MJV Workshop for Seveso Inspections

French past and current experience with ageing of hazardous installations

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1. Introduction to the ageing in France

2. Feedback on the national inspection campaign

3. Some difficulties faced to implement the modernisation plan

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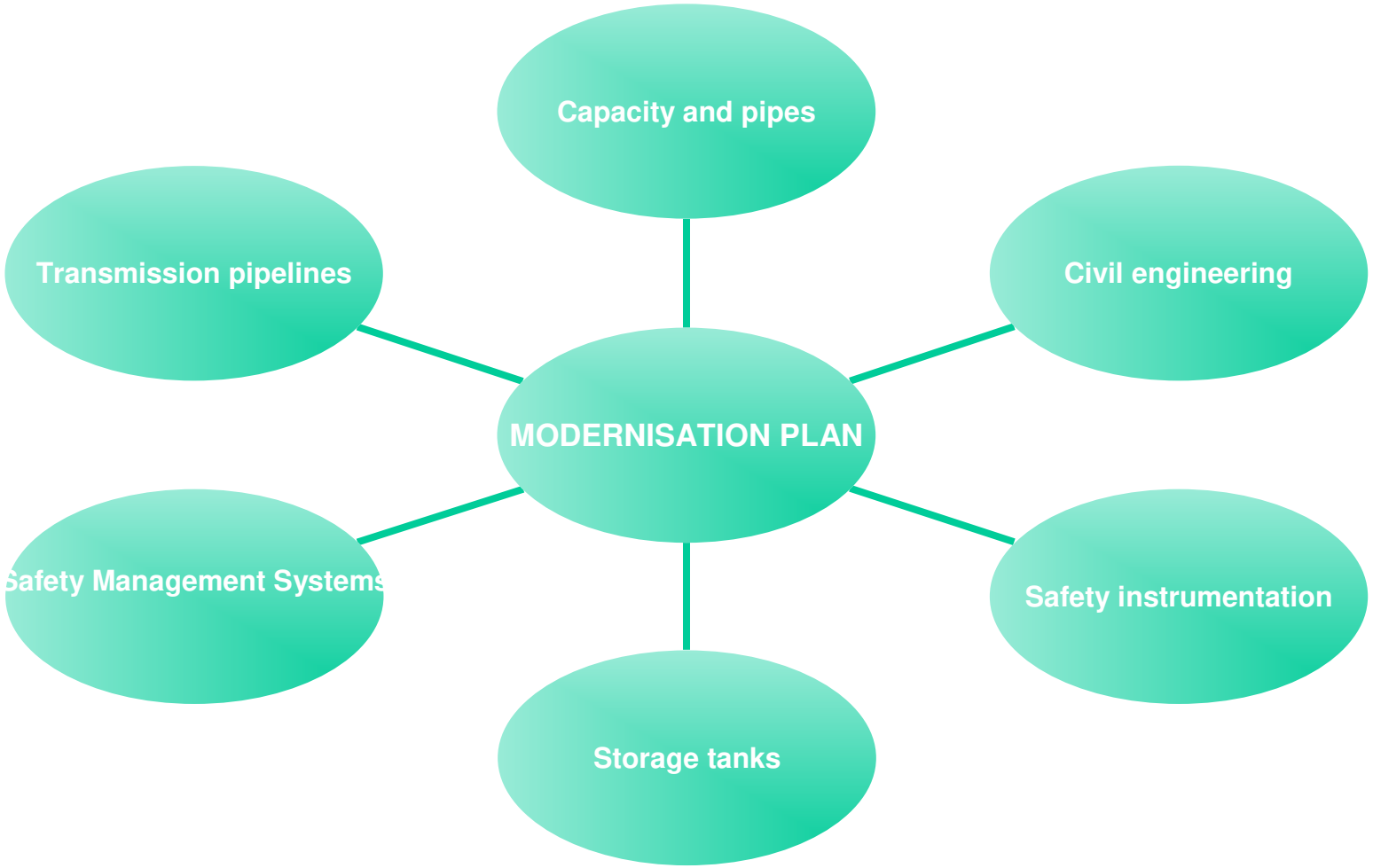
Creation of the modernisation plan

The Modernisation Plan for Industrial Facilities was created in 2010 for authorized or SEVESO sites



