Approach of the Sustainable Management of POPs/PCB contaminated sites

Introduction 0.4

October 2021

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Content of presentation

- Dealing with contaminated sites
- Examples of POPs/PCB contaminated sites
- Components of a POPs/PCB contaminated site
- The objectives of sustainable management of POPs/PCB contaminated sites
- The five phases of the sustainable management of contaminated sites
- The BAT & BEP guidance on the sustainable management of POPs contaminated sites of the Stockholm Convention

Dealing with contaminated sites

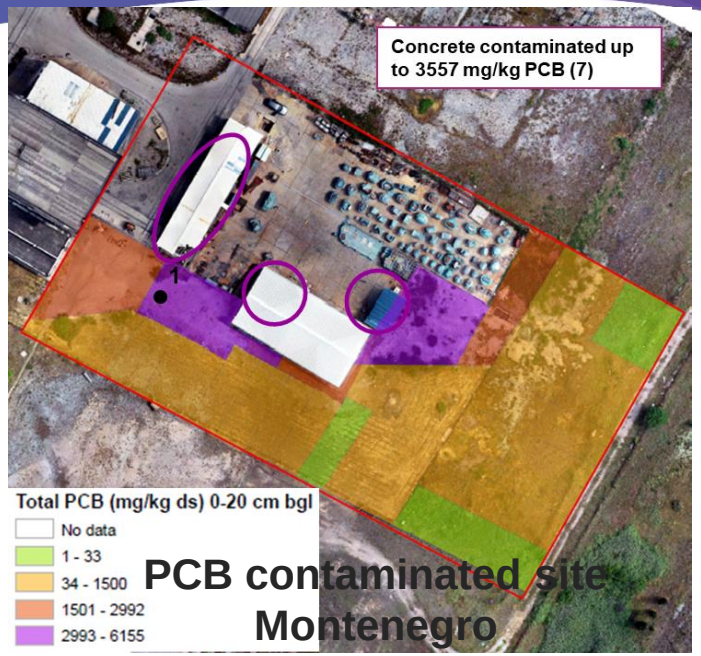
When you have a wide scientific knowledge concerning contaminant fate and transport processes in soil and groundwater, site characterization, Human Health Risk Assessment, Ecological Risk Assessment and Groundwater-related Risk Assessment, AND have experience with designing cost-efficient Risk Management solutions AND have a creative personality AND have good communication qualities AND are in a position to take policy decisions: Go ahead. Otherwise: Build a team.

Frank Swartjes
Dealing with Contaminated Sites
From Theory Towards Practical Application
National Institute of Public Health and the Environment (RIVM), Bilthoven, The Netherlands

Examples POPs contaminated sites


PCB contaminates site in Bosnia Herzegovina


HCH isomers store Turkey



PCB contaminated site Montenegro


DDT contaminated site Viet Nam

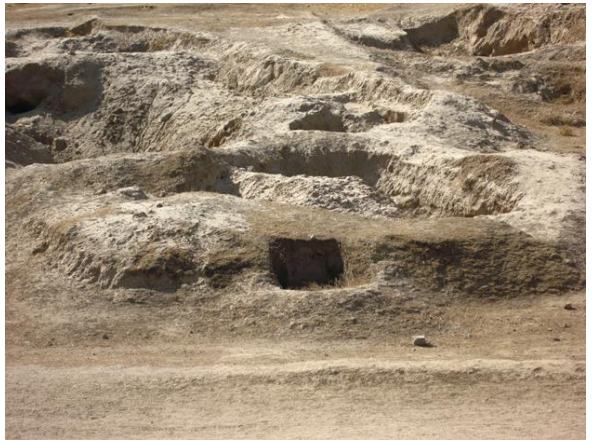

POPs contaminated site Tajikistan


PCB contaminated site Serbia

Components of a PCB contaminated site

Stocks with oil containing PCB

PCB Contaminated building



Buried hazardous waste containing PCB

PCB Contaminated soil & groundwater plus source area

Sustainable management of contaminated sites

The objectives

- **Protect human from contact with contaminants**
  - ✓ Direct contact: dermal contact, swallowing and inhalation
  - ✓ Indirect contact: through food & water
- **Protect ecosystem / environment**
  - ✓ Protect soil and groundwater from getting contaminated
  - ✓ Protect drinking water resources from getting contaminated
  - ✓ Protect surface water from getting contaminated
- **Prevent off-site migration of contaminants**
  - ✓ Prevent contaminants to become airborne
  - ✓ Prevent contaminants to run-off
  - ✓ Prevent contaminants to leach into your soil & groundwater

