Identifying and Mapping European Standardisation and Metrology Needs

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Nanostrand was a Specific Support Actionsupported by the European Commission 6th Framework Programme - Contract: NMP4-CT2006-033167

Nano-strand project

- EC call FP6-20046-NMP –TI-4 of December 8, 2004
- Closure date : September 15, 2005 at 17:00
- Evaluation results sent on December 5, 2005
- Opening of contract negotiation on February 6, 2006
- **Start of the project : August 1st, 2006**
- Duration : 18 months
- **Project ended on January 31st, 2008**

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Objectives

- To facilitate industrial development and exploitation of nanotechnologies by
  - ✓ Identifying:
    - Barriers and societal needs
    - Needs for measurement tools and standards
    - Priorities for pre-normative research
  - ✓ Providing
    - a standards foresight and roadmap for nanotechnologies

- To enhance integration and bridge the gaps between
  - ✓ Research and production fields in nanotechnologies
  - ✓ Different aspects of industrial safety related to nanotechnologies

- To provide information on the needs of the different stakeholders involved in nanotechnologies

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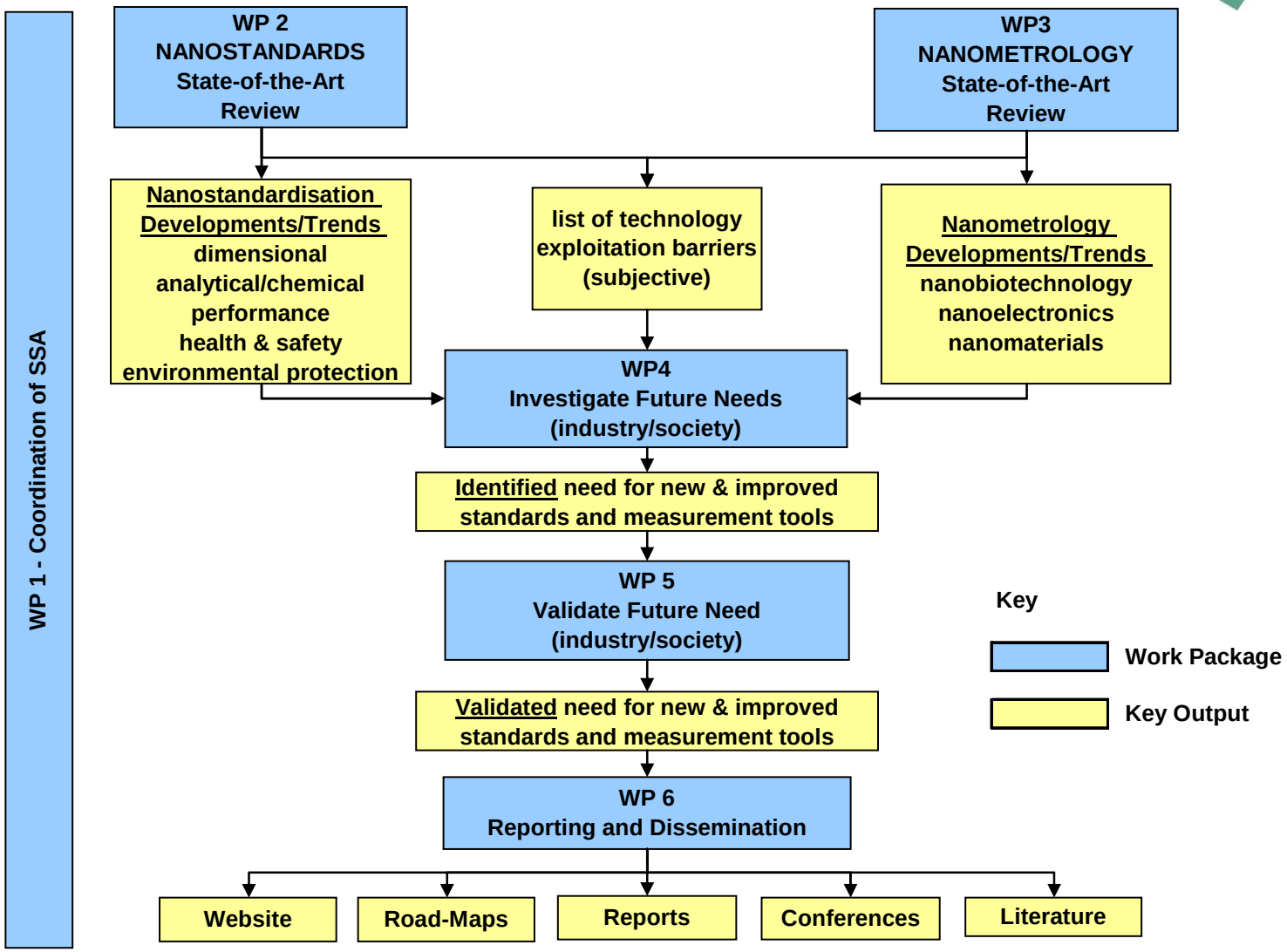
Approach


WP 1 - Coordination of SSA
WP 2
NANOSTANDARDS
State-of-the-Art
Review
WP3
NANOMETROLOGY
State-of-the-Art
Review
Nanostandardisation
Developments/Trends
dimensional
analytical/chemical
performance
health & safety
environmental protection
list of technology
exploitation barriers
(subjective)
Nanometrology
Developments/Trends
nanobiotechnology
nanoelectronics
nanomaterials
WP4
Investigate Future Needs
(industry/society)
Identified need for new & improved
standards and measurement tools
WP 5
Validate Future Need
(industry/society)
Validated need for new & improved
standards and measurement tools
WP 6
Reporting and Dissemination
Website
Road-Maps
Reports
Conferences
Literature
Key
Work Package
Key Output

Survey of Future Needs

- Based on a combination of
  - ✓ Face to face and telephone interviews
  - ✓ On-line and email survey
- Over 150 responses to date
- Some key points
  - ✓ Focus is on development and application of techniques rather than standards development
  - ✓ Some issues identified in state of the art reviews reinforced, e.g.
    - Particle size and shape (morphology)
      - To understand performance benefits of nanoparticles
      - To support H&S assessment
    - Feature shape and size in sub-micron structures
    - Defect analysis on surfaces and thin films
- Survey has been been closed early in October 2007

