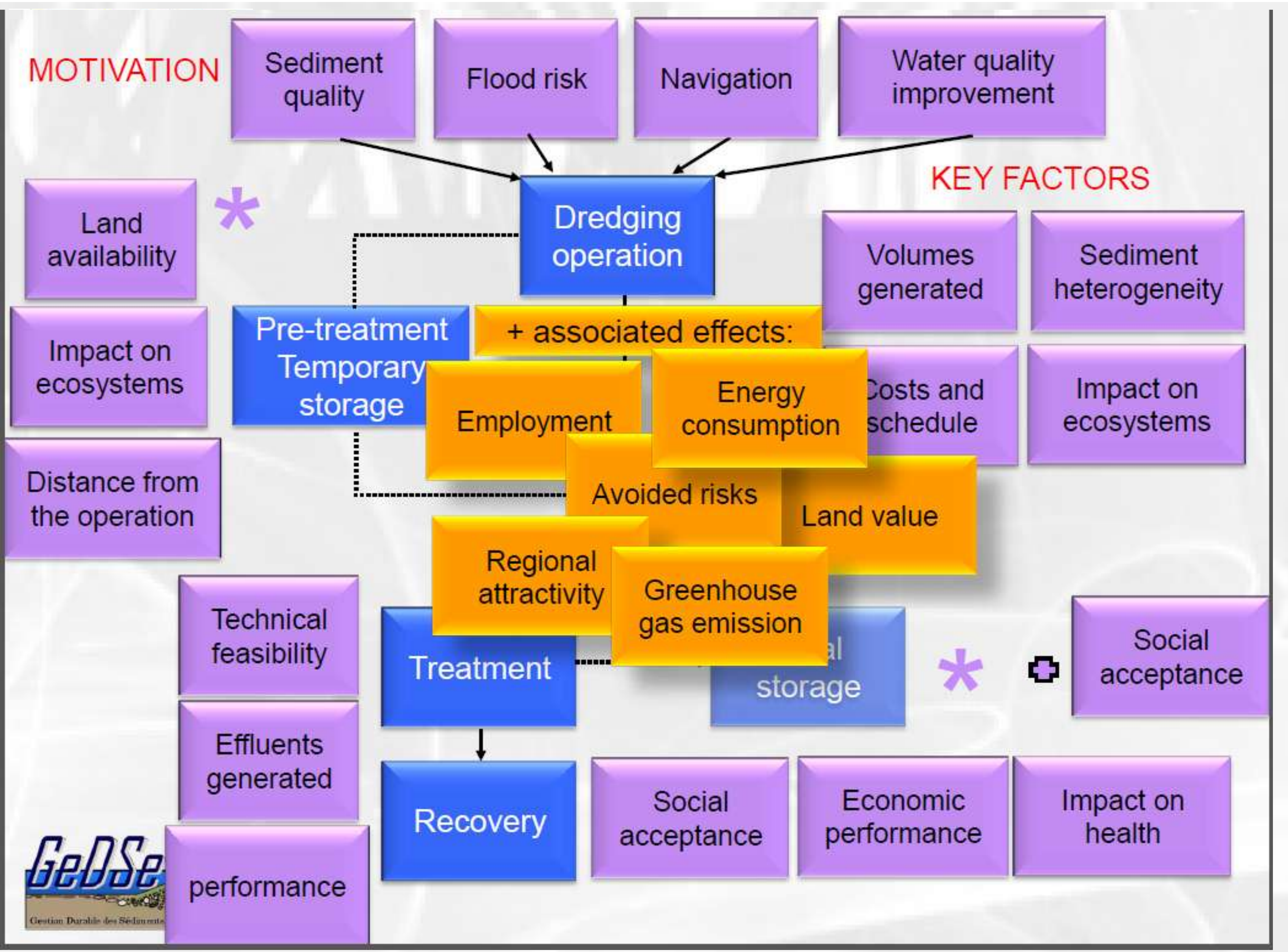

MOTIVATION
Sediment quality
Flood risk
Navigation
Water quality improvement
KEY FACTORS
Land availability
*
Dredging operation
Volumes generated
Sediment heterogeneity
Pre-treatment Temporary storage
+ associated effects:
Impact on ecosystems
Employment
Energy consumption
Costs and schedule
Impact on ecosystems
