ProSafe

Grant Agreement Number 646325

Draft Deliverable D2.1

Synergy Scan report – Final M14

Due date of deliverable, as modified by MC10: *2016/10/31*

Actual submission date: *2017/04/30*

Author(s) and company:	Sara Totaro, Hugues Crutzen – JRC Martie van Tongeren, Ioannis Basinas- IOM David Carlander, Sean Kelly – NIA
Work package/task:	WP2 / Task 2.1
Document status:	draft / final
Confidentiality:	confidential / restricted / public
Key words:	Synergy scan

DOCUMENT HISTORY

Version	***Date***	***Reason of change***
1	2016/04/19	Drafting started by JRC
2	2016/09/23	Final version for comments by partners
3	2017/04/30	Submitted by JRC for approval of MC
4	2017/07/14	Project Office harmonized lay-out

Lead beneficiary for this deliverable: Joint Research Centre, JRC, 3

Owner(s) of this document	
Owner of the content	JRC, partner n 3
Co-Owner 1	IOM, partner n 2
Co-Owner 2	NIA, partner n 8

Table of Content

1 Description of task

Exploitation of potential synergies between EU-funded projects and, to a wider extent, key international networks and national initiatives starts by identifying and listing over-lapping or complementary activities. This task thus maps and reports as far as possible on potential synergies that are helpful in tackling ProSafe's coordination and support objectives, including the EU NanoSafety Cluster (NSC) annual reports and sources such as national program reviews and the US National Nanotechnology Initiative. In particular, the starting point in the search for synergies - 'Synergy Scan' is, at project level, NANoREG and NANoREG II. The main tracer or theme followed in the review process is *Safe by Design*. The synergy scan expands from NANoREG (especially its WP6) and NANoREG II towards other EU projects and the international project landscape to identify synergy opportunities for the Safe-by-Design (SbD) theme. The scan is also a strategic way to contact and establish links between ProSafe and other worldwide initiatives.

2 Description of work and main achievements

2.1 Summary

Task 2.1 (led by JRC, with contributions from IOM and NIA) aimed at identifying activities/ projects that can link to NANoREG, identifying exploitable synergy areas relevant to ProSafe.

Different arenas have been scanned, resulting in a mapping of those initiatives that were connected to the main tracer of SbD. The research has been systematically organised using the keywords *Safe(r) by design*, *Hazard* and *Exposure*.

JRC has focused the mapping on the projects grouped under the umbrella of the EU NanoSafety Cluster (NSC), retrieving the NSC Compendium. This allowed for a comprehensive review of FP7 and H2020-funded projects. Other funding schemes at EU or national level have been evaluated and scanned by IOM. Given its involvement in the industry sector, NIA provided an overview, when possible, of projects relevant to ProSafe operated or sponsored by Industry. Additional information on national initiatives has been also provided by JRC, given its involvement in the provision of the nanomaterials (NMs) via its JRC Nanomaterials Repository.

The information retrieved has been gathered in an Excel spreadsheet that lists these projects and provides key data for ProSafe. The spreadsheet is accessible as downloadable file from CIRCABC: Library>C-Work packages>WP2>Task 2.1
https://circabc.europa.eu/d/d/workspace/SpacesStore/a3b48aef-e8cb-4bbf-8faf-a4d56eba3e94/PROSAFE_D2.1_M14_AnnexI_Final.xlsx .

2.2 Background of the task

Many projects have been funded under different schemes (e.g. FP7, H2020, Life+) that address the general topic of "Risk Assessment of Nanomaterials", and all of these projects (have) produce(d) relevant data. ProSafe is a Coordination and Support Action (CSA) that aims at extracting information from these initiatives and exploit the results produced. Indeed, the final purpose is to evaluate them in support to regulatory activities and to contribute, when and if possible, to the of the safety assessment of chemicals, including nanomaterials (NMs).

Even if largely applied in other fields since several years, the introduction of *Safe-by-Design* (SbD) in the field of nanomaterials manufacturing is rather new and can be listed as one of the approaches that could be used for risk management / assessment. The NANoREG project gave particular emphasis to this approach, where it proposed a definition[1]:

> *The 'safe by design' concept aims at reducing potential health and environmental risks at an early phase of the innovation process. Such concept aims at creating an integrated research strategy, which enables the consideration of safety aspects for humans and the environment in the design process of a product/material to eliminate or minimise the risk of adverse effects during its life cycle including construction, use, maintenance and deconstruction. Within the safe-by-design concept the functionality of a nanomaterial and its toxicity/safety are therefore considered in an integrated way. Such an approach maximises resources use and expedites the development of products containing nanomaterials and new nanomaterials that are safer by design*.

SbD can significantly improve the risk management (of NMs). It is therefore considered (according to the ProSafe Description of Activities – DoA) as the main tracer/theme to be pursued in the identification of the activities that can be linked and mapped, and therefore included in the synergy scan.

One of the final aims of the project is to foster the inclusion of SbD as a Risk Management / Assessment approach within the European Community, and its Member and Associated States, and even beyond, to international organisations, such as OECD.

