NANORA Competence Selection Principle

Introduction

The focus of NANORA is to develop support offers to nanotechnology stakeholders and, specifically, to offer tailor-made supports to develop nanotechnology Research, Development and Innovation (R&D&I) collaboration projects that bring added economic value to the participating regions. Designing the support offers so the participating nanotechnology organisations benefit from an R&D&I collaboration project requires taking into account how collaborating partners can develop and complement each other's competences. To this end, NANORA has rooted the foundation of its support offers in the following principles:

1. Building value chains requires a smart interconnection of competences

R&D&I collaboration projects must involve organisations' activities and links among them so the collaborating partners can deliver products and services valuable to their customers. In doing so, value activities focused on technology development interconnect in the R&D&I collaboration projects to support an overall chain of value activities, hereafter referred as **value chain**, focused on designing, producing, marketing and delivering the organisations' products and services. To increase the performance and matching of the organisations' activities in **value chains underpinned by nanotechnology development**, NANORA has identified the following key types of activities organisations have to focus on:

- the provision of raw materials,
- distinctive production methods,
- analysis activities, and
- additional services such as characterization, dissemination or patent services.

R&D&I collaboration partners' expertise in any of these activities is what constitutes their specific competences. Complementing one's own specific competences in the value chain with supplementary competences is crucial for any nanotechnology company wishing to commercialize its research results, know-how, processes, and intermediate products.

2. Databases must enable the identification of specific competences

As a result, one of the key support offers by NANORA is TINCA (Transnational Interactive Nanotechnology Competence Atlas): a **database of nanotechnology stakeholders** active in the NANORA regions. In order to make that database a useful tool in terms of identifying complementary competences, NANORA has opted for structuring TINCA not along a traditional principle of company selection but along a principle of **competence selection**.

3. Conventional company profiles must be enriched by additional data

As in conventional business databases like [FAME][1] and [Amadeus][2], the core of each individual database entry in TINCA is still a company profile. Beyond basic company profiles, however, TINCA integrates organisations' data related to specific activities in the value chain as outlined above as well as other data allowing for more detailed qualification of the competences the organisations have to offer to potential R&D&I collaboration partners. In this way, TINCA provides new integrated data on:

- **raw materials** used by organisations;
- **end markets** targeted by organisations; and
- the potential role of organisations in **value chains** underpinned by nanotechnology development.

For organisations trying to identify new partners, TINCA thus offers key relevant information and new search tools focused on the competences organisations can offer to facilitate matching technology requests and offers arising from NANORA Access Points as well as from R&D Managers, Technology Managers, and researchers.

4. Additional data must be collected and filtered through systematic suitable categories

The search tools implemented in TINCA enable database users to simultaneously filter entries for, e.g., use of nanorods, targeting of the energy sector, and covering of characterization services in the value chain. Nanotechnology stakeholders have the choice of regulating the depth of information for their own profile or for filtering other profiles; thus, it is not only possible to filter for use of nanorods, but for use of nanorods => Ceramic Nanomaterials => Ceramic Nitrides => Silicon Nitrides (cf. Fig. 1) and not only possible to filter for targeting of the energy sector, but for targeting of Energy => Generation of Electricity => Hydrogen (Fuel Cells).
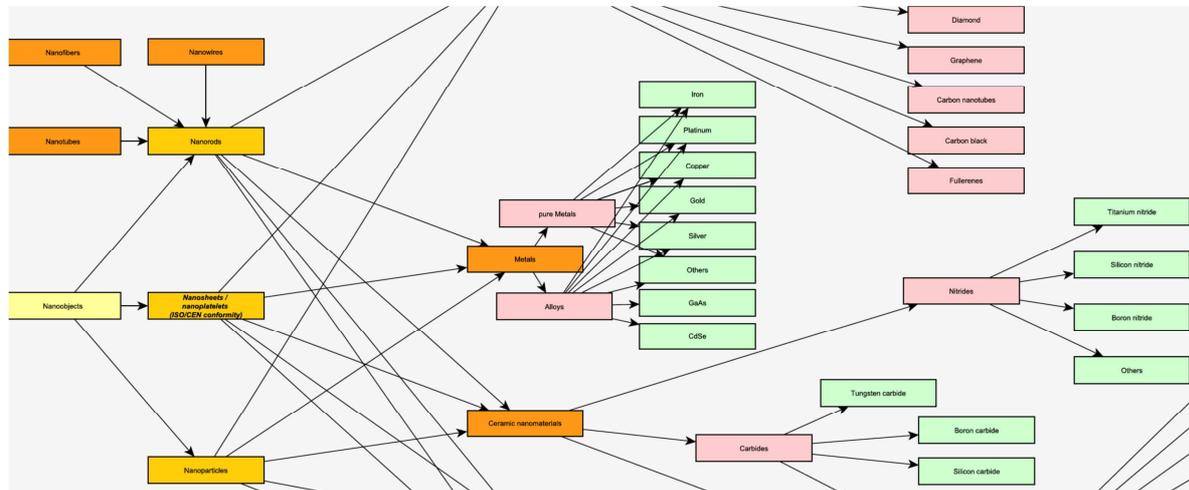
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[1] https://fame.bvdinfo.com
[2] https://amadeus.bvdinfo.com