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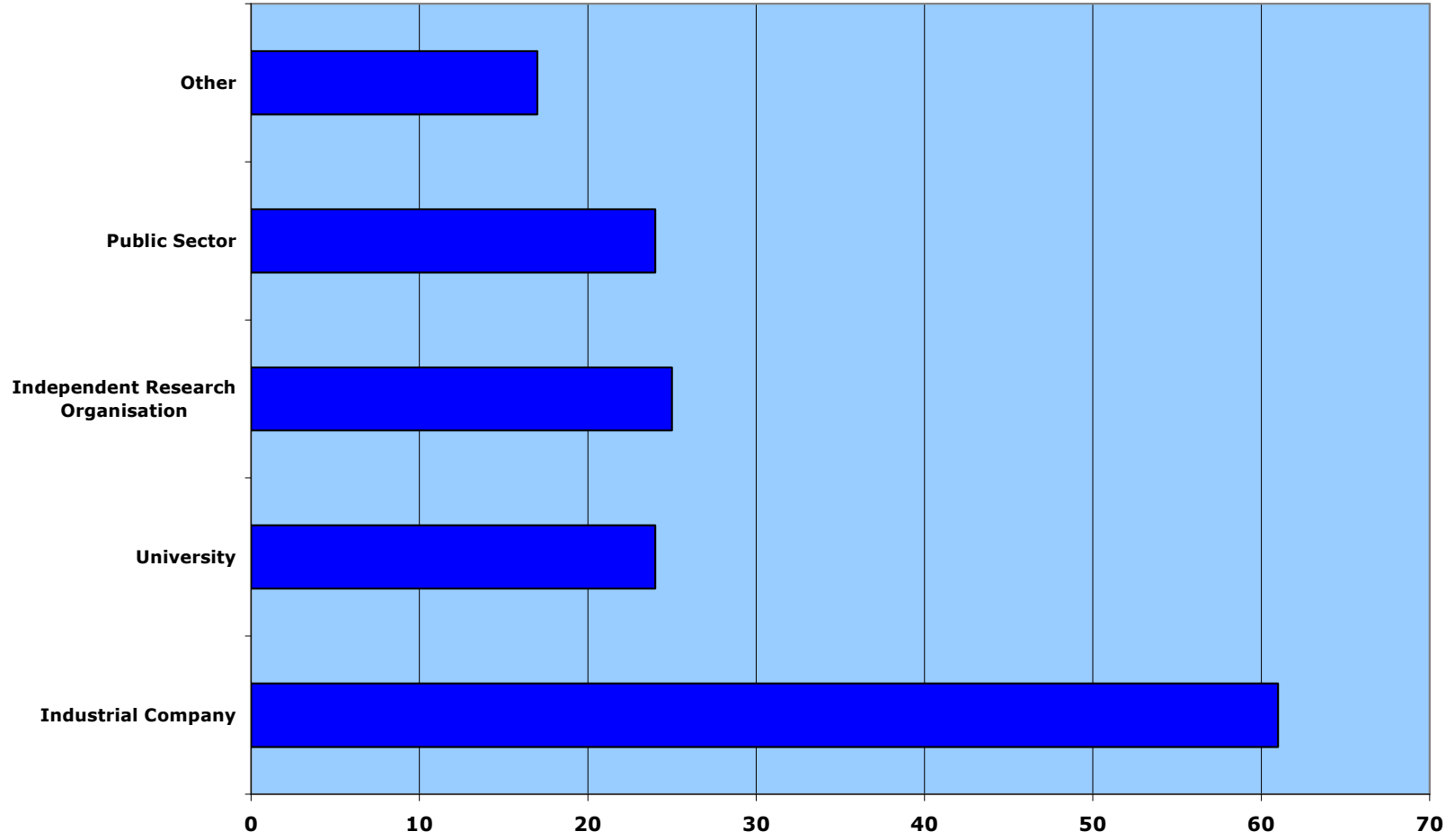
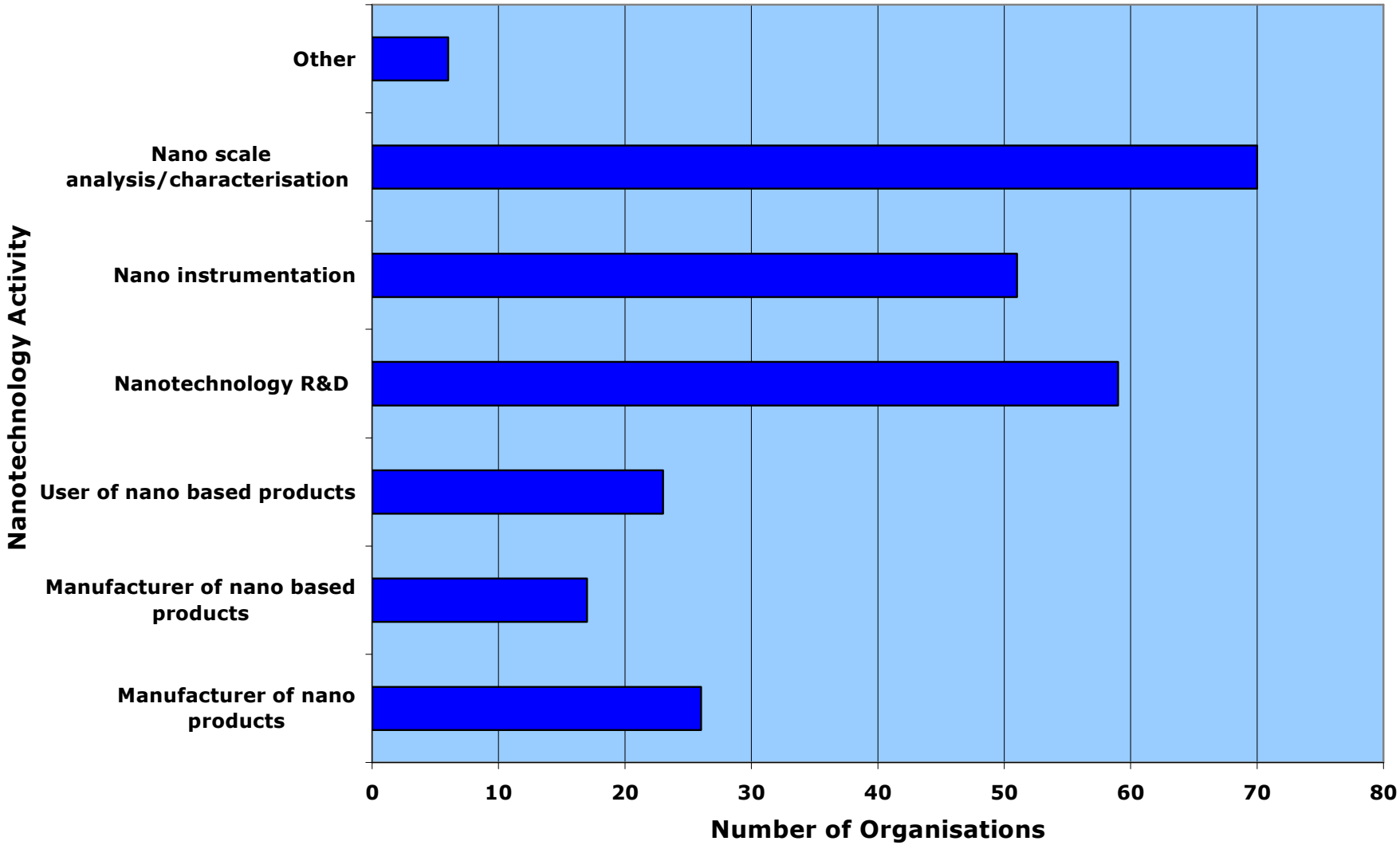
Participants

