



# Exposure through Life Cycle CoR

## Martie van Tongeren & Rick Canady

QEEN workshop: Quantifying Exposure to Engineered Nanomaterials  
7 – 8 July, 2015, Arlington, US

# Background

- History – initiated as one of a handful of CoR's to facilitate US-EU collaboration in nano EHS research
- 4<sup>th</sup> year, with the outputs mostly limited to communication in workshops so far
- How do we move beyond to actually do collaborative work?

# Creating independent consortia

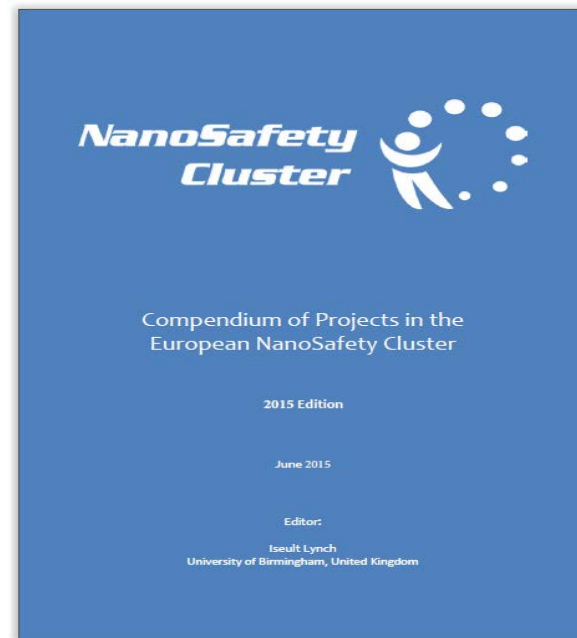
- Goal
- European FP/H2020 model
- Going beyond EU: NanoRelease (exposure), Prosafe (SbD)
- How we can move forward with the CoR

# Goal: Improve efficiency addressing shared public health goals with multinational, multi-stakeholder consortia

- Many groups and funding schemes want the same goal of sustainable products
- Many would also like to develop policies, methods, data in ways that meet multiple regulatory schemes
- We tend to approach these interests in parallel and inefficient processes
  - E.g., publication cycle is long, data are here now, we find out too late that we are doing the same thing several times over, and that we have developed avoidable policy divergence
- Joint development and discussions in consortia can provide efficient merging of interests

# European nano-EHS research

- ~ 50 projects in FP6/FP7 on nano-EHS
  - International
  - Inter/multi-disciplinary
- Current projects are summarised in the NSC-compendium
- Some specific on exposure, eg:
  - NANEX
  - NANODEVICE
  - NANOINDEX
  - NANOFASE



