The Importance of Experience Based Decommissioning Planning

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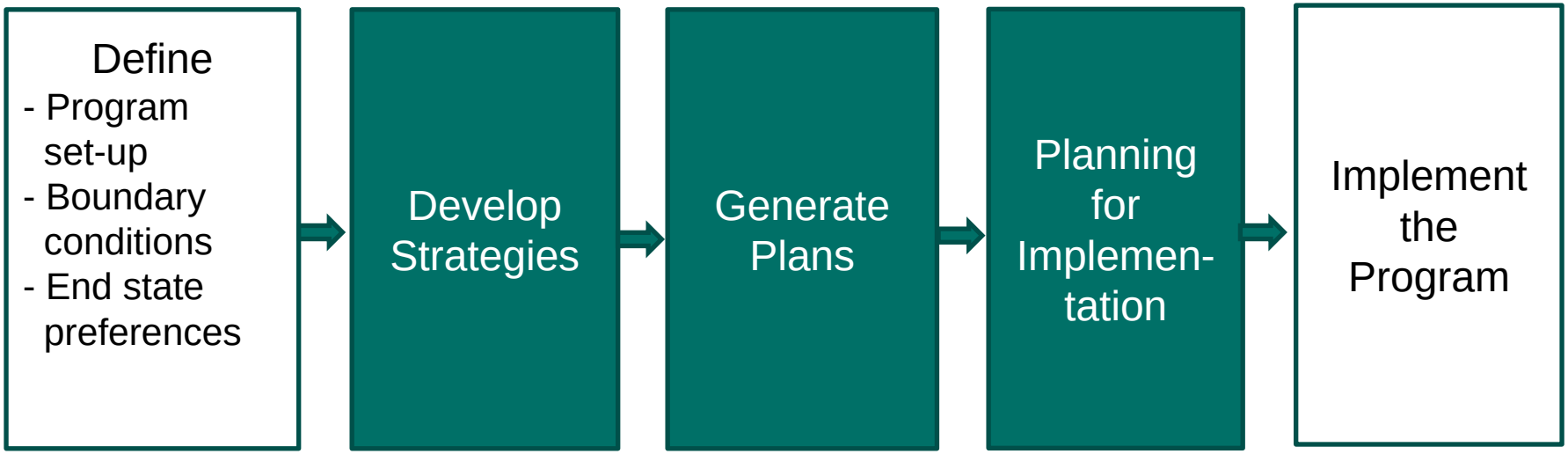
Agenda

- Introduction and overview
- The Decommissioning Steps
- Experience based Decommissioning Planning
- Conclusions