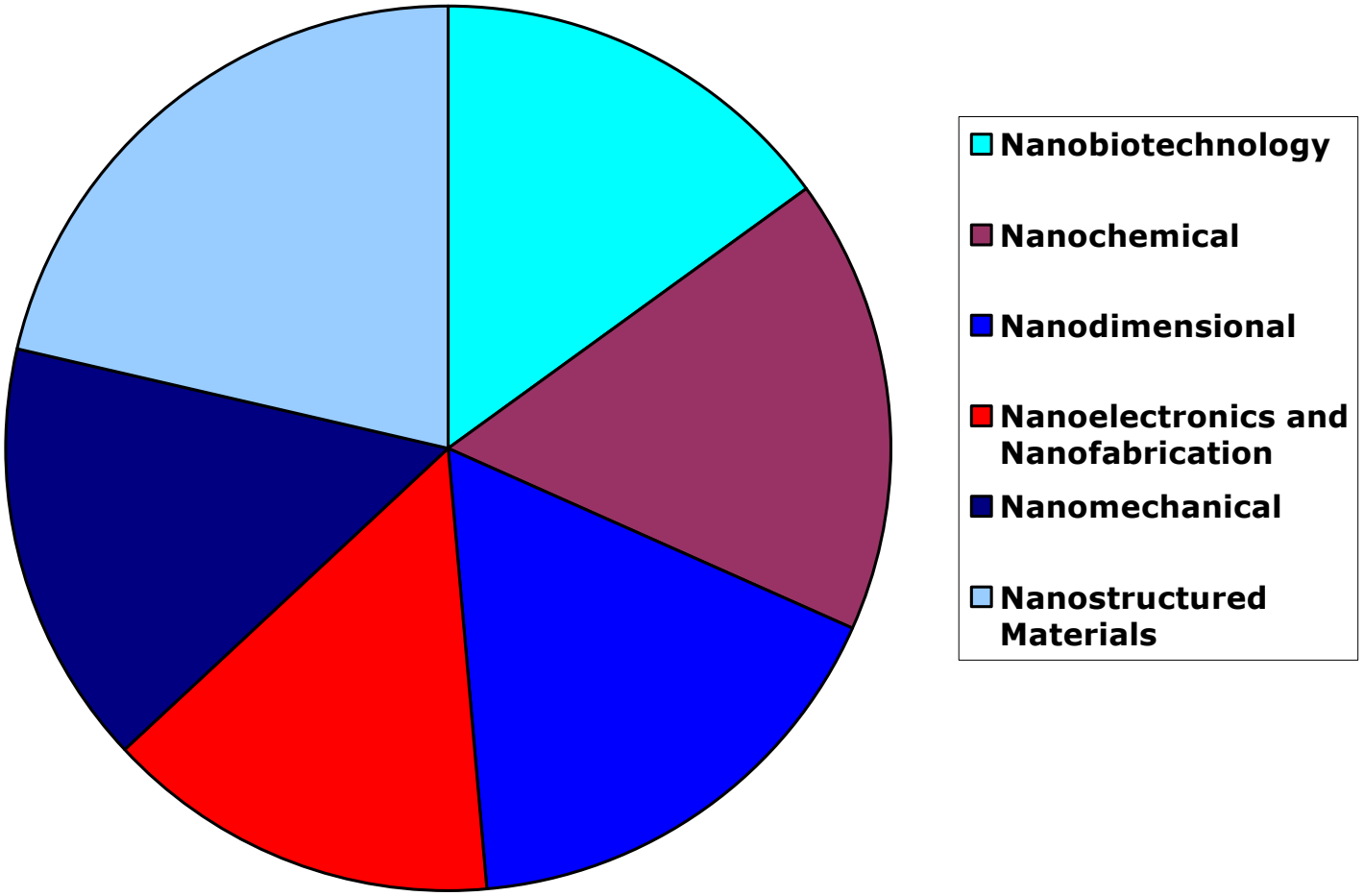
- Over 150 participants



Main Nanotechnology Activity

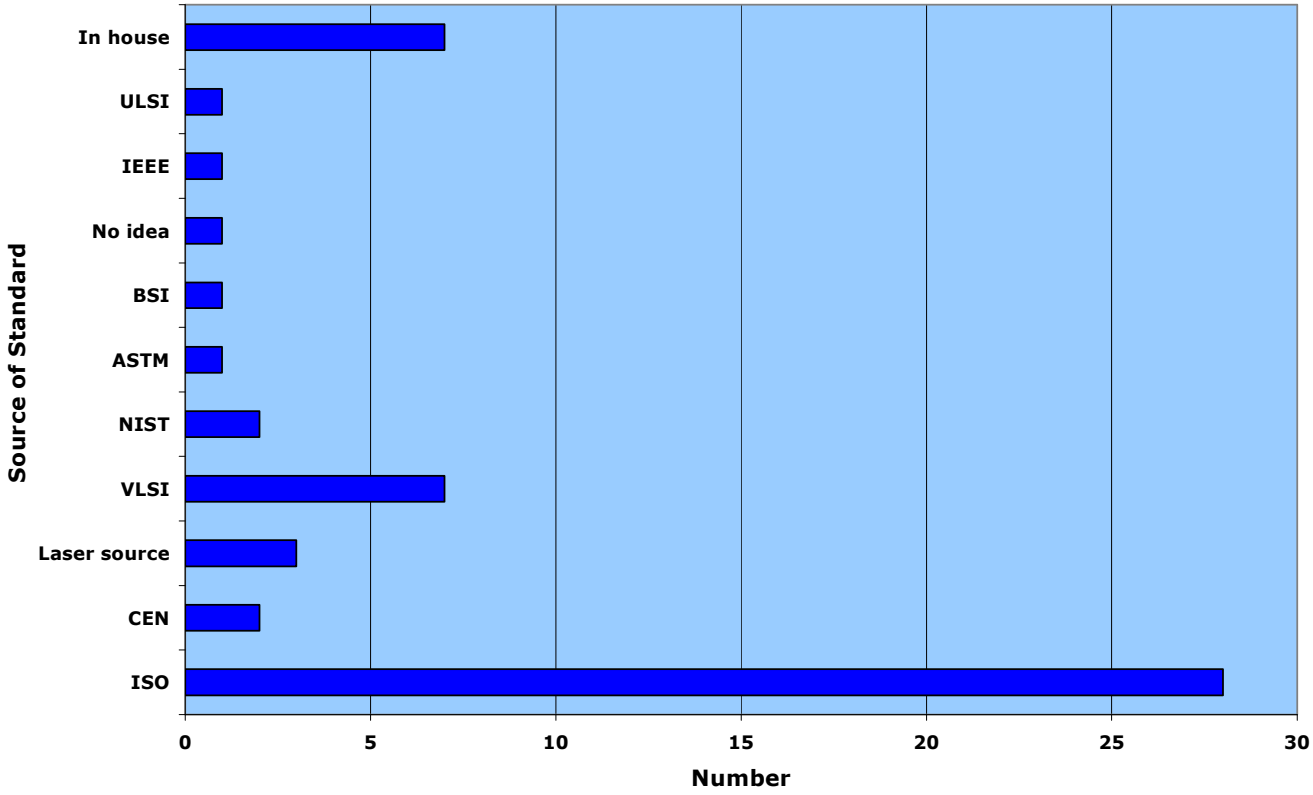


Nanotechnology Theme



Use of Standards

- Do you use standards?
  - ✓ Yes 51
  - ✓ No 74
- Standards used



Use of Physical Artefacts/RMs

- **Do you use?**
  - ✓ Yes 78
  - ✓ No 45
- **Source**
  - ✓ In-house 30
  - ✓ Purchased 55
- **Certified**
  - ✓ Yes 52
  - ✓ No 31

- **Who Certified?**
  - ✓ NMI 30
  - ✓ Inst Supplier 5
  - ✓ Various 2
  - ✓ ISO/CEN 2
  - ✓ ASTM 1
  - ✓ UKAS 1
  - ✓ Other 6

Need for New/Improved Measurement Techniques

Measurement Needs (1)

- **Measurement needs but techniques not available at reasonable cost**

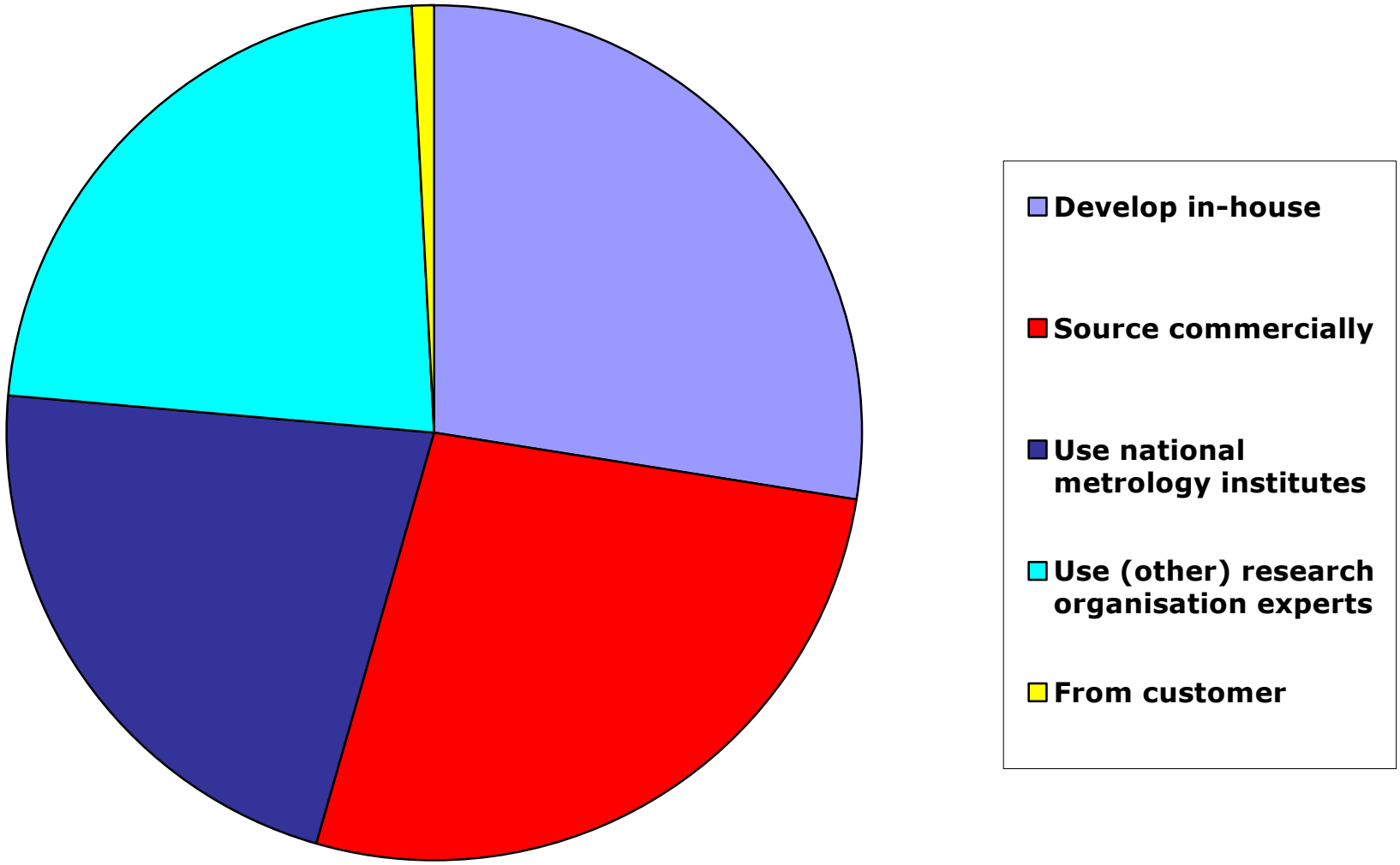
Surface characteristics	24
Nanoparticulates	32
Materials structure	7
Physical / mechanical properties	13
Optical properties	3
Chemical analysis	16
Biological analysis	1
Microscopy/spectroscopic techniques	25
Instrument calibration	3
General comments	12

Measurement Needs (2)

- **Measurement needs but techniques not available at any cost**

Nanoparticulate sizing	19
Optical	2
Chemical	9
Microscopy	3
Physical	4
Optical	1
Surface analysis	5