Only for hazardous substances, and “big” industrial facilities

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General principles

- Assessment of an initial condition : *initial state*
  - Specify the targeted equipment
  - Technical files (construction features, background on interventions on the equipement,…)
- *Timetable* for assessing the initial condition and setting up inspection plan
- Development and implementation of an *inspection plan* conducted by the plant owner
  - Example: Tanks
    - Routine visit (every year)
    - External inspection (every 5 years)
    - Internal inspection (every 10 years)
- Development of a record per equipment

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Professional guides

- Identify equipments and give their usual description
- Explain possible failures and degradation mechanisms
- Detail procedures for the initial state
- Specify control points and methods
- Specify acceptance criteria
- Specify controls frequency
- Give repairs timeframes

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National inspection campaign

- 2012 : deadline for plant owners to comply to the plan. First “friendly” visits

- Started in 2013, up to 2017

- Aims

  = follow the implementation of the plan by plant owners

  = implement the modernisation plan in the long run

- Yearly average number of inspections : 300

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Vigilance points for inspectors

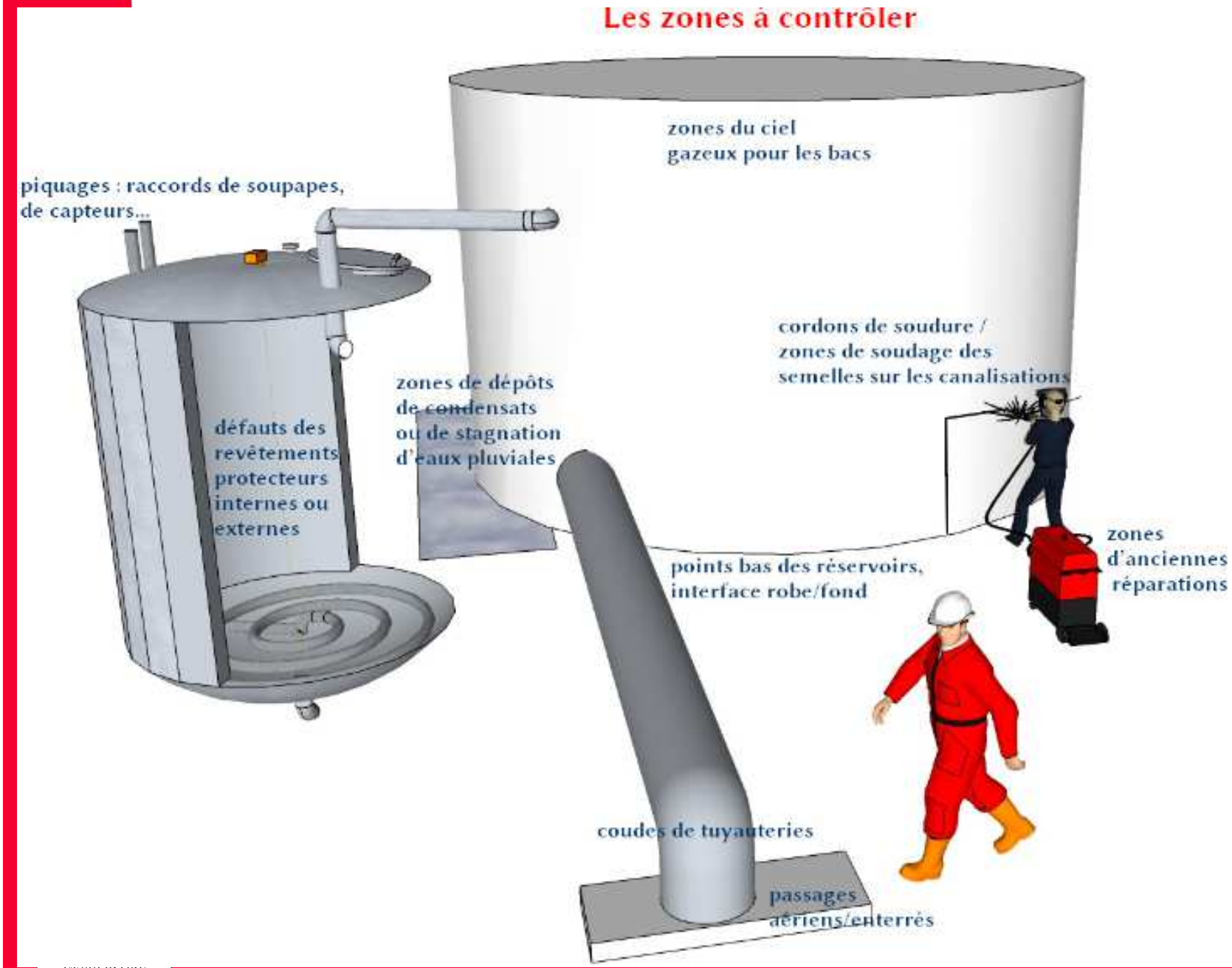
- Checking records of initial conditions of equipment : can it be used as a reference for next controls ?

