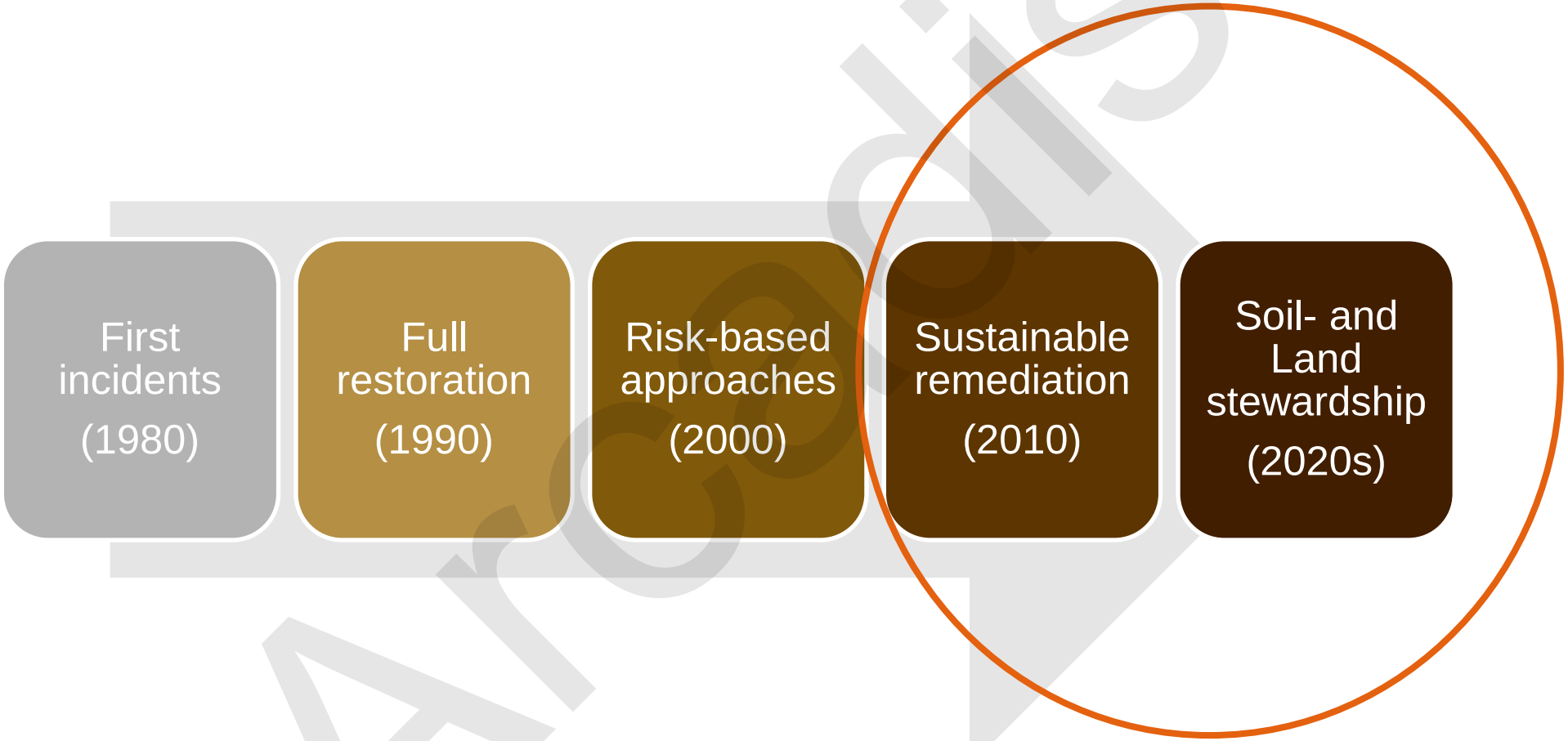
SUSTAINABLE LAND MANAGEMENT

European Policy, Sustainable Remediation, Soil- and Land Stewardship

Hans Slenders

Antwerp, April 17th

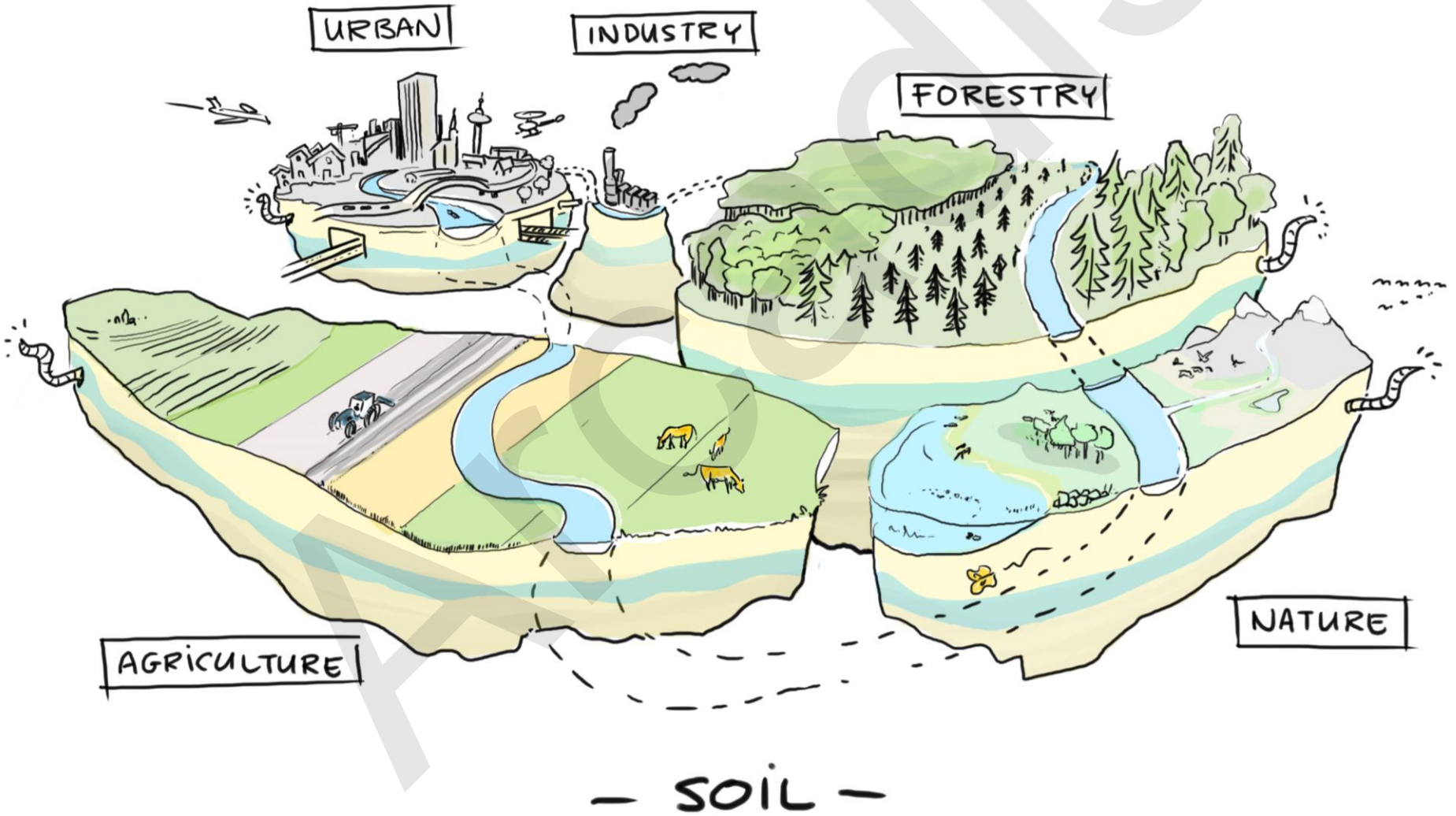
Evolution in policy and approach



A glimpse of European Policy on Soil

SOIL STEWARDSHIP?

A policy towards healthy soils in Europe



Challenges

60-70%
of soils are not healthy

78%
of land take takes place in agricultural land

13%
of EU soils suffer from severe erosion with 1.25 bEUR yearly cost

200 – 800k
deaths globally per year due to contamination

7.4 million tonnes
of CO_2 lost yearly by mineral soils under cropland

390.000
contaminated sites to be remediated

25%
of land in Southern, central and Eastern Europe at high or very high risk of desertification

Erosion, compaction, organic matter decline, pollution, loss of soil biodiversity, salinization, desertification, land take and sealing

Climate change is our second-largest environmental problem – we need to get serious about the largest