The work performed under T2.1 is linked to other mapping exercises that are foreseen in ProSafe, such as the 'Mapping databases' task 3.1 in WP3. These are for instance the activities to achieve D4.4 – *Inventory of the harmonised national regulation oriented task*, and the work for the ProSafe Task Force (TF) document related to "*Reviewing Data, Protocols, Reports, and Guidance notes for*

[1] Gottardo et al; NANoREG harmonised terminology for environmental health and safety assessment of nanomaterials; EUR 27808; doi:10.2788/71213 .

regulatory relevance". D2.1 in its final version (M14) is available to the competent partners of the project, i.e.:

- To WP1 and T2.3 to provide them with an overview of the potential synergy areas,
- To the ProSafe Task Force to provide it with a comprehensive list of the available data and other outcomes (e.g. deliverables, project reports) from other (non-)European initiatives that can be used to fill the gaps identified, and
- To the expert panel involved in the foresight exercise to provide them with useful material and data.

2.3 Description of the work carried out

2.3.1 *Approach used for the Synergy Scan*

As agreed during the second Management Committee meeting (MC02), in order to perform the mapping of relevant initiatives and projects, the Synergy Scan shall consider three different criteria from a SbD strategy:

1. The 'intervention' on nanomaterials,
2. Activities intervening on exposure to the products, and
3. Interventions on processes (workers).

On top of those criteria, it was decided to focus the entire synergy scan on the NMs selected in NANoREG. There are several experiments performed in NANoREG that potentially will provide sufficient data to allow the evaluation of hazard and exposure scenarios, including workers' exposure, for those NMs.

2.3.2 *Description of the strategy adopted*

2.3.2.1 Project screening

The involvement in the task of three different partners with different fields of expertise allowed dividing the work among them, thus covering different areas. The research has been systematically organised via keywords. Starting from the assumption that in order to adopt a SbD approach for risk management, *a priori* data on hazard and exposure are needed, these two words have been used as searching keys in addition to 'safe by design'. Thus, documents were analysed and the worldwide web was scanned using the keywords:

- Safe(r) by design,
- Hazard,
- Exposure.

A) JRC focused the mapping on EU-funded projects, identifying them via the EU NanoSafety Cluster (NSC) compendia. Hence, both H2020 and FP7 projects have been scanned. Worth noting is that for most of the projects, search results using with the keyword "Safe by Design" show a promotion of knowledge transfer to facilitate the safe by design approach, rather than development work on the concept itself.
Thanks to its involvement in the supply of NMs via its JRC Repository, JRC could integrate and provide information about national initiatives or other programmes that are also using the "NANoREG nanomaterials".
During the revision of D2.1 for its final version in 2016, JRC expanded the screening including two additional keywords, namely *risk assessment* and *risk management*. They were excluded in the first instance because they were strictly connected to the keywords that were considered during the first iteration (as also explained in Section 2.4.1). However, for sake of completeness, the NSC compendium was scanned for these two keywords and the results added to the matrix (Annex I to this deliverable).

B) IOM agreed to focus its attention on non-RTD EU-funded and national initiatives. The work started by scanning the websites (when available) of the partners involved in the NANoREG, as well as those in the GUIDEnano projects. Other relevant platforms (e.g. France and Belgium) have been taken into consideration.

C) Finally, given NIA's role in the nanotechnology Industry sector, this partner has focussed the scanning on projects possibly related to that sector (via funding schemes of through direct participation) and which are not EU-funded and, thus, not easily accessible .

National projects in France, Germany, Ireland, Norway, Sweden, and UK have been scanned, still using the keyword combinations *'Safe by design'*, *'Safer by design'* and *'Nano safe / safety'*.
In addition, using standard web-searching tools, several databases of funded projects (such as Grants on the Web (UK) and Gateway to Research (UK)) were used to locate relevant projects.

As expected, it was easier to locate projects that have been supported by government funding, rather than projects run and paid for directly by industry. Several spotted projects were found to have no named companies associated with them, but have been retained for completeness, also because results from them may become available to Industry in the near future.

2.3.2.2 Information gathering

Once the projects were identified, the work of the task has been to tackle in which way these projects might be supportive to the ProSafe aim, i.e. supporting SbD implementation, also in regulatory arenas. A complete analysis of project results and deliverables would have been out of the scope and would have required a tremendous effort from the task partners. Moreover, the information that the T2.1 partners could have extracted would have been subject to their interpretation about the relevance to SbD, as well as results that each project produced about

hazard and exposure evaluation. This could have left to the users of the Synergy Scan (D2.1) less freedom in the actual use of the synergies that were found.

Given these premises, T2.1 decided to submit to representatives (2 or 3) of each project, a questionnaire reporting five very simple questions that could help to collect general information on what can be extracted from each project. Again, as in the project screening, focus has been SbD. Also, with respect to the proposed definition for safe-by-design and in line with the strategy adopted for the screening, the five questions that have been formulated were connected to the elements that are needed to perform SbD. The questions that have been included in the questionnaire and normally required a very limited time to be answered by the respondents (around 5 minutes).

Q1. Are/were there activities/tasks in your project devoted to:

- Hazard identification?
- Hazard characterisation?

Q2. Are/were there activities/tasks in your project devoted to the identification and evaluation of most probable exposure scenarios?

If yes, are these related to humans (workers, consumers) or to the environment?

Q3. Are you generating any tool/data/method on i) hazard (identification or characterisation) or ii) exposure?

If yes, can these be used, in your opinion, to support SbD? For instance, can they provide relevant and robust data to support modelling or an "a priori" evaluation of risk?