The Decommissioning Planning process



Decommissioning overview

Detailed planning & Licensing support

Fuel Leakage Detection

Inventory calculations

On-site dismantling

Waste treatment systems

Waste transportation

Waste processing

Survey measurements

Characterization

I Initial Planning

II Defueling

III Inventory & Charac-terization

IV Deconta-mination

V Dismant-ling

VI Waste Manage-ment

VII Clearance and Demo-lition

VIII Site Clearan-ce

Planning studies

Decontamination systems

Chemical decontamination

Segmentation

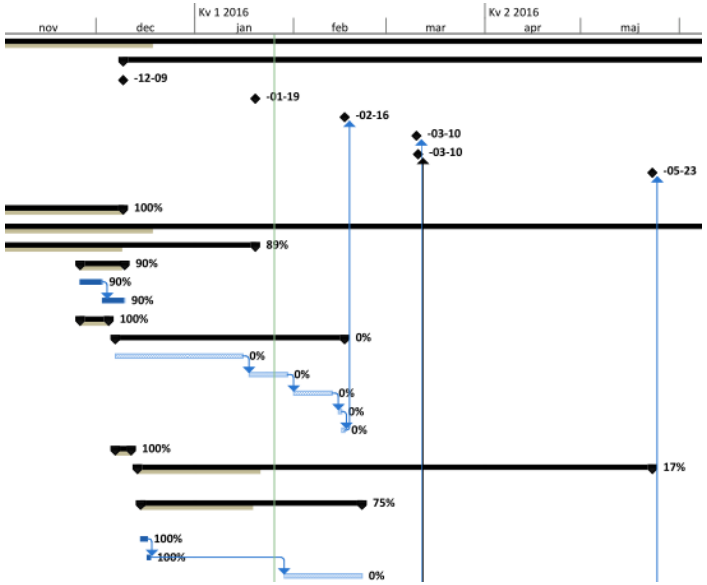
Waste acceptance

Material flow optimization

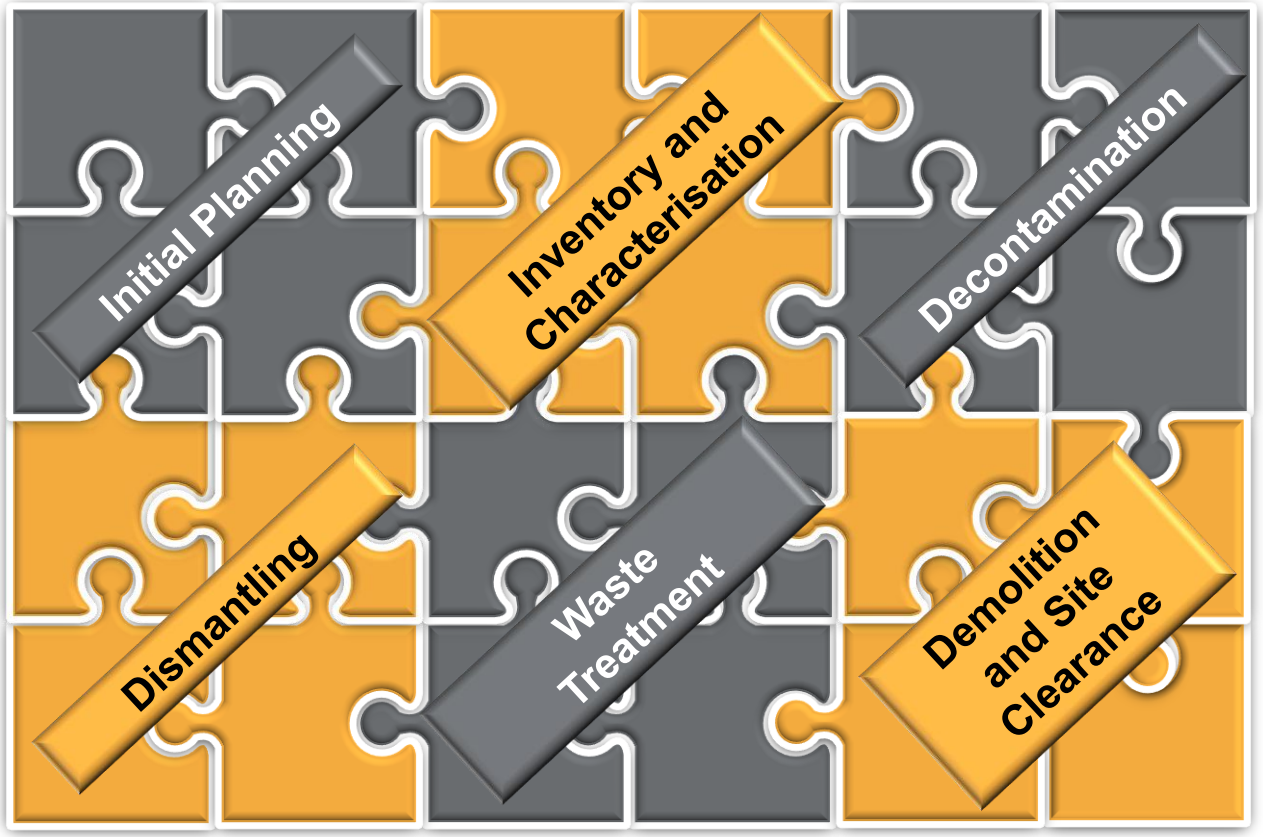
Clearance measurements

Decommissioning success factors

- Defined end-state criteria
- Early decision on self performance or contracting
- Clear and well communicated objectives
- Staff management (transition, replacement and redundancy)
- Active knowledge management
- Focus on structure and logistics, do things in the right order
- Effective and robust waste management processes
- Good relations to stakeholders



