International Cooperation

Teresa Fernandes
Heriot-Watt University
Edinburgh, UK

Nanosafety Cluster Review Meeting, Brussels, Dec 2014

Aims of International Collaboration with the NSC

- To promote the approach fostered by the NSC globally
- To align and harmonise NSC research activities with similar activities globally
- To benefit from synergies and avoid replication of effort
- To promote dissemination, education and training
- To interact with the widest range of stakeholders
- To contribution to worldwide activities such as the work of OECD

Cooperation with the USA

- The US-EU CoRs are aligned with NSC activities across the different WGs.
- Regular tele-conferences take place.
- Forthcoming event: US-EU workshop (Venice), March 2015; http://us-eu.org/2015-eu-u-s-workshop/

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Cooperation with a variety of Countries, e.g.

- **Japan**
  - Ongoing meetings with Japanese researchers (Academics and Industry, Regulators), and as part of FP7 MARINA with respect to (i) Health Effects of NP and (ii) Nano Metrology.
  - In discussion with NanoReg
- **Singapore**
  - Asia Nano Forum
- **Brazil**
  - EU delegation to Brazil in relation to FP7 NanoREG. Brazil to join EU initiative (national level)
  - Partner within NanoSolutions

Cooperation with a variety of Countries, e.g.

- **South Korea**
  - Meeting with South Korean delegation in Dublin (as part of EuroNanoforum 2013). Dialogue with NanoREG.
- **China**
  - As partner in various FP7 projects e.g National Academy of Science in MARINA (joint publications)
- **Russia**
  - As partner in FP7 MARINA (Russia National Academy of Science – link with Rusnano)
- **India**
  - As partner in Nanolinen; Nanovalid
- **International Network**
  - Qnano multi-lab round robin testing of NM using *in vitro* models, involving EU, US partners.

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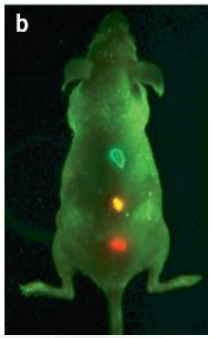
Communities of Research for Nanotechnology EHS

Stacey Standridge (contractor)

National Nanotechnology Coordination Office









Communities of Research for NanoEHS (CORs)

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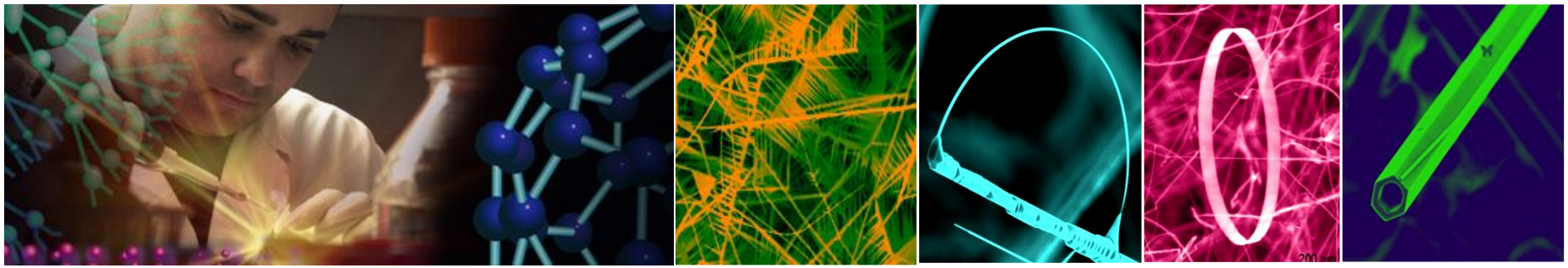
- groups of **people**: US-EU scientists
- share a **significant interest:** nanoEHS
- develop a **shared repertoire of resources**: experiences, tools, ways of addressing recurring questions and challenges
- **regular contact:** use wikis, webcasts, conference calls, annual US-EU meeting.