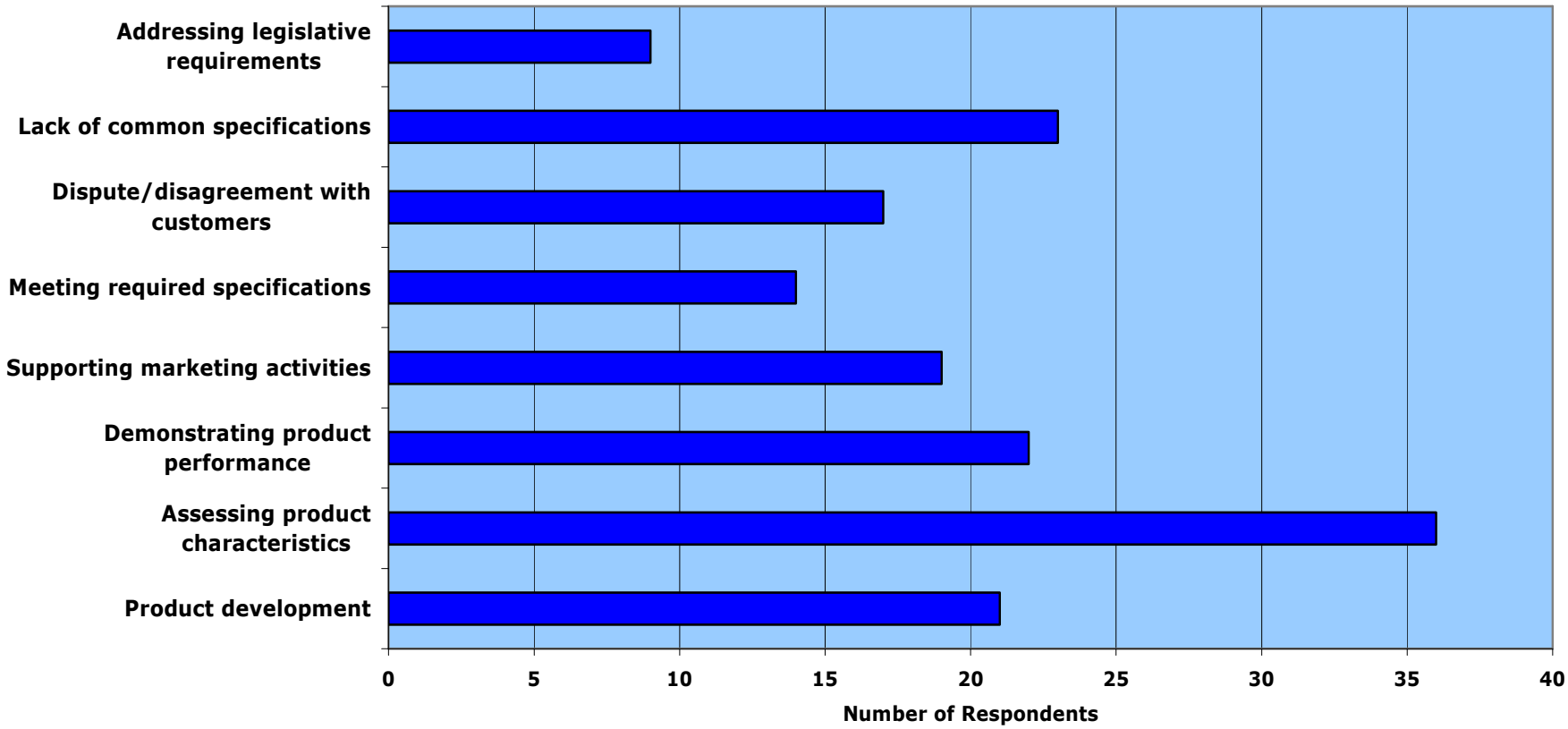
Obtaining New Techniques



Need for New Nanotechnology Standards

New Nanotechnology Standards

- Is the lack of standards affecting your business?
  - ✓ Yes 58
  - ✓ No 51
- Problems caused



Where Are Standards Required?

Surface characterisation	26
Particle size / size distribution	16
Gas adsorption	3
Dispersion/agglomeration	2
Physical/mechanical properties	21
Electronic properties	1
Chemical properties	10
Environmental/health monitoring	3
Microscopy	21
Vocabulary	1
Other	18
Need to agree/develop methods first	3

Deliverables

- Two key reports
  - ✓ Roadmap on priorities for standardisation
  - ✓ Roadmap on research priorities for nanometrology
  - ✓ Delivered in January 2008 to :
    - EC DG Research and CEN TC 352 mandate group
  - ✓ Disseminated later on to :
    - DG Enterprise and FP7 projects, such as Co-nanomet