<http://www.nanosafetycluster.eu>

# Current FP7/H2020 projects with Exposure

| Project Acronym   | H2020    |         | FP7 running projects (or just ended) |             |            |                 |           |        |                  |             |            |              |           |           |          |            |             |         |              | FP7-ended     |           |            |             |          |       |        |      |          |           |             |            |
|---|----------|---------|--------------------------------------|-------------|------------|-----------------|-----------|--------|------------------|-------------|------------|--------------|-----------|-----------|----------|------------|-------------|---------|--------------|---------------|-----------|------------|-------------|----------|-------|--------|------|----------|-----------|-------------|------------|
|   | NanoFASE | ProSafe | NanoREG II                           | enanoMapper | Fibralspec | FutureNanoNeeds | GuideNano | MARINA | MembraneNanoPart | Mod-ENP-Tox | NanoDefine | Nanodetector | NanoHeter | NanoMICEX | NanoMILE | NanoOxiMet | NanoPUZZLES | NANOREG | NanoSafePack | NanoSOLUTIONS | NanoValid | PreNanoTox | QualityNano | SANOWORK | SIINN | SIRENA | SUN  | NanoFATE | NanoReTox | NanoSustain | ModNanoTox |
| Start Year  | 2015     | 2015    | 2015                                 | 2013        | 2014       | 2013            | 2013      | 2011   | 2013             | 2013        | 2013       | 2012         | 2013      | 2012      | 2013     | 2013       | 2013        | 2013    | 2011         | 2013          | 2011      | 2013       | 2012        | 2013     | 2013  | 2013   | 2010 | 2008     | 2010      | 2011        |            |
| End Year  | 2019     | 2017    | 2018                                 | 2016        | 2017       | 2016            | 2016      | 2015   | 2015             | 2015        | 2017       | 2015         | 2016      | 2015      | 2017     | 2016       | 2015        | 2016    | 2014         | 2017          | 2015      | 2016       | 2015        | 2016     | 2015  | 2016   | 2014 | 2012     | 2013      | 2013        |            |
| <b>Characterisation and measurement of NMs</b>            | X        |         |                                      |             |            | X               | X         | X      |                  |             | X          | X            |           |           | X        |            |             |         |              | X             | X         |            |             |          |       |        |      | X        |           | X           |            |
| Physico-chemical properties                               | X        |         | X                                    |             | X          | X               | X         | X      | X                | X           | X          | X            | X         | X         | X        | X          |             | X       | X            | X             | X         | X          | X           | X        | X     |        | X    | X        | X         | X           |            |
| Next generation NMs                                       | X        |         |                                      |             |            | X               | X         | X      |                  |             | X          |              |           |           |          |            |             |         |              |               |           |            |             | X        |       |        | X    |          |           |             |            |
| <b>Exposure assessment for humans and the environment</b> | X        |         |                                      |             |            | X               | X         | X      |                  |             |            |              |           | X         |          |            |             |         | X            |               | X         |            |             |          |       |        | X    | X        |           | X           |            |
| Develop & validate exposure measure / modelling methods   | X        |         |                                      |             |            | X               | X         | X      |                  | X           |            |              | X         | X         |          |            | X           | X       | X            |               | X         |            |             |          | X     | X      | X    | X        |           |             | X          |
| Application of measurement / modelling methods on NMs     | X        |         |                                      |             |            | X               | X         | X      |                  |             |            |              | X         | X         |          |            |             | X       | X            |               | X         | X          | X           |          |       | X      | X    | X        | X         |             |            |
| Environmental Exposure Assessment                         | X        |         |                                      |             | X          | X               | X         | X      |                  |             |            |              | X         | X         |          |            |             | X       | X            |               | X         |            |             |          | X     | X      | X    | X        |           | X           | X          |

# H2020 workprogramme

- H2020 has major emphasis on Key Enabling Technologies (KET)
  - Including nanotechnology (includes safe development and application)
- A number of 2016/2017 topics encourage cooperation with US, eg

*NMBP 03-2016: Innovative and sustainable materials solutions for the substitution of critical raw materials in the electric power system*

*NMBP 44-2016: Promoting safe innovation through global consolidation and networking of nanosafety centres and strengthening the European nanosafety cooperation*

*NMBP 14-2017: Regulatory Science Framework for assessment of risk-benefit ratio of Nanomedicines and Biomaterials*

- Brokerage event on KET 1 October 2015, Strasbourg, France (<https://www.b2match.eu/kets2016/>)



# Example of a volunteer consortium: NanoRelease

- *Mission: “foster the safe development of nanomaterials by supporting development of methods to understand the release of nanomaterials used in products”*
- Seeded as a volunteer consortium in 2010 between EPA, ACC, NGO (advisor)
- Grew to two Steering committees (food, plastics), funding from 10+ sources, participation from dozens of countries, 12+ papers from ~60 authors, 6 workshops, definitions and policies agreed to between stakeholders, methods development from 10 labs in 6 countries across industry, NGO, academia, government
- So – the incentive is there. The challenge is building and keeping the independence, communication, and trust.



# A collaborative expert community with over 60 authors spanning stakeholders and regions

## Academia

- **US:** Andrew Whelton (Univ. of South Alabama) Anthony Andrady, (North Carolina State Univ), Cristina Sabliov (Louisiana State Univ), David Julian McClements (Univ. Massachusetts), James Oxley (Southwest Research Inst), Mengshi Lin (Univ. Missouri), Paul Westerhoff (Arizona State Univ.), Qixin Zhong (Univ. of Tennessee), R. Paul Singh (Univ. of California Davis), Steve Roberts (Univ. Florida)
- **Europe:** Eva Maria Collnot (Saarland Univ., Germany), Lourdes Gombau, Gemma Janer, Socorro Vazquez-Campos (Leitat Tech. Center, Spain), Vicki Stone (Heriot-Watt Univ., UK), Michael Stintz, (Technische Universität Dresden, Germany), Heinz Fissan, Thomas Kuhlbusch, (Institute of Energy and Environmental Technology, Germany)
- **Canada:** Rickey Yada (Univ. Guelph)
- Andrew Bartholomaeus (Univ. Canberra, Australia)