Decommissioning is interface management

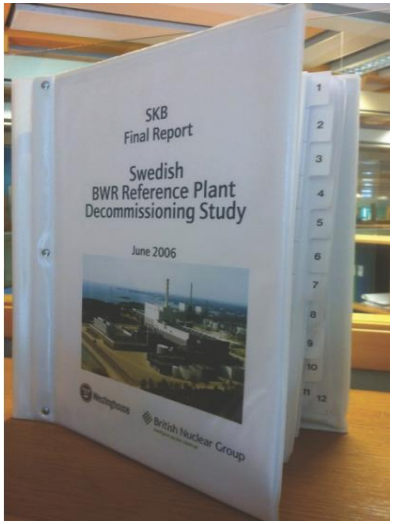


Participation in 250 decommissioning projects the last 10 years

The Decommissioning Steps

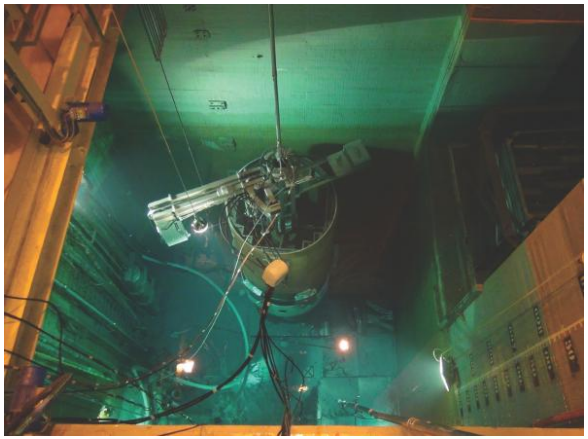
I – Initial planning

- Decommissioning strategy
- Dismantling and Waste Management Strategies including disposition routes
- Licensing documentation
- Material flow optimization
- Detailed planning



II – Defueling

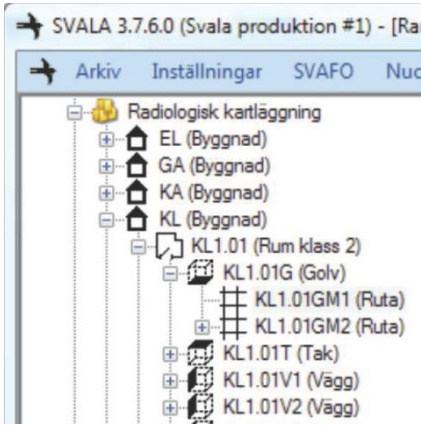
- Fuel leakage detection
- Management of intact and failed fuel



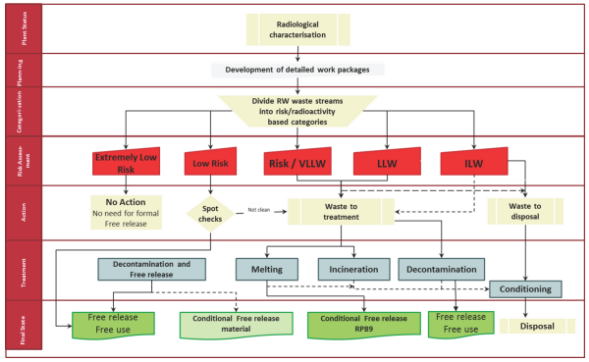
Decommissioning Steps

III – Inventory and characterisation

- Inventory assessment – theoretical calculations verified by in-situ measurements
- Radiological characterisation of systems, installations, structures and site



- Waste and material categorisation based on risk for contamination
- Building and site categorisation based on risk for contamination



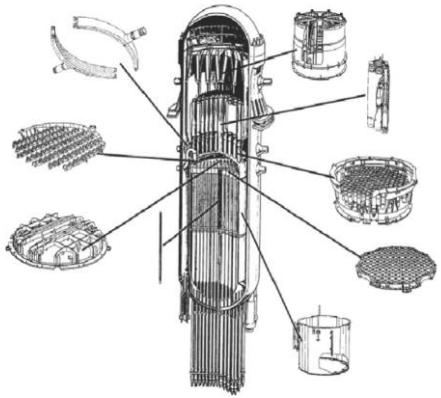
Decommissioning Steps

IV – Decontamination

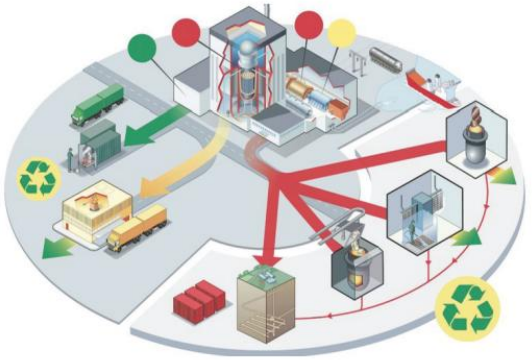
- Selection of decontamination techniques
- Chemical decontamination of systems and components
- Mechanical decontamination of materials and structures