Professor Ravi Naidu, 2022

The European Green Deal (11/12/2019)

EU Biodiversity Strategy (°20/05/2020)

↓

EU Soil Strategy (°17/11/2021)

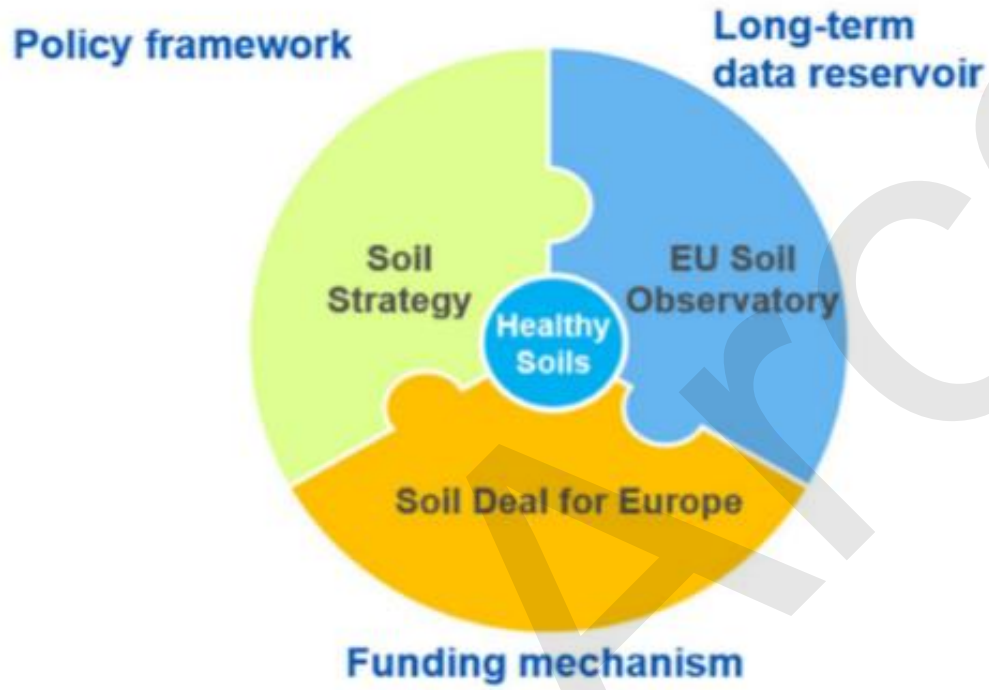
↓

Proposal for a Soil Monitoring Law (mid 2023)

European Commission

European Soil strategy

Science-policy framework



The new Soil Strategy will provide the overarching framework and the concrete pathway towards achieving the following objectives:

- Step up efforts to protect **soil fertility** and reduce **soil erosion**.
- Increase **soil organic matter** and **restore carbon-rich ecosystems**.
- Protect and **enhance soil biodiversity**.
- Reduce the rate of **land take, urban sprawl and sealing** to achieve **no net land take by 2050**.
- Progress in identifying and remediating **contaminated sites** and address **diffuse contamination**.
- Address the growing threat of **desertification**.
- Achieve **land degradation neutrality** by 2030.