The five site management phases

Phase 1 Preliminary Site Assessment

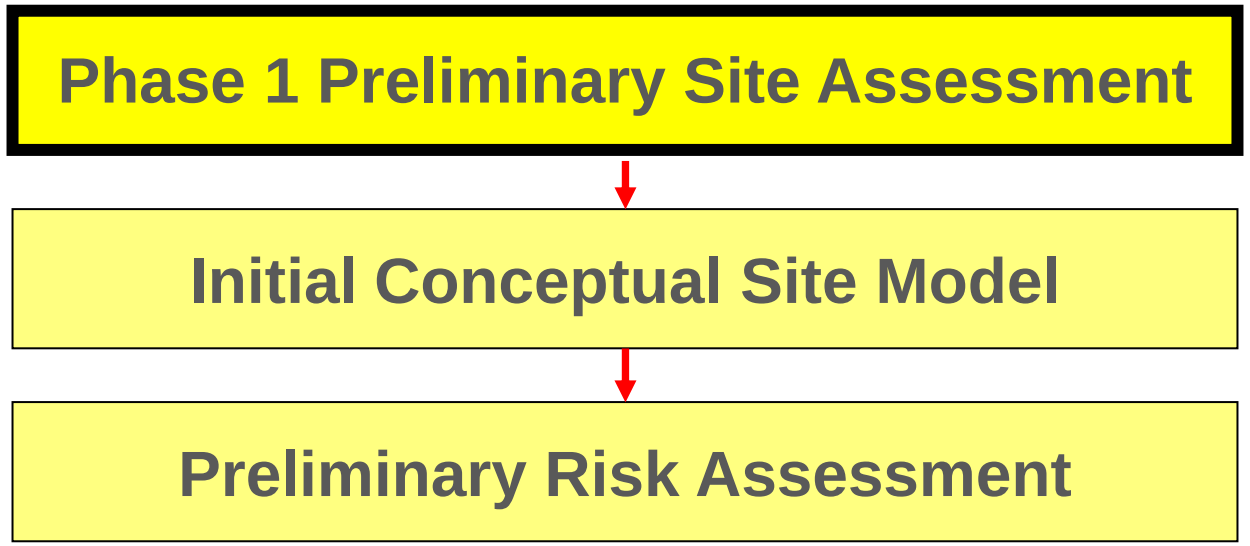
Phase 2 Site Assessment

Phase 3 Site Remediation Assessment

Phase 4 Site Remediation Management

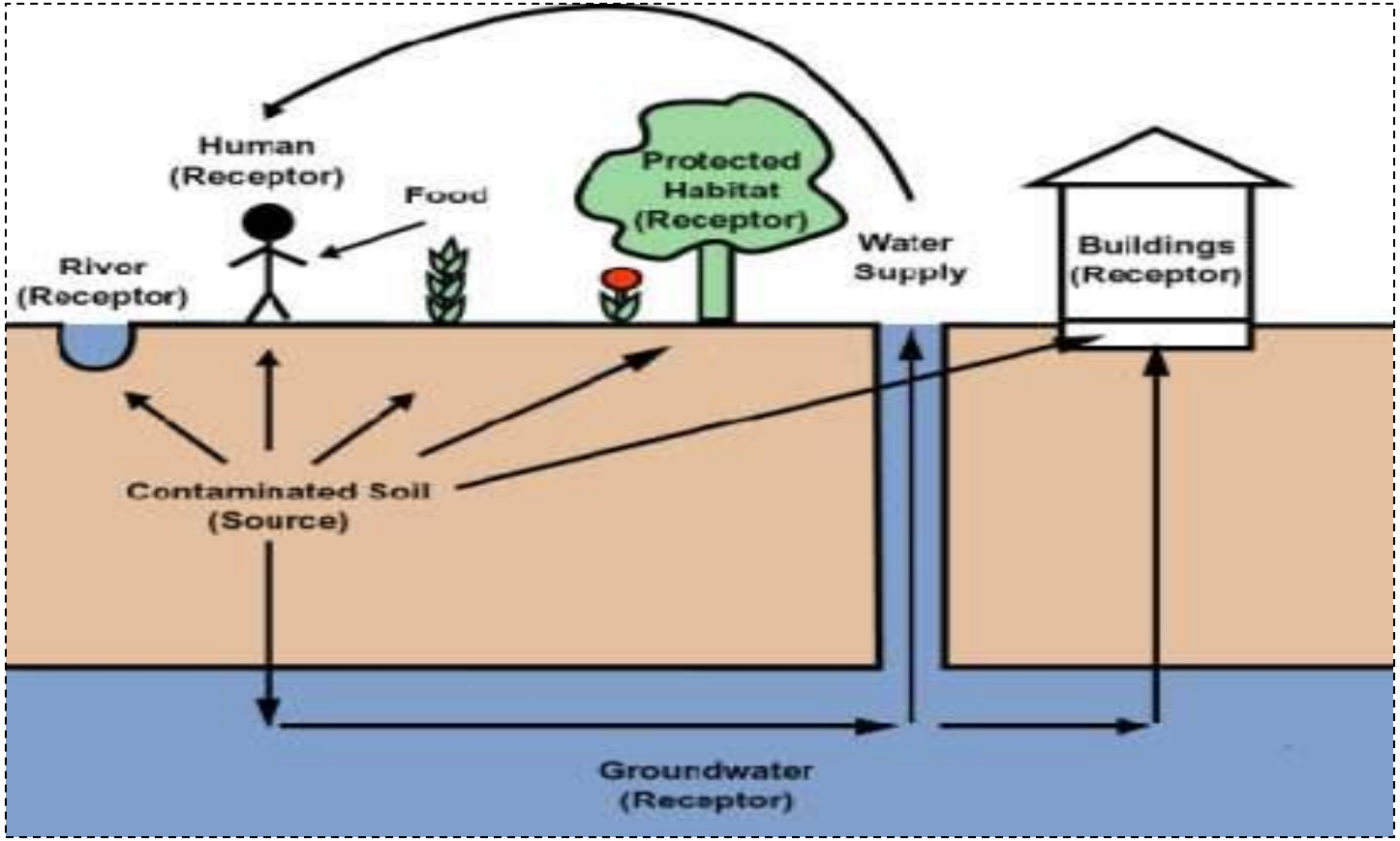
