Scienza, politica e società: l'approccio della scienza post-normale" a cura di Alba L'Astorina e Cristina Mangia. Collana Editoriale SCIENZIATI IN AFFANNO? CNR EDIZIONI 2022 doi: 10.26324/SIA1.PNS

List of English abstracts

Andrea Saltelli. My encounter with post-normal science
doi: 10.26324/SIA1.PNS5
What is post normal science? What are the reasons and what the consequences for encountering it in one's professional life? I share my own experience of readings, practices and discussions with PNS' fathers, supporters and detractors. Difficult to explain and translate into formulae or checklists, PNS provides practitioners with useful keys which may open relevant doors, allowing multiple perspectives to be brought to bear while widening the space of the possible solutions. Seen by some as a solution and by some as a problem, its message has not lost its radical or revolutionary edge. PNS is rigorous in its quest for quality. It is not value-free nor neutral, not shy of engaging in negative theology (what is not), nor of using irony in the process. Seen in retrospect, PNS has proven capable of prophetic diagnoses of the trajectory of science. Its disenchanted and circumspect gaze over the wonders of technology provides a useful antidote to persistently reductionists and techno-optimistic narratives which dominates the policy discourse.
Keywords: reductionism, techno-optimism, epistemology, quantification

Mario Giampietro. The role of scientists in the governance of uncomfortable knowledge
doi: 10.26324/SIA1.PNS6
According to complexity "all models are wrong, but some are useful". This entails that the usefulness of a scientific input for decision making depends on its fitness for purpose. The definition of both the problem and the solution have to be checked by triangulating between: (i) a relevant justification (in the political sphere); (ii) a pertinent explanation (in the scientific sphere) and (iii) the choice of a plausible and fair normative call (in the post-normal sphere). This fact entails that scientists, depending on the circumstances, have to play 3 different roles in decision making: (i) normal scientist in academia – generating analysis providing robust information about effective solutions to well defined problems; (ii) consultant - doing the above triangulation together with the clients in order to co-produce decisions; (iii) post-normal scientist – participating as team members of an extended peer community charged with ensuring the quality of decisions to be made.
Keywords: post-normal science, uncomfortable knowledge, complexity, governance

Zora Kovacic. Theorising post-normal science from "uncomfortable" sites
doi: 10.26324/SIA1.PNS7
We live in post-normal times, yet the current conditions are not necessarily welcoming to post-normal science. Irreducible uncertainty, value disputes and high stakes, as experienced for example during the covid-19 pandemic, create an uncomfortable situation. In this contribution, I argue that it is important to resist the urge to 'solve' uncomfortable situations and rather see them as a site from which to reflect upon what it means to do science in the context of complexity and pluralism. Post-normal science offers valuable insights on letting go of the ideal of science speaking with one voice, navigating the contradictions and possible inconsistencies that emerge from within science, and focusing on the quality of the processes of knowledge production that are inclusive and open-ended.
Keywords*:* uncomfortable knowledge, complexity, quality, participation

Alessandra Pugnetti, Caterina Bergami, Amelia De Lazzari, Alba L'Astorina. LTER-Italia scientists on the move along "uncomfortable" paths: the challenges of post-normal science
doi: 10.26324/SIA1.PNS8

Post Normal Science (PNS) inspires a new scientific practice, reflexive and inclusive of other perspectives. This is challenging for researchers working under constraints of “peer-or-perish”. Informal science communication initiatives can be a stimulating setting for a cultural shift towards this new way of reframing own research practices and relationship with society, through the empowerment of audiences and the valuing of their worldviews and experiences. This is particularly relevant in the ecological field, where it is increasingly clear that the environmental crises and those //affecting society, culture, ethics, policy and economy are closely related. Within this complexity and uncertainty, new communication models inclusive of emotions, narrative and collective identities are needed, and researchers are requested to critically reflect on their ways of perceiving, understanding and describing the natural environment. In this paper we report reflections from the 5-year experience “Cammini LTER”, an informal and itinerant science communication initiative carried out within the Italian Long-Term Ecological Research network (LTER Italy), which originated from questioning about the ecological researcher’s role and responsibility to finally address the need of a cultural change overcoming own disciplinary boundaries and able to explore a broader idea of Nature that include cognitive, philosophical, ethical, emotional and spiritual dimensions beyond the scientific one.