Benefits Soil Monitoring Law according to the EC

- Strengthen the resilience of European food and farming
- Disaster prevention and management
- Depollution and decontamination of soils will also greatly improve the health of citizens, especially vulnerable groups
- Farmers will benefit because their livelihoods and future depend on the long-term health of the soils
- Sustainable management practices will maintain or improve soil fertility, productivity and yields
- Improve our knowledge on soils
- New business, innovation and job opportunities in sectors such as advisory services, training, certification, environmental consultancy and soil testing

What is soil health? Criteria:

- Salinization: < 4 dS/m when using saturated soil paste extraction (EC) method
- Erosion : < 2 t ha/yr
- Loss of organic carbon:
    - For organic soils respect targets set for such soils at national level
    - For mineral soils: SOC/Clay ration > 1/13
- Subsoil compaction: soil texture
- Excess of nutrient content: extractable phosphorous 30-50 mg/kg
- Soil contamination: no unacceptable risk for human health and the environment
- Reduction of soil capacity to retain water: to be set at national level
- Loss of soil biodiversity: Soil basal respiration (mm3 O2 g/hr) in dry soil
- Land take and soil sealing: % of surface, net land take (avg/yr)

Contaminated sites

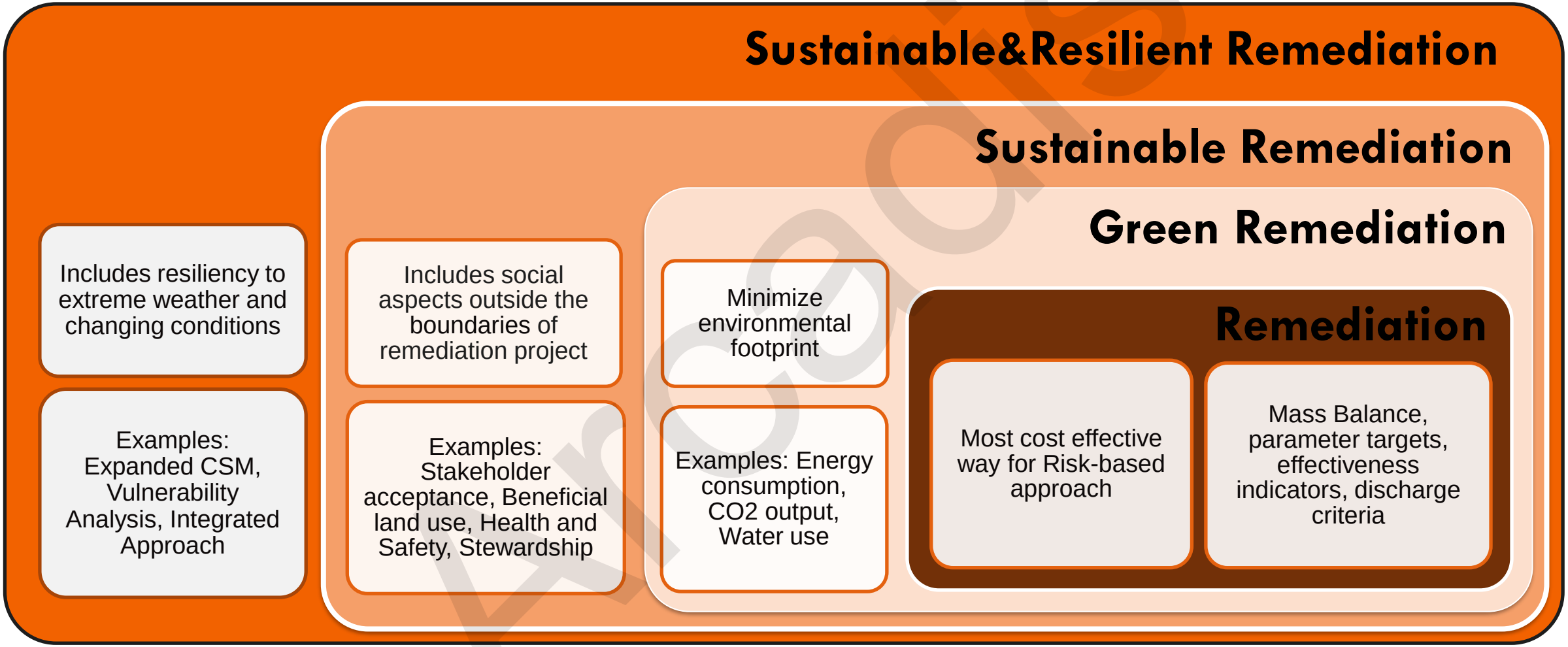
- Risk Based: after 4 years, Member States (MS) should establish a risk-based approach for identifying (potentially) contaminated sites, and management of contaminated sites
- Investigation of potentially contaminated sites
  - MS to ensure that all sites are identified 7 years after entry into force
  - MS shall define specific events that trigger an investigation
- Risk assessment and management
  - MS shall define a methodology for defining site specific risks
  - MS shall define what is an unacceptable risk
  - Competent authorities shall take appropriate measures to bring risks at an acceptable level
  - Risk reduction measures shall take into consideration costs, benefits effectivenees, durability and technical feasibility
- Register: after 4 years, MS shall draw up a register that will be publicly available

Some remarks

- The SMD will bring a more consistent approach across the EU (7 years to comply)
- There will be a lot to do for many:
  - Define soil districts
  - Align regulation with SMD
  - Set up and implement monitoring
- The pressure to remediate will increase
- For industry there is an opportunity to improve biodiversity and social benefits
- It can be expected that more restrictive guidance by the EC will come up after the first round of monitoring.