Q4. Is your project performing any activity/task that can directly be (or indirectly) related to risk assessment, management or treatment?

Q5. Would you be keen/would your project allow sharing this knowledge to support a safe innovation approach for nanomaterials?

With respect to the projects mapped by JRC, the questionnaires have been sent personally (single recipient for each email) to the representatives of the projects, whom have been identified mainly exploiting the good working network of the JRC. In addition, where there was no direct connection, questionnaire recipients were identified based on the information included in the NSC Compendium, in the project websites, or via *EU-Cordis*.

2.4 Results

2.4.1 *Project screening*

In total around 70 projects are listed in the Synergy Scan. The project titles are listed in tables 1 to 5 (see further down). Short summaries of the projects, as well as their aims, can be found in an Excel® file – see Annex I. Besides the names of the projects and some details like the length of the project or its Coordinator, the table provides key information on the objectives and more.

The mapping exercise of EU H2020/FP7-funded projects, performed by JRC, led to the identification of 26 initiatives that are potentially involved and connected to SbD. The three different keywords used for the search gave in certain cases overlapping results. The list of the projects is included in Annex I in section *"NSC 2015"*.

The inclusion of the two additional keywords (*risk assessment* and *risk management, see 2.3.2.1 above*) did not enlarge the results of the screening, adding just few projects to the list compiled at M8. This was indeed expected.
Put simply, the paradigm for Risk Assessment (RA) is :

$$RA = H \times E ,$$

where H stands for Hazard and E for Exposure.

There is a very strict connection between these three "variables". Therefore projects where hazard and exposure are evaluated, highlighted during from the first round of screening, can be normally also related to risk assessment. Notwithstanding this consideration, it was still decided to perform the screening first, as a form of control, and to consider those projects that were related to risk assessment but, for instance, did not perform any experimental work, but just literature data analysis or collecting from other sources (e.g. NanoPUZZLES).

Overall, less than 10 projects were added as results of this second screening, namely Hinamox, NanoPUZZLES, ITS Nano, nanoMILE, NANOGENOTOX (that was included however in the list of the project supported by the JRC Nanomaterials Repository), and ModNanoTox- The total is eventually 32. According to the projects description found in the NSC, it was also possible to allocate the majority of projects that have been highlighted in the second screening in the already existing 'categories'. The only exceptions were ITS Nano and nanoMile, which were found more related to risk assessment and management *per se*. Figure 1 gives an overview of the projects and the overlaps in terms of investigated areas.

IOM provided information on non-H2020/FP7 EU-funded projects and, in addition, 10 national platforms/research centres were identified, as well as 19 national and collaboration projects between different EU countries. These results are included in Annex I under the section *"NATIONAL INITIATIVES"*.
There is also a complete list, in the form of hyperlinks in Annex II.

With respect to industry involvement, NIA has mapped 28 projects, included in Annex I, under the section *"INDUSTRIAL and GOVERNMENT FUNDED"*. As anticipated, countries with more accessible databases and government-sponsored R&D have given more results. As mentioned in 2.3, it was easier to locate projects that have been supported by government funding, rather than projects run and paid for directly by Industry.

NIA also contacted its members and other industries to locate further industry-funded and run projects that are related to *SbD*.