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CORs for NanoEHS

- Exposure through the Life Cycle
- Ecotoxicity Testing and Predictive Models
- Predictive Modeling for Human Health

- Databases and ontologies
- Risk assessment
- Risk management and control measures

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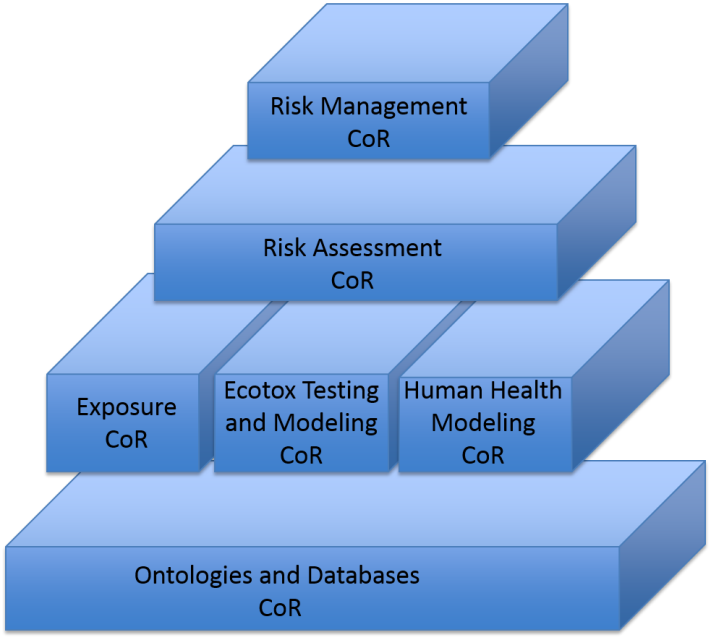
Communities of Research