V – Dismantling

- Segmentation of internals and reactor pressure vessel
- Dismantling of systems and installations in a waste led process



Decommissioning Steps



VI – Waste management

- Development of a Waste Management Plan implementing the Waste Management Strategy
- Establish the required in-situ Waste Treatment and Material Clearance Systems
- Implement waste transportation and off-site treatment routes
- Implement waste conditioning for disposal in accordance with WMP
- Implement the waste documentation systems

Decommissioning Steps

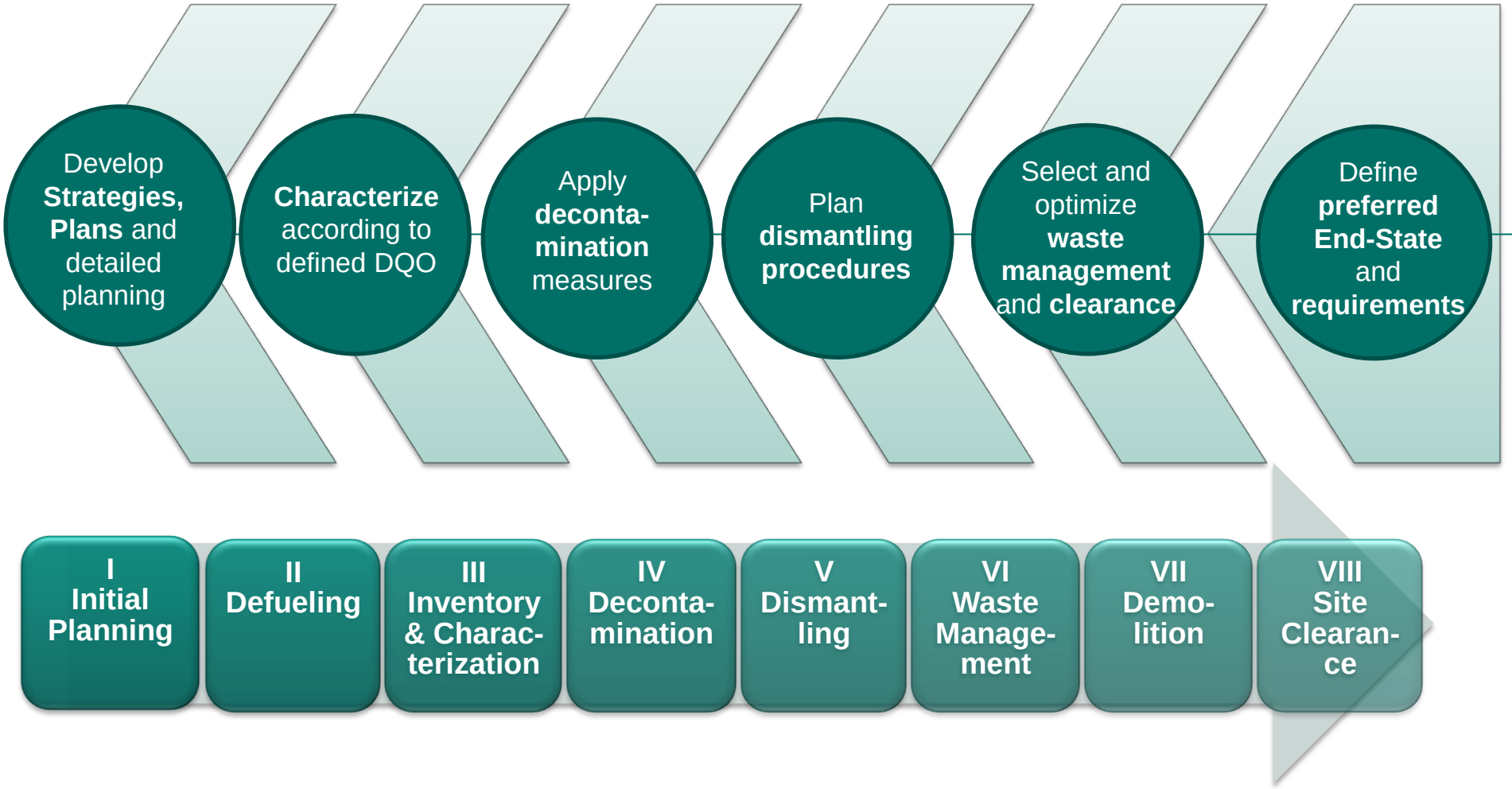
VII – Clearance and demolition of structures