Sustainable Land Management

Different levels of sustainable remediation



Sustainable Remediation

The Network of Industrially Contaminated Land in Europe (NICOLE) defines Sustainable Remediation in its Road Map as:

"A sustainable remediation project is one that represents the best solution when considering environmental, social and economic factors, as agreed by the stakeholders"

The definition of Sustainable Remediation according to the Sustainable Remediation Forum - UK (SuRF-UK):

"The practice of demonstrating, in terms of environmental, economic and social indicators, that the benefit of undertaking remediation is greater than its impact and that the optimum remediation solution is selected through the use of a balanced decision-making process"

SR is about selecting the most sustainable option and building consensus among multiple parties!

Sustainable Remediation is more than green technology, it's a tiered approach with an evaluation of options

Frameworks

- NICOLE Road Map
- SuRF Frameworks
- ISO guidance

Selecting indicators

Expression of sustainability, make the differences between options comparable or measurable.

End point strategies

SR is NOT a do nothing approach

a remedial option must sustain in time

Remedial Objective

Biggest sustainability gain in earlier stage of decision making.

Simplicity, keeping decision making tangible

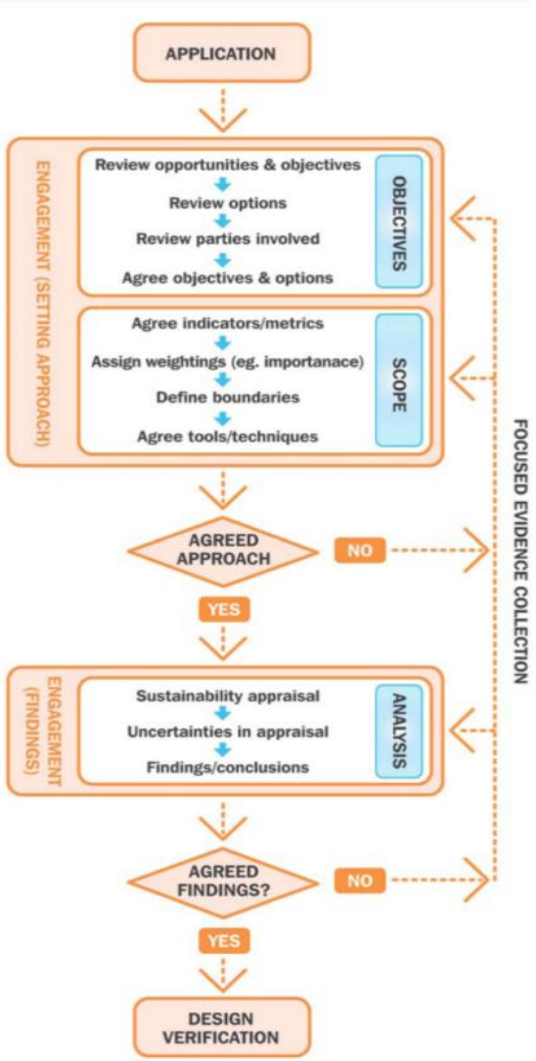
The 6 underlying principles of Sustainable Remediation

1. Protection of human health and the wider environment
2. Safe working practices
3. Consistent, clear and reproducible evidence-based decision-making
4. Record keeping and transparent reporting
5. Good governance and stakeholder involvement
6. Sound science and evidence base

From *SuRF-UK A Framework for Assessing the Sustainability of Soil and Groundwater Remediation, March 2010*

Frameworks: Tiered Processes:

NICOLE
Network for Industrially Contaminated Land in Europe



ISO-18504 Sustainable Remediation

Set Objectives and Starting Points

Identify and engage stakeholders

Agree with stakeholders
- Objectives and Starting Points
- Sustainability Indicators (and prioritise or assign weightings)
- Remedial Options
- Methodology to be used (Tools for the selection of preferential option)

Detail options and indicators

Select preferential option (and motivate your choice in one sentence!)

Execution

Selecting indicators

From SuRF-UK : Primary headline categories of sustainability to consider for every remediation project

Environment	Social	Economic
Emission to Air	Human Health & Safety	Direct economic costs & benefits
Soil and ground conditions	Ethics & equity	Indirect economic costs & benefits
Groundwater & surface water	Neighborhoods & locality	Employment & employment capital
Ecology	Communities & community involvement	Induced economic costs & benefits
Resources & waste	Uncertainty & evidence	Project lifespan & flexibility

Simplicity and Flexibility

- Occams Razor, 13th century philosopher Monk
  - With increasing parameters and assumptions uncertainty increases
  - The fewer assumptions an explanation depends on, the better the explanation;
  - Simpler theories are preferable because they are better understood and testable
- Understanding by Stakeholders essential
- With simplicity flexibility increases
- Dare to keep things as simple as possible, no more no less, only detail further if necessary, and remember Goethe 1802!
- Astonishingly, very often the best option is obvious…

