

Äspö Hard Rock Laboratory An Overview Introduction

NEA IRT visit
December 14th, 2011



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Agenda

08.30 An Introduction to Äspö Hard Rock Laboratory

09.30 Underground visit

11.40 Bentonite Laboratory visit

12.00 Lunch

13.00 Experiments related to SR-Site with focus on NEAs questions

- Purpose and results from experiments (CRT, ABM, Prototype, EVA)
- Ongoing work and plans of new experiments (C&C, ABM45)
- Follow-up to NEA Questions on buffer addressed on Tuesday

14.45 Experiments related to EBS with focus on NEAs questions

- Ongoing work and plans of new experiments (Buffer, Backfill, Plug)
- NEA Questions to answer

15.45 Summing up/conclusions

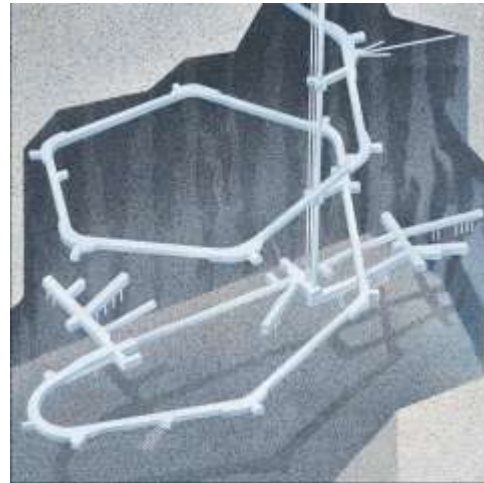
16.00 Departure



Äspö Hard Rock Laboratory

Background information

- In September 1986 SKB presented the first **Research Development and Demonstration Programme** according to the new Act on Nuclear Activities.
- One of the major highlights of the programme was the plan for the construction of **an underground research laboratory**.
- The main aim was to provide an opportunity for research, development and demonstration in **a realistic and undisturbed rock environment** down to the depth planned for the future final repository.



1986 – Important basic decisions

- The use of the underground laboratory is only for research purposes. It will not be converted into a repository in the future!
- Suitable geology, existing infrastructure and service should be available. To begin with, the suitability of one of the nuclear power sites, especially the regional area around Simpevarp in the municipality of Oskarshamn should be explored.



Äspö Hard Rock Laboratory

Phases of realization



Preconstruction phase, 1986 – 1990

- Regional geological investigations
- Surface and borehole investigations
- Predictions based on the site investigations

Construction phase, 1990 – 1995

- Detailed characterisation of the rock
- Modelling of groundwater flow
- Evaluation of predictions from the preconstruction phase