## Government

- **US:** Timothy Duncan, Dragan Momcilovic, Gregory Noonan, Scott Thurmond, Luis Valerio, Jeffrey Yourick (FDA), Christopher Szakal, Debra Kaiser, Keana Scott, Tinh Nguyen (NIST), Richard Zepp, Richard Fehir, Philip Sayre, Justin Roberts, (EPA), Aleksandr Stefaniak (NIOSH)
- **Canada:** Christopher Kingston, (National Research Council), Yasir Sultan, (Environment Canada), Genevieve Bondy, David Lefebvre, Rekha Mehta, Jayadev Raju, Gurmit Singh (Health Canada)
- **Europe:** Koen Venema, Derk Brouwer (TNO, Netherlands), Hans Bouwmeester (RIKILT, Netherlands), Bernd Nowack (Swiss Federal Laboratories for Materials Science and Technology, Switzerland)
- Howard Morris (SafeWork Australia), Jurg Schutz (CSIRO, Australia)

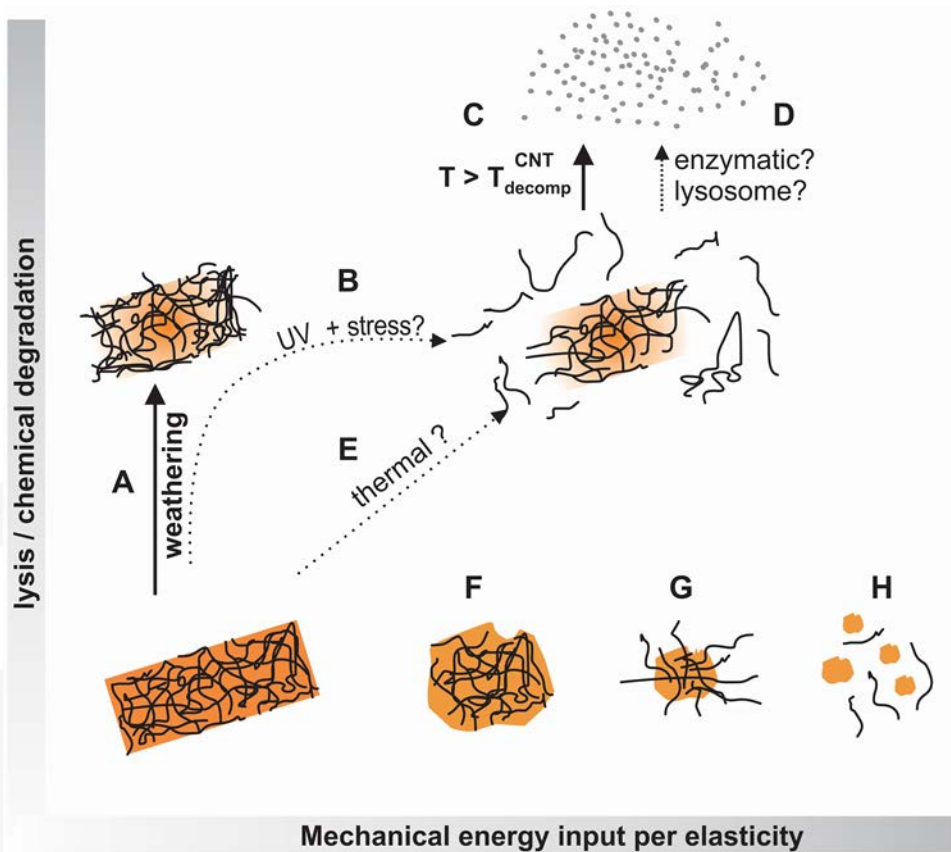
## Industry

- **US:** Chady Stephan (PerkinElmer), Christopher DeMerlis (Colorcon, Inc), Darrell Boverhof, Douglas Hawkins (Dow), Shaun Clancy (Evonik), US, Raymond M. David, (BASF), Stephan Froggett, US, Viktor Vejins, (Nano-C), Jo Anne Shatkin, (CLF Ventures), Betsy Shelton, (FerrousWheel Solutions)
- **Europe:** Wendel Wohlleben, (BASF, Germany), David Carlander (Nanotech. Industries Association, Belgium), Neil Buck (ILSI Europe Novel Foods and Nanotechnology TF, Belgium)
- Lekh Juneja (Taiyo Kagaku, Japan)

## NGO

- Ian Illuminato, (Friends of the Earth, US), Amy Clippinger (PETA/PISC, US), Heather Alger (Pew Charitable Trusts, US)

# ● NanoRelease Materials perspective



Must re-align the main focus of EHS attention to study of what is released.

