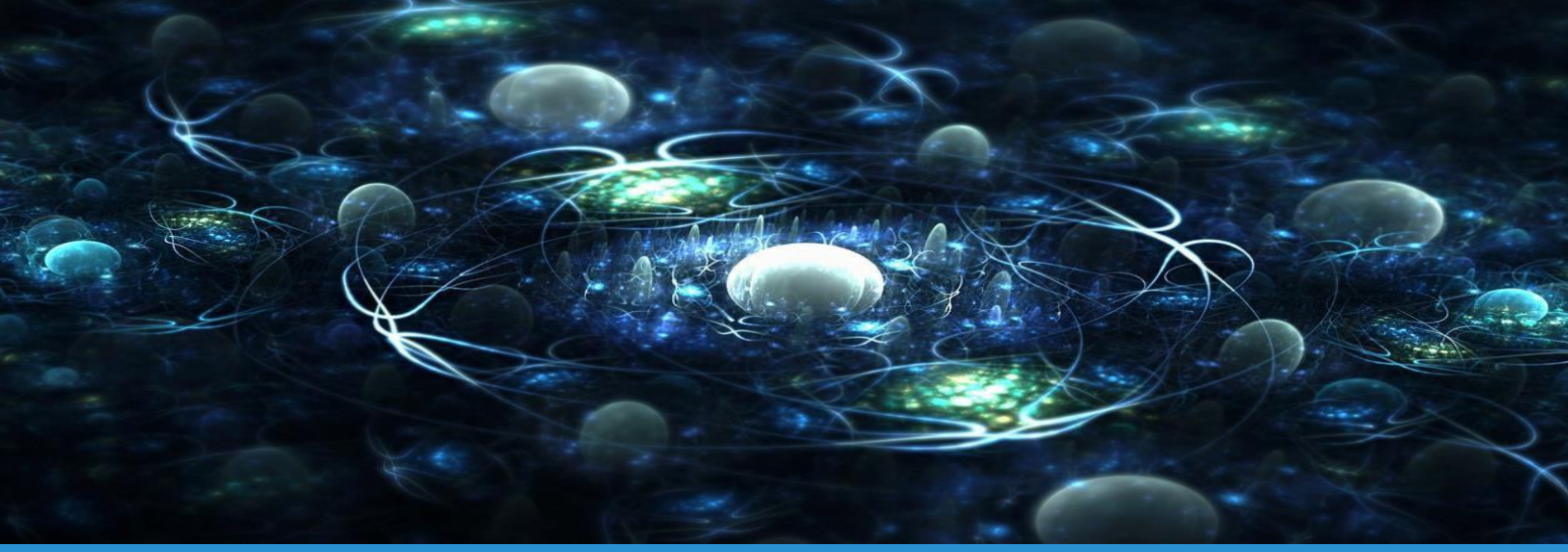

Responsible nanotechnology R&I – Societal engagement practices

TIME for NANO

Introduction

NANO2ALL is an initiative funded by the European Union's Horizon 2020 Research and Innovation programme under the Grant Agreement Number 685931. It supports the establishment of Responsible Research and Innovation (RRI) policy and governance on nanotechnologies. NANO2ALL also aims to identify RRI practices, with a focus on societal engagement in nanotechnology research and innovation (R&I) across Europe and beyond, with the purpose to share knowledge, experience and recommendations with other nanotechnology stakeholders and motivate a wider application of such mechanisms in our region.

RRI is an approach that anticipates and assesses potential implications and societal expectations with regard to R&I, with the aim to foster the design of inclusive and sustainable R&I[1] . As a dimension of RRI, societal engagement implies interactions between relevant stakeholders (companies, research organisations, policymakers, civil society organisations (CSOs), consumers, affected citizens and others) in order to align research, development and innovation with the values, expectations and needs of the society. Such interactions can take various shapes, such as brainstorming, scenario workshops, user committees, online forums, dialogues, informal / formal meetings, or other formats.