Distance from the operation
Avoided risks
Land value
Regional attractivity
Greenhouse gas emission
Technical feasibility
Treatment
storage
*
Social acceptance
Effluents generated
Recovery
Social acceptance
Economic performance
Impact on health
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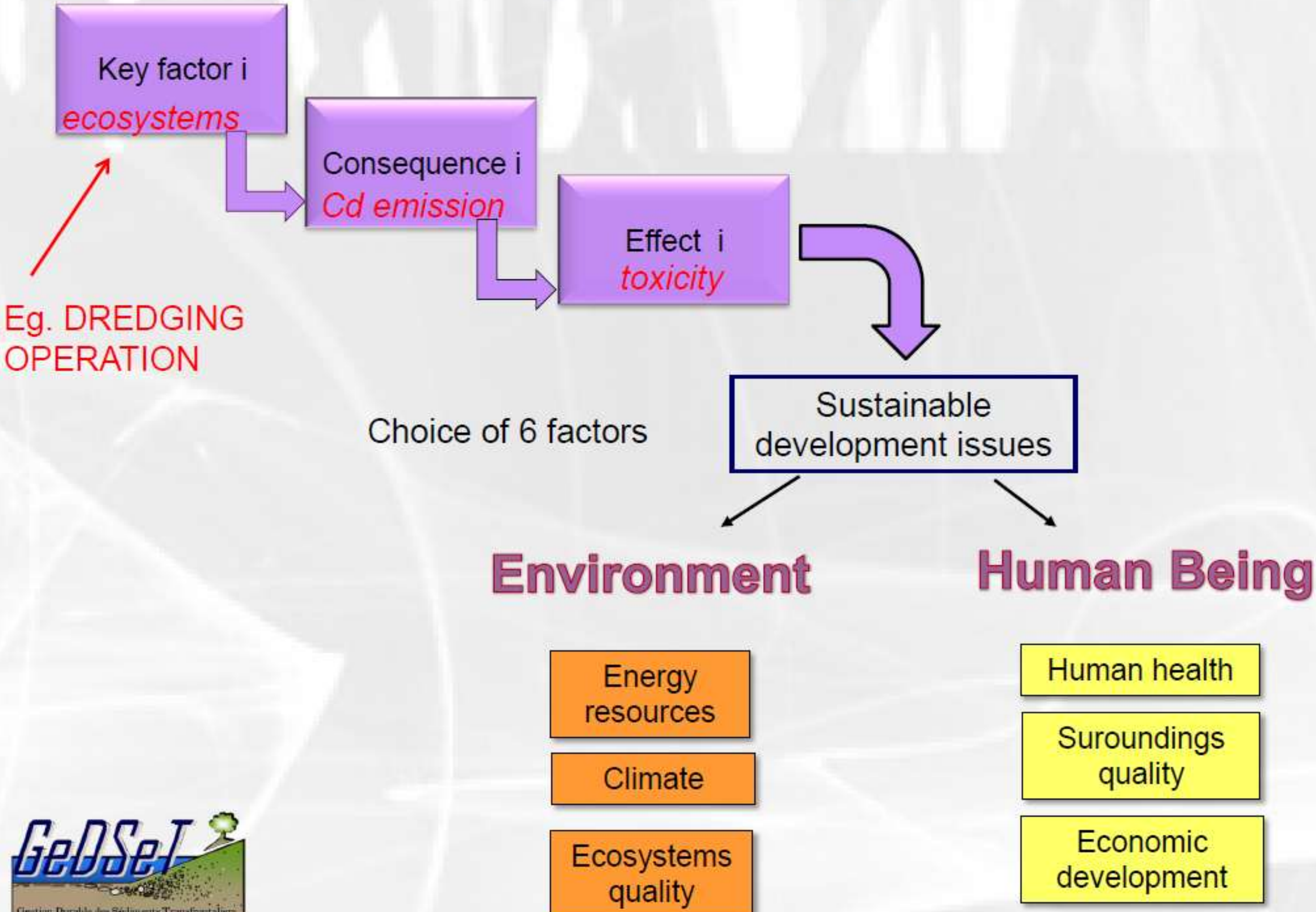
performance