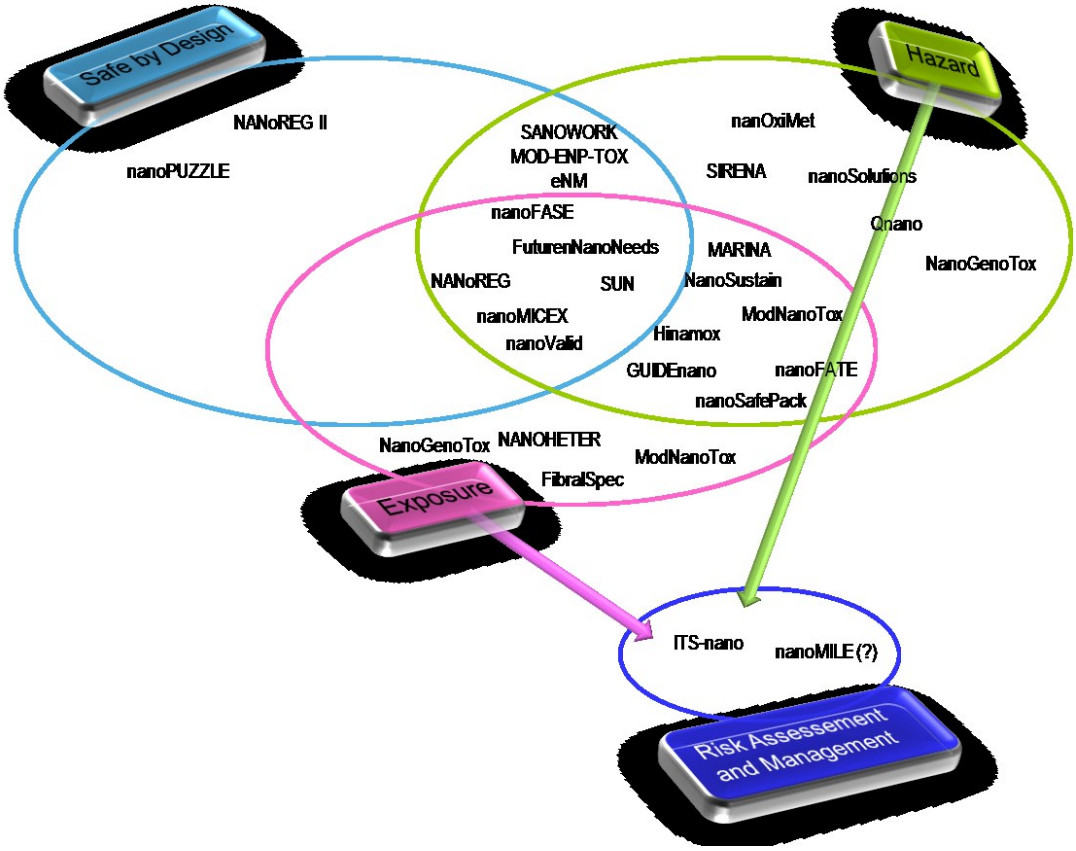

Figure 1 EU-funded projects grouped according to the investigated area. Overlaps are in the intersections

In addition to this synergy scan exercise, and due to its involvement in several FP7 projects, JRC also took into consideration outcomes from FP7 projects and international initiatives listed in table 6 below. JRC also integrated information obtained via the JRC Nanomaterials Repository, which has been supplying NMs to the European and global nanoEHS community. The initiatives identified via the JRC Repository are listed in table 7 below. So far, the list only mentions organisations and countries, without providing further details in order to protect customer privacy.

Table 1. List of NSC projects organised with respect to the keyword(s) (JRC)

NSC compendium 2015		
key word: Safe by design	key word: hazard	key word: exposure
NanoFASE (H2020)	nanoFASE	NanoFASE
NanoReg2 (H2020)	eNanoMapper	FibralSpec
eNanoMapper	futureNanoNeeds	FutureNanoNeeds
FururеNanoNeeds	GUIDEnano	GUIDEnano
Hinamox	Hinamox	NARINA
MOD-ENP-TOX	MARINA	NANOGENOTOX
NANOMICEX	MOD-ENP-TOX	NANOHETER (funded under SIINN)
NANoREG	NanoFATE	NanoMICEX
NanoPUZZLES	NANOGENOTOX	NanoSafePack
NanoValid	NANOMICEX	NanoValid
Sanowork	nanOxiMet	SUN
SUN	NanosafePACK	NanoFATE
	NANOSOLUTIONS	NanoSustain
	NanoSustain	NanoReTox
	nanoValid	
	QualityNANO	
	SanoWORK	
	SUN	
	SIRENA (Life programme)	
	ECO-TEXNANO (Life programme)	

Table 2. List of projects related to the "NANoREG materials". Retrieved via the JRC Nanomaterials Repository (JRC)

NANoREG MATERIALS
FP7 PROJECTS / NSC /other EU funding schemes
NANoREG
MARINA
NanoMILE
QualityNANO
NANOGENOTOX
ENPRA
PROSPECT
MOD-ENP-TOX

Table 3. List of projects highlighted in the second screening of the NSC Compendium (JRC). SIINN is not strictly speaking a project, but rather an ERANET providing funding through calls

NSC compendium 2015	
KEY WORD : RISK ASSESSMENT	KEY WORD : RISK MANAGEMENT
MARINA	NanoReg2
MOD-ENP-TOX	GUIDEnano
NANOHETER (funded under SIINN)	MARINA
NANOMICEX	NANOHETER (funded under SIINN)
nanOxiMet	NANOMICEX
NANoREG	NANoREG
NanosafePACK	NanosafePACK
nanoValid	nanoValid
Sanowork	QualityNANO
SIRENA	SanoWORK
SUN	SIRENA
NanoFATE	SUN
NanoSustain	NanoSustain
ModNanoTox	ITS Nano
SIINN	
nanoFASE	
NANoREG II	
eNanoMapper	
GUIDEnano	
ITS Nano	
NanoMILE	
SIRENA	
NanoReTox	
NANOGENOTOX	

Table 4. List of national initiatives (IOM)

NATIONAL INITIATIVES	
SERENADE	France
NorNANoREG	Norway
Turning forestry biomass into sustainable nanocellulose-based materials	Sweden
Inflammatory, genotoxic and tumorigenic effects of multi-walled carbon nanotubes with emphasis on the interleukin-1 family	Norway
DENANA	Germany
nanoCOLT	Germany
nanoGRAVUR	Germany
ProCycle	Germany
NANOMOBIL	Germany
NanoUmwelt	Germany / USA