These gave an important contribution to future policy and funding decisions

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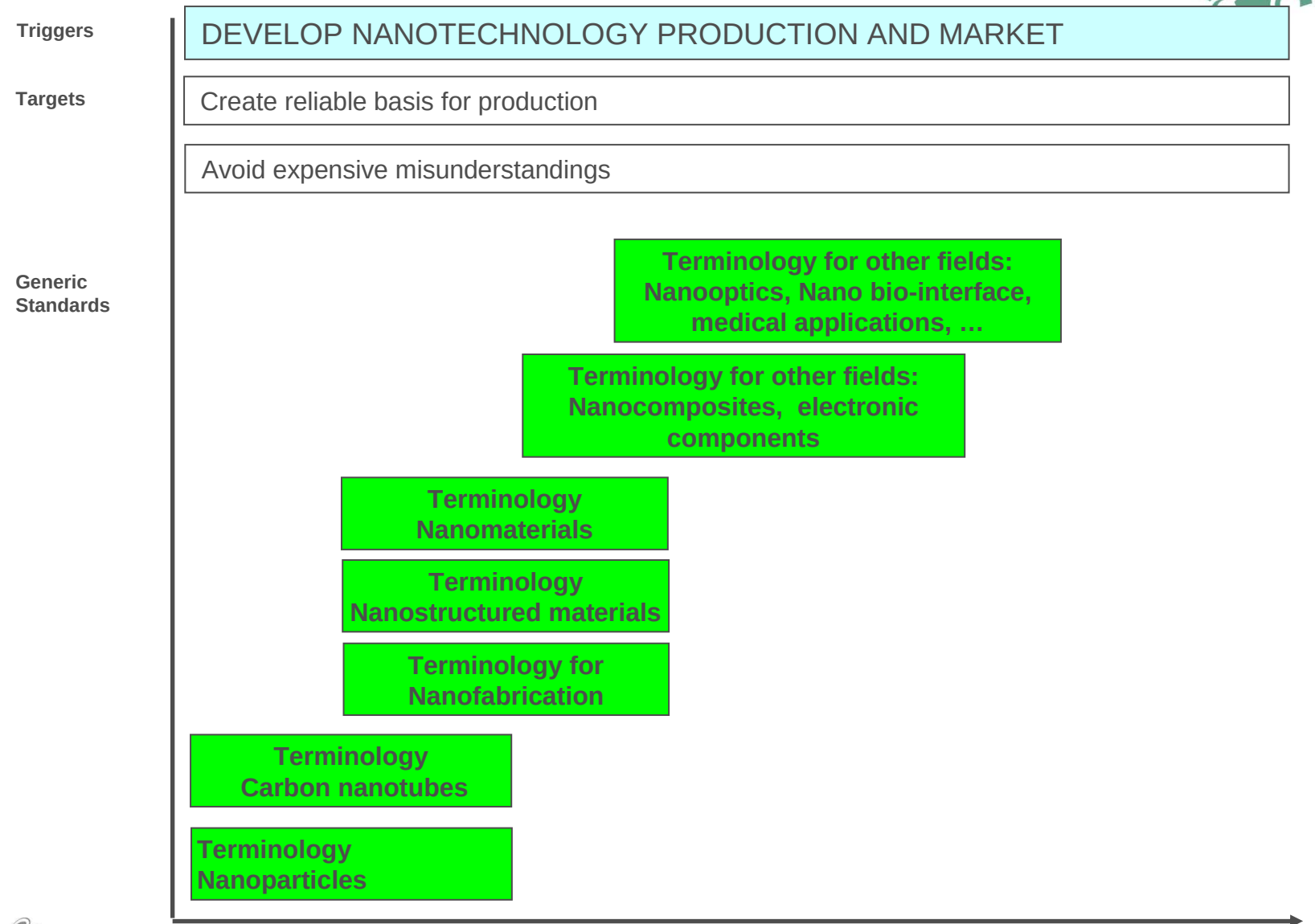
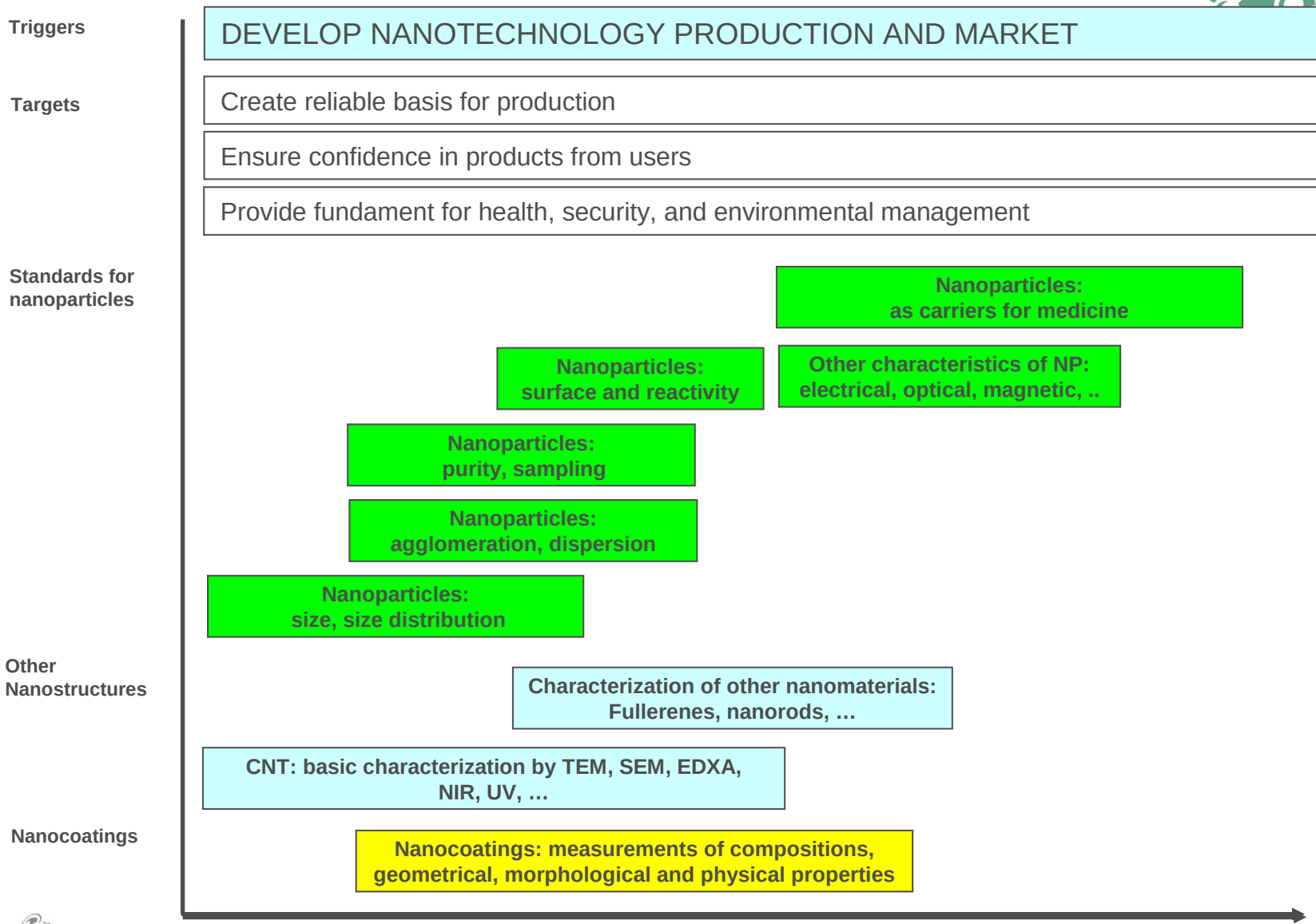
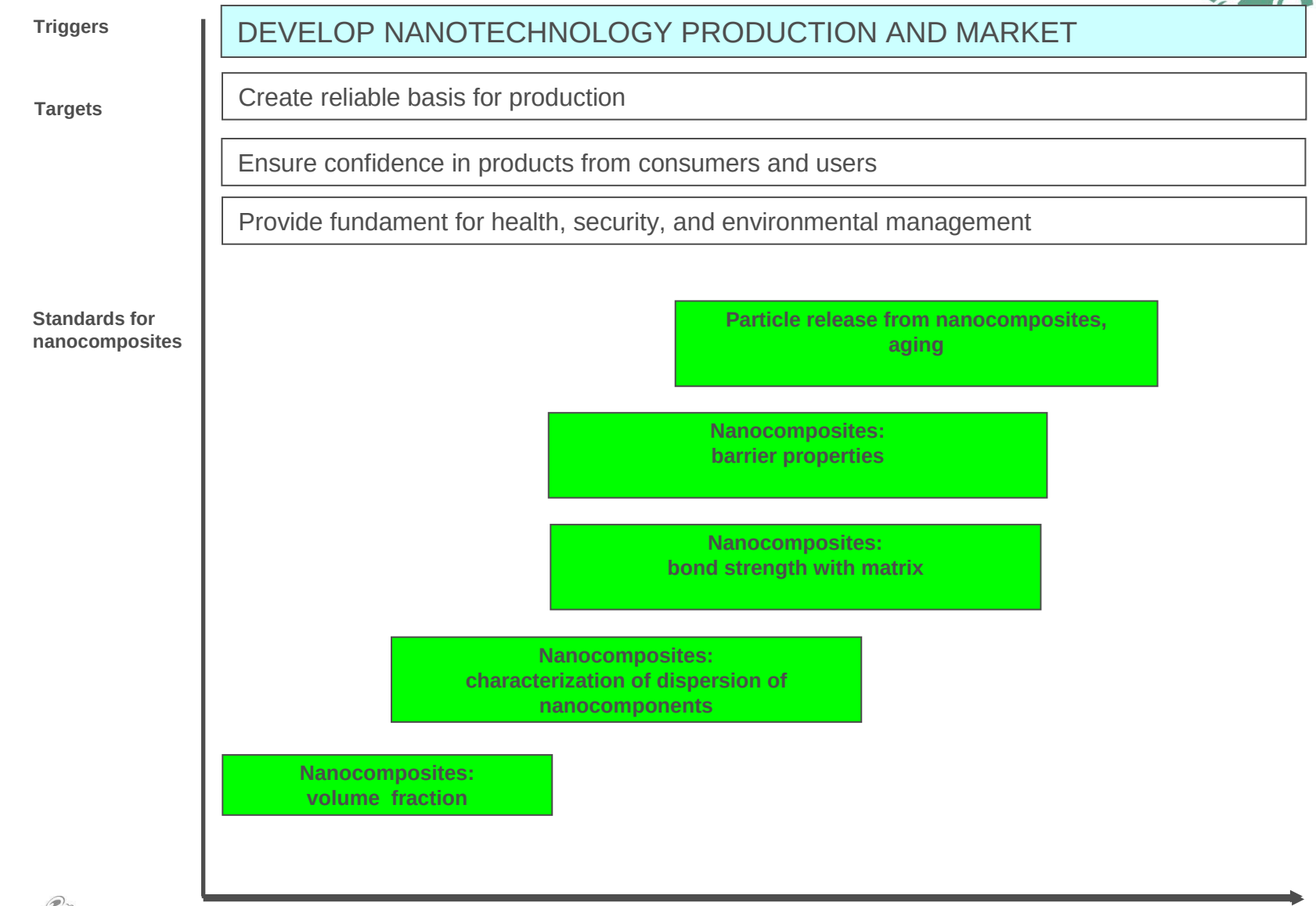
ROADMAP FOR NANOSTANDARDIZATION: GENERIC STANDARDS