Second step : translate key factors into indicators



Third step: quantify the effect

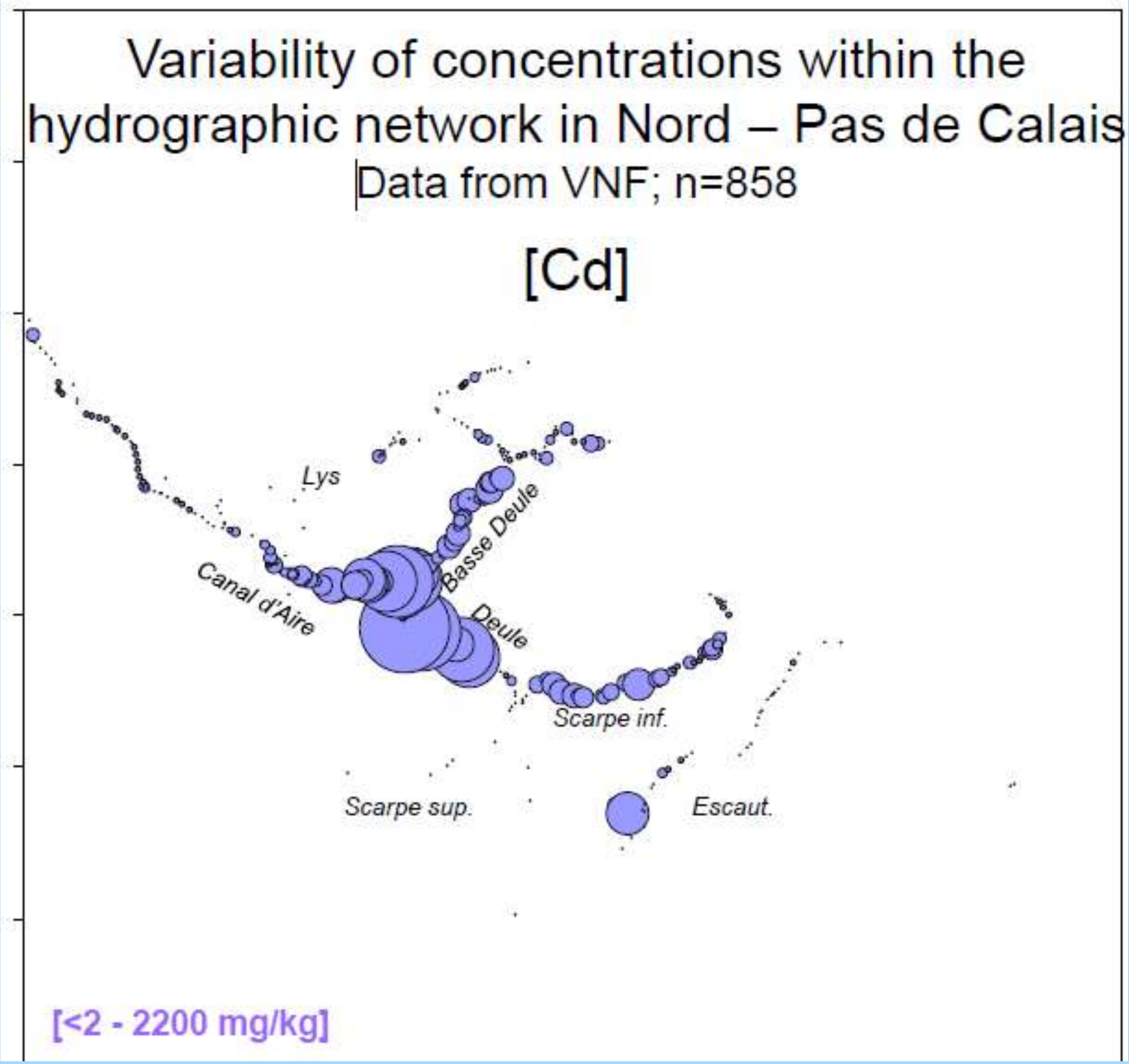
Information sources

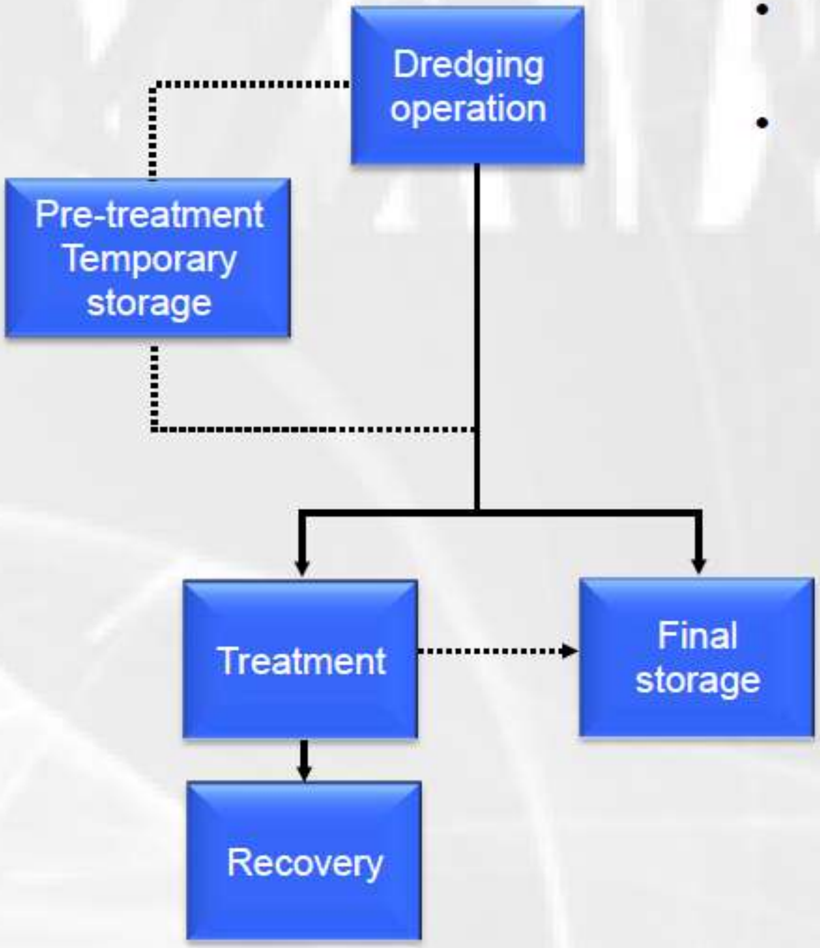
- literature and databases review
- exchanges with stakeholders
- focused research (Action 2) outcome
  - characterisation for decision-making
  - emissions according to scenarii
  - treatment options according to material valorisation opportunities