Table 5. List of projects linked to industry or under government funding schemes

INDUSTRIAL AND GOVERNMENT FUNDED
Conjugated Polymer Nanoparticles for Near Infrared Fluorescence Imaging
Microbubbles for Hydrophobic Drug Delivery and Enhanced Diagnostics; Towards Personalised Healthcare for the Treatment of Colorectal Cancer
Nanoenabled Peptide Pills - Unlocking the Potential of Therapeutic Peptides
Toxicology of nanopolymer dispersions. A case study of aqueous acrylic ester copolymers
Nanofibre scale-up and industrial validation - Industrial Biotechnology Catalyst Translation and Industrial Research Awards
Ultrastable targeted multifunctional hybrid nanomaterials for long-term stem cell tracking
Mitigating the risk of micropollutants in the environment
Computer-aided design of degradable Mg-based metallic glasses for safe medical implantation
Water-safe slug pellets
Catalysis by Itterative Rational Design
MASSIVE Materials
Design Principles for New Soft Materials
Computational modelling and design of nanoporous silica materials
The molecular frontier: extending the boundaries of process design
Rational design of solid-state semiconductor-sensitized solar cells: from materials modelling to device fabrication
InhalT-90
NanoBEL
NanoBioDetect
nanoGRAVUR
NANOSUPPE
NanoUmwelt
LABEX SERENADE
LUMINOSURF
DENANA
Mistra Environmental Nanosafety program
Novel nanomaterials as antimicrobial coatings
Smart Antibacterial Materials Using Novel Metallic Nanoparticles
Manufacturing nano-structured photonic structures for chemical sensing

Table 6. FP7 projects and international initiatives directly linked to JRC (where JRC is partners/has been partner)

NANoREG
MARINA
NanoMILE
QualityNANO
NANOGENOTOX
ENPRA
PROSPECT
MOD-ENP-TOX
NanoReg2
OECD Sponsorship Programme for the Testing of MNMs

Table 7. National initiatives (other than EU funded) supported by the JRC Nanomaterials Repository. The list of these initiatives is continuously expanding. Non-exhaustive list hereunder (update end 2015)

ALATA - FR
EMPA - CH
UNIVIE - AT
SINTEF - NO
University of Zaragoza - ES
PATA - US
University of Ginevra - CH

2.4.2 *Information gathering using the questionnaire*

The information retrieved from the NSC compendium for each project, namely the summary and the objectives, besides providing the essential details on a given project, was also used to estimate the relevance of the highlighted projects with respect to ProSafe aims. Considering the task partners expertise, a priority was set for each project, assuming 1 as lowest value (almost not relevant) and 5 highest (very relevant). This estimation of relevance was used to define the order to contact the project representatives. As mentioned in the previous section, for each project, at least two contact persons (when possible) were identified and received the questionnaire.
JRC has sent in total 36 questionnaires to contact 18 EU-funded projects and received a total of 16 replies, from 13 different projects, corresponding to a percentage of 72.2% of replies.
The replies to the five questions have been elaborated and included in a summary table that is giving an overview to the reader of what information can be expected from which project.

IOM, in alignment with the adopted strategy described in the previous paragraphs, has contacted national initiatives, and has sent 10 questionnaires contacting a total of 5 projects (also in this case two representatives for each project). The percentage of replies was quite high, having received feedback from at least one of the representatives from 4 out of 5 projects.

NIA has sent the questionnaire to the relevant contact persons of the projects that have been highlighted during the first phase of Synergy Scan (project screening). They received a total of 10 replies.

The answers to the questions are summarised in table 8 (copied from the 'answers' tab of the Excel® file in Annex I).

Table 8. Overview of the answers to the questionnaire

project	priority project *	Hazard	H char H ident	Exposure	env E hum E	mth (H/E)	tools (H/E)	Support to SbD	Risk Assessment/ Man. activities	possibility/will to share	data available	possibility/will to share	NOTES
EU funded projects and other relevant related initiatives													
NanoFASE	3 to 4	N	N/N	Y	Y/N		Y		Y (RA case studies)	Y The project will create an open-access portfolio of exposure models	Y	Y Databse sharing activities will probably co-organised with the CEINT center (USA)	
NanoReg2	4	Y	Y/Y	Y	Y/Y	Launched Search Call		Y	Y (TEMAS, together with RIVM is developing the Safe Innovation approach)	tested/harmonized (with experts of NanoReg2)	Y	Y	
eNanoMapper	3	N	N/N	N	N/N	N	eNanoMapper virtual applications on data management, ontology integration and analysis infrastructure	Y	Y (RA: data management and analysis infrastructure together with ontologies in order to support risk assessment activities)	Y	N (data are gathered)	Y (eNanoMapper database, ontology and modelling tools are accessible at http://www.enanomapper.net/applications)	data included in the eNM DB are subject to specific IPR issues related to the projects. Besides these constraints there is the willing to share
FutureNanoNeeds	4 to 5	Y	Y/Y (focus on environmental hazards of new generations of nanomaterials)	Y	Y/N (exposure scenarios are taken as the starting point of hazard and risk assessment.)	Y (models predicting environmental hazards of homologues of nanomaterials with novel properties)			Y (the final aim is to integrate the project findings in (environmental and human health) risk assessment.	Y (contact: project-office@futurenanoneeds.eu)	Y (?)	Y (contact: project-office@futurenanoneeds.eu)	WP
		Y	Y/N	N	YES data and method on hazard				N	Y	?	Y	RV
NANOMICEX	3 to 4	Y	Y/Y	Y	N/Y (occupational)	Y	Y	Y	Y	Y	Y	Y	
NanoValid	2	Y	Y/Y	Y	N/Y	Y	Y	Y (dustiness testing and exposure estimation using the nanosafer model)	Y	Y (the approach is also under consideration in NANoREG II and in CALIBRATE)	?	Y (the approach is also under consideration in NANoREG II and in CALIBRATE)	Keld
	2	Y	Y/Y	Y	Y/Y	Y	Y	Y	Y	Y (but restricted to non-confidential data/information)	Y	Y (but restricted to non-confidential data/information)	Rudolph
SanoWork	4	Y	Y/Y	Y	N/Y (occupational)	Y (H/E)	Y (H/E)	Y (we even did safe-by-design with High Aspect Ratio materials)	Y	Y (to be sure, please contact Anna Costa)	Y	Y to be sure, please contact Anna Costa	