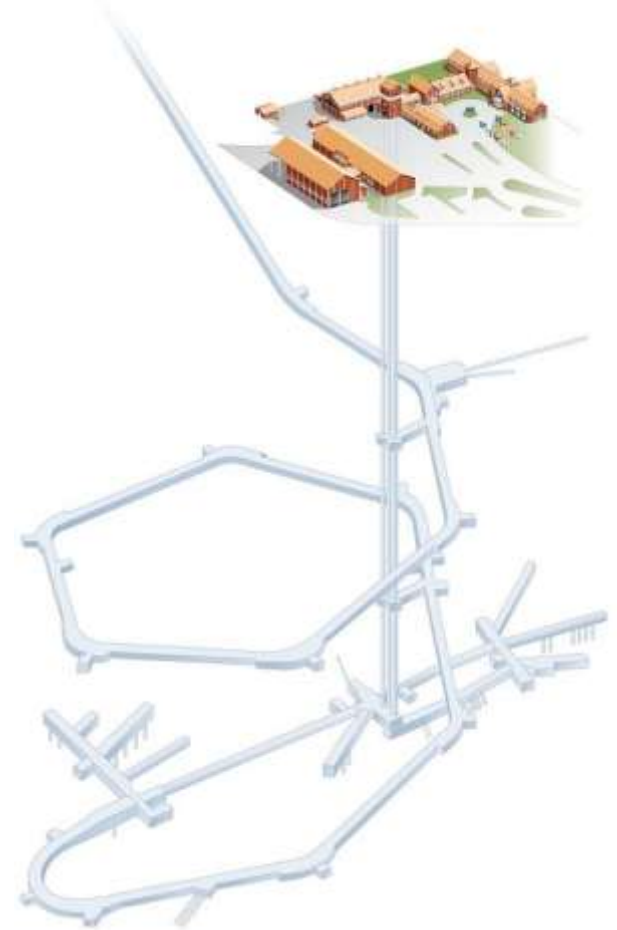
Operating phase, 1995 –

- Test models describing the barrier function of the rock
- Demonstrate technology and function of the repository system
- Refinement of detailed characterisation technology



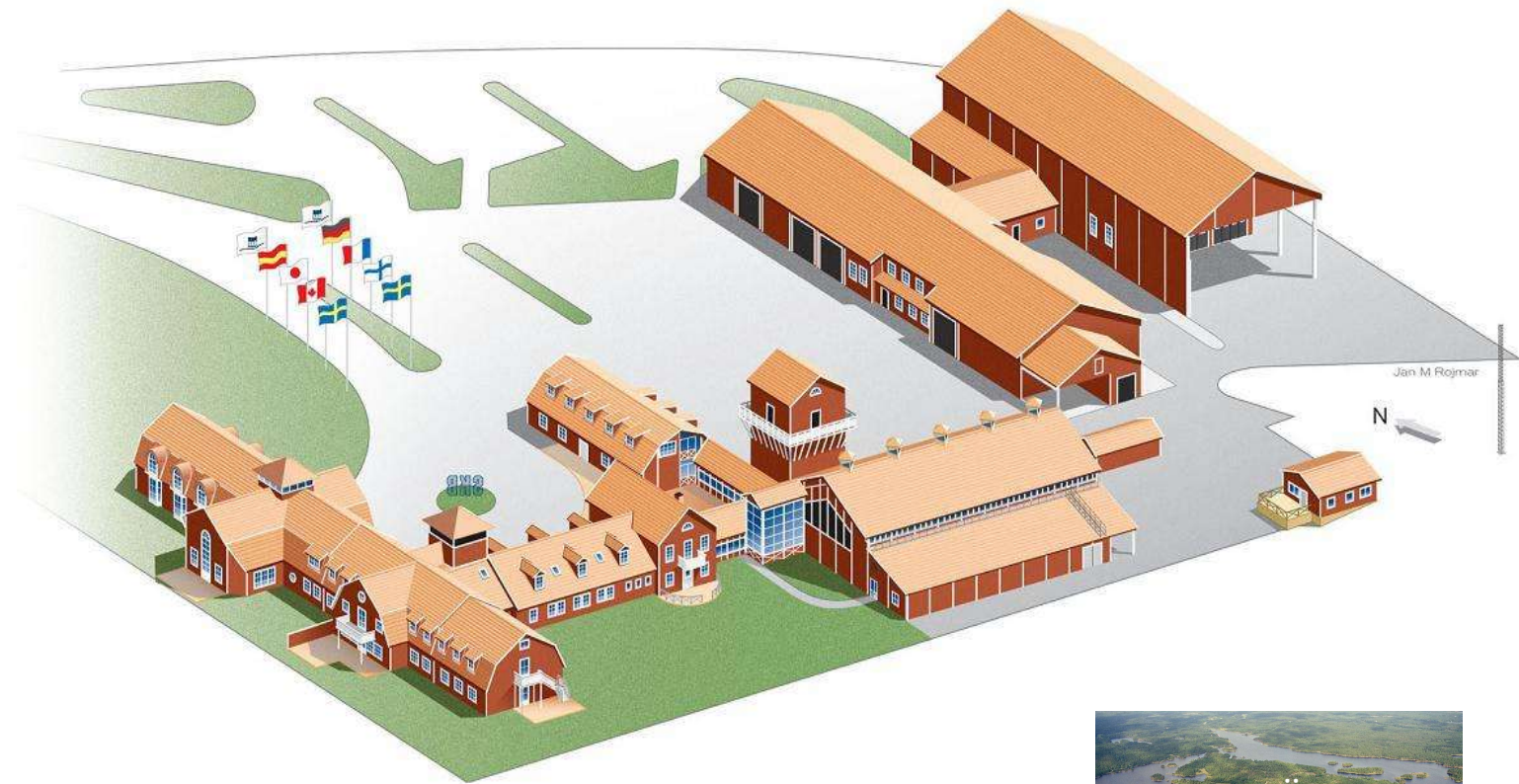
The role of the Äspö Hard Rock Laboratory