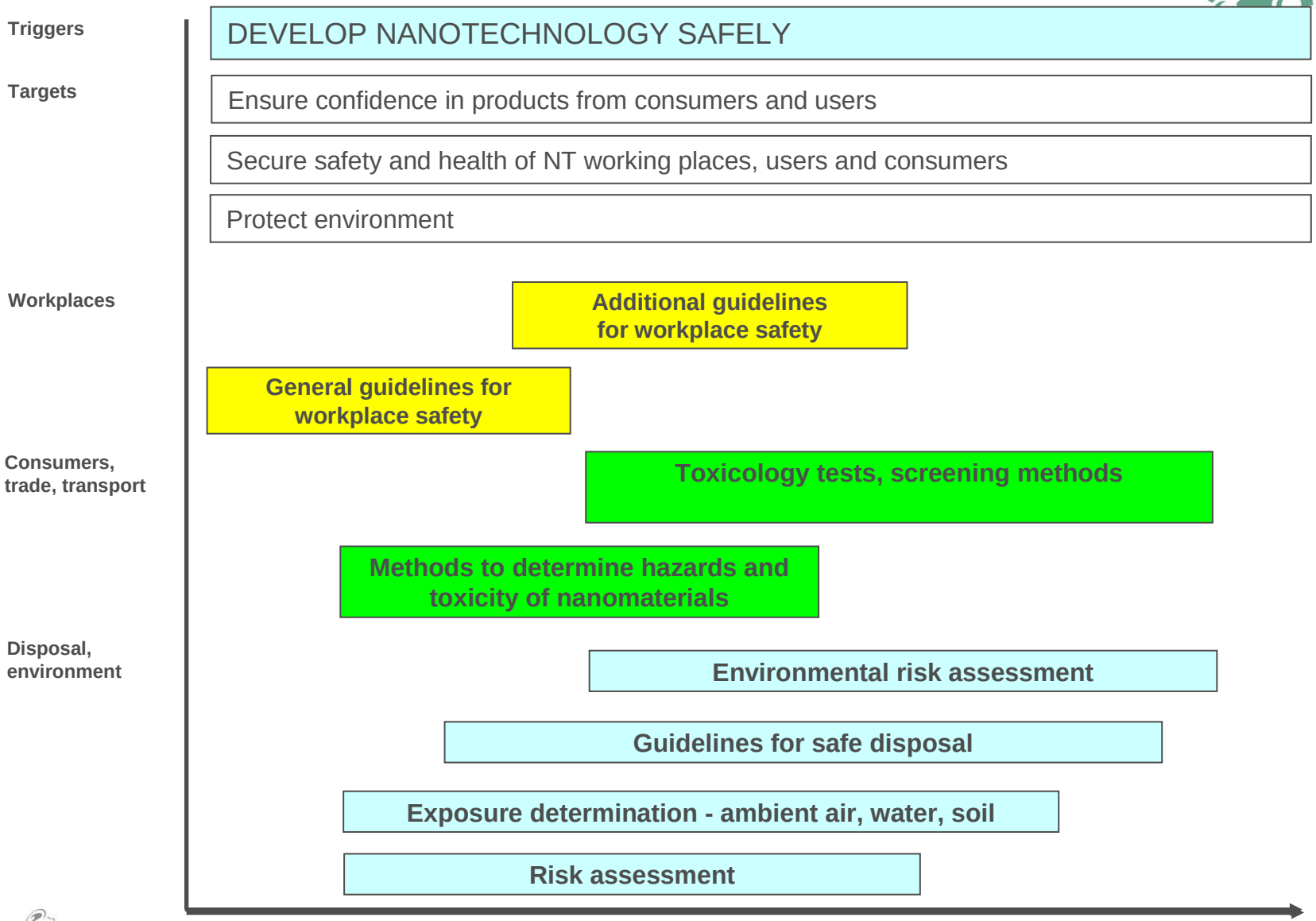
ROADMAP FOR NANOSTANDARDIZATION: MATERIALS



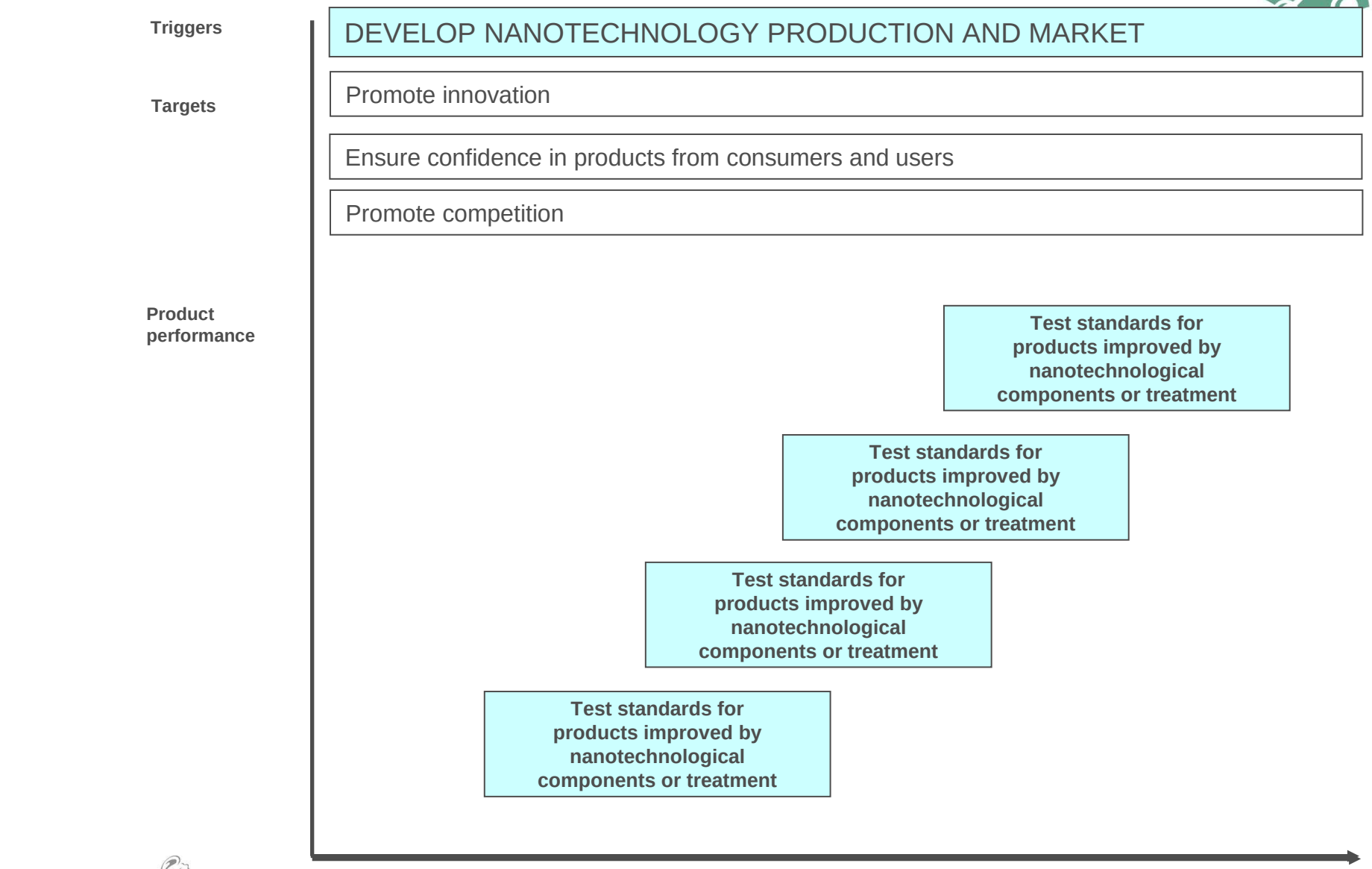
ROADMAP FOR NANOSTANDARDIZATION: NANOCOMPOSITES



ROADMAP FOR NANOSTANDARDIZATION: HEALTH + SAFETY



ROADMAP FOR NANOSTANDARDIZATION: PERFORMANCE



Nano Metrology Roadmaps

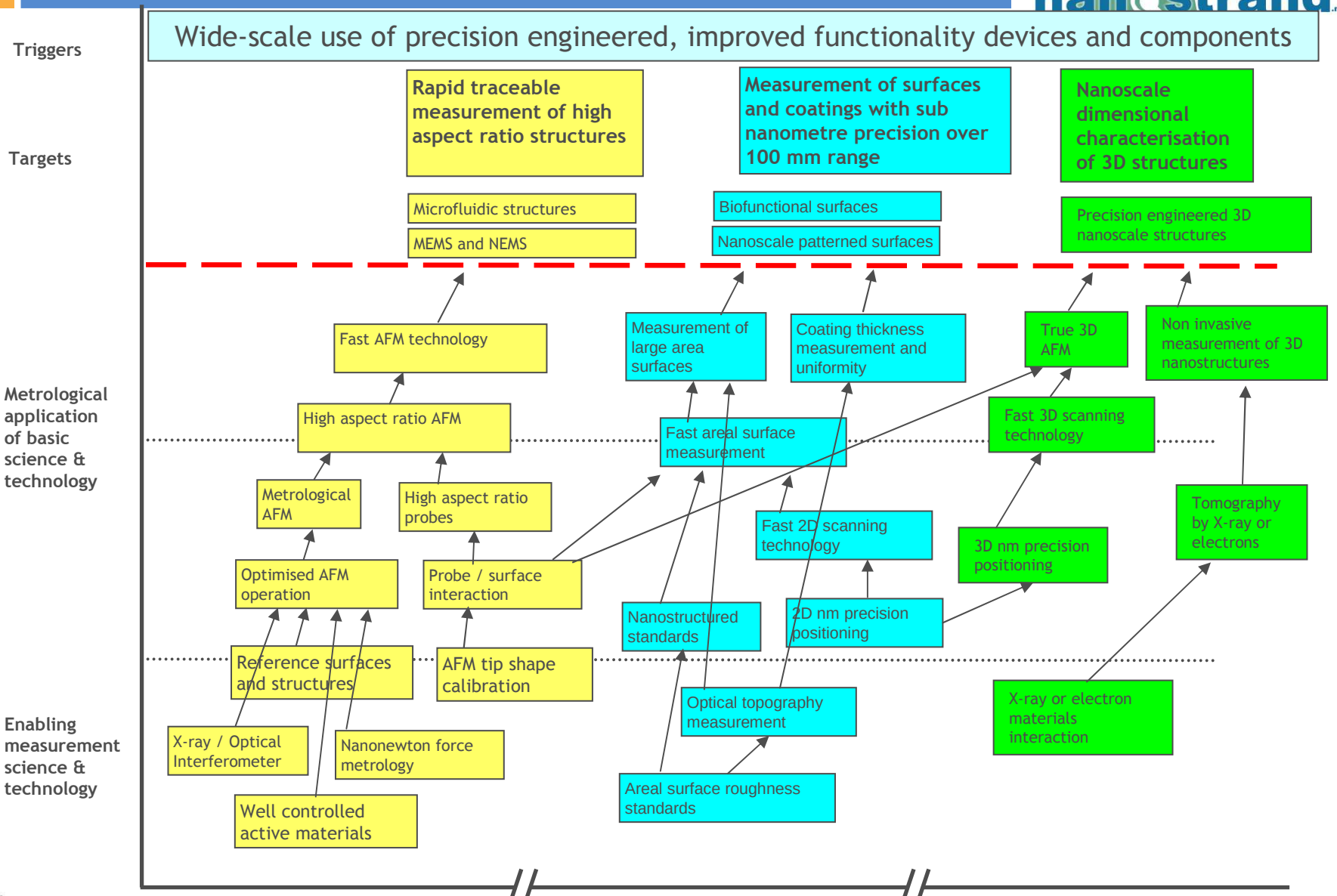
Corresponding to disciplinary areas identified in Nanometrology – the state of the art