- Characterisation and categorisation of structures upon completion of dismantling
- Decontamination and demolition of contaminated structures, as necessary
- Clearance measurements and documentation
- Demolition of remaining structures after clearance

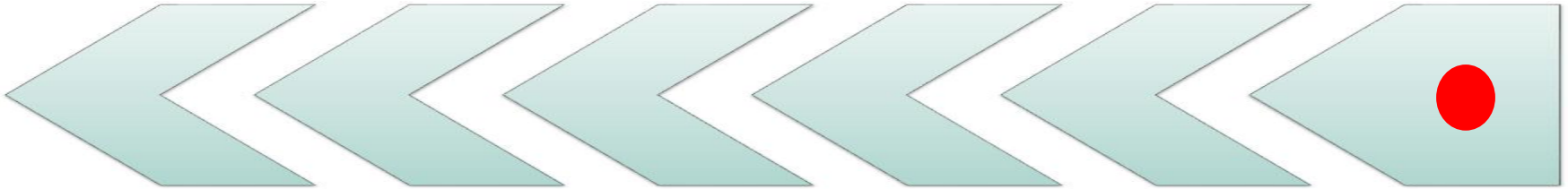
VIII – Site clearance

- Site characterisation (surface/sub-surface)
- Site remediation
- Site clearance

Planning for Implementation



Planning for Implementation

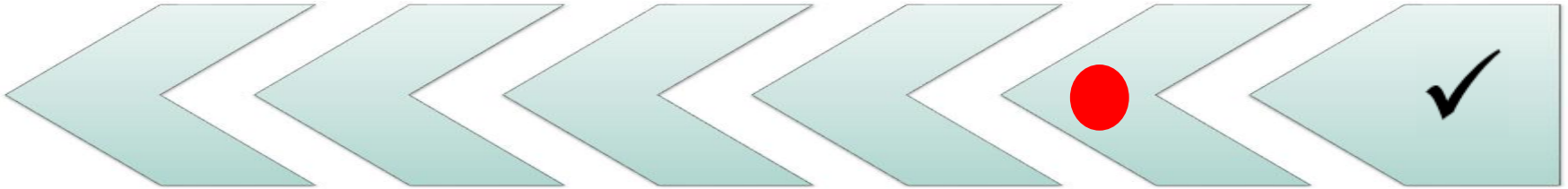


Define end state and disposition routes

Key objectives:

- Clearance criteria for materials, buildings and site
- Secure disposal routes
- Evaluate costs and economical risks for different options
- Evaluate repository requirements (WAC) and availability
  Do not underestimate consequences of intermediate storage – try to reach end-state as soon as possible

Planning for Implementation

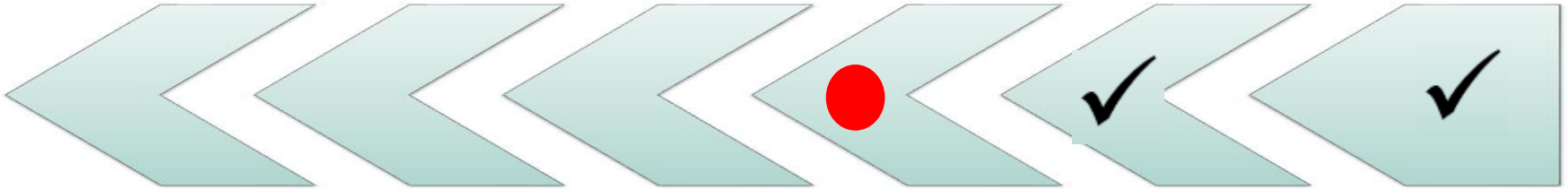


Select and optimize waste management and clearance

Key objectives:

- Select the material and waste management processes to meet selected end-states
- Define and optimize the different waste streams
- Define what should/could be done inside the facility, at other locations on the site and off-site.
- Start planning for validation and acceptance of methods (statistical methods for clearance evaluation etc.)