Fig. 1: „Nanorods" category and subcategories

Together the fine-tuned categories and the respective filters
a) offer a very precise picture of the competences a specific nanotechnology organisation has to offer, and
b) allow for identifying tailor-made sets of matches to technology requests and offers routed through the NANORA Access Points or other business matchmaking services.

5. Data categories must be based on a sound and flexible taxonomy

Some NANORA partners differentiate their nanotechnology organisations more according to which materials they work with, while others place more importance on the questions of which end markets they supply products for. Consequently, the NANORA experts developed a new nanotechnology taxonomy, i.e., an integrated structure of categories used to characterize and filter nanotechnology organisations, specifically for TINCA. Categorizations that different NANORA partners were already using internally were taken into account as well as other existing nanotechnology databases and classification systems, among them:

- the "Competency Map Nanotechnology in Germany" (NanoMap) of the German Federal Ministry of Education and Research (see www.nano-map.de)
- the NanoTechMap by the French company NanoThinking (see www.nanothinking.com/nanotechmap.html)
- the InterTradeIreland Research Connections database of the InterTradeIreland agency (see www.intertradeireland.com/researchandpublications/research-connections/)
- the document "Towards a European Strategy for Nanotechnology" (Communication from the Commission (COM(2004) 338), see http://cordis.europa.eu/-nanotechnology/actionplan.htm)
- the "Integrated Research and Industrial Roadmap for European Nanotechnology" by NANOfutures, the European Technology Integrating and Innovation Platform on

Nanotechnology (see http://www.nanofutures.info/sites/default/files/NANOfutures-_Roadmap%20july%202012_0.pdf),

The NANORA experts compared the different categorizations, distilled those most useful to NANORA purposes and adapted them to the preferences and needs from the different NANORA regions. The resulting taxonomy is a flexible structure with different possible points of entry that honours regional specificities but allows for structuring and displaying TINCA entries from all participating regions in a harmonized fashion.

The entire cross-linked tree structure of the taxonomy displaying all the categories and subcategories is attached in the Annex.

Relevance to SMEs

As SMEs play a major role in the socio-economic indicators of the European regions[3], the support offers to nanotechnology stakeholders in NANORA are designed and developed mainly for the benefit of SMEs. The relevance of NANORA's competence selection principle and TINCA for SMEs arises from the following barriers to develop and exploit nanotechnology:

- SMEs often lack enough resources to search and liaise with organisations in their regions and beyond.
- Available databases are often restricted in their usefulness due to
  o covering only stakeholders from one region or one country,
  o containing only general company profiles without details on specific expertise presented in homogeneous terminology, and/or
  o not enabling systematic filtering of entries by predesigned categories instead of by idiosyncratic key words.

NANORA's competence selection principle and TINCA with its specialized taxonomy and filters diminish the identified barriers and allows SMEs to develop effective R&D&I collaboration projects and concentrate on the development of nanotechnology to deliver products and services. At the same time, TINCA is useful for large enterprises and universities as it can increase their interactions with SMEs in their regions and beyond.

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[3] http://www.eesc.europa.eu/resources/docs/eesc-13-283-en.pdf