Keywords: informal science communication, cultural shift, ecological research

Maria Chiara Tallachini. Extended peer-review and pandemic: entrusting citizens with epistemic and regulatory responsibility

doi: 10.26324/SIA1.PNS9

If the defining conditions of Post-Normal Science (PNS) introduced new roles for citizens, who have fully become peers in an extended community of creators and reviewers of knowledge, the current pandemic amplified this concept as individual and collective behaviors have become crucial in limiting viral infections.

This contribution briefly explores what can be seen as a “double task”, both epistemic and normative, that in several democratic societies decision-makers entrusted to citizens. Indeed, these have been invested both with the duty of identifying and contextualizing the appropriate knowledge underlying their own actions and, at the same time, with the responsibility of complying with the fiduciary normative framework established by decision-makers.

Keywords: Extended peer-review and pandemic: entrusting citizens with epistemic and regulatory responsibility

Silvia Caianiello. The Extended Peer Community between reflexivity and anticipation

doi: 10.26324/SIA1.PNS10

The democratic governance of science and technology in late modernity is by now overwhelmingly set up in a “post-normal” framework in which “facts are uncertain, values in dispute, stakes high and decisions urgent” (Funtowicz e Ravetz 1993). Such a framework calls for the interaction between the scientific community, the stakeholders, the wider public and the political decision-makers. The participatory turn ¬– increasingly sustained by national and international recommendations ¬– has been programmatically promoted as well by the Postnormal Science movement, in the form of the “extended peer community” (Funtowicz e Ravetz 2003), as from other theoretical approaches (Collins e Evans 2017, Nowotny et al. 2001) equally committed to turn the fertile but mostly deconstructive work of Science and Technology Studies into a proactive commitment to reshape the relationship between science and society (Latour 2010). After a rapid overview of the debate – lately enriched by an abundance of new experimental data – about the theoretical as well as procedural and political criticalities related to the implementation of the “extended peer community”, I will focus on the problem of the temporal mismatch between an integrated deliberative practice and the “urgency” of decisions. This mismatch may be addressed by the constitution of new spaces permanently devoted to the integrated negotiation between

science and society, which may orient ex ante the very process of scientific production, by interfacing the probabilistic projection of alternative scenarios typical of the contemporary scientific method with the plurality of values, but also of imaginations and aspirations emerging from society (Appadurai 2013). I will highlight both some potential strengths and weaknesses of this new regulative ideal.
Keywords: post-normal science, extended peer community, urgency of decision,anticipatory governance

Eleonora Severini, Elena Gagliasso, Cristina Mangia. The extended peer community in environmental research: situated knowledge as an extension of epistemology
doi: 10.26324/SIA1.PNS11
One of the founding pillars of the post-normal science, the "extended peer community", clashes with one of the foundations of modern science, namely that the production of scientific facts is the result of the work of a community of experts.
The difficulties of enlarging expert communities have been the subject of several studies. Among these, a significant contribution is made by feminist epistemologists who came up against the standard conception of science. Notably, the "feminist standpoint theory" undermines the alleged objectivity of scientific knowledge and offers an alternative idea of it, i.e. as a social goal to be pursued collectively.
It is precisely the lens of feminist epistemology that will prove valuable in assessing the epistemic obstacles which affect the recognition of the "extended peer community" in post-normal research contexts. Moreover, it will allow us to re-describe the role of experts and non-experts in the process of scientific knowledge production.
Keywords: feminist standpoint theory, strong objectivity, environmental research, situated knowledge.

Anna Scolobig. Extended peer communities to co-design nature-based solutions for landslide risk mitigation in Nocera Inferiore
doi: 10.26324/SIA1.PNS12
This chapter presents a participatory process on landslide risk management at the local scale, namely for the co-design of naure based solutions in Nocera Inferiore in the Campania region (southern Italy). An extended peer community allowed the development of cooperative activities between experts with different backgrounds, from geotechnical to social sciences, and local stakeholders. Community residents also took part in the designed public participatory process. Several risk mitigation options were prepared on the basis of extensive fieldwork aimed at better understanding local views and perspectives. Each option was comprised of a mix of active and passive measures, including relocation. On the basis of the results of discussions in working groups, a compromise solution for risk mitigation emerged from the stakeholder discussions and expert advice. This led to the implementation of nature based solutions on one of the most endangered slopes.
This pilot study demonstrates the potential and challenges of public participation in decisions characterized by high stakes, values in dispute and intricate technical, economic and social considerations.
Keywords: post-normal science, extended peer communities, participatory processes, compromise solutions.