Planning for Implementation



Plan the dismantling procedures

Key objectives:

- Safety is always No 1
- Secure robust and proven technologies
- Apply ALARA
- Focus on material and waste management.
  Do not forget the logistics

Planning for Implementation

Implement decontamination measures

Key objectives:

- ALARA (keep dose rates low)
- Transfer waste to another category (for example LLW -> VLLW)
- Open up for expanded possibilities for clearance

Watch up:
Residues from chemical decontamination from chemical decontamination can be a Waste Management challenge

Planning for Implementation

Define the Characterization and categorisation efforts required

Key activities:

- Definition of objectives in general and especially DQO
  Define plant status and perform initial categorisation
- Careful planning
- Proper implementation
- Data assessment and draw conclusions

A proper information management system should be taken into operation as early as possible

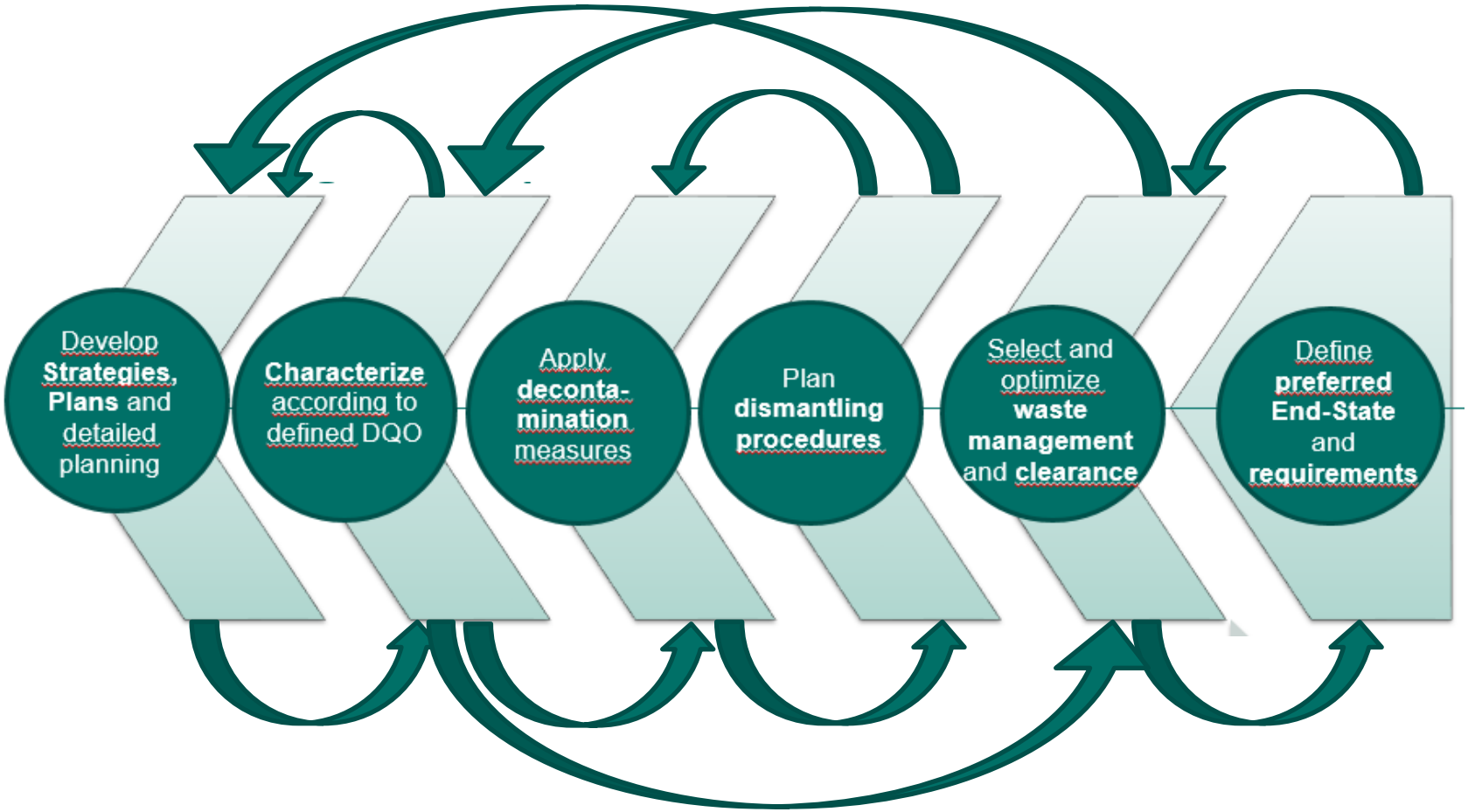