- Checking inspection plan recorded : does it detail degradation mechanisms, acceptance criterion, controls methods and frequencies, repairs, abilities of controllers, recognised standards attached to equipment ?

- Checking controls timetable : are there any controls without undue delay in accordance ? Do future controls frequencies modified according to conclusions of past controls ?

- Checking controls reported : **do they conclude about time remaining before potential failures ?**

Technical controls of equipment : tank for instance



source BARPI

National inspection campaign

- Maintenance got stronger
- Most of equipments are now identified
- Good implementation in SEVESO sites : plans give degradation mechanisms and quantified physical criterion not to be reached

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National inspection campaign

- Absence or incomplete documentation on the equipment
- Absence or incomplete initial condition, programme, or inspections plans : plans and controls are not really clear about kinetics of degradation, controls must be conclusive
- If defaults are detected, corrective actions are not executed automatically
- Some sites are subcontracting, and are not aware of potential problems

Some specific lessons learnt about good practices

- Ageing management of equipments = handling initial ageing signs and repairing in time
- Control plans must be built with practitioners ; practitioners give alerts
- More controls on near shutdowns equipments
- Equipment configuration can sometimes quickly lead to ageing
- Spare parts management : compatibility and availability

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Ageing of out-of-scope equipment

Case study - Rupture of a water tank in a LPG-storing site

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Ageing of out-of-scope equipment

Sudden release of water in the industrial site alongside

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Ageing of out-of-scope equipment

Causes :

1. Misinformation about the tank construction : presence of a liner in an already tight-sealed tank
    - No up-to-date file of the tank
    - No transfer of information between old and new workers

2. Corrosion between the liner and the tank wall

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Ageing of out-of-scope equipment

Consequences :

1. No casualties (by luck)

2. Release of 1.300 m^3 of water in the contiguous site
   - Collapse of a 30 m-long fence
   - The flood didn't occur on the side of the LPG tanks and didn't cause any more damages by ripple effect (by luck)

3. Water reserves drop from 1660 m^3 to 360 m^3
   - Need of new water reserve in emergency

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Ageing of out-of-scope equipment

Remedial actions :

- In the case study introduced :

  ⇒ External and internal inspection planned (with an aquatic robot)

- In general:

For substances out-of-scope of the modernisation plan, but taking part in the safety of the installation (for instance, risk control measures and safety instrumentation)

⇒ Controlling the ageing of equipment

⇒ Inspections of procedures and files of equipment

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Cryogenic storage tanks of air gases

Background:

- Air gases: oxygen, nitrogen and argon (T < -10° C, P < 0.5 bar)

- In French regulation, it is mandatory to carry out a yearly routine visit, an external and internal inspection for cryogenic tanks

  ⇒ Possibility to request a derogation for the internal inspection based on a well-documented study

- Internal inspection (after emptying the tank) can cause damages to the structure of the tank due to the differences of temperatures

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Cryogenic storage tanks of air gases

Technical answer:

- We received from a professional organisation :
  - A technical study of ageing phenomena on cryogenic tanks
  - A technical study of growth of a defect in the tank according to the chosen phenomena
  - A report and lessons learnt about the internal inspection of one tank

⇒ Kinetics of the appearance of a crack in the inner wall of the tank will be very long (years) and can only occur if there is an initial defect of significant size

Cryogenic storage tanks of air gases

Government decision :

- Technical expertise of the files led to 6 conditions to exempt internal visit for cryogenic tanks over the years.
  - Tracking lessons learned worldwide on this type of tank
  - Controlling according to the dedicated professional guide
  - Internal conditions always maintained to prevent corrosion inside
  - Nitrogen flush and insulation in-between walls always maintained to prevent external corrosion of the inner wall
  - Operations conditions maintained
  - Internal controls during construction can confirm the absence of defect of significant size

⇒ Problem : some plant owners cannot find the document of construction to assure there was no initial default

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Cryogenic storage tanks of air gases

- How do you inspect cryogenic storage tanks of air gases in your countries ?

- Is an internal inspection mandatory ?

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Thank you for your attention

Any questions?

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