Rita Giuffredi. Across boundaries and within visions: building bridges between research communities, inside and outside academia
doi: 10.26324/SIA1.PNS13
Research work struggles to impact on the interweaving of visions, interests, values, uncertain and partial knowledge, high stakes and urgent decisions denoting contemporary societies. Academia is caught in the constraints of a disciplinary organisation that creates ever greater specialisation, producing effective knowledge to address technical problems, but frequently unsuitable for tackling

complex issues. Science-based controversies highlight the need for academic knowledge to equip itself with new tools – and even a new paradigm – in order to deal constructively with complex issues, lying on the difficult line between expert knowledge and public values and which require adequate consideration of the existence of shared narratives, capable of conditioning choices and positions.
The BRIDGES project (Building Reflexivity and response-ability Involving Different narratives of knowledGE and Science), through the case study of soil fertility, intends to experiment a transdisciplinary and innovative research pathway, inspired by post-normal science and oriented to the construction of extended research communities outside and inside academia. Through a series of research activities, the project aims to bring out the boundaries that define and legitimise different forms of knowledge, describing and revealing the narratives on science and technology shared in the Italian research world, and the boundaries by which researchers define and legitimise different forms of knowledge, with the ultimate aim of experimenting with transdisciplinary methods for the co-production of hybrid research that stimulate systemic and relational thinking and are able to generate responsible, inclusive and relevant knowledge.
Keywords: narratives on science and technology, hybrid research practices, co-construction of knowledge, soil fertility

Alice Benessia. The poetry of post-normal science: extracts from Pianpicollo's diary
doi: 10.26324/SIA1.PNS14
Over the past two decades I have had the privilege to be in dialogue with Silvio Funtowicz, sharing research and experience along the boundaries of science, philosophy and art. In multiple and precious occasions, Jerome Ravetz has been contributing with his unique enthusiasm for ambitious endeavours. In this ongoing collaboration, I have learned about the intellectual framework of post-normal science and, most importantly, I have been slowly absorbing its spirit. Here I propose a poetic exploration of the post-normal universe, through some extracts from the diary of an open-ended experiment I am conducting in Pianpicollo Selvatico, a farm and research center located in a remote rural area of Southern Piemonte.
Wild and domesticated plants, a chicken named Priscilla, three old horses and two little pigs animate a post-normal choreography, triggering open questions about the Cartesian ideal of control, the systemic and reflexive complexity of living beings, the quality of empirical and hybrid knowledge, the unavoidable presence of contradictions.
Keywords: experience, hybridization, praxis, inter-species cohabitation

Salvatore Paolo De Rosa, Marco Armiero. Post-normal Campania (why normality was the problem)
doi: 10.26324/SIA1.PNS15
The Campania waste conflicts expose the dark side of modernization processes, marked by the top-down instrumental use of techno-scientific knowledge and by the exclusion of local environmental knowledge. This approach has led to the mystification of science and technology and to the marginalization of citizens' committees and experts not aligned with power. In response, committees built their own "research centers" and legitimacy protocols, establishing an awareness of environmental problems and alternatives. Their contribution created a debate around political choices passed off as science and made visible the reality of rural areas transformed into cheap socio-ecological dumps for toxic waste. Thanks to the social mobilizations, the enlarged space of deliberation that post-normal science calls for has been created. Therefore, we argue, conflict is not the problem to be solved in cases of contested environmental governance, but one of the ways by which problems become visible and can be solved.
Keywords: waste; socio-environmental conflicts; Campania; local knowledge