This short report provides brief insights into the **TIME for NANO Project**, a 30-month project run by partners in 9 EU countries and financed by the European Commission under FP7 - NMP. The aim of the project was to engage the general public, with a special attention to young people and future potential researchers on benefits and risks related to nanoscale research, engineering and technology, through specific informal education products. Data for this report was gathered via desk research and through structured interviews with Anne-Marie Bruyas and Alessandra Drioli from Fondazione IDIS-Città della Scienza which was the coordinator of the project.

Time for Nano project

TIME for NANO - Tools to increase mass engagement for Nanotechnology, funded under FP7-NMP - Specific Programme "Cooperation": Nanosciences, Nanotechnologies, Materials and new Production Technologies, is a 30-month project which started on February 2009 and ended on July 2011. It was coordinated by Fondazione Idis-Città della Scienza, based in Italy. Città della Scienza is a non-profit organization specialized in dissemination of the **scientific and technological culture**, as well as in educational and business systems. One of the main values of Città della Scienza is to set up a new scientific citizenship, filling the gap between science

[1] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation

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and society, in order to bring the science out of laboratories through an open dialogue with citizens and stakeholders, create an efficient relationship between science, innovation and society for the economic and social development of the region and foster social inclusion through social innovation.

The TIME for NANO project addressed a major challenge, applying to any emerging technology: the fast development of nanotechnologies is raising radically new public policies **fostering upstream citizens' participation in the debate about the governance** of these emerging issues.

Therefore, the project was **designed to ensure that nanoscience and nanotechnology (N&N) research activities would be made comprehensible to the public and even more should respect fundamental rights and be designed, conducted, implemented, disseminated and used in the interest of the well-being of individuals and society**. The initial objectives of TIME for NANO can be divided into three broad categories: 1. Implement innovative tools to engage young people, 2. Communicate on five key issues (the "nanodilemmas"), namely **health, privacy, environment, socioeconomic divide and improvement**[2] and 3. Develop a community. Those objectives were addressed through three types of action: outreach, **dialogue** and education.

The **dialogue activities** can be seen as the project's central activities, with a heavy focus on the primary **target audience** of the project, i.e. young people. The aim of these activities was to fully engage young people in the issues at stake in N&N. Teachers were an indirect target group. The general public and professionals were strictly secondary and although few of the project's dialogue activities were targeted at these groups, a significant number still participated.

How did it work?

TIME FOR NANO project implemented and employed creative ways of raising awareness and interest in nanoscience among young Europeans. Those instruments helped in providing an adaptable model for communicating the nanoscience to young people. **There were two central dialogue-based elements to the TIME for NANO project: the Nanokit activities and the online video contest**. The Nanokit[3] is a box containing 10 hands-on activities, introducing nanotechnologies and potential applications, to be carried out using real nano materials - as 'magic sand' and 'hydrophobic textiles' - scripts for experiments and the PlayDecide game[4]. It was a tool for stimulating the participation of youngsters in the nano-olympics and for engaging in debate scientists, stakeholders and the public in general. The kit was conceived to have an impact on three levels of information: it stimulated the cognitive level, it influenced the experiential knowledge and it triggered the socio-political knowledge, stimulating discussions on how "good" nano activities can be. Such discussions proved to be extremely engaging for the public. 1000 editions of the Nanokit were distributed throughout schools and science centres where they were also used as a tool for the Nanoday events (central outreach activities of the project) and to increase the involvement of young people in the online video contest.

[2] The five nanodilemmas:
- Health: Nanorobots inside your body: "cool" stuff?
- Privacy: Tagging the whole world?
- Environment: Mending or harming the living world?
- Socioeconomic divide: What do you get if you can't pay?
- Improvement: What nano-powers would you choose to have, and why?