project	priority project *	Hazard	H char H ident	Exposure	env E hum E	mth (H/E)	tools (H/E)	Support to SbD	Risk Assessment/ Man. activities	possibility/will to share	data available	possibility/will to share	NOTES
SUN	4	Y	Y/Y	Y	Y/Y	Y (H/E)	Y (H/E)		The entire project is focused on risk assessment and management of existing industrial nanomaterials and nano-enabled products.	Y?	Y	Y	**TOOLS and METHODS** Exposure We are upgrading existing models for probabilistic material flow analysis to calculate PECs. We are developing a human exposure framework, including upgrades of both occupational and consumer exposure models such as NANOSAFER, STOFFENMANAGER NANO and CONSEXPO. These environmental and human exposure models will be linked to the SUN Decision Support System (DSS). Hazard We are considering to support the development of the PROAST dose response model as an online tool to be linked to the SUN DSS. This is currently being discussed with RIVM and funding is being secured. In the meantime we are developing an alternative dose-response model based on the BMD approach in case the negotiations with RIVM fail or the PROAST developments are prolonged beyond the SUN reporting deadlines. Risk We developed a probabilistic human health risk assessment approach, based on previous work by Slob et al. (2009), which will be integrated in the SUN DSS
GUIDEnano	4	Y	Y/Y (env and human)	Y	Y/Y		Y A Risk Assessment Web-based Tool	?	Y (The project main goal is to deliver a Risk assessment Tool which will include risk management measures)	Y (The Tool will be presented to stakeholders in November 2016 and the final version of the Tool will be publically available at the end of the project (May 2017)	?	?	The Tool will guide the industry/user through the risk assessment process to identify and quantify the potential human and environmental risks of their product/ material considering the whole product life cycle. Furthermore, if risks are identified the Tool will propose risk mitigation measures to reduce it (safe-by-design strategies or exposure controls)
NanoSustain	3	Y	Y/Y	Y	Y/Y	Y	Y	Y	Y	Y (but restricted to non-confidential data/information)	Y	YES (but restricted to non-confidential data/information)	
NanoPUZZLES	3	Y	Y/Y (modelling)	N	N/N		Y (models § on hazard identification and characterisation)	Y	Y - RA The QSAR models for predicting hazard developed by the project, along with read-across methodologies, and the datasets curated might possibly be integrated into approaches for risk assessment.	Y	Y	Y	§ These models were not made available as re-usable tools, although some modelling software was released as a re-usable tool. new data were generated, toxicity and physicochemical data were curated from the literature and these were publicly released.

project	priority project *	Hazard	H char H ident	Exposure	env E hum E	mth (H/E)	tools (H/E)	Support to SbD	Risk Assessment/ Man. activities	possibility/will to share	data available	possibility/will to share	NOTES
National inititatives - IOM													
SERENADE	5	Y	Y/Y	Y	Y/Y		Yes	Y	Y	Y	Y	Y	
NorNANoREG - National initiative towards developing a common approach to the regulatory testing of manufactured nanomaterials	4 5	N	N/N	N	N/N		Yes	N	Y	Y	?	?	
Turning forestry biomass into sustainable nanocellulose-based materials	4	Y	Y/Y	Y	N/Y	N	N/N	N	Y	Y (I am keen to share the knowledge if the communication section of the project allows it.)	?	?	
DENANA - Design criteria for sustainable nanomaterials	3 4												
Industrial inititatives - NIA													
Conjugated Polymer Nanoparticles for Near Infrared Fluorescence Imaging	3	Y	Y/Y	N	N/N	Y	Y	Y	Y	Possibly	Y	Possibly	
Mistra Environmental Nanosafety program	3	Y	Y/Y	Y	Y/N	Y/E	Y	Y	Y	Y	Y	Y	
Nanofibre scale-up and industrial validation - Industrial Biotechnology Catalyst Translation and Industrial Research Awards	1	Y	Y/Y	Y	N/Y	Y	Y	Y	Y	N	N	N	Pharmaceutical
Mitigating the risk of micropollutants in the environment	2	Y	Y/Y	Y	Y/N	Y	Y	Y	Y	Y	Y	Y	Micro, and not nano focused, but indirectly
NanoBioDetect	3	y	y/Y	Y	Y/Y	Y	Y	Y	Y	Y	Y	Y	
MASSIVE Materials	3	y	Y/Y	Y	Y/Y	Y	Y	Y	Y	Y, publications	Y	Y, publications	
Computer-aided design of degradable Mg-based metallic glasses for safe medical implantation	1	Y	Y/Y	Y		N	Y	Y	N	Possibly	Y	Possibly	Mainly modelling exercises
Design Principles for New Soft Materials	2	y	Y/Y	Y	Y/Y	Y	Y	Y	Y	Y, publications	Y	Y, publications	Modelling, more physchem
The molecular frontier: extending the boundaries of process design	1	N	N/N	Y	Y/N	Y	Y	Y	Y	Y, publications	Y	Y, publications	Modelling
Rational design of solid-state semiconductor-sensitized solar cells: from materials modelling to device fabrication	1	N	N/N	N	N	N	Y	Y	N	Y, publications	Y	Y, publications	Modelling, not safety

2.5 Synergy with T3.1 / D3.1 – Mapping databases

One of the crucial points in performing SbD is the availability of good quality data to allow predicting the behaviour of NMs[2], and assisting in designing intelligent testing strategies. The availability of structured and harmonised data should in principle facilitate structure-activity relationship analysis for the NMs, going towards the vision of SbD that has been supported by ProSafe, NANoREG and recently NanoReg2.