Tools for the selection of a remedial option

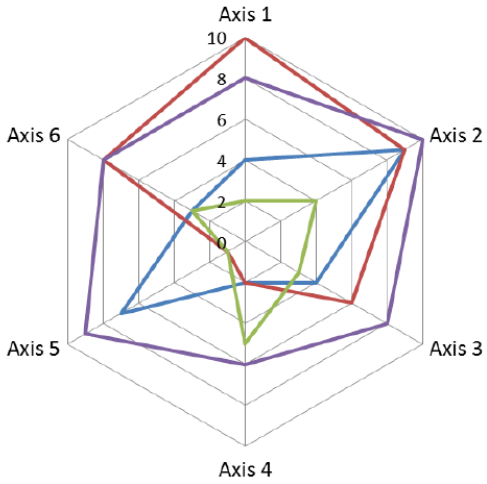
There is a lot available (structure from ISO):

- Qualitative: narrative analysis or ranking

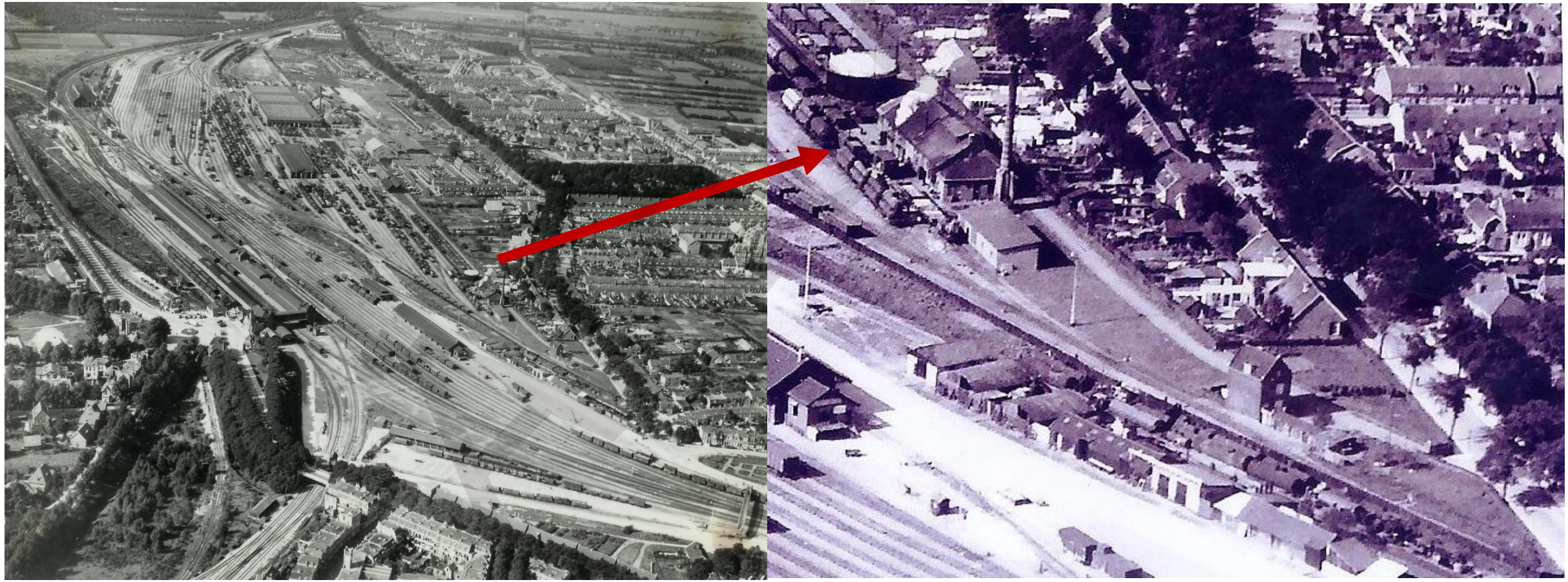
- Semi quantitative
  - Multi-criteria analysis, weightings and scores
  - Pairwise comparison (Weighing of benefits and impacts)

- Quantitative
  - Cost Benefit Analysis
  - Life Cycle Assessment
  - Etc.