Virtually all release from composites was dominated by matrix NOT by nanofiller.

Need basic methods development to describe quantitatively what is nano of concern in a realistic release.

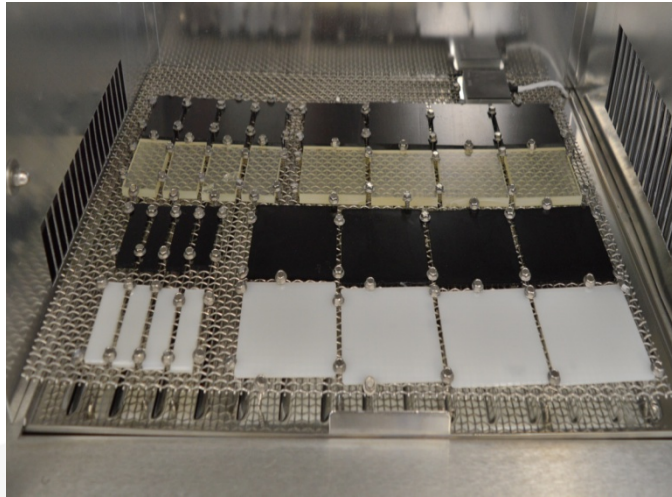


Release symposium proceedings online May 2015

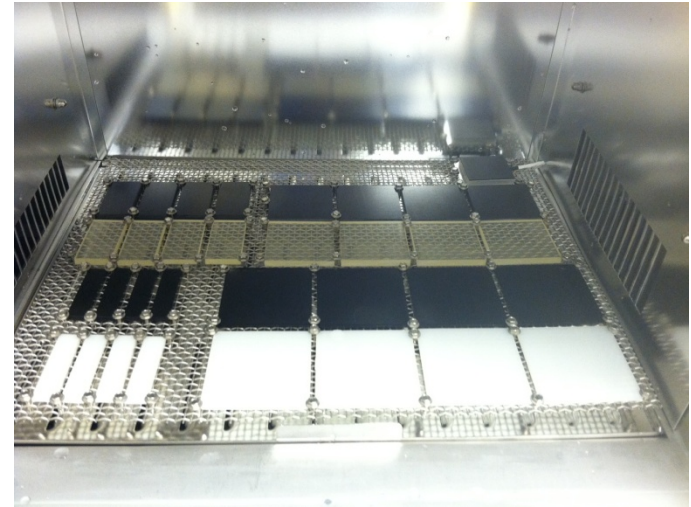
Including the ● NanoRelease State of the Science Report.

S Harper, W Wohlleben, M Doa, B Nowack, S Clancy, R Canady, A Maynard

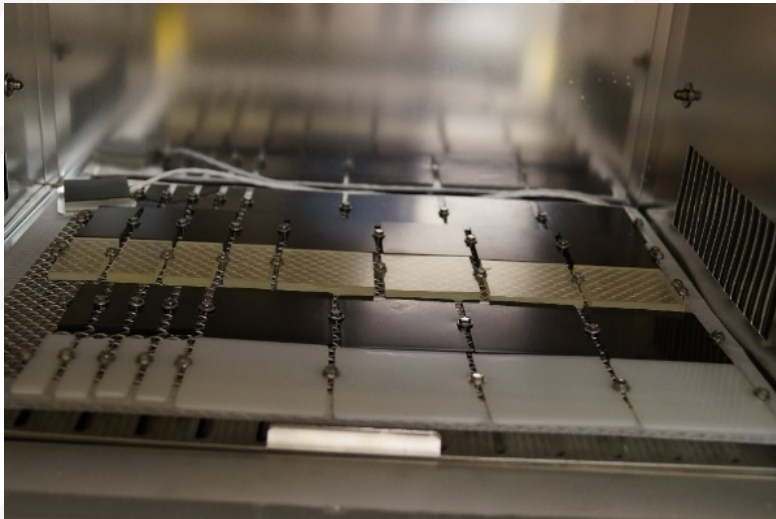
*J. Physics Conf. Ser.* **617** (2015) 012026 (*open access*)