Christian Colella. Xylella emergency in Puglia: scientists, institutions and movements confronted with a 'certain' pathogen, a 'disputed' disease, and 'high value' plants
doi: 10.26324/SIA1.PNS16
In their landmark article, Funtowicz and Ravetz stated that in the 'post-normal age' (PNS) "science is called on to remedy the pathologies of the global industrial system". By touching upon the frame of PNS, this contribution will discuss the case of Xylella fastidiosa in Italy and the pathologizations and medicalizations proposed to the plant pathology Olive Quick Decline Syndrome: a "pathology of the global and local agricultural system". In 2013 the plant pathogen and quarantine organism Xylella fastidiosa was discovered in Apulian (Italy) olive trees suffering from severe and extended desiccations. While the sole presence of this alien pathogen was enough to trigger urgent phytosanitary measures (via the removal of infected and possibly infected plants) and to completely capture the attention of experts from the capital of the region, other local plant scientists and, most of all, socio-environmental movements that instead mobilized in the following years in favor of an epistemic and political de-centralization of the role of Xylella in the pathology. These movements addressed other possible causes of such disease (i.e. the role of microbially poor and chemically polluted local soils and other already known pathogenic factors) which in their view were - and still are - the real and ignored cause of the disease. In doing this, over the years social movements resorted to different tactics aimed not only at impeding the removal of infected olive trees, but also at reclaiming and pursuing the "undone science" of this plant disease through what we can define as a call for an 'extended peer community'. Basing on ethnographic research conducted between 2017 and 2020, and by theoretically moving at the intersection of Studies of Expertise and Experience, Ignorance and Social Movements Studies, I will try to re-examine the "Xylella controversy" and this case study with the lenses of PNS.
Keywords: non-knowledge, expertise, social movements, emerging plant diseases

Sara Moraca. Indigenous knowledge and climate change: the post-normal approach
doi: 10.26324/SIA1.PNS17
Indigenous knowledge and western science are domains of knowledge perceived as distant and incompatible. Climate science, as it is traditionally understood, is dominated by Western academic contributions. Indigenous heritage, especially languages, contain unique knowledge also on the relationship between man and the environment, risks disappearing forever. Making climate science more inclusive is not only an ethical duty, but also a possible way to seek solutions in knowledge systems that have not been adequately valued and exploited to date.
Keywords: climate change communication, indigenous knowledge, post normal science.

Cinzia Colombo. Comunication on anti-Covid-19 vaccines in a post normal scenario
doi: 10.26324/SIA1.PNS18
Public messages on Covid-19 vaccines given by regulatory agencies, governments, single experts have been criticise because they were considered often inconsistent, partial, and ambiguous. The complexity of communication due to the uncertainty of available knowledge, the multiple values at stake and the urgency of the decisions to make has been managed with variable levels of awareness and transparency by the different sources.
The Comirnaty and Vaxzevria vaccines produced respectively by Pfizer/BioNTech and Astrazeneca are addressed as cases of communication in particular regarding the timing of the second dose, the side effects and their use by age groups. Specific issues are presented with the aim to propose matters for discussion on the health communication on vaccines.
Keywords: Covid 19 vaccines, scientific communication, citizen engagement, post-normal scenario.

Laura Colucci-Gray, Educating in post-normal times: exploring a pedagogy of being 'in the world'
doi: 10.26324/SIA1.PNS19

By including a ‘plurality of legitimate perspectives’ in decision-making about science and technological issues, post-normal science (PNS) fundamentally re-shaped the relationship between science and society. Yet, significantly under-explored are the implications of PNS in relation to the multiple purposes of education, which this contribution aims to discuss as a series of educational ‘shifts’: from ‘I’ before the world (reductionist science – that describes and measures); to ‘I’ into the world (science of sustainability – challenge and innovation- driven); and further, to ‘I’ as part of the world (sustainable science – responsive and participatory). The latter is perhaps the most difficult but also most significant as it calls educators to pursue an educational relationship that is attentive to experiences which may be unheard, unspoken or unexpected, and by this nature often lie outside of our attention. In this sense, education for post-normal times is radically democratic as it will never cease to be a narrative ‘in the making’.

Keywords: imagination, democracy, pedagogy

Michela Mayer. Post-normal Science. Post-normal Education?

doi: 10.26324/SIA1.PNS20

An "extended community of peers", on which post-normal science relies, implies the existence of an educated collectivity (formally and informally), able to face problems through the comparison and dialogue between different languages, cultures, visions of the world. The short essay explores the contribution that studies, and practices, related to education, and in particular to environmental education and sustainability, can provide to post-normal science and to the construction of an educated and educating 'community', aware of its role as an “agent for change”. The reflection addresses the need, and the characteristics, of a 'transformative' education, which explores possible futures in which problems are constructed and not just solved, and in which the role of the educator and the necessary competences are redefined.