3 CORs announced at Society of Toxicology Annual Meeting
Mar 15, 2012

3 CORs announced at NanoSafety Cluster Meeting
May 31, 2012

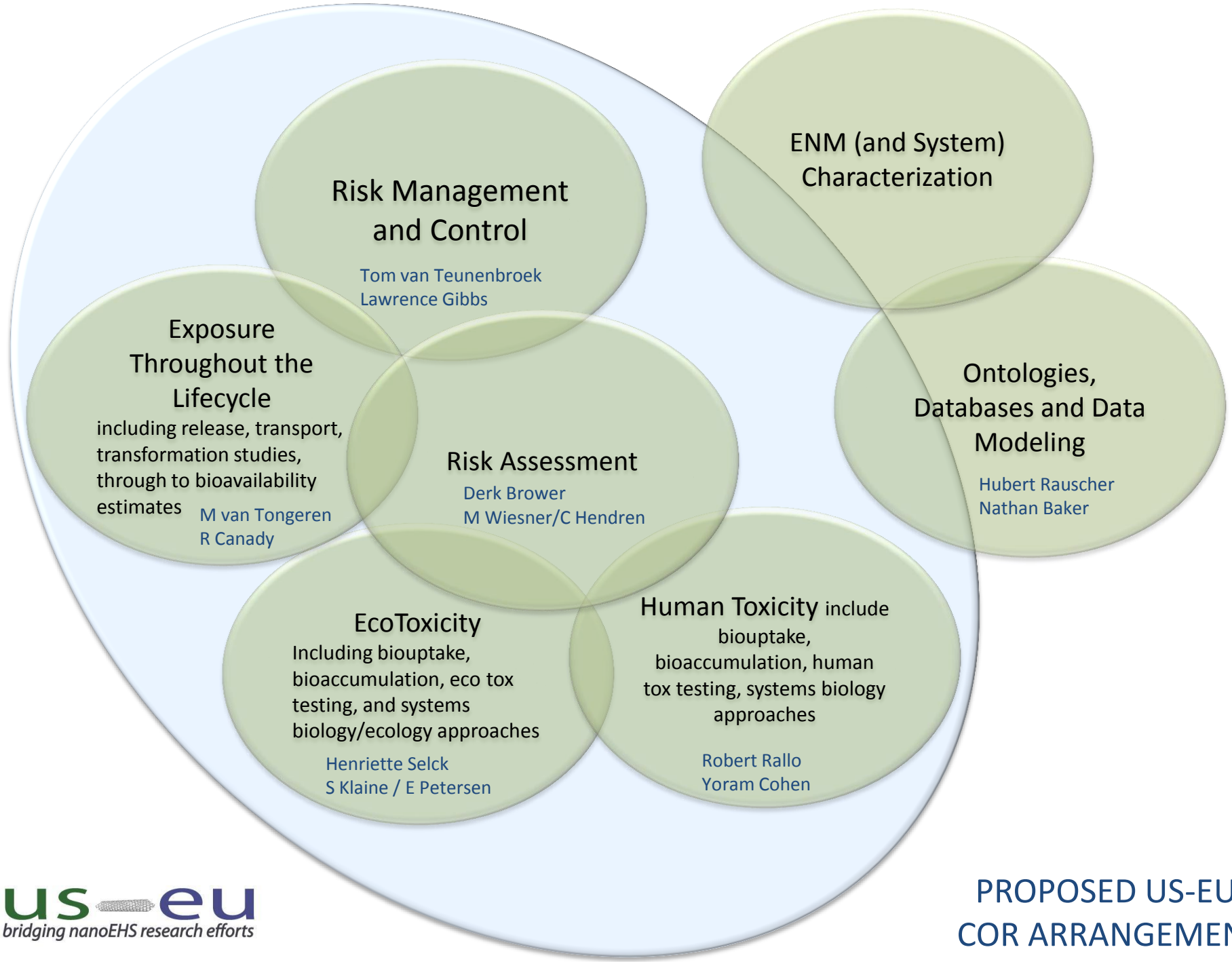
EuroNanoForum
Jun 18, 2013

2011 | Mar | Aug | Jan 2012 | Jun | Nov | Apr 2013 | Sep | 2013

Mar 11, 2011
CORs proposed at first U.S.- EU workshop

Oct 25, 2012
First in-person meeting of all CORs at second EU-U.S. workshop

Dec 3, 2013
In-person COR meetings at third U.S.-EU workhsop



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PROPOSED US-EU COR ARRANGEMENT

Further information on CoRs:

www.us-eu.org

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RUC
Roskilde University

Ecotox CoR

Henriette Selck[1], Richard Handy[2], Teresa Fernandes[3], Elijah Petersen[4], Stephen Klaine[5]

[1]Dept. Environmental, Social and Spatial Change, Roskilde University, DK
[2]School of Biological Sciences, Plymouth University, UK
[3]School of Life Sciences, Heriot-Watt University, UK
[4]National Inst of standards and technology, USA
[5]Inst. Of Environmental Toxicology, USA

Research needs - Ecotoxicology

Status:

- How engineered NMs behave and how they interact with biota is poorly understood
- In aquatic systems sediment is accumulation site for NMs
- Terrestrial soil system is also an important accumulation site

Need:

- Validated bioassays, hazard assessment tools and predictive models to be developed and tested for NMs
- Sediment tests: deposit-feeders are at particulate risk
- Soil systems: need to consider particular fate and exposure conditions
- Fundamental research: to assess consequences of interactions of NMs with biota governing:
  - bioavailability, bioaccumulation, internal deposition, and deleterious effects.
- Consider exposures and effects through NM life cycle
- Consider media and seasonal effects
- Link short to long term effects

Research needs – Environmental chemistry & Characterization

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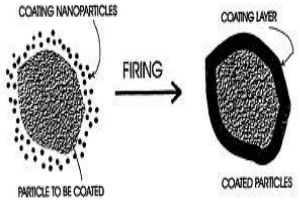
Need:

- understand the influence of NM characteristics on processes incl: environmental fate, bioavailability, bioaccumulation, internal deposition, and effects.
- standardize testing methods for NMs!



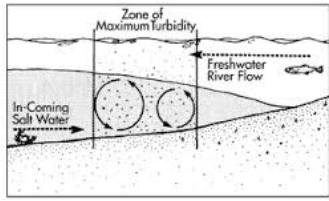
+ complexing agents => **?**

Require:

- Methods to characterize NMs: every stage of exposure (incl. complex media), uptake, distribution, and accumulation

⇒ determine exact bioavailable/bioaccumulated dose (incl kinetics) & correlate quantified response with measured dose

⇒ together with ecotox data, will allow the derivation of sound RAs and the set-up of environmental quality standards for NMs.