[3] https://www.ecsite.eu/sites/default/files/nanokit.pdf

[4] This is a card game for fact –based group discussion, already known for its effectiveness in triggering debates and discussions among the participants. The game was adapted for the Nanokit and for young people above 12 years old. The last part of the game has been modified so as to introduce the nanodilemmas and to trigger debates around these issues.

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The **international online video contest**[5] aimed to engage young people in N&N by encouraging them to create short videos communicating one of the five ethical issues in an innovative and creative way. The contest was heavily promoted by project partners across their vast networks of schools, through project activities. This produced a real engagement with many complex issues related to N&N in the classroom and in science centres and museums as students got to grips with the five nanodilemmas and came up with ways to communicate them to their peers through the medium of video. The online video contest encouraged ordinary young Europeans to become budding amateur filmmakers and produce YouTube videos exploring nano-related themes. During the lifetime of the project, more than 200 entries were uploaded.

A **web platform** was created to be a resource centre and an attractor for the whole community of N&N communicators, through its contents (continuous addition of new information etc), its innovative tools (web contest), the artistic approach and the online feedback collection. The central outreach actions of the project were the **Nanoday events. Those events** aimed to engage young people, with the help of science communicators and researchers.

A great added value of the project is that of "growing" a community of people engaged in N&N communication. Through the **implementation of training courses in each of the participating Science Centres (at national level) and by Ecsite**[6] **(at European level)** the project reached a number of at least 450 multipliers (experts working in outreach and education efforts), carefully chosen among three main groups: explainers in science centres and PhD students in science communication; teachers from primary and high schools. The public participation to the web-contest was ensured by the organisation of many events in science centres of 9 countries each year: launch event, nano days, final event with award prizes, intended as occasions for informing/educating, on one hand, and for engaging youngsters, collecting perceptions and opinions, on the other.

Project Results

The **Nanokit** was clearly one of the project's great successes. The feedback on the kit, from project partners, from users of the kit, from teachers and other professionals being trained and from the young people taking part in the tool was virtually universal acclaim for the quality and its innovative nature. Many more Nanokits were requested than it was possible to produce within the limitations of the project; a testimony to the usefulness of this tool.

The project consortium rose to the challenge of how to engage young people in the contest. The choice to focus on five key areas ensured that young people engaged directly with five topics which are particularly relevant to their daily lives, and which raise interesting ethical, legal and social questions.

The **online video contest** was an innovative and creative means by which to engage young people in N&N. The impact of the video contest is felt not just in the significant number of entries into the contest Europewide, but also in the numbers of views the videos have received on YouTube, and in the positive feedback the contest received from schools and young people. The result of the video contest is not just the deep engagement and dialogue that took place during the project but also a produced set of resources that can be used by educators and science communicators on the long term.

According to an interview-based evaluation of the participation in the video web contest, it seems that the opportunity to ask questions on N&N to teachers or explainers at a science centre is fundamental to make young people aware of N&N research and its impact. The web platform works well to provide contest participants with in-depth information on N&N. School plays a big role in stimulating interest in the topic of

[5] https://www.ecsite.eu/activities-and-services/news-and-publications/participate-second-edition-time-nano-online-video

[6] The European Network of science centres and museums

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N&N. Nevertheless, a lot of information on N&N has been taken on students' own initiative, according to web contest participants.

The **multipliers' training** was the key to ensuring the project's lasting impact. These training courses ensured that teachers and science communication professionals knew how to work with the Nanokit itself, but more importantly how to address controversial ethical, legal and social aspects like the five nanodilemmas. The result is a European network of nano communicators, in contact with each other both on a local level and a European level. The multiplying effect of this type of activity is difficult to measure, since by its nature it fosters the development of collaboration between professionals in an organic and spontaneous way. What is certain is that each of these professionals will come into contact with many hundreds of young people, using the expertise from the training course to engage them in nanotechnology and nanosciences.