Keywords: educating community, transformative education, post-normal science, change agents

Elisabetta Falchetti. Scientific museums towards a post-normal vision of science and society

doi: 10.26324/SIA1.PNS21

The Statutes-Charts of scientific Museums, until to a thirty years ago, has been defined by the three letters “PRC”, i.e. Preservation, Research and Communication. Museum collections have played a fundamental documentary role for the taxonomic, evolutionary and ecological Sciences (the naturalistic collections) and for other scientific domains (documents, instruments, etc.). The museum focus has been centered on the collection preservation and implement and on the exhibitions, inspired to the epistemological and experimental models of the scientific disciplines. The wide debate on Science and Society launched a revolutionary “new museology” approach more attentive towards the needs of communities and socio-environmental dynamics. Today scientific museums are experimenting new forms of social relationships and “equal” dialogue with many institutional and civil stakeholder; they are exploring a science more oriented towards environmental, territorial and citizen problems; they are accepting poli-trans disciplinary/cultural narrations and languages and the agreement of their scientific policies with other external stakeholder; they are practicing a more dialogic, participative and co-produced science; they are employing the scientific collections as resources for a new sustainable culture, for social dialogue, and cohesion, inclusion, well-being and social harmony; they are claiming for social justice, equity, intercultural dialogue and sustainability. This contribution will present some meaningful example of the new “post-normal” deal of scientific museums.

Keywords: cultural Heritage and society; inclusive science; dialogue with different communities and stakeholder; scientific museology and sustainability

Emanuela Molinaroli, Stefano Guerzoni, Alba L'Astorina. Introducing a post-normal perspective in academic teaching: Venice Sea Futuring Tours

doi: 10.26324/SIA1.PNS22

Global phenomena such as climate change or health emergencies provide an understanding of the social, economic, political reality and the definition of urgent solutions that imply the involvement of different actors, whose values are often in conflict. This requires collaboration among researchers from different background and beyond the scientific community which is rare in the academia. We present here reflections from a project carried out as part of an environmental studies course at the University of Venice, where a group of students collected visions of the future of the Venetian coast based not only on scientific inputs, but also on involving the inhabitants of the barrier islands of Lido and Pellestrina who had been strongly affected during the flood episode of more than 50 years before (Aqua granda). The experience was an occasion to reflect on barriers and incentives to introduce a post-normal perspective in the curricula of students in academia.

Keywords: post-normal science, experience-based knowledge, transdisciplinary, participatory approach

Cristina Mangia, Marco Cervino, Santa De Siena, Patrizia Colella. Let's legalize the air: environmental science-based civic education

doi: 10.26324/SIA1.PNS23

We present an innovative multidisciplinary educational experience aimed of enable students aware of the interdisciplinary and interdependence of knowledge, and how disciplinary and transdisciplinary knowledge are essential and effective to progress in the formation of scientific citizenship, particularly in the typical contexts of post-normal science such as environment and health. The course designed by teachers of the high school together with CNR researchers aimed to combine, on the one hand, the knowledge of the various phenomena of pollution together with the knowledge of legal rules and straightforward effects on health; on the other hand, the construction of research practices and processes of active citizenship for the development of a responsible ecological awareness. The course consisted of different phases: a theoretical training phase carried out in the classroom with experts, the implementation of an environmental monitoring campaign, a cross-country activity and discussions with representatives of environmental associations and institutions.

Keywords: environmental education, responsible citizenship, multi and trans-disciplinary knowledge

Valentina Tudisca, Claudia Pennacchiotti, Adriana Valente. Peer extended communities in the educational research: the case study of CNR Officine

doi: 10.26324/SIA1.PNS24

Educational research is one of the fields ascribable to the "post-normal science" paradigm, where, due to the high level of uncertainty and interest at stake, extending the peer community is necessary to ensure quality. "Officine" are participatory conferences yearly organized by the National Research Council of Italy that represent an example of extended peer community practice, involving social actors in co-creating knowledge and evaluating European research projects' intellectual outputs. The chapter presents first results from the 2021 edition, virtually conducted due to the COVID-19 pandemics, focused on the issue of stereotypes in school textbooks and on secondary school student representatives' views on "futures of education", in collaboration with the homonym UNESCO initiative. We argue that the digital way of working, to which the pandemics forced research practice, could represent a chance to further extend the peer community.