Phase 5 Site Monitoring & Aftercare

Phase 1 - Deliverables



Phase 1 - Deliverables

Initial Conceptual Site Model



Phase 1 – Deliverables

Preliminary Risk Assessment or tier 1 risk assessment

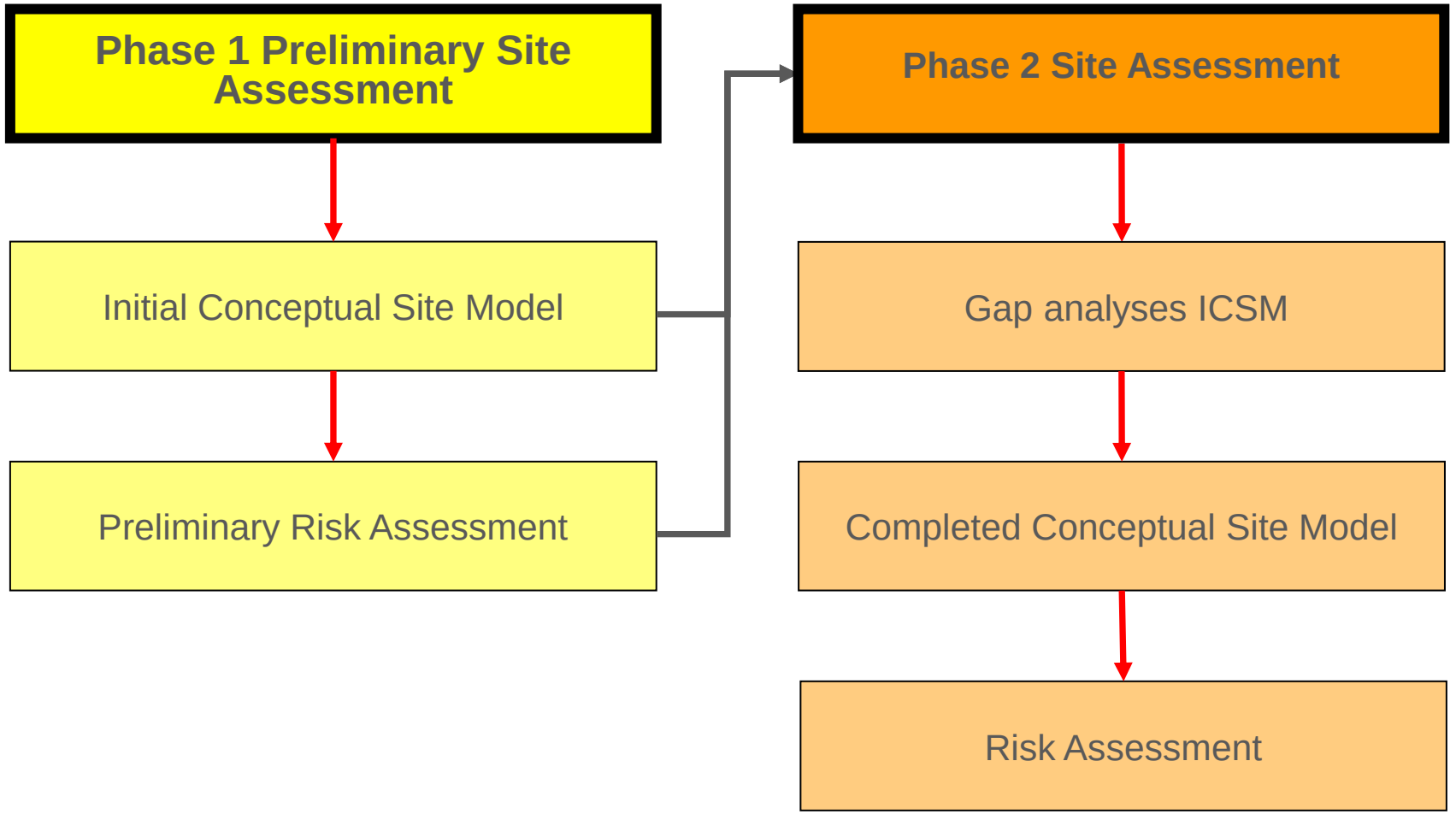
Receptors