During the third ProSafe Consortium Meeting, the importance of data sources was underlined and it was suggested that the Synergy Scan included also information on "*quality of data, harmonisation of data management, lack of continuity of data storage"*. However, it was also agreed that, since D3.1 was mainly related to the topic of "data and databases", the discussion should be transferred from D2.1 therein. Nonetheless, in this context it is worth mentioning that a clear link was established between T2.1 and T3.1 (and related deliverables). This data aspect is visible in question number 3: *are you generating any tool/data/method on i) hazard (identification or characterisation) or ii) exposure?* In answering this question, several projects mentioned that data are indeed being produced.

Several projects that have been highlighted in T3.1 (see in ProSafe D3.1) are also included in the Synergy Scan (this deliverable). Indeed, considering that the aims of the two tasks and related deliverables were slightly different, there is still a good percentage (around 50%) of overlapping between the results coming from the two mappings, as can be seen in **Table 9**.

As mentioned above, for a deeper discussion on this topic, we refer the reader to D3.1 – *Landscape of databases useful to EHS assessment of nanomaterials - Gaps and overlaps review*.

[2] Prosafe D4.4 – *Inventory of harmonised national regulation oriented task*

Table 9. List of projects highlighted in D3.1 and D2.1 respectively. Grey background indicates projects that are found in both mappings

D3.1	D2.1
BUONAPART-E	DENANA
CaNanoLab - Cancer Nanotechnology Laboratory	DUSTINANO
CASCATBEL	ECO-TEXNANO (Life programme)
Dana	eNanoMapper
EURONanoTox (Nano-HEALTH)	ENPRA
FIBRALSPEC	FIBRALSPEC
FutureNanoNeeds	FutureNanoNeeds
GLADIATOR	GUIDEnano
GUIDEnano	HINAMOX
HINAMOX	Inflammatory, genotoxic and tumorigenic effects of multi-walled carbon nanotubes with emphasis on the interleukin-1 family
ITS Nano	ITS Nano
LICARA	MARINA
MARINA	MOD-ENP-TOX
MembraneNanoPart	ModNanoTox
MOD-ENP-TOX	nanoCOLT
MODERN	NanoFASE (H2020)
ModNanoTox	NanoFATE
NanoCare	NanoGenotox
NanoDefine	nanoGRAVUR
Nanodetector	NANOHETER (funded under SIINN)
NanoDevice	NANOMICEX
NanoEIS	nanoMILE
NanoFase	NANOMOBIL
NANOFATE	NanoPUZZLES
NANOfutures	NANoREG
NanoGEM	NanoReg2 (H2020)
NanoHeter	NanoReTox
NanoHouse	NanosafePACK
Nanohub (JRC)	NANOSOLUTIONS
Nanohub (US/NSF)	NanoSustain
NanoLyse	NanoUmwelt
Nanomaterial Biological Interactions Knowledgebase	NanoValid
NanoMICEX	nanOxiMet
NanoMILE	NorNANoREG
NanoMiner (FP7 NANOMMUNE project)	ProCycle
Nanoparticle Information Library	PROSPECT
NanoPUZZLES	QualityNANO
NaNoREG	Sanowork
NanoReg2	SERENADE
NanosafePACK	SIINN
NANOSOLUTIONS	SIRENA (Life programme)
nanoSTAIR	SUN
NanoTOES	Turning forestry biomass into sustainable nanocellulose-based materials
NanoTransKinetics	

NanoValid
nanOxiMet
NMs Registry
OECD Database on Research into the Safety of Manufactured NMs
PreNanoTox
QualityNANO
SANOWORK
Scaffold
SetNanoMetro
SIIN
SIRENA
SmartNano
SUN

2.6 Evaluation and conclusions

The Synergy Scan has identified relevant initiatives that can contribute to the implementation of SbD as an alternative or complimentary approach for the safety assessment of NMs. Most initiatives appear to be indirectly connected with SbD itself, since their main aim is to provide and transfer knowledge, for instance in the form of data or protocols, to SbD. Even if there are only few initiatives actually dealing with SbD itself, the contribution in the generation of qualitatively meaningful and reliable data is however of utmost importance to promote SbD as a valid approach. The results of the scan in Annexes I and II allow the reader to easily find access to projects or programmes of interest, and further contact them.

3 Deviations from the work plan

If relevant explain why a delay has occurred and/or why the task as described in the DoA has been modified.

This deliverable was initially delayed by about 6 months compared to the planned submission date. This is mainly due to a general slower-than-foreseen ramp up of the project activities at its start, as well as slow response time for some project representative to reply to the questionnaire.