=> evaluate the effects for considered options

Using and improving data from operators

- Know the deposit
- Prioritise sectors
- Define strategies



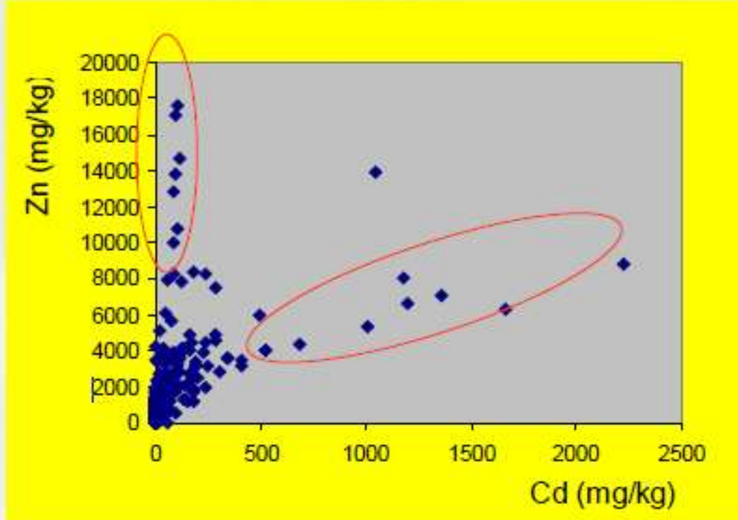


1. Crossing data :

- Help to prioritize : Motivation for dredging
- Management options

➤ **inputs**

2. Interpretation of data : Prevention of Sources and transfer modelisation



- Different transport media within the canal ?
- Different Sources ?

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How to display results?

100% reference scale ⇔ « worst » scenario

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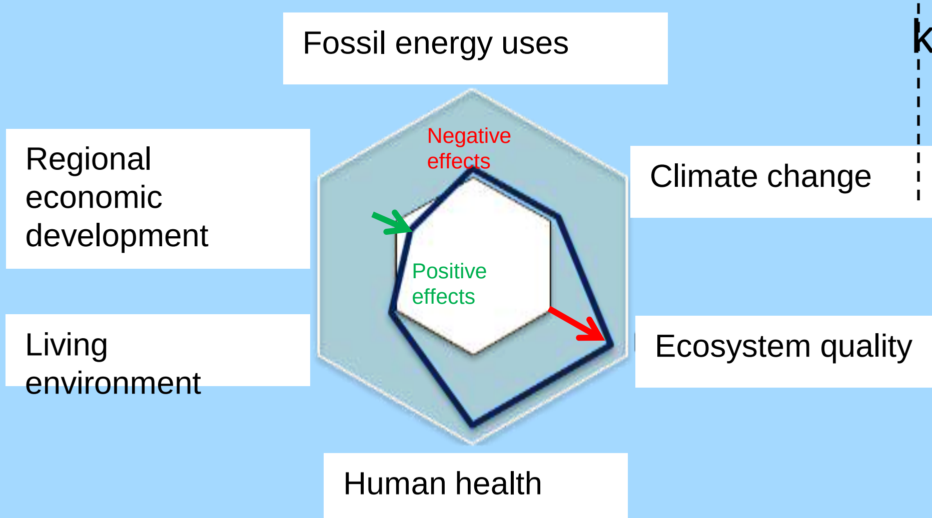
Decision risk level
note

Cost assessment
k€



Improvement due to sediment management

Damage due to sediment management

Compared to the « nothing done » option

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Conclusions from tool development

To be highlighted :

The indirect costs of the cheaper options have actually to be borne by other public budgets.

$\Rightarrow$ Need for regulation and for discussions to support sediment recycling/re-use

It allows to model the potential for regional economic development of innovative options, along with evaluating the risk level associated with each decision.

It confirms the benefits of early planning and of the integration of potential uses for sediments in waterways dredging plans.

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Action 2

R & D support for innovative scenarios:

- on-site characterisation
- emissions towards water from in-situ sediments
- emissions from dredged sediments and sites
- innovative processing of sediments
- phytostabilisation of pollutants

Coordination : Laurence Haouche

2.1. – On-site sediment characterisation

- **Objective**

Information on the contamination level or on the valorisation properties of sediment, on site, without delay (ASAP):

- before dredging, during characterisation campaigns,
- during dredging, on dredged sediment loads,

to facilitate sediment reuse and disposal minimisation (action/decision level)

- **Techniques**
  - evaluation of metal contamination (pXRF)
  - evaluation of organic contamination (UV, IR,...)
  - geophysical methods (identification of discontinuities)

Evaluation of metal contamination (pXRF)