Source – Receptor Pathway

Source

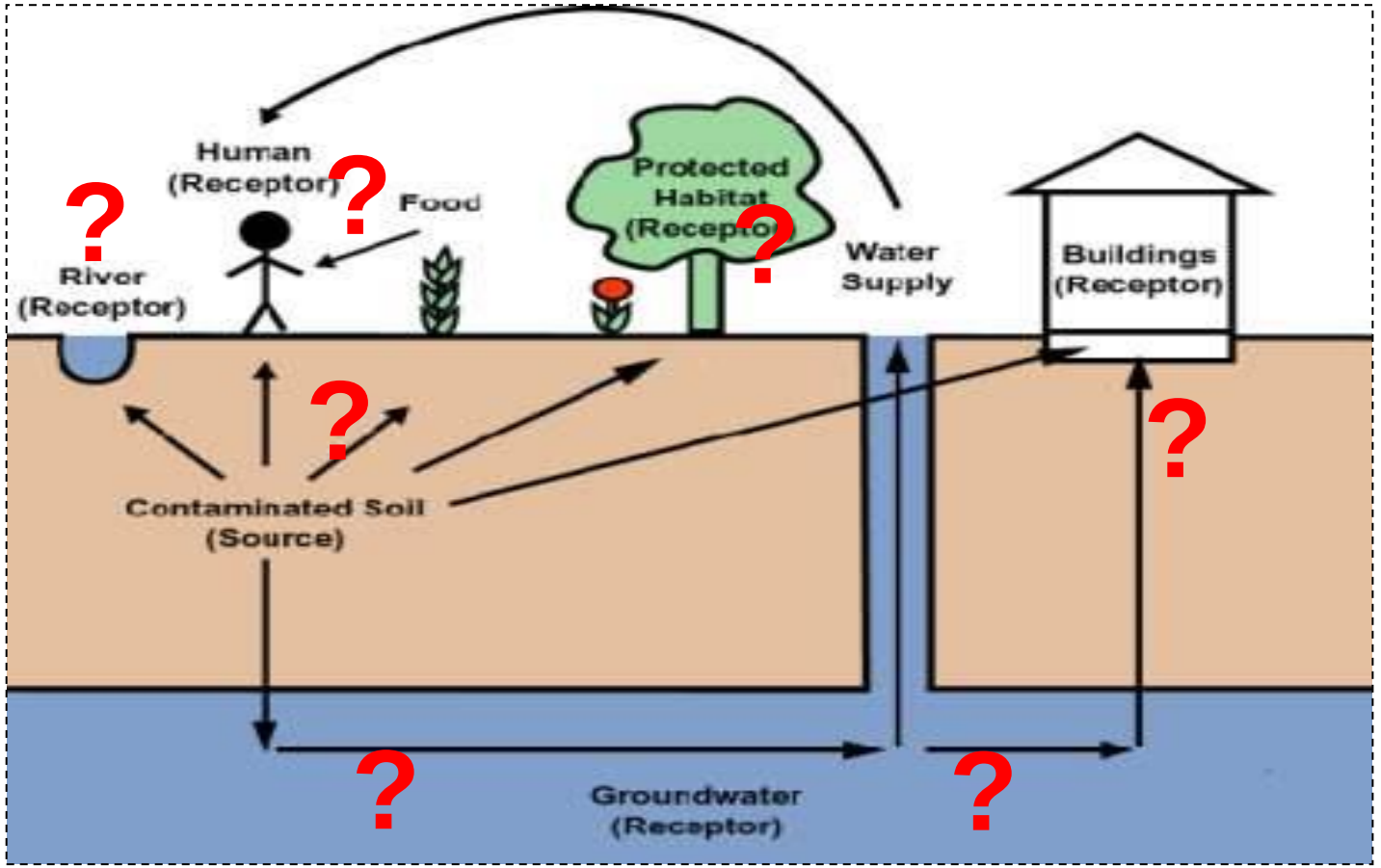
DDT dumpsite

Phase 1 & 2 - Deliverables



Phase 2 – Deliverables

Gap analyses Initial CSM



Phase 2 - Deliverables

Completed Conceptual Site Module providing descriptions of

Source(s) of contamination

- The cause(s) of the contamination
- The type of contaminant(s)
- The extent of the source(s)

Receptor's Pathway

- The identified receptor's pathways
- The type of contaminants
- The extent of the pathways

