

Summary of discussions

“Cement-Organics-Radionuclide-Interactions”

TSWG CORI

- M. Altmaier, KIT-INE, Germany
- Frederic Plas, ANDRA, France

IGD-TP EF6, 3+4.11.2015, London

TSWG CORI (JA6b)

- **TSWG CORI established within IGD-TP:
JA6b: Cement-Organics-Radionuclide-Interactions**
- *Joint activity launched in EG15*

- *WP activities in 2015*
 - *March: meeting in Karlsruhe, 28 representatives from 4 WMOs and 16 Research Institutes. Definition of key topics and responsibilities.*
 - *Spring: distribution of CORI Questionnaire to partners.*
 - *Summer/Fall: evaluation of questionnaires and input from partners, several follow up meetings.*
 - *November: presentation of CORI at IGD-TP EF6.*
 - *Always: highly constructive exchange with WMO representatives!*

Presentations and discussions on CORI at IGD-TP EF6



TWG3 – Cement Organics Radionuclide Interactions (CORI)

Rapporteurs: M. Altmaier – F. Plas

Programme

Tuesday 3rd November

14:00 - 17:00	Introduction M. Altmaier, KIT- INE
	Overview of the outcome of the TSWG CORI “Cement Organics Radionuclide Interactions” - Marcus Altmaier, KIT-INE, Germany
	CORI-WP - WMOs priorities and expectations - Eric Giffaut Andra France
	Degradation of organics - result of hydrolysis and radiolysis - Johan Vandendorre, SUBATECH, France
	Mobility of organics in cementitious environment and their interaction with Fe - Mireia Grivé, Amphos 21 Consulting, S.L., Spain
	CORI-Work Package on “Mobility of organics-RN complexes in a cementitious environment - Virginie Blin, CEA, France
	CORI: WP on “Modelling, upscaling, application to PA” - Diederik Jacques, SCK.CEN, Belgium

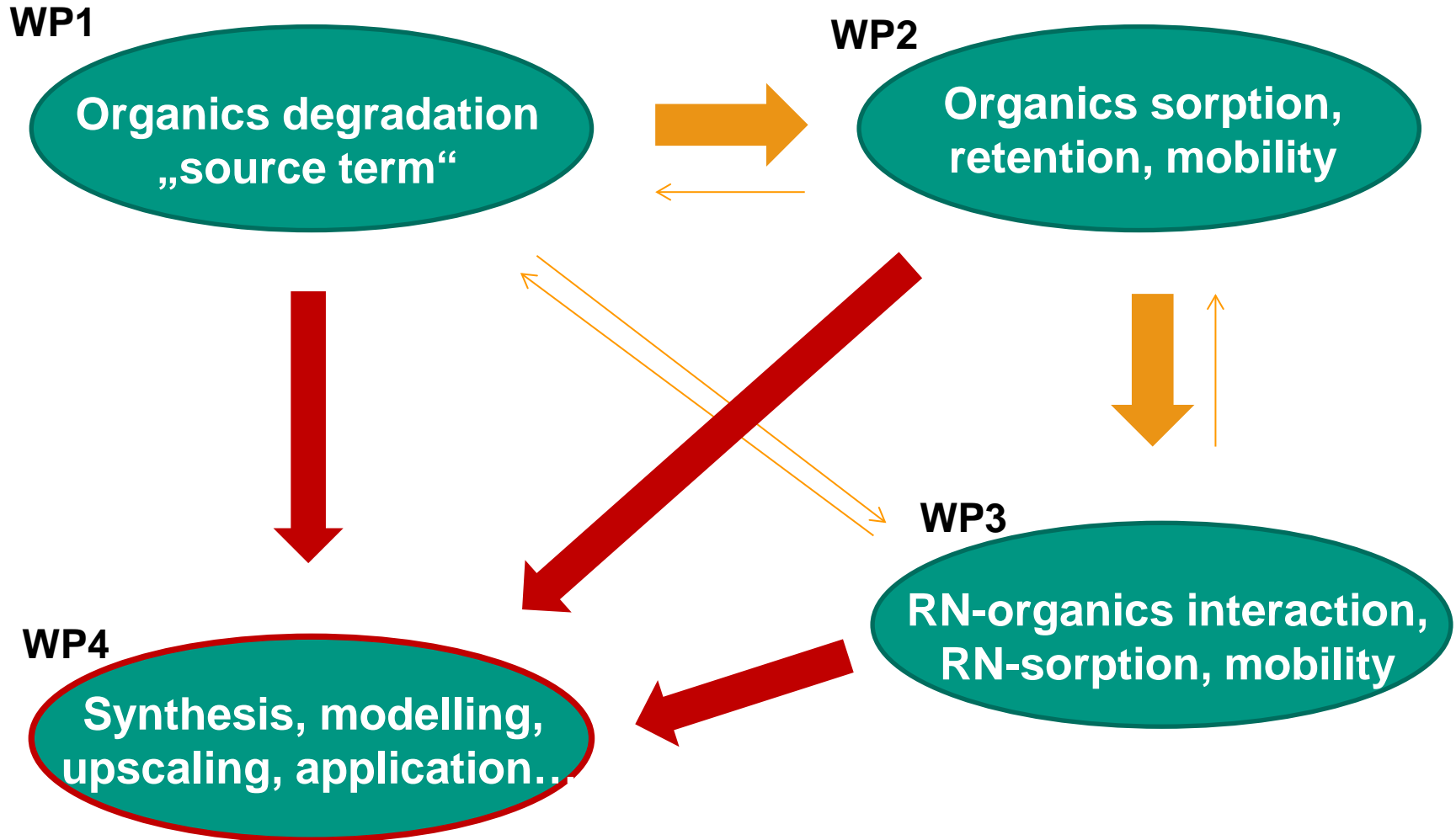
OUTCOME OF TSWG CORI

- Investigation of cement-organics-radionuclides-interactions is a relevant topic with potential implications for nuclear waste disposal.
- WMOs analysis of relevant organics inventories in repository projects!
- The identified key topics, research tools and strategy allow to develop a R&D approach for investigating the CORI topics.
- *CORI suggests to develop a proposal for the next Horizon 2020 call.*