The quantitative data coming from the entry and exit questionnaires show that there has been a significant cognitive output for young people involved in the activities scheduled within the Nanodays. After taking part in the workshops, more than **80% agreed that they had learnt about the consequences of N&N on everyday life**. These data show that there has been a significant learning output in terms of raising awareness about the implications of nanotechnology: the activities performed during the Nanoday allowed participants to learn more about N&N and its effects.

The result was also **a total of 207 videos uploaded to YouTube** by young people, which also serve as an excellent tool to engage other young people on nanotechnologies and **which have attained over 30 000 views during the project alone.** Overall, participants involved in discussion groups, seemed impressed by the opportunity to find connection to **their own everyday lives**.

Outreach target audience involved were young people, general public, professionals and teachers from local region. Overall, 20,000 people attended the Nanoday events, 117 entries received from the online video contest, 11,000 visitors and 45,000 pageviews for the webplatform, 25 trainings for science communication professionals and explainers from science centres and museums.

Conclusions & Recommendations

Time for Nano identified the following key conclusions and recommendations for engaging young people in a constructive dialogue on nanotechnologies:

Engaging society is a slow and difficult process and it requires time. In most RRI societal engagement projects, industry and the academia have a heavy presence while CSOs are maybe engaged if the topic is controversial enough. **TimeforNano confirmed that nanotechnologies are unknown to the general public and faced the difficulty to involve people, given the complexity of the issues**. However, the project results and impact inspired a reverse of that trend by raising the issue of "how to successfully communicate the complexities of N&N" which is essential in order to engage people. In this context, **the project highlighted how important it is to address mainly young actors, who are not touched yet by politics that may influence their way of thinking and who are capable to adapt better to novelties**. This is why there is a need for long-term projects capable of enabling students to form a well-informed opinion on nanotechnologies, their broader societal impacts and the assessment of foreseen benefits and risks.

The project showed an **urgent need to engage young people on the ethical, legal and social aspects of N&N** with a focus on the issues of energy and environment as well as the practical uses of nano-innovations such as water, surgical devices, textiles and cosmetics and medical applications. What also became clear is the need to **train or recruit study support personnel** with sensitivity to the challenging questions of nanotechnologies. Further to that**, involving the policy makers** (at any level) and convincing them that investing on nanotechnology can bring them consensus is a preliminary step for a structured dialogue.

The communication of N&N needs new "languages" with which to engage the public: media, arts and games, especially when the target is young people. The nanotechnology sector should be proactive in collecting suggestions for nano development from the public. There is also a **need for more popular experiments on nanotechnologies**, in order to strengthen connections with schools, and the development of public engagement activities, exhibitions and other products. There is a compelling **need for public debate on specific case studies**. In addition, the role of media is essential in order to define the agenda about nanotechnologies innovations.

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One of the objectives of the TIME for NANO project was to develop a growing community of people interested in Nanotechnology. The project succeeded in involving a community of different audiences through activities that managed to involve, among others, museums, institutions, research centers and centers of excellence. The organization of big public events helped in engaging not only stakeholders, but civil society as well.

The Nanokit was initially tailored to be part of the school curriculum, but it can go further by addressing other scientific issues. **If incentives and platforms for interaction are given, the public debate on nanotechnologies could be performed at higher educational levels**. After all, when the Nanokit was presented to Academics it received a rather positive feedback. In terms of sustainability, the Nanokit, as well as the rest of the project tools, was designed to be used in the long term. **It could ensure a great degree of inclusiveness and the participation of a diversified audience, provided that the contents are regularly updated and adapted to different themes so as to keep up with the nanotechnology diverse challenges**.

Overall, **the facilitation of debate on nanotechnology within the education institutions could foster a participatory culture and increase public debate in general. However, much depends on the sensitivity of the actors interested in the subject and their policy priorities.**

Città della Scienza still practice in their science centre the activities implemented with The Time for Nano Project showing important results in societal engagement

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