- Computer Tools, e.g. Balance E3

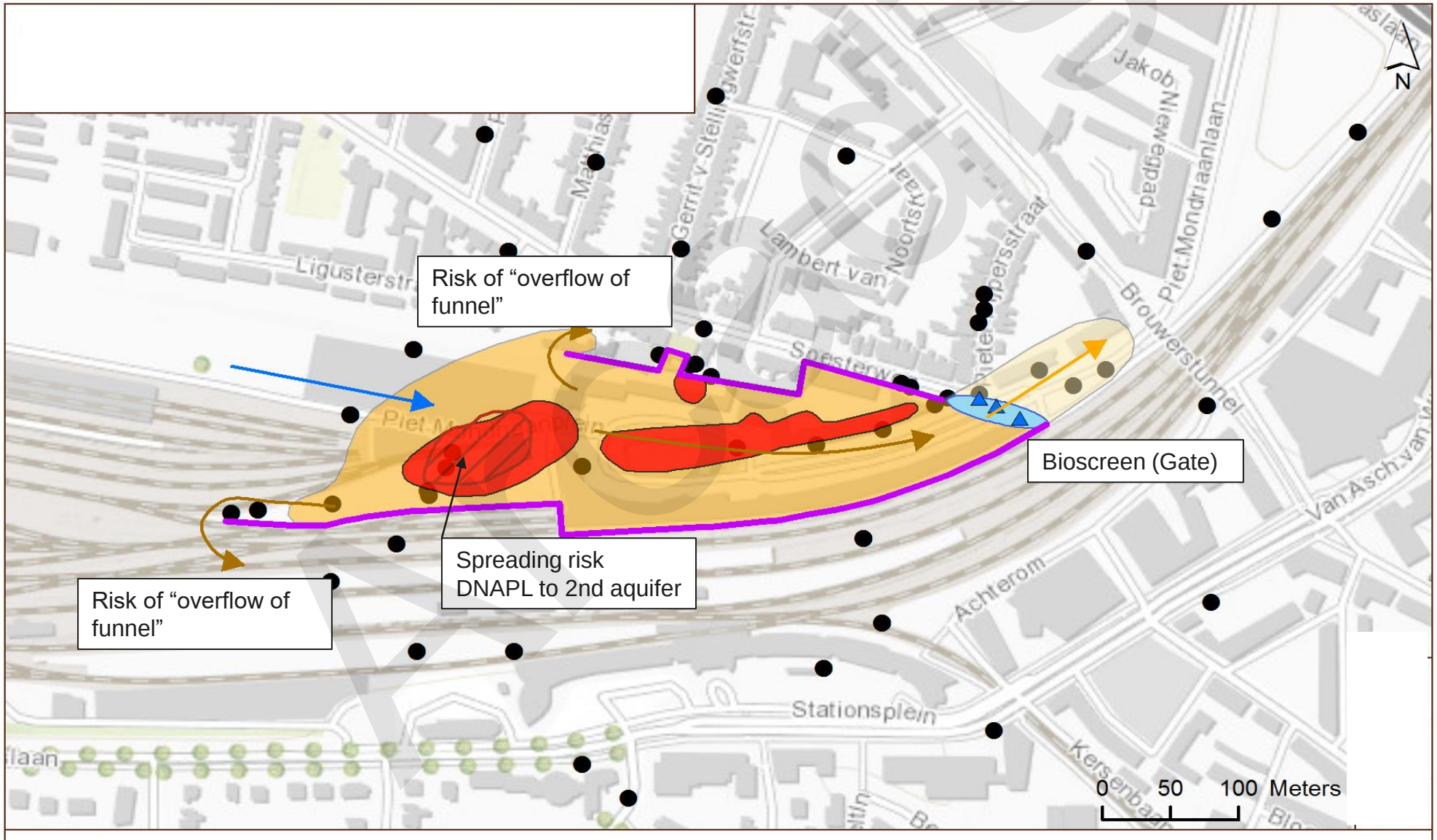


Case Study: Diesel Gasplant - Amersfoort, NL
Remediation to a sustainable end point

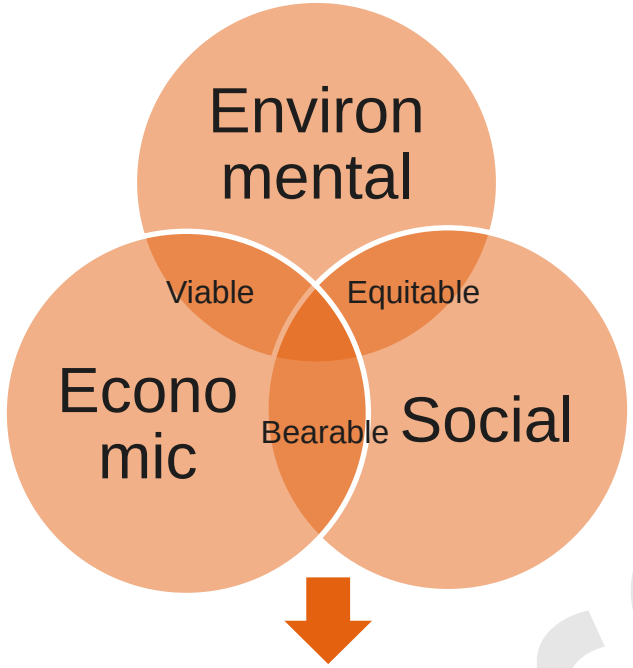


Core drillings in source zone

Current funnel and gate for containment



Selecting and sorting of indicators

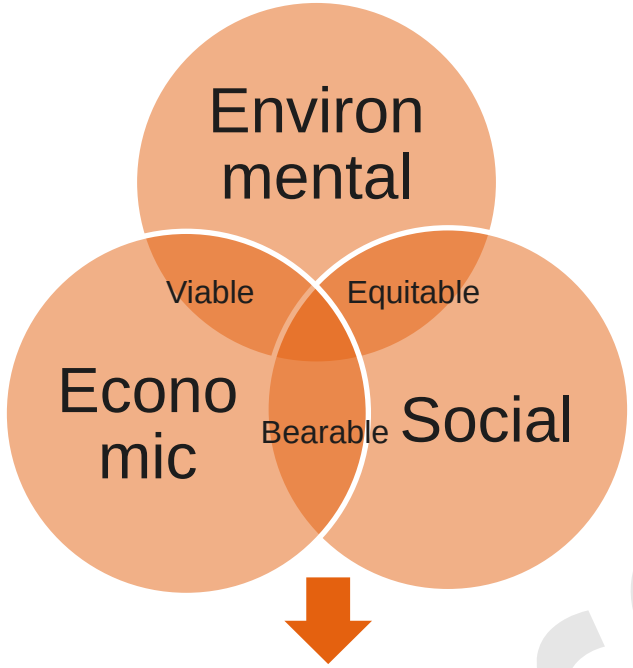


- Checklist indicators People-Planet-Profit, sorted as Benefits vs. Impacts
- Standard indicator set of SuRF-NL discussed in workshop
- Guideline: max. 12 indicators
- Avoid double counting or overlapping indicators.