Receptors

- The identified receptors

Completed Conceptual Site Module

Secondary Source

Receptor

Floating layer

Groundwater flow direction

Watershed

Contaminated groundwater

Primary Source

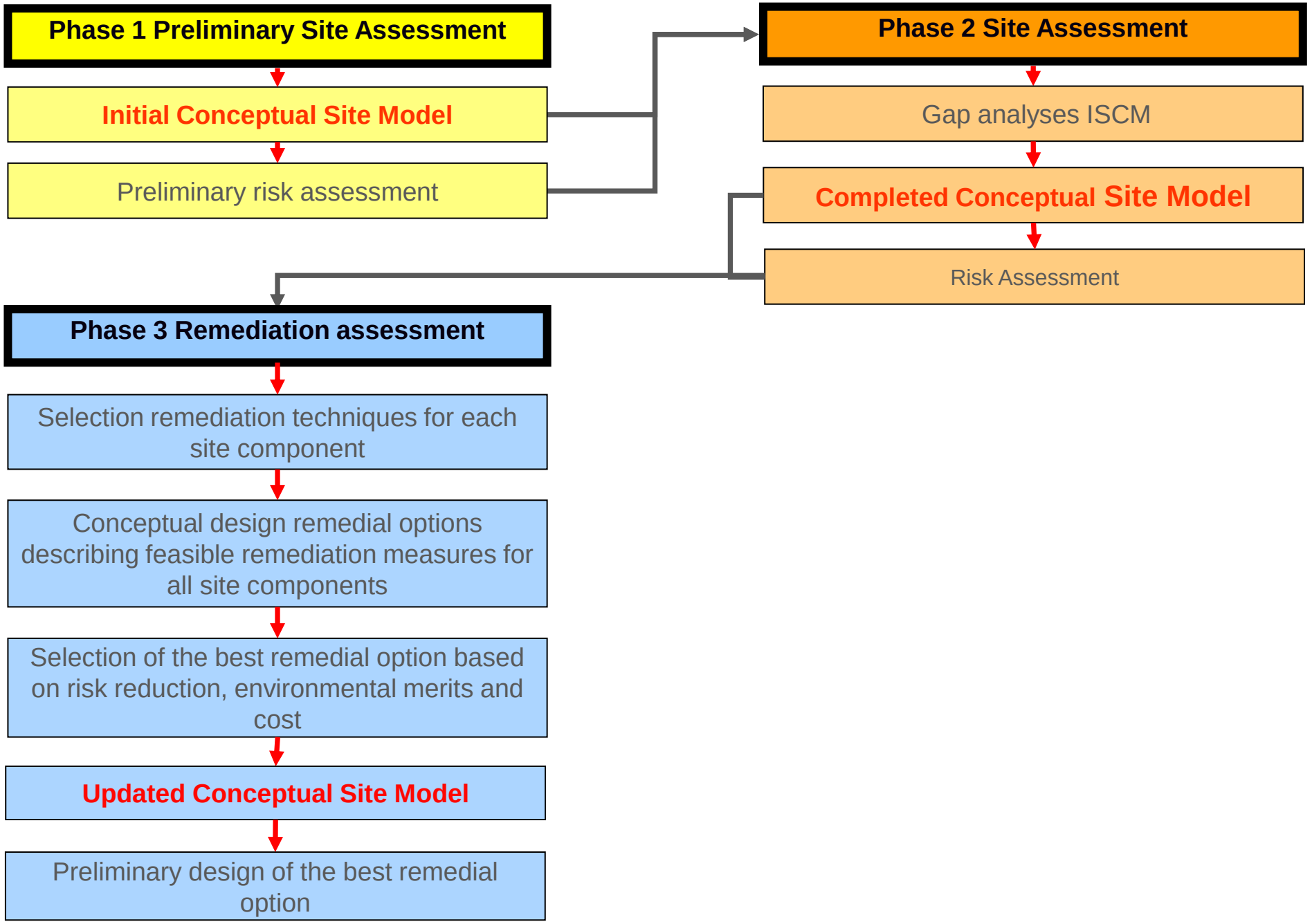
Pathway

Phase 2 - Deliverables

Risk assessment or tier 2 risk assessment

- **Quantification of direct, potential & latent risks for**
  - Human health
  - Ecosystem
  - Migration into the environment
- **The levels of contaminants in soil & groundwater**
  - ✓ Are analyzed
  - ✓ Analytical results are tested against national reference levels