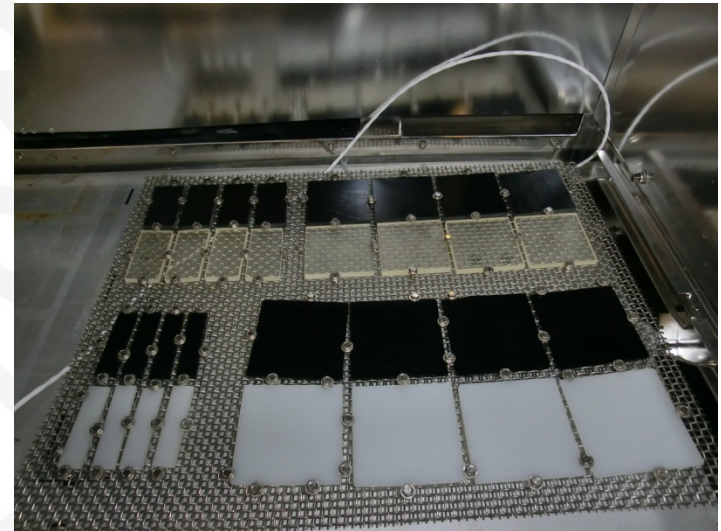
BASF – Ludwigshafen, Germany



EPA – Athens GA, USA

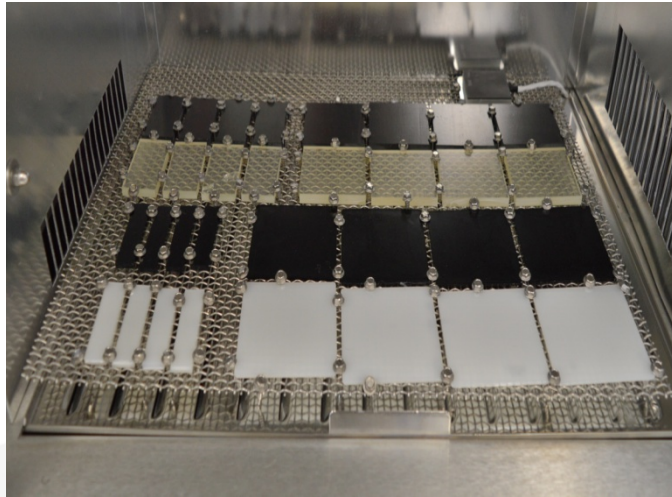


EPA – Cincinnati OH USA

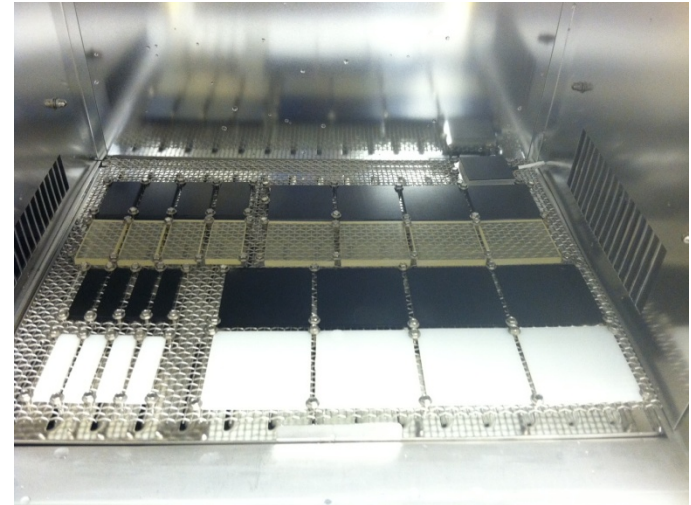


LEITAT – Barcelona, SPAIN



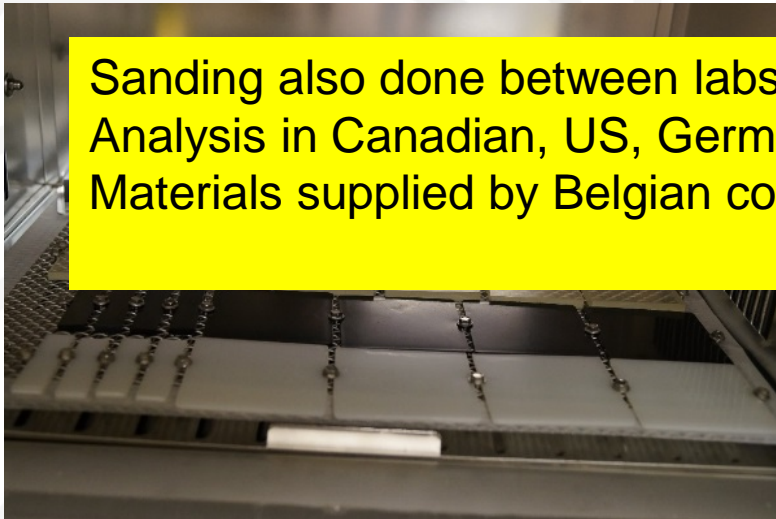


BASF – Ludwigshafen, Germany

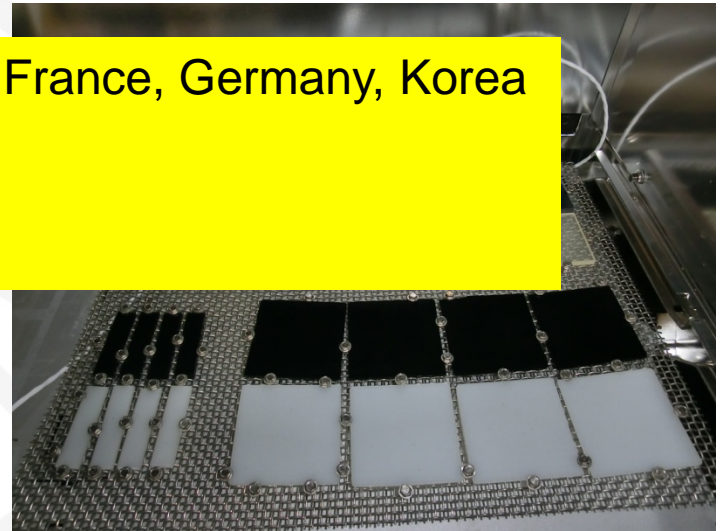


EPA – Athens GA, USA

Sanding also done between labs in US, France, Germany, Korea  
Analysis in Canadian, US, German labs  
Materials supplied by Belgian company



EPA – Cincinnati OH USA



LEITAT – Barcelona, SPAIN

# Lessons learned

- Initiation key is finding shared goals and leadership to guide discussions
- Trust needs time to build (years) when the discussions are so technical and complex
- Incentives

- Coordination and Support Action, funded under H2020 (grant agreement nr: 646325)
- Main aim is to produce a white paper presenting the building blocks for Safe by Design
  - ***Understanding and managing exposure is critical***
- Includes workpackages on
  - Establishing/expanding global networks, joint activities
  - Identifying/exploiting synergies
  - Streamlining data acquisition
- Foresight exercise
  - Solicit expert knowledge using Delphi poll on risk assessment/management needs in next 5-10 years

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## *“Leadership”*