Planning for Implementation

Optimisation and finalisation

- Perform modelling to identify and mitigate potential bottle necks
  Revisit and optimise previous steps, as necessary
- Secure Quality Assurance
- Communicate to build stakeholder confidence
- Identify and secure competence and resources for the different phases. Plan for transition- and redundancy programs, recruitments and contractor support

Press the button: **Ready to Go**

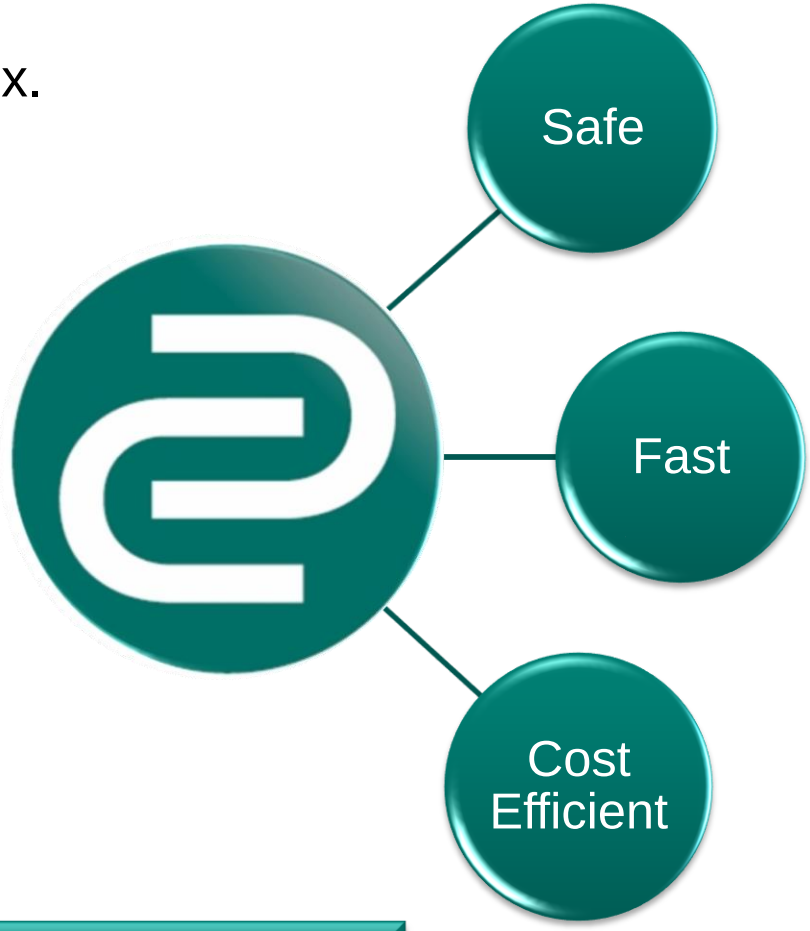
Planning in practice



Decommissioning planning is an iterative process

Summary and conclusions

- Decommissioning projects are complex. Planned and performed by people
- Do not underestimate the staff management in planning activities
- Experience, competence and understanding is crucial in planning
- Structure, logistics and robust processes is vital for success
- Focus planning on reaching end-state conditions as early as possible



Motivated staff building their career performs better

Thank you for your attention