  And/or
  - ✓ Risk assessment models are used to establish the risks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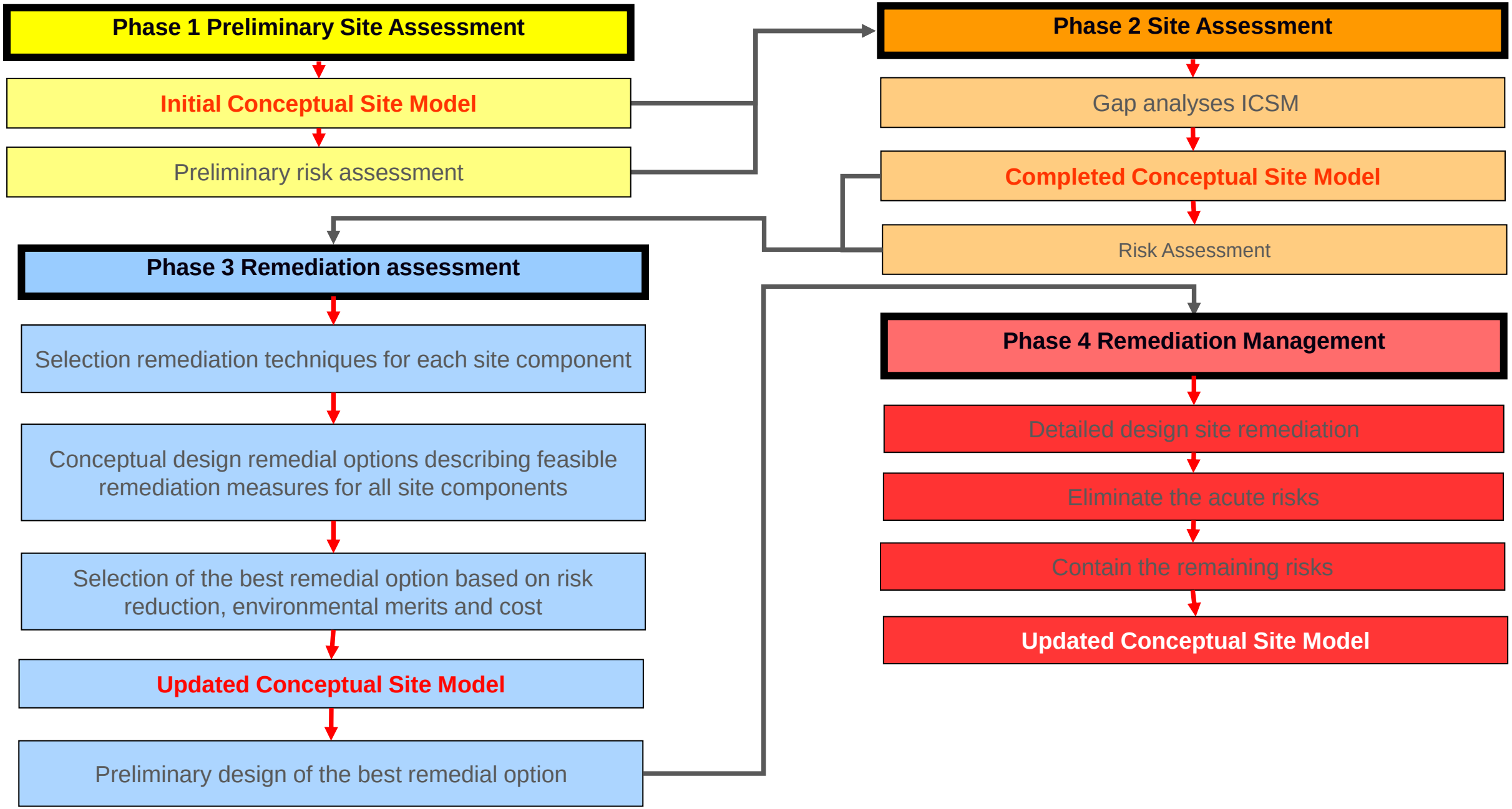
Initial Conceptual Site Model
Preliminary risk assessment
Phase 2 Site Assessment
Gap analyses ISCM
Completed Conceptual Site Model
Risk Assessment
Phase 3 Remediation assessment
Selection remediation techniques for each site component
Conceptual design remedial options describing feasible remediation measures for all site components
Selection of the best remedial option based on risk reduction, environmental merits and cost
Updated Conceptual Site Model
Preliminary design of the best remedial option

Phase 3 - Remediation Assessment

Tasks of the remediation assessment

- **Pre-Design remedial options**
  - ✓ Select techniques
  - ✓ Make different options
- **Select best option**
  - ✓ Risk reduction
  - ✓ Environmental merits
  - ✓ Cost
- **Design best option**
- **Estimate cost best option**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Phase 4 Remediation Management
Detailed design site remediation
Eliminate the acute risks
Contain the remaining risks
Updated Conceptual Site Model

Phase 4 - Site Remediation Management

Implements risk reduction measures

- Detailed design best remedial option*
  - ✓Eliminate the direct risks
  - ✓Contain remaining potential risks
  - ✓Monitor the latent risks

* Best remedial option is using the best available techniques, using environmentally sustainable methods, while not entailing excessive costs, reducing as much as possible the environmental risks