2.2. - In-situ (underwater) sediment emissions characterisation

- **Objective**

Information on water pollution by contaminated sediments:

- without dredging (pollution if sediment is not dredged),
- during dredging, through pollutants or particle release,

Evaluate the relevance of environmental dredging

- **Techniques**
  - milieu exposure evaluation (passive sensors)
  - continuous water monitoring (multiparametric probe,...)
  - laboratory experiments (sorption/desorption kinetics, contaminant degradation)

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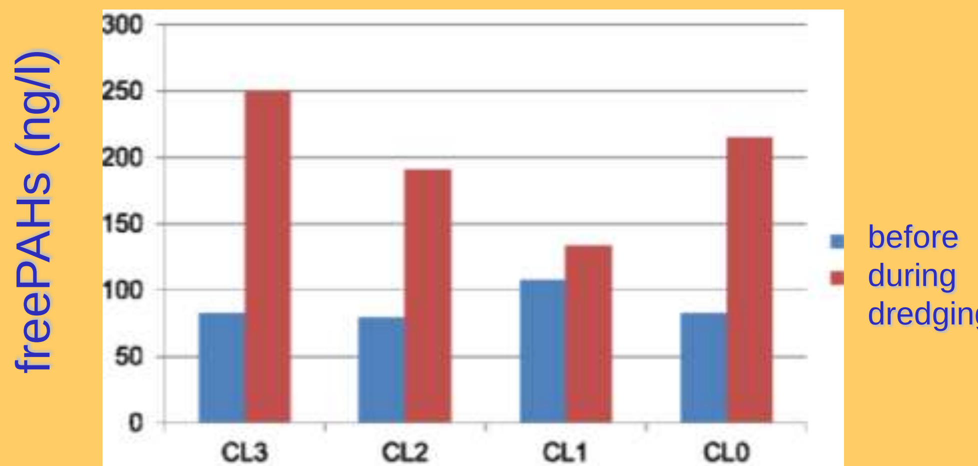
2.2. - In-situ (underwater) sediment emissions characterisation



2.3. - Ex-situ (disposal site) sediment emissions characterisation

■ Objective

Groundwater and surface water pollution by deposited sediments:

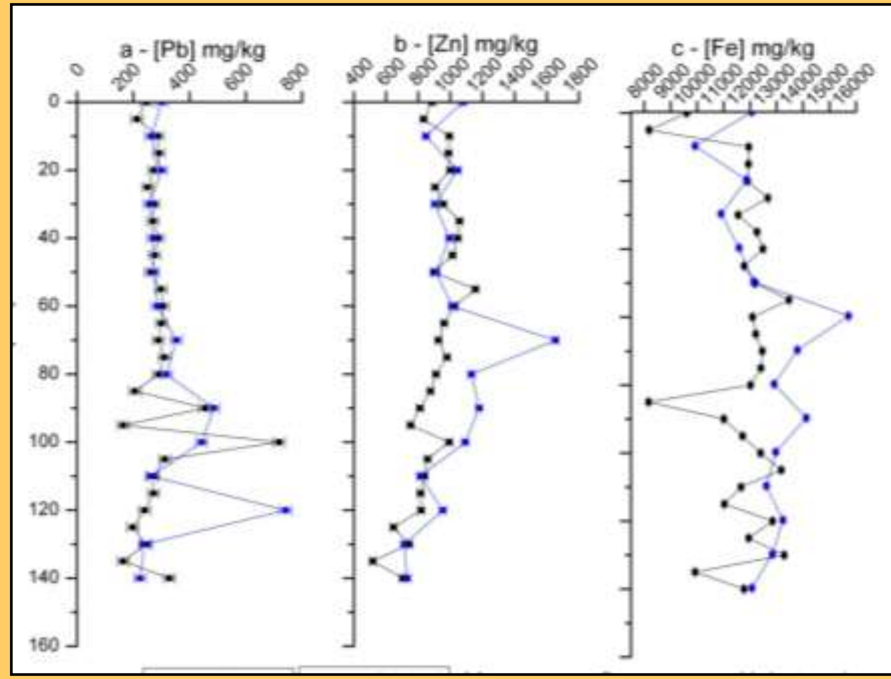
- through contaminant leaching and infiltration,
- through pollutants and particle release by rainfall,
- through pollutant evolution in natural conditions,

in order to evaluate the environmental impact of disposal sites, in relation with their age and maturity (10 to 35 years).