- Co-Chairs: Paul Westerhoff (US) and Martie van Tongeren (IOM)
- CoRe group: 4-8 people (Rick Canady,...), consisting of occupational, consumer, environment, food (release and exposure).

## *“Identifying shared goals”*

- Increasing emphasis on release and exposure
- Development of a workplan to
  - Exploit synergies,
  - Encourage data sharing,
  - Develop tools and methodologies
  - .....



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## ***“Trust”***

- CoRe group to meet (via conference call) regularly (eg every month) to plan activities and plan deliverables
- Regular webinars with whole group
- Organise meetings/symposia at conferences (eg QEEN, ISES)

## ***“Incentives”***

- Publications
- Forum to meet with and learn from other scientists, in particular to encourage interaction between younger and more experienced scientists
- Funding

# How to join us

- Website

<http://us-eu.org/communities-of-research/search-communities-of-research/>

- Email:

[martie.van.tongeren@iom-world.org](mailto:martie.van.tongeren@iom-world.org)

[P.WESTERHOFF@asu.edu](mailto:P.WESTERHOFF@asu.edu)

[NeutralScience@gmail.com](mailto:NeutralScience@gmail.com)

Stacey Standridge [sstandridge@nnco.nano.gov](mailto:sstandridge@nnco.nano.gov)

- Informal meeting after the poster session