- ✓ Test and verify methods for site characterisation and modelling - both surface based and from the underground.
- ✓ Develop and demonstrate methods for construction and operation of the final repository.
- ✓ Test alternative technology that can improve and simplify the design of the final repository without compromising its high quality and safety.
- ✓ Increase the scientific understanding of the safety margins and provide realistic data for safety assessments of the long-term safety of the repository system.
- ✓ Provide experience and train personnel for various tasks in the final repository.
- ✓ Provide information to the general public on technology and methods that are being developed for the final repository.



Äspö Hard Rock Laboratory

The research village on the island Äspö



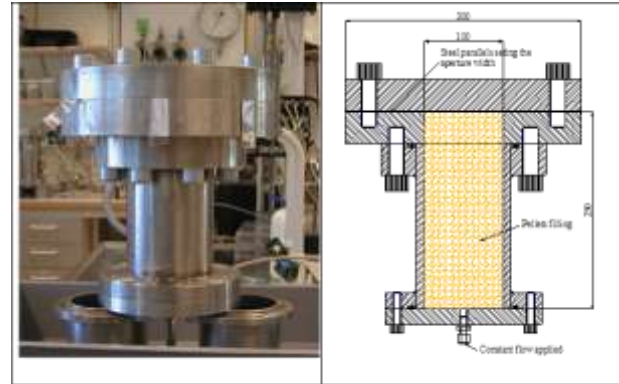
Inauguration of the Bentonite Laboratory - March 29th, 2007



