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Results of the “call for ideas” on repository monitoring

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OBJECTIVES:

- Identify specific areas related to repository monitoring in which further research is required, and have strong influence on:
 - Strategies
 - Repository design
 - Repository implementation plans
 - Communication strategies (present and future)

- Serve as starting point for the definition of the objectives and scope of a potential future collaborative project on repository monitoring

- Carried out among MoDeRn partners
- Inputs received from 7 parties
- Final version (V 3.1) issued on 31.05.2013

- A. Strategy aspects**
- B. Technology development**
- C. Practical implementation**
- D. Communication & stakeholder involvement**

1. Establishing links and inter-comparison between monitoring plans, the rationale for these plans, and the safety cases, in order to identify **monitoring requirements**, including the analysis of test cases to identify critical and non-critical **parameters**
 - Comment:
 - combine the presentation with M. White
 - strategy aspects to install confidence
2. Definition of procedures for the **analysis of data**, and management of potential **deviations** from the expected system evolution, including the consideration of ~~potential~~ **response plans**, and the analysis of implications on the **safety case** and on the repository design and construction
 - Comment:
 - remove the second “potential”
3. Analysis of the **staged implementation** of monitoring activities during the different repository phases, and the potential role of Underground Rock Laboratory (URL) **tests and pilot** facilities, to define the monitoring approaches during the whole lifecycle.

1. Development and demonstration of **sensors and sensing techniques**, including geophysics, with particular emphasis on methodologies and systems that do not affect passive safety, and on those which can monitor parameters of key significance to the safety case (e.g. chemical parameters)
2. Further development and demonstration of **wireless** communication systems for short, medium, and long distance links through solid materials, including non-electric systems, to improve its range of applications and to optimise energy requirements
3. Research and demonstration on smart **power supply** systems for buried sensors and data transmission equipment, for very long operational periods
4. Development and demonstration of mobile and **robotic inspection systems** for non-backfilled areas
 - Comment:
 - Non destructive methods

5. Assessment of the long-term behaviour and the **durability** of the different types of materials and components used in monitoring systems (sensing devices, electronics, cables, casings, etc), taking into account the expected operating conditions (e.g., temperature, chemical environment and radiation field).
6. Development of **quality assurance** methodologies that enable the quantitative assessment of the **long term performance** of monitoring systems and components.
 - Comment:
 - Merge the two last points re-phrase them ?
7. Development of methodologies for the **management and interpretation of data** provided by the monitoring systems, taking into account sensor drift and reliability, and including topics such as redundancy, data filtering, data correlation and extrapolation, and data fusion, as well as the database storage and management.

1. Development of disposal specific **monitoring plans**, based on modelling of natural end engineered systems, and taking into account the spatial heterogeneity, the density and location of measurements, and trigger values for critical parameters and locations
2. Integration of monitoring requirements with repository concepts, in order to include them in the technical **design of repository** facilities for the different geological environments (crystalline rock, clay, rock salt)
3. Demonstration of **integrated monitoring systems** including coupling of new and advanced technologies with well-known technologies in realistic conditions, to solve specific technical issues.
4. Analysis of monitoring data from demonstrators to examine the implications of monitoring results to the **safety case**, including the potential feedback to performance assessment modelling.
 - Comment:
 - Change the word démonstrator

1. Research into **stakeholder expectations** of roles and relationships in relation with monitoring, and development of strategies for the **involvement of stakeholders** and independent organizations in the different phases of monitoring.
2. Research into **communication** processes and development of strategies and methodologies for the communication of monitoring results in an effective and acceptable way in order to contribute to confidence building.