The three T2.1 partners completed the work and description of the contents of this deliverable by September 2016. The final editing by JRC took longer than foreseen.

4 Performance of the partners

The overall performance of the partners and their collaboration was adequate.

5 References / Selected sources of information (optional)

List of most important sources of information.

None

6 List of abbreviations (optional)

Abbreviation	Meaning
E	Exposure
FP7	The 7th Framework Programme for Research and Development
H	Hazard
H2020	Horizon 2020 – The Framework Programme for Research and Innovation
MC02	ProSafe Management Committee – 2nd meeting
NM(s)	Nanomaterial(s)
NSC	EU NanoSafety Cluster support by the European Commission DG RTD
RA	Risk Assessment
RM	Risk Management
SbD	Safe by Design

7 Annexes (optional)

7.1 ANNEX I

Synergy Scan results summary table in Excel® file format, uploaded in CIRCABC: Library>C-Work packages>WP2>Task 2.1: *https://circabc.europa.eu/d/d/workspace/SpacesStore/a3b48aef-e8cb-4bbf-8faf-a4d56eba3e94/PROSAFE_D2.1_M14_AnnexI_Final.xlsx*.

7.2 ANNEX II - NATIONAL NANO RESEARCH PROGRAMMES – LINKS

GERMANY

- **German Federal Ministry of Education and Research (BMBF)**
  - "Safe handling of synthetic nanoparticles" (From "Material to Innovation Programme" 2015-2025). Part of the "High Tech Strategy" of the German Government, and will support material research with 100 million euros annually until 2025
  - See clickable clinks for current "High Tech Strategy" projects at: http://www.nanopartikel.info/en/projects/current-projects
  - "Production goes nano" http://www.bmbf.de/en/6666.php?hilite=nanotechnology

- Action Plan Nanotechnology 2015 http://www.bmbf.de/en/131.php?hilite=nanotechnology

- **German Federal Environment Agency**
  - Funding for nano-related projects. Information is available in the Research database **UFORDAT:** http://doku.uba.de/aDISWeb/app;jsessionid=CD0B7367DDA41CBFBE1395A18030A99E?service=direct/1/POOLUBAN@@@@@@@@_4B002E00_2F107C80/$Tree.treeNodes&sp=SVH&requestCount=0

IRELAND

- **Collaborative Centre for Applied Nanotechnology (CCAN)** http://www.ccan.ie/
  - CCAN Projects:

    NanoMAPS: http://www.ccan.ie/research/current-projects/nanomaps/

    INHALE: http://www.ccan.ie/research/current-projects/inhale/

    NANOKINETICS: http://www.ccan.ie/research/current-projects/nanokinetics/

NETHERLANDS

- **NanoLab NL** http://www.nanolabnl.nl/about-nanolab-nl
- **NanoNextNL** - Dutch national research and technology programme for micro and nano technology: http://www.nanonextnl.nl/themes/

DENMARK

- **National Research Centre for the Working Environment**
  - Danish NanoSafety Centre: http://www.arbejdsmiljoforskning.dk/en/projekter/dansk-center-for-nanosikkerhed
  - DUSTINANO: http://www.arbejdsmiljoforskning.dk/en/projekter/dustinano---dustiness-of-nanomaterials

UNITED KINGDOM

- **Environment, Health and Safety Research**
  - http://www.nanotechproject.org/about/mission/
  - http://www.nanotechproject.org/inventories/ehs/
- **Innovate UK grants**
  - Quantum Research Technology http://www.nanowerk.com/nanotechnology-news/newsid=40530.php

FRANCE

- **CEA**
  - Minatec nanosafety platform: http://www.minatec.org/en/recherche/bridging-rd-and-real-world-applications

- **SERENADE**
    - **Lab**oratory of **Ex**cellence for **S**afe(r) **E**codesign **R**esearch and **E**ducation applied to **NA**nomaterial **DE**velopment: https://serenade.cerege.fr/#&panel1-1

BELGIUM

- **Narmur university**
    - Namur Nanosafety Centre (NNC)
      https://www.narilis.be/research/research-centers-groups-1/namur-nanosafety-center

FINLAND

- Finnish National Technology Program
  http://www.foresight.org/Conference/MNT05/Abstracts/Saarabst.html

HUNGARY

- KNRET http://nkfih.gov.hu/hungarian-innovation/environmental-and-150128

NORWAY

- The Research Council of Norway
    - NANO2021 http://www.forskningsradet.no/prognett-nano2021/Home_page/1253969916222
- SafeNano Norway
    - Nanowaste http://www.sintef.no/projectweb/safenanonorway/research-opportunities/news2/

CZECH REPUBLIC

- Czech Nanotechnology Cluster http://www.czechnanocluster.com/inpage/projects/

LUXEMBOURG

- NANO-PH http://www.list.lu/en/project/nano-ph/

AUSTRIA

- ZSI https://www.zsi.at/en/competence/25

SPAIN

- CIC NANOGUNE http://www.nanogune.eu/projects
- Catalan Institute of Nanoscience and Nanotechnology http://www.icn.cat/index.php/en/funded-projects/projects
    - IMDEA Nanoscience http://www.nanoscience.imdea.org/research/research-projects#National_Programs
    - Ciber-BBN http://www.ciber-bbn.es/programas-de-investigacion/proyectos/proyectos-intramurales

-oOo-