■ Techniques

- seasonal sampling and characterisation
- determination of maximum releasable amount of pollutants
- laboratory experiments (determination of maximum release rates, rainfall simulation, artificial ageing cycles)

2.3. - Ex-situ (disposal site) sediment emissions characterisation



pXRF measurements along depth (cm)

2.4. - Sedimentent treatment technologies

- **Objective**

To compare and test the efficiency of various mineral processes for contaminant separation or stabilisation,

To define their application scope and conditions,

To identify emerging technologies that could be applied for sediments.

- **Techniques**
  - mini-pilot plant conception and testing,
  - process testing and calibration on various types of sediments and pollutants,
  - upscaling to a pilot-scale facility

2.4. - Sediment treatment technologies

- Mini-pilot

- Upscaling

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Innovative scenarios for sediment management, deduced from the DST

- Scenario 1: selective dredging
- Scenario 2: on-site treatment
- Scenario 3: selective treatment
- Scenario 4: alternative uses of sediment
- Scenario 5: alternative use of disposal sites

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Scenario 1: selective dredging

- Selectively dredge first the most contaminated hotspots
- then bulk dredge the remainder of sediments from the waterway section

Consequences:

- reduction of the contaminated volume to be treated or sent to hazardous waste disposal
- reduction of the average contamination of bulk dredged sediments
- selection of less contaminated sediment lots, acceptable for reuse

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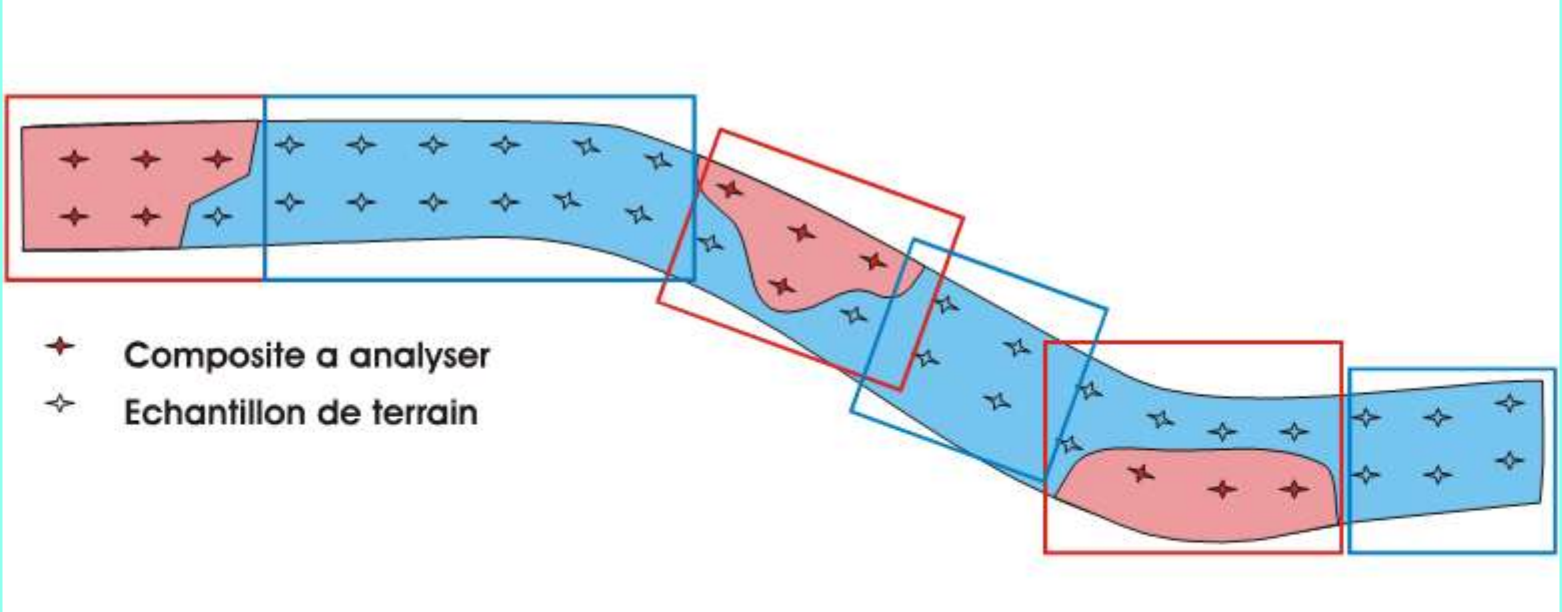
Scenario 1: selective dredging