Keywords: extended peer community, education, co-creation, participatory methodologies

Cristina Mangia, Annibale Biggeri, Bruna De Marchi. Manfredonia: how to transform an environmental epidemiology study into post-normal research

doi: 10.26324/SIA1.PNS25
On 26th September 1976 an accident in the petrochemical plant, Enichem, in Manfredonia (Province of Foggia, Apulia Region, Southern Italy) resulted in the release of several tons of arsenic compounds. A population of about 57,000 was exposed. Several other accidents occurred since that date and the plant was closed in 1994. The purpose of the present paper is to describe the approach used to design an epidemiological investigation in the face resentment and lack of trust in institutions from the part of the exposed population. An approach grounded in the insights of Post-Normal Science was implemented together with a formal infrastructure to encourage the population's engagement. The epidemiological questions, the data gathering and the methodology were openly discussed with all interested parties. So were the potential scenarios resulting from the study and their implications in terms of public health actions. The choice of adopting a participatory approach is both innovative and challenging. All participants have accepted to be part of an "extended peer community" where outcomes, methods, procedures, inputs, data, and results are collectively discussed.
keywords: participatory research, environmental epidemiology, Manfredonia, industrial accident

Antonella Ficorilli e Fabrizio Rufo. "Aria di Ricerca in Valle del Serchio": Openness in a process of knowledge co-production
doi: 10.26324/SIA1.PNS26
The principle of openness has been a central ethical criterion for the production of new knowledge since the birth of modern science. Over the years, it has been revised in the light of transformations in the way of performing science and in the type of knowledge produced culminating in the recent movements of open access and open science. The paper suggests a further revision that should be considered in contexts characterized by scientific uncertainty, conflict of values and urgency in policy decisions. To this end, some innovative communication and stakeholder inclusion strategies that are being adopted in the participatory and citizen science epidemiological study "Aria di Ricerca in Valle del Serchio" will be briefly reported.
Keywords: Openness, Post-normal science, citizen science, environmental epidemiology

Liliana Cori e Fabrizio Bianchi. Citizenship mobilises science in Val d'Agri
doi: 10.26324/SIA1.PNS27
The Alta Val d'Agri, in the province of Potenza-Basilicata, has experienced since the 1990s oil extraction and primary refining. Despite the signs of polluting emissions and apprehension of local communities, only in recent years targeted environmental and health studies were carried out as part of a Health Impact Assessment (HIA) established by the municipalities of Viggiano and Grumento Nova. The situation that has settled over time and that the researchers in charge of the HIA found in 2015, allows to read the situation according to the philosophical approach of Post-normal science defined by Funtowicz and Ravetz in 1993, for circumstances characterized by "Uncertain facts, conflicting values, high stakes and urgent decisions". The studies carried out, with broad stakeholder participation, have quantified the uncertain facts, brought out the conflicting values, qualified the high stakes, and provided scientific evidence for decisions. The studies need to be updated, many protective decisions have yet to be taken, scientists came out from the laboratories, citizens have played their part, responsibility for actions and inactions lies with administrators at various levels.
Keywords: Oil extraction, Health Impact Assessment, Environmental Epidemiology, Citizen science

Laura Greco, Maura Peca. The transformative power of Citizen Science as science open to citizens: the partecipative practices of A Sud and of the l Centro Documentazione Conflitti Ambientali (CDCA)
doi: 10.26324/SIA1.PNS28
Supporting committees in claiming local struggles has always been the mission of A Sud and CDCA.

In recent years, Citizen Science has come to help us as a practice to lay the foundations for obtaining environmental justice.
CS processes can transform citizens and activists into protagonists of an open science that leads to the construction of knowledge on the state of health of the territory and its inhabitants, with the aim of creating an incisive advocacy process that can guide public policies and decisions.
In this article we will examine some examples of environmental monitoring projects implemented by the CDCA and A SUD: Tiber River, Aniene River, Terra dei Fuochi, Colleferro are just some examples of how is it possible to create projects of evaluation and protection of the territory that can overturn the processes of power in conflict territories.
Keywords citizen science, participative research, environmental justice.