Benefits	Risk reduction	Increase in land use	Mass removal	Added value real estate	Responsible care	Reduction of liability
Impacts	Cost	Time and aftercare	Emissions and CO_2 production	Resource use	Risk of failure	Accidental risk

Standard set, to be agreed by stakeholders

Selecting and sorting of indicators



- Checklist indicators People-Planet-Profit, sorted as Benefits vs. Impacts
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Benefits	Futureproof	Increase in land use	Acceptance		Responsible care	
Impacts	Cost	Time and aftercare			Risk of failure	Accidental risk

Indicators as agreed by stakeholders

a solution that sustains in time for the F&G

	1 Basic Wall+top			4 Insitu Exten.
Cost (mln.)	2			6,5
Aftercare	Lim. passive			Lim. passive
Risk of failure	10%			10%
Accidental Risk	Limited			Limited
Responsible care	Sufficient			Good
Future proof	Robust			Robust
Increase site use possibilities	Good			Good
Acceptance Contaminant Load	Sufficient <5%			Good 80%

All the skipped options obviously score less than the remaining two, (selected by pairwise comparison

a solution that sustains in time for the F&G

	1 Basic Wall+top			4 Insitu Exten.
Cost (mln.)	2			6,5
1. These indicators subsequently don't differentiate between options, and can be skipped in the comparison				
Responsible care	Sufficient			Good
Acceptance Contaminant Load	Sufficient <5%			Good 80%

Land Stewardship

Introduction and guide

Land Stewardship

"Land Stewardship (LS) is the collective recognition of the natural, social and economic capital that land possesses or may possess, and the possibilities that this recognition offers for unlocking that value"

NICOLE 2020, www.nicole.org

Lady of the North
Courtesy of The Land Trust, UK
www.northumberlandia.com

Key elements of LS

- Understanding the natural and social values land represents
- Visualizing the value of Land for decision making
- Stakeholder and community engagement beyond the fences
- Applicable in all lifecycle stages; long-term horizon
- Benefits of use by industry
- Benefits of redeveloping derelict land

There is no single pathway to LS; the route may vary in different regions and under different regulatory regimes

Scope and scale of Soil and Land Stewardship

Soil Stewardship main focus is on soil vitality and biodiversity

Land Stewardship regards the broad value of land or a site

Settings:

- **Diffusely degraded soil at a regional scale and urban areas**: SS/LS can help revitalize the soil and increase the value and benefits
- **Brownfields**: LS is a perfect tool for creating support for (nature, recreational etc.) redevelopment by visualizing the potential of unlocking values
- **Active industrial sites**: LS can underpin the broad value of the use and help improve the natural value and community relationship (Land Stewardship)

"Xarxa de Custòdia del Territori" *A network for land stewardship in Catalunia*

NICOLE developed a booklet (2018) and a guide (2021)

- Written by the volunteers of the working group!

"Land stewardship is key in the transition towards a Circular Economy"

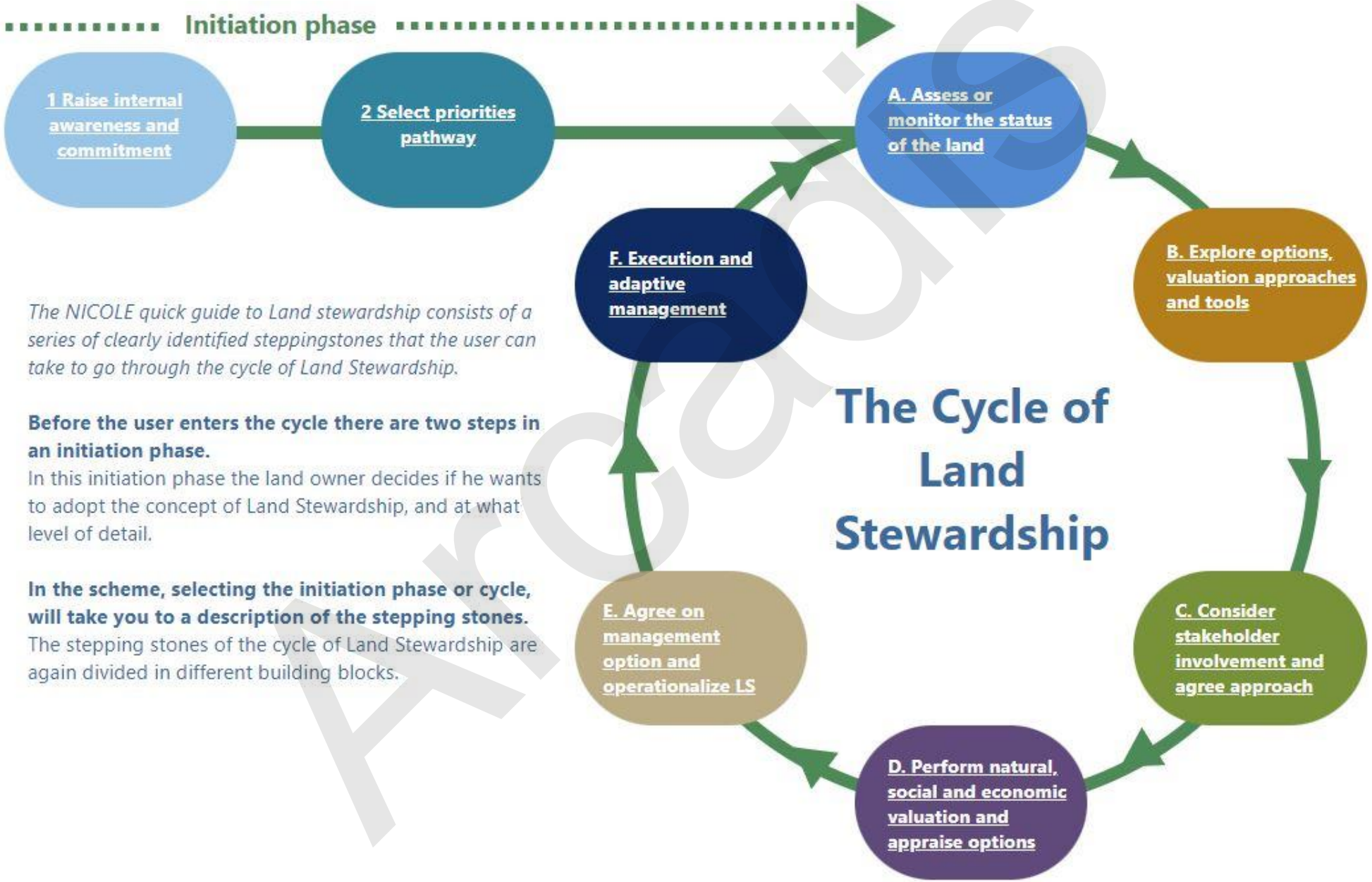
- Should be applicable in multiple legislative and cultural settings (High level guidance, the details are in the references and links)