Phase 4 - Site Remediation Management

Remediation strategy

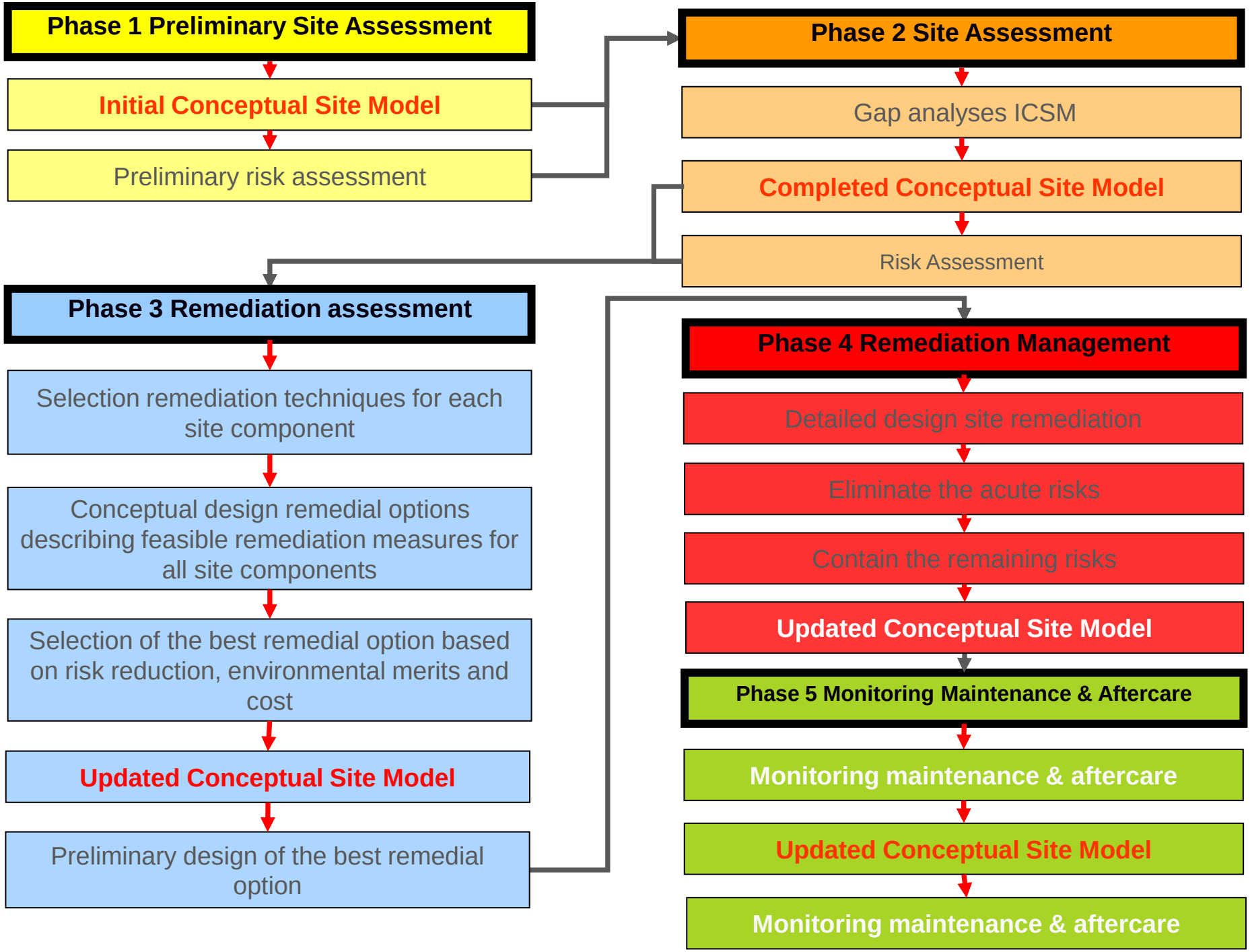
- Risk based approach
- Phased implementation
- Dynamic work plan

Start by elimination of direct risks

- Remove the source
  - ✓ Excavate, repack and destruct source areas
- Cut of the receptor's pathways
  - ✓ Control erosion
- Protect the receptors
  - ✓ Fence source areas
  - ✓ Restrict land-use

Containing potential risks

- Maintain fencing
- Maintain restricted land-use
- Implement erosion control measures
- Pump & treat contaminated groundwater
- Restore vegetation cover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Phase 5 Monitoring Maintenance & Aftercare
Monitoring maintenance & aftercare
Updated Conceptual Site Model
Monitoring maintenance & aftercare

Phase 5 - Monitoring & Aftercare

Monitor the latent risks

For example:

- Inspect and repair containment measures
- Sample and analyse groundwater quality
- Sample and analyse drinking water quality
- Sample and analyse surface water quality

BAT & BEP Guidance
Stockholm Convention

Module	Guidance on BAT & BEP for management of POP contaminates sites	Phase
	Executive Summary	All
	Introduction	
1	Background to POPs contaminated sites	
2	Site investigation, Assessment and Conceptual Site Model	1 & 2
3	Environmental Risk Assessment	1 & 2
4	Principles & Approaches for Contaminated site Management & Remediation	3, 4 & 5
5	Remediation technologies and techniques	3, 4 & 5
6	Technology selection tool for remedial options	3
7	Safety, Health and Public Engagement	All
8	Getting started: Legislation, Policy & Inventory Development	
9	Case Studies	

Questions?

Contact

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Phase 2 Site Assessment

Phase 3 Site Remediation Assessment

Phase 4 Site Remediation Management

Phase 5 Site Monitoring & Aftercare

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