ET&C Focus Paper

bridging nanoEHS research efforts

Title:

Nanomaterials in the aquatic environment: status and challenges ahead

Authors:

- Henriette Selck[1], Richard Handy[2], Teresa Fernandes[3], Elijah Petersen[4], Stephen Klaine[5]
- [1]Roskilde University, Dept. of Social, Spatial and Environmental Change, Denmark
- [2]Plymouth University, School of Biological Sciences, United Kingdom
- [3]Heriot-Watt University, School of Life Sciences, United Kingdom
- [4]National Institute of Standards and Technology, Biosystems and Biomaterials Division, USA
- [5]Clemson University, Institute of Environmental Toxicology, USA

Status:

- First version expected early January, 2015
- Submission March, 2015

Input into OECD work

- Variety of workshops
- Joint publications
- Input into adaptation of test guidelines and testing approaches
- Forthcoming publication:
  - ADAPTING OECD AQUATIC TOXICITY TESTS FOR USE WITH NANOMATERIALS: KEY ISSUES, CONSENSUS RECOMMENDATIONS, AND DATA GAPS
  - Steve Diamond, Teresa F Fernandes, Greg Goss, Shannon Hanna, Kerstin Hund-Rinke, Al Kennedy, Elijah Petersen, Edward R. Salinas, et al.
- Forthcoming Workshop in Jan 2015 (German Federal Environment Agency, Dessau-Rosslau)
  - Development of OECD TG and GD for Nanomaterials agglomeration and dissolution behaviour

UK-US (EPA) joint projects

- For example: NanoBEE project
- Coordinator: Jamie Lead (Columbia University, USA, Birmingham University, UK)
- Partners include: Exeter Univ UK, Heriot-Watt Univ UK, Natural History Museum UK, Clemson Univ USA, Rice University USA, and others

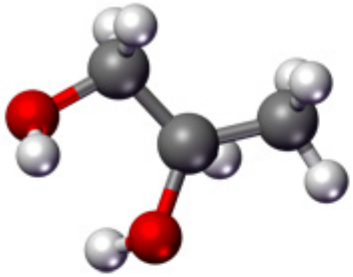
- The aims of this project are:
  - To generate controlled and well characterized NMs libraries for environmental assessment
  - To develop modified biodynamic models for NM bioavailability that reflect both water and food exposures and
  - To validate biotic ligand models for NM effects on aquatic organisms.

NERC SCIENCE OF THE ENVIRONMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Others …

- SETAC Nanotechnology Advisory Group Steering Committee
- SETAC sessions on ENM characterisation, fate, effects, RA…



SETAC's Nanotechnology Advisory Group

Larry Kapustka, Associate Chair

Return to the Globe

In 2007, at the SETAC Europe meetings in Porto, the first organizational meeting was held, and the intention to form the Nano AG was communicated to the SETAC World Council. Subsequently, at the SETAC North America meeting in Milwaukee, the Nano AG was launched. Since that time, there have been efforts to promote the interests of SETAC members through the sponsorship of sessions at regional meetings, organizing a series of papers to be published in *ET&C*, and holding a workshop in Clemson, SC, following the NANO2010 conference, to identify emerging issues. Discussions have been underway for sometime on the possibility of organizing a Pellston-style workshop or to promote some activity that could have a similar impact that enhances the work of SETAC members and contributes to the broader dialogue underway in the scientific, business, and regulatory communities.

SETAC maintains a Communities site for the Nano AG. To gain access to the site, log in to http://www.setac.org and update your profile to indicate you wish to join the Nanotechnology Advisory Group (click here to download a .pdf file with detailed instructions). Once you have access to the communities' page you can download and upload files and engage in dialogue with other members. In the next several weeks, I and others will be doing some housekeeping of the site. The plan is to establish an archive folder that will become the home of files that currently reside with AG members but may have historical value to the members at large. This will include minutes of earlier meetings, workplans of various subgroups, and other pertinent correspondence about the group. With this housekeeping, the site will then have active files that have greatest relevance to on-going activities.