Work Package 3 – Deliverable No 7

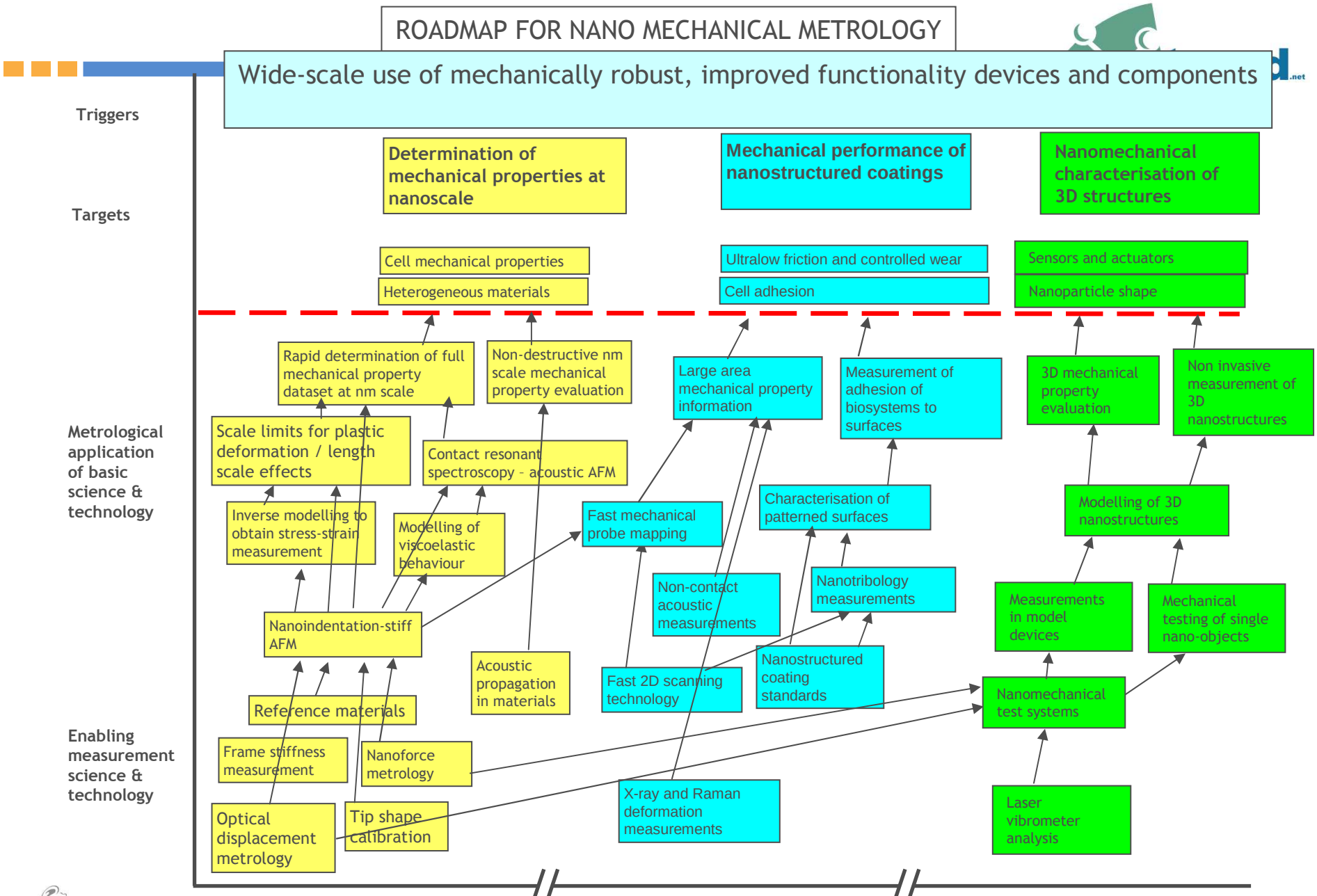
1. Dimensional Nanometrology
2. Nano Mechanical metrology
3. Nano Chemical metrology
4. Nano Structured Materials
5. Nano Biometrology

Metrology for Nano-electronics is covered in the International Technology Roadmap for Semiconductors (ITRS)