- Field measurements to locate pollution hotspots



- requires on-site characterisation

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Scenario 2: on-site treatment

- Process as much as possible the sediment with a ship-borne plant
- On-site dehydration allows to obtain easier output material

Consequences:

- reduction of the dredged volume to be managed or sent to valorisation
- water can be returned to the waterway after treatment

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Scenario 3: selective treatment

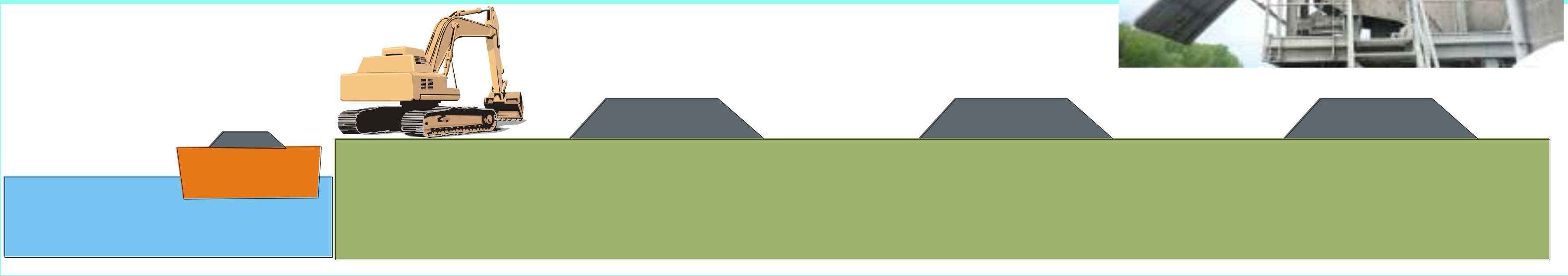
- Select the treatment scheme according to contamination of loads (metals, organic chemicals, both...)
- Treat either to reduce contamination or to concentrate it

Consequences:

- reduction of the contaminated volume to be treated or sent to hazardous waste disposal
- increase the volume of reusable sediments
- reduce the volume of sediment storage

Scenario 3: selective treatment

- Required:
- quick on-site analysis of contamination
- sediment treatment facility on the canal



unloading	low contamination	high contamination	near thresholds
destination:	valorisation	HW disposal	treatment
handling:	direct shipping	direct shipping	unloading, storage

Scenario 4: alternative uses of sediment

- Selectively dredged sediments directed to reuse according to contamination level and regulatory constraints
- Bulk use where applicable (landfill cover, civil works, excavation backfill)
- Composite use (mix with concrete demolition aggregate)
- Use as alternative mineral resource (cement production)

Consequences:

- reduction of primary minerals extraction
- reduction of sediment storage
- increase of possible waterways dredging

Scenario 5: alternative use of disposal sites

- High organic matter
- Unfit for food
- Energy crops
- Wood pellets, seeds

Consequences:

- reduction of undesirable land use
  - energy crops on fertile soil without competition for land with food crops

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Thank you for your attention

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