Caterina Arcidiacono, Terri Mannarini. Participation, active citizenship and inter-institutional co-creation
doi: 10.26324/SIA1.PNS29
Citizen participation and the sharing of different knowledges and experiences, including experts and lay knowledge, are key to innovate decision-making processes and increase both their quality and efficacy. Yet the possibility to integrate a variety of perspectives and make diverse social actors (i.e., academics, institutional representatives, community leaders, economic and social stakeholders, unorganized residents, etc.) collaborate needs to be based on a theory-informed methodology. This contribution reports on the workshop "Naples: Urban Participation and Co-creation HUB. Community Psychology and Urban Regeneration Castelcapuano" (February 2017), in which an exemplar of urban design was launched, based on the principles of co-creation and aimed at defining a decision-making model/process based on inclusion, diversity, participation and innovation.
Keywords: participatory action research; co-creation; community psychology

Giuseppina Carrà, Gabriella Vindigni, Clara Monaco, Giulia Maesano, Iuri Peri. Diversification strategies of fisheries activity: an analytical-deliberative process in assessing stakeholder preferences
doi: 10.26324/SIA1.PNS30
The Common Fisheries Policy (CFP) promotes the diversification of fishing activities to improve the resilience of fishing communities and the sustainability of coastal fisheries. However, this objective has proven to be a complex task, despite the opportunities offered by European programming. This study, moving from this problem, has adopted a participatory modelling to analyze stakeholders' preferences regarding the choice to undertake complementary and integrative activities. Small-scale fishermen and other stakeholders were invited to participate in the problem structuring process and to give input and evaluate the results of the scientific models used. Different survey strategies were adopted, integrating traditional models of multicriteria analysis with deliberative mapping models. Participatory modelling facilitates the deliberative process structuring, contributes to collective learning, legitimacy increasing, and scientific understanding.
Keywords: cognitive maps, diversification fishery activities, multicriteria decision aid, participatory approach

Stefano Bocchi. Participatory research in the agri-food system: first (difficult) experiences in Italy
doi: 10.26324/SIA1.PNS31
Innovation within the agri-food system is still predominantly carried out by adopting principles, practices and objectives of the so-called Green Revolution. The latter, which has been a powerful and widespread system of top down innovation, having shaped, in the second half of the last century, the agriculture of the richest countries, appears to have completed its parable, demonstrating today that it is totally inadequate to face the new challenges. The reductionist approach, which has been able to deepen its roots in the cultural environment of research centres

and universities, is now the biggest obstacle to new paths of innovation that sustainability science pushes us to explore. This paper aims, on the one hand, to highlight these critical aspects that the scientist is facing today and, on the other, to describe a participatory research experience in the agri-food system.
Keywords: agrifood system, system innovation, participatory research, agroecology

Bruna De Marchi, Scira Menoni. Close encounters between sociology, urban planning and post-normal science for risk prevention
doi: 10.26324/SIA1.PNS32
Two experiences that we carried out jointly are discussed, the first designing a communication campaign in the context of the "Seveso Directive", the second developing a variety of participative activities within a project funded by the European Commission. In the former case, the core of the activity consisted in combining the technical assessment of risk with the understanding of the experience of those living close to a dangerous facility. In the latter, living labs and workshops were developed to explore new modalities of knowledge sharing and co-production in the field of disaster risk reduction. In both cases dialogue between and integration of different disciplines, types of expertise and knowledge, both professional and lay were pursued.
Keywords: sociology, land use and urban planning, disaster risk reduction, extended peer communities

Raffaele Giordano. Ambiguity and knowledge co-creation in the management of climate risks: reflections from some European research projects
doi: 10.26324/SIA1.PNS33
The knowledge co-creation based on stakeholders' engagement processes for the development of participatory modelling are becoming increasingly popular in the field of the climate-related risk management. Notwithstanding the main benefits for both the decision-makers and the participants, key issues remain largely unaddressed. Among those, the analysis and management of ambiguity in problem perception and framings among the different participants play a key role. On the one hand, the seek for the legitimacy of the knowledge co-creation process, and the need to engage all possible stakeholders, could contribute to the richness of the collected knowledge. On the other hand, it could create barriers to the participatory development of the model due to the presence of different, equally valid, and potentially conflicting problem frames. Based on the experiences carried out within the EU funded project NAIAD, this work demonstrates that ambiguity in problem frames is a source of creativity in the knowledge co-creation process, rather than a barrier, if there are effective interaction mechanisms among the participants.
Keyword: knowledge co-construction; participatory modelling; social network analysis; ambiguity