- Guide has three parts:
  1. Introduction LS (summary of the booklet)
  2. Quick guide with Stepping stones and building blocks
  3. Cases

- "Living" guide, open for evolution

Available at www.Nicole.org publications

Stepping stones

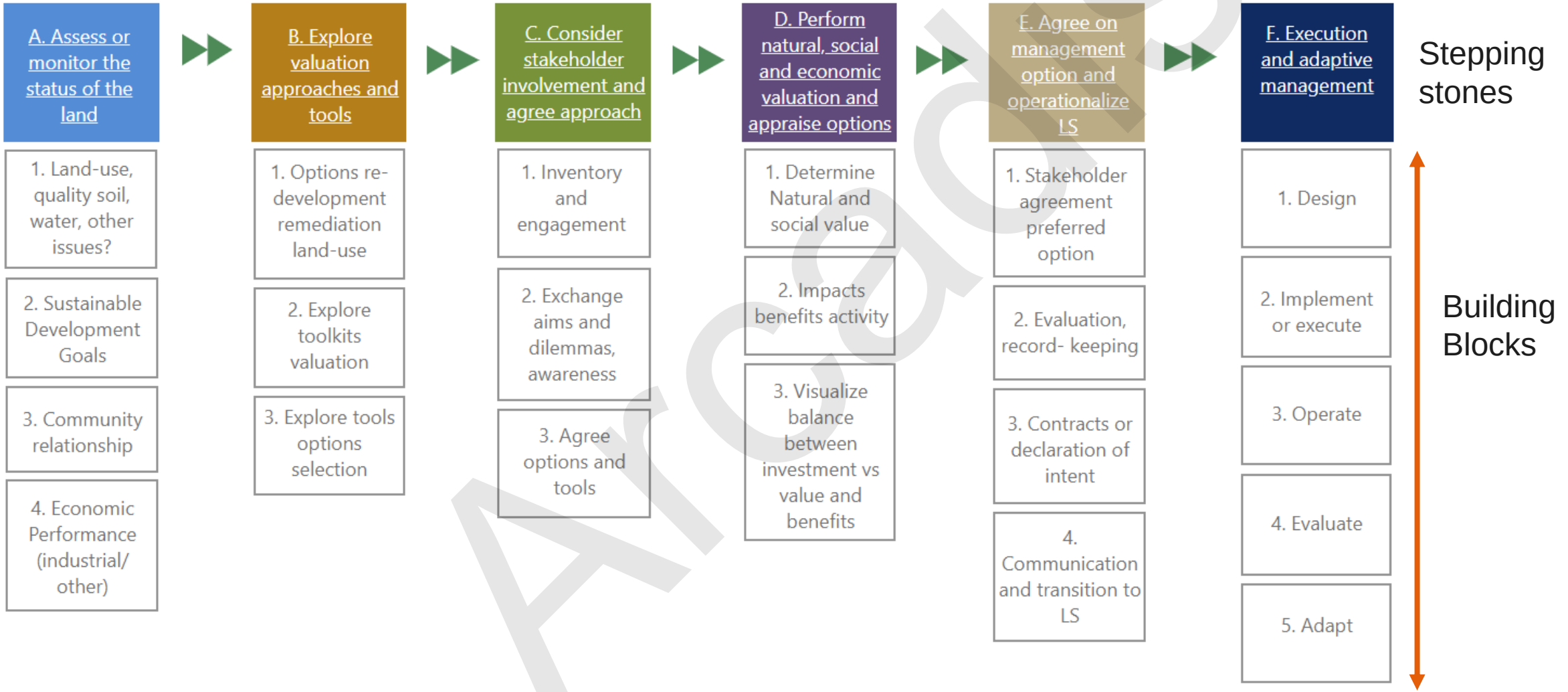


The NICOLE quick guide to Land stewardship consists of a series of clearly identified steppingstones that the user can take to go through the cycle of Land Stewardship.

Before the user enters the cycle there are two steps in an initiation phase.
In this initiation phase the land owner decides if he wants to adopt the concept of Land Stewardship, and at what level of detail.

In the scheme, selecting the initiation phase or cycle, will take you to a description of the stepping stones.
The stepping stones of the cycle of Land Stewardship are again divided in different building blocks.

Stepping stones and building blocks



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