Full-scale tests in the Bentonite laboratory

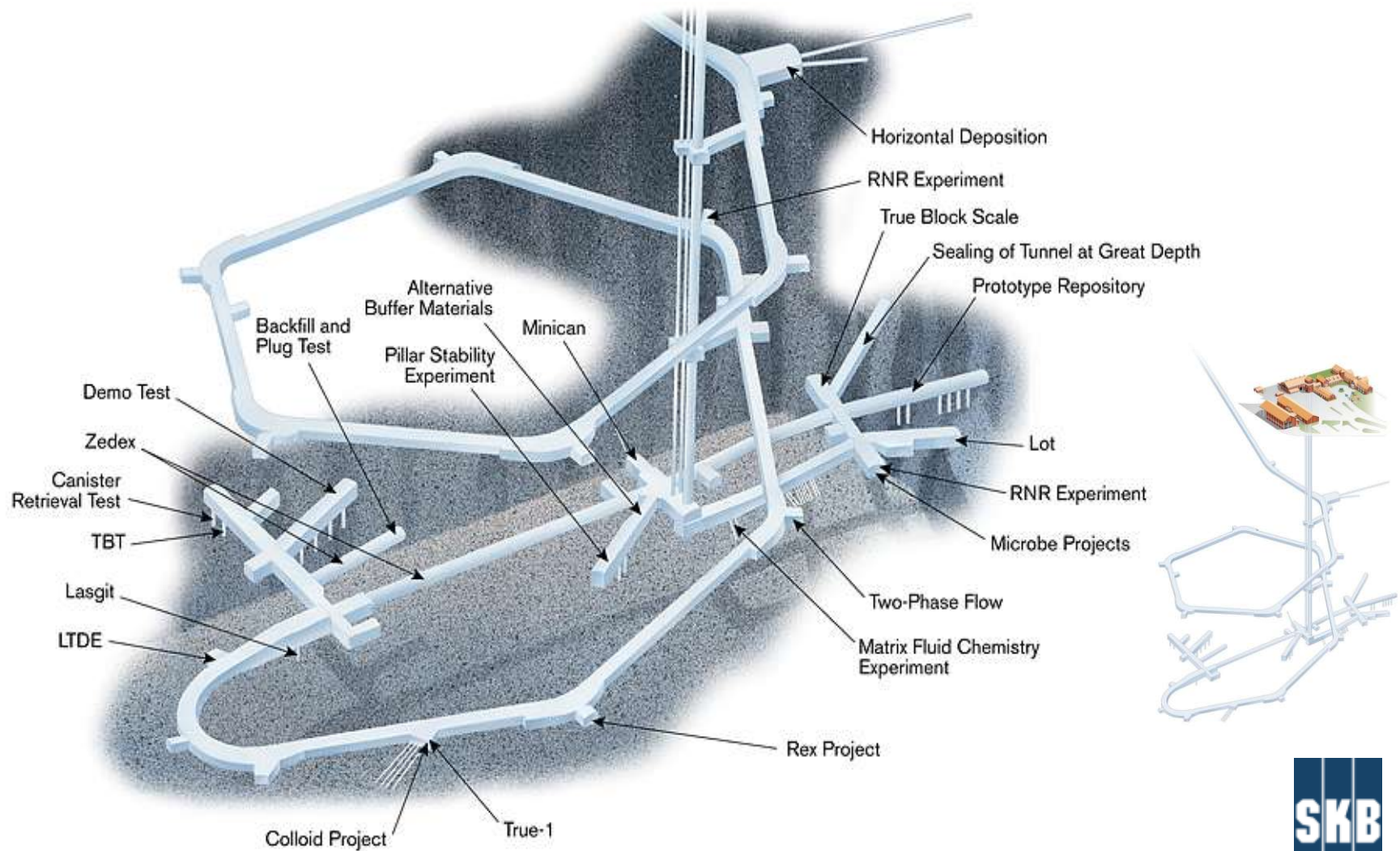


Laboratory tests at Clay Technology (Lund)