ROADMAP FOR NANO DIMENSIONAL METROLOGY

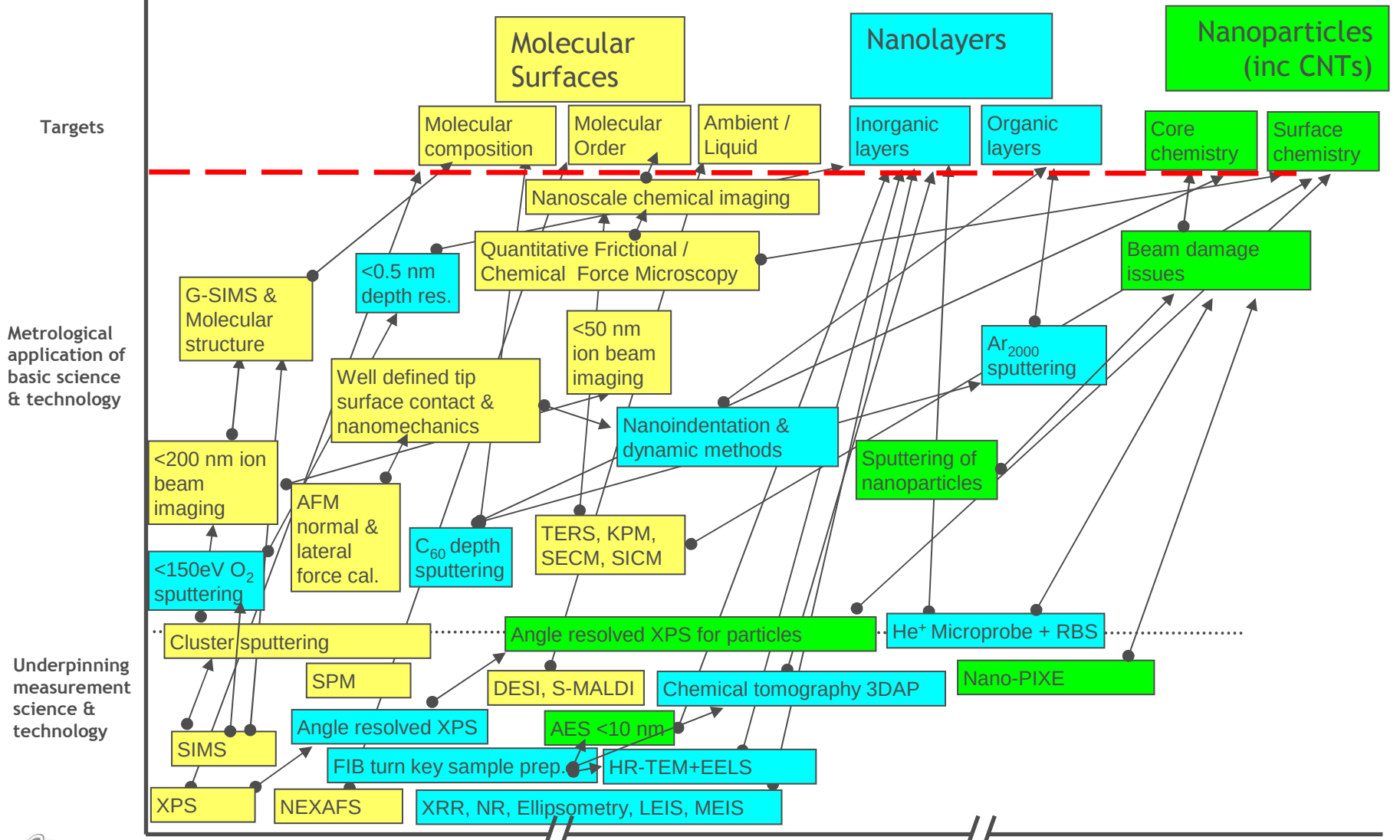


ROADMAP FOR NANO MECHANICAL METROLOGY



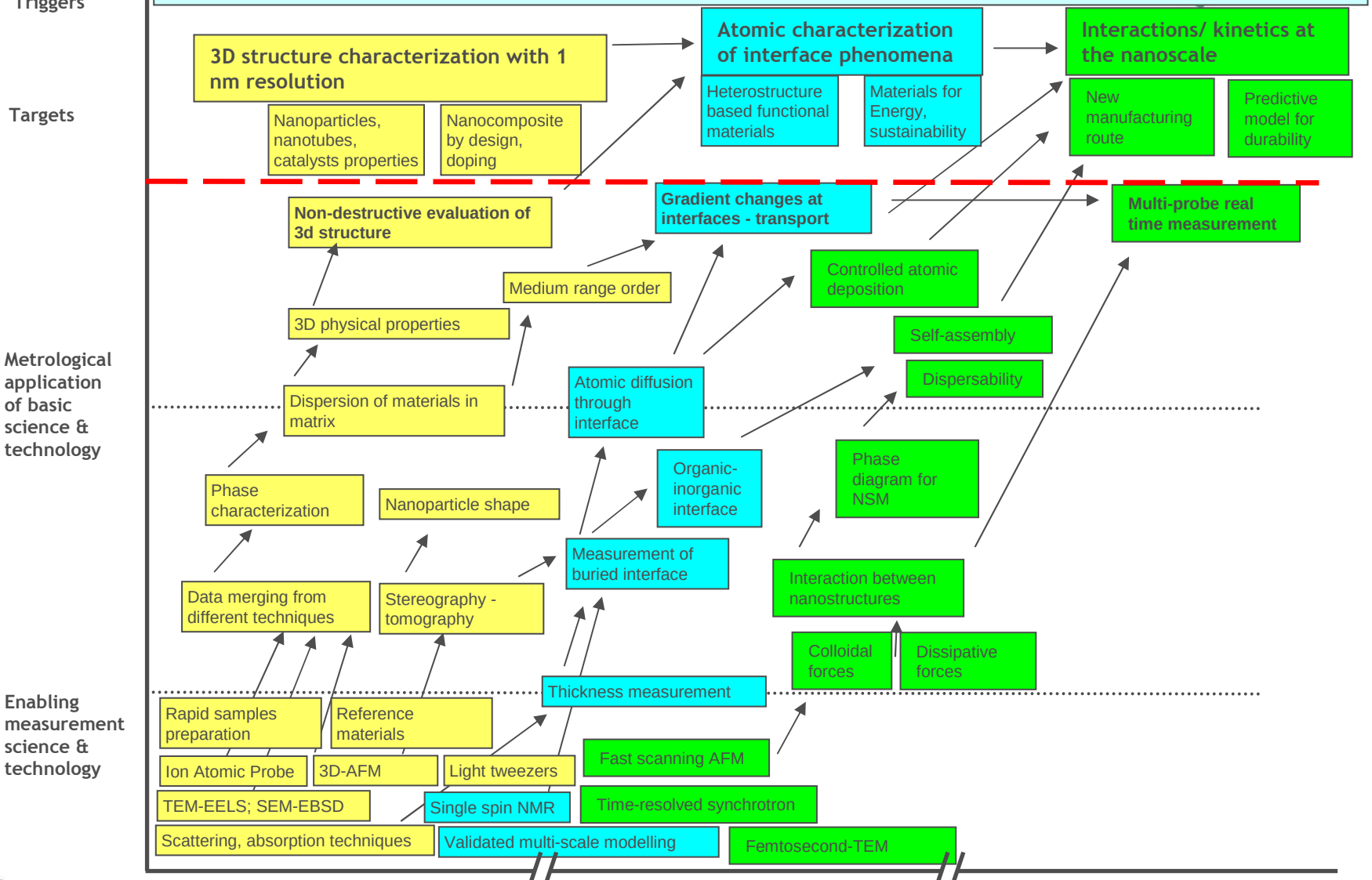
ROADMAP FOR NANO-CHEMICAL

Healthy society with an ageing population, Innovation and competitiveness
Intelligent and connected world, Sustainability

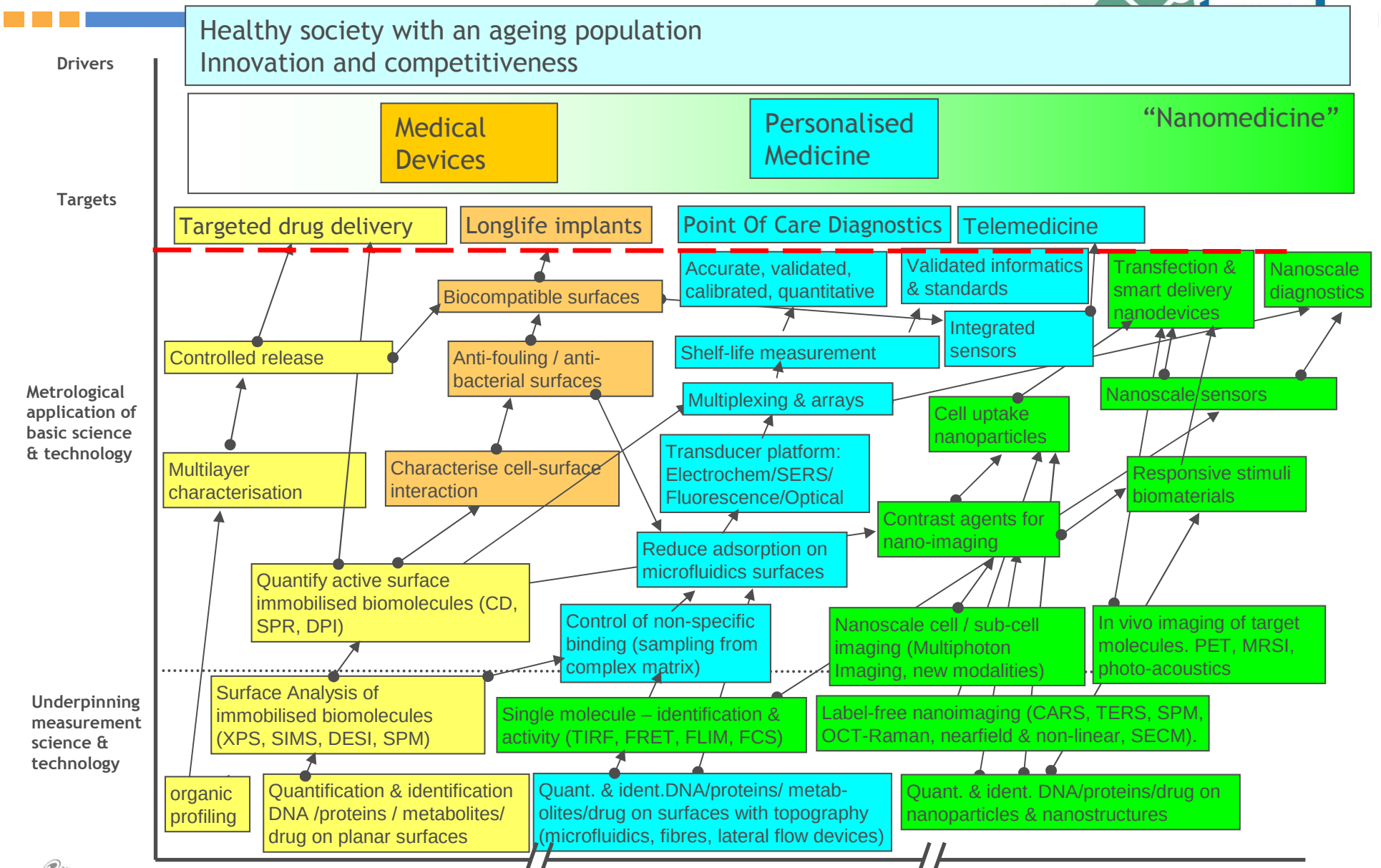


ROADMAP FOR NANO-STRUCTURED MATERIALS

Materials by design:energy, sustainability, innovation, improved efficiency, reliability.
Quantitative, non-destructive measurement of interfacial phenomena at the atomic scale



ROADMAP FOR NANOBIOMETROLOGY(Healthcare)



Thank you for your attention!