CONCEPT FOR CORI PROPOSAL

- **CORI includes four R&D oriented Work Packages:**
 - **WP 1** “Degradation of organics - result of hydrolysis and radiolysis” (*Subatech*)
 - **WP 2** “Mobility of organics in cementitious environment and their interaction with Fe” (*Amphos21*)
 - **WP 3** “Mobility of organics-RN complexes in a cementitious environment” (*CEA*)
 - **WP 4** “Synthesis, modelling, upscaling, application” (*SCK·CEN*)
- Additional WPs on Management (Coord. KIT) + Training/Dissemination
- **Total requested EC contribution: < 4 M€**

CONCEPT FOR CORI PROPOSAL



INTERACTION WITH OTHER PROJECTS

- CORI topics allow strong synergies with ongoing EC projects.
- Complementarity of approaches and complementary research results.

MIND

*Organics degradation via bio-mediated processes studied.
=> Synergy with CORI WP1.*

CAST

Chemical speciation and concentrations of ^{14}C from irradiated materials. => Synergy with CORI WP2.

CEBAMA

Transport processes and RN sorption studied and modelled in cement based systems. => Synergy with CORI WP4.

POTENTIAL CORI PROJECT PARTNERS

Potential CORI partners

Amphos21 (ES), Bern Univ. (CH), BRMG (F), CEA (F), CTU (CZ), ENEA (IT), Heidelberg Univ. (DE), Juelich (DE), KIT-INE (DE), Loughborough Univ. (UK), Mainz Univ. (DE), Manchester Univ. (UK), NNL (UK), NRG (NL), Potsdam Univ. (DE), PSI (CH), SCK·CEN (BE), Sheffield Univ. (UK), Subatech (F), TERAMED (CZ), UJV (CZ).

At present: 21 potential partners from 8 countries

CORI is open for additional contributions from new partners focusing on the identified key issues in CORI.

WMOs

ANDRA, NAGRA, ONDRAF/NIRAS, RWM, SKB, SURAO, (ENRESA), ...

General Comments

- CORI has three sufficiently linked experimental WPs.
- Good complementarities and synergies with other projects (CAST, MIND, Cebama).
- Investigated cement systems shall be consistent with Cebama.

- Motivation of CORI to develop proposal for Horizon2020 is confirmed.

WP 1: “Degradation of organics - result of hydrolysis and radiolysis”

- Degradation studies in **WP1** under varying conditions (pH, dose).
- Irradiation experiments performed both under α and γ dose (β ?). Attention should be made to avoid artefacts at very high doses.
- Balance of work efforts on radiolysis/hydrolysis degradation studies needs to be clarified.
- Analysis of gas production from organics degradation presently included in CORI concept within WP1.

WP 2 “Mobility of organics in cementitious environment and their interaction with Fe”

- **WP2** builds on selected low weight organic molecules (priorities according to inventories and chemical representativity) already identified and adds increasing complexity during project via WP1 input.
 - *Large complexity of expected organics from WP1 systematized according to functional groups and chemical characteristics.*
- Competition effects, e.g. with Fe or between organic molecules, in cementitious environments investigated in WP2.
- Investigation of ^{14}C mobility in cementitious environments from activated materials as identified in CAST included in CORI WP2.

WP 3 “Mobility of organics-RN complexes in a cementitious environment”

- Radionuclides prioritized in **WP3** include typical representatives for main relevant metal classes. => Ni, Pb, Ln(III), Am, Pu, U , (present).
- CORI intends to derive mechanistic understanding and provide a combination of complementary diffusion and batch experiments.
- Comparison of chemical modelling with K_d approach. (see WP4)

Main arguments from discussions

WP 4 “Synthesis, modelling, upscaling, application”

- Feedback from WMOs required for **WP4** to better define requirements. Exchange between CORI and WMOs is ongoing process (=> EUG).
- CORI aims at providing a synthesis of results on a level that allows integrating the results as input in national programmes and PA.
- CORI does not intend to do PA calculations.

CONCEPT FOR CORI PROPOSAL

- **CORI includes four R&D oriented Work Packages:**
 - **WP 1** “Degradation of organics - result of hydrolysis and radiolysis” (*Subatech*)
 - **WP 2** “Mobility of organics in cementitious environment and their interaction with Fe” (*Amphos21*)
 - **WP 3** “Mobility of organics-RN complexes in a cementitious environment” (*CEA*)
 - **WP 4** “Synthesis, modelling, upscaling, application” (*SCK·CEN*)
- Additional WPs on Management (Coord. KIT) + Training/Dissemination
- **Total requested EC contribution: < 4 M€**