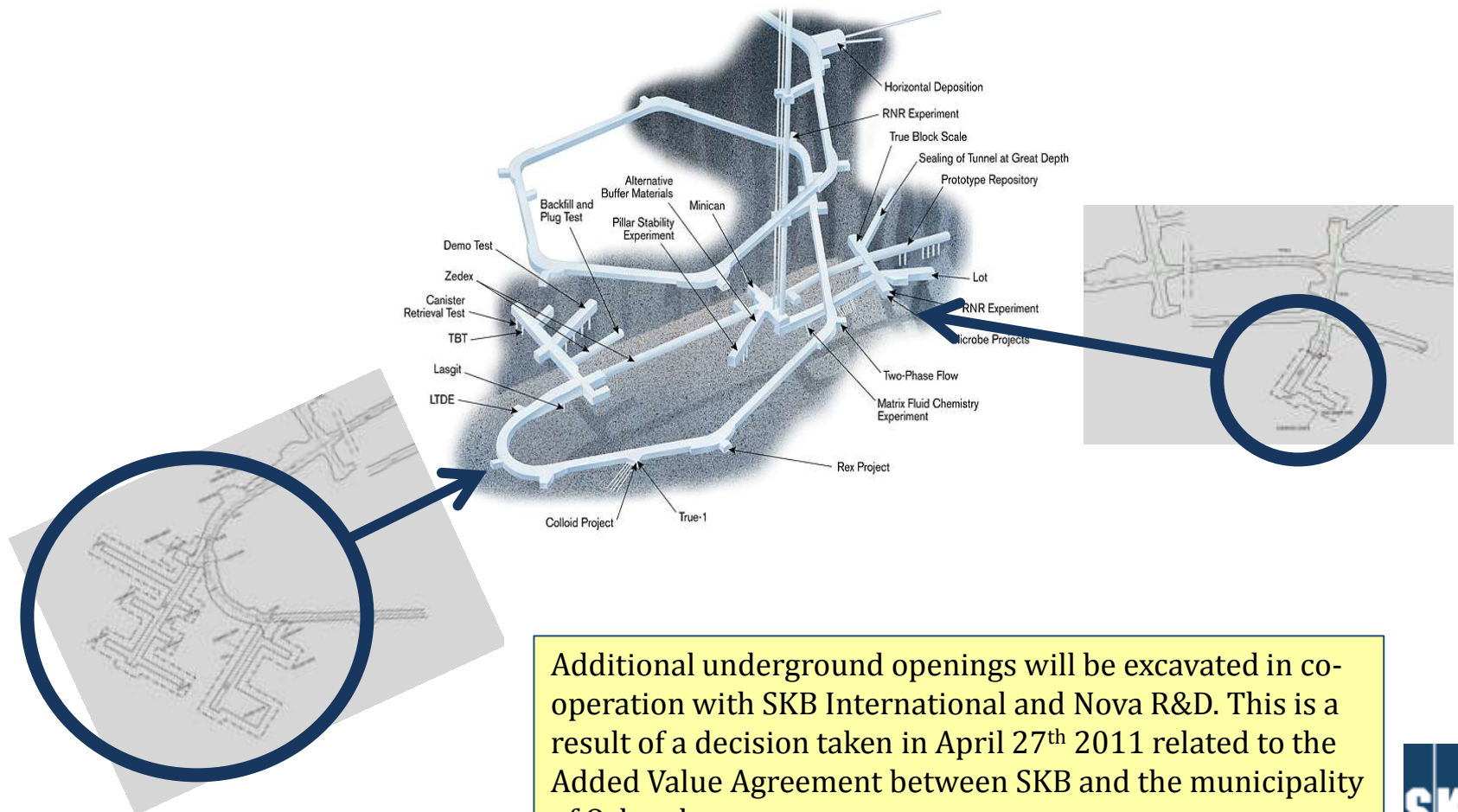


Äspö Hard Rock Laboratory

Allocation of experimental sites from -220 m to -460 m level



Extension of Äspö HRL, 2011-2012



Reasons for extension

Need of new sites for new experiments by different interested parties.

- Verification of plug for deposition tunnels
- Test of tunnel excavation methodology
 - Characterisation methodology
 - Grouting methodology
 - QC
- New KBS-3H test site
- Concrete and clay experiment
- SKB International

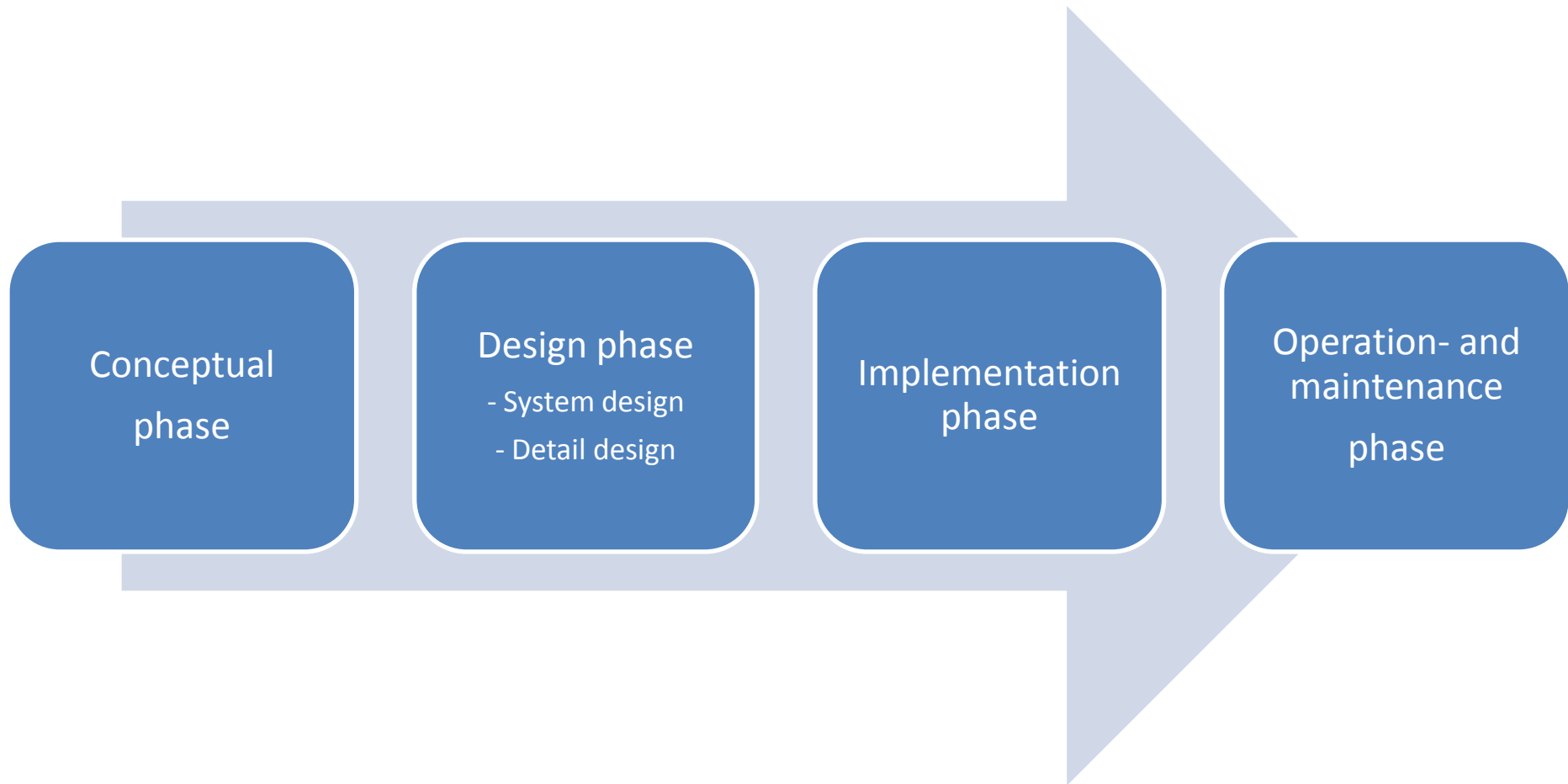


Public Relations and Visitor Services

- ✓ About 10 000 visitors yearly
- ✓ 15 % of the visitors are coming from foreign countries
- ✓ “Urberg 500”, summer-tours for the general public



SKB's development process



Conceptual design

- Design premises
- Different conceptual solution considered
- Verification through laboratory tests and some full-scale tests
- Selection of reference design

Buffer full-scale tests (conceptual level)



Backfill full-scale tests (conceptual level)



System Design (2010 - ca 2016)

- Revised requirements specification
- Develop and optimise design
- Verification
- Plan for industrialisation and inspection methods
- Preliminary operational safety program
- Risk analyses
- Buffer
- Backfill
- Plugging of deposition tunnel
- Deposition machine
- Etc

➤ *Input to updates of production line reports and PSAR*

NEA question: Feasibility of the canister emplacement operation in the deposition hole. Available demonstration tests.

Deposition Machine



Robot (Backfilling of deposition tunnels)



Self Propelled Modular Transporter



Äspö Hard Rock Laboratory Oskarshamn, Sweden

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