Elisa Vecchione. Which political disposition for Post-normal Science (PNS)?
doi: 10.26324/SIA1.PNS34
This contribution discusses the political dimension of PNS by interrogating the meaning and frontier of its political action and democratic vocation. This question begs important reflections about how PNS positions itself with respect to what Nadia Urbinati calls the 'disfiguration' of democracies happening through technocratic and populistic forms of policymaking. The discussion will proceed along the selection of scholarly literatures on public policy in order to analyse their approach to typical features of PNS: refusal of the myth of neutral knowledge and technocratic government; the view of policymaking as a problem-solving process; the role of framing in issue definition; the attention to the pluralism of meaning and values. By highlighting their scientific endeavour towards policymaking as a political struggle over power and ideas, this contribution will conclude on the need to extend the political disposition of PNS along the same understanding of policymaking.
Keywords: framing, power, democracy, techno-populism

Luigi Pellizzoni. Post-normal science and neoliberal governmentality
doi: 10.26324/SIA1.PNS35
The post-normal science approach (PNS) has played a major role in the conceptualization of late modern techno-scientific challenges, at both academic and policy level. Its topicality is assessed by comparing the epistemic and political conditions of its emergence, related to the rise of theories of complexity and disequilibrium of both biophysical and social systems, with the present ones. It is found that the diagnostic component of PNS meets with growing confirmations, while its recipe for a new, inclusive social contract for science is challenged by a governmental rationality that turns to opposite, reactionary, ends its very underpinnings. The Sars-CoV-2 pandemics and the post-truth debate provide evidence in this regard. The task for PNS scholarship is to explore new routes, suited to the current and prospective conditions of science and politics.
Keywords: neoliberal governmentality, post-truth, Anthropocene, pandemics

Marta Bertolaso. Why unique solutions are not a solution
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One of the questions at the heart of the PNS reflection is the need to operate through *conditional knowledge*. This expression indicates the contextuality of scientific predictions: that is, they affirm certain changes once certain conditions are guaranteed. The current circumstances of complexity of pandemic management ask for similar approaches: despite various attempts to converge on unique solutions, it is evident that local and global dynamics require alternative strategies. This integration of models and solutions opens up questions which are not matched by the traditional paradigms, inherited from the modern technical-scientific mentality.
In the following pages, the epistemic foundations of the current complexities and the consequent practical and ethical issues for a generative knowledge society and for new and reliable solutions are illustrated. The starting point is constituted by an understanding of the dynamics of complex systems, of how a multiplicity of models and approaches is not only possible but desirable.
Keywords: complexity, relational epistemology, conditional knowledge, practical truth

Michele Carducci. Post-normal paradigm and Constitutions
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This study answers two questions: in what constitutional context does the post-normal paradigm mature? Are Constitutions an incentive or an obstacle to its experimentation and dissemination?
The post-normal paradigm assumes a framework of freedom of science and democracy. But this condition is an exception among the States of the world. Moreover, even when scientific freedom and democracy exist, decision-making processes implement the so-called "*Garbage Can Model*" and promote the role of "non-experts" according to the logic of the "median participant". This scenario could also include post-normal practices. However, in the era of climate emergency it is totally inadequate.
The inadequacy is not about the role of "experts," but about the constitutional qualification of "non-experts." In fact, it is necessary to recognize a new "*status*" of them: *oecologicus et climaticus*.
Keywords: constitutions; post-normal science; garbage can model; climate emergency

Lorenzo Benini. Post-normal science (PNS) in the context of the European Environment Agency (EEA)
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The European Environment Agency (EEA) is a body of the European Union whose mission is to inform citizens and policy makers on the state and prospect of the environment in Europe and support the achievement of sustainability goals. In line with its mandate, the EEA has recently developed activities inspired by post-normal science (PNS). These include: a project on quality of evidence and uncertainty, a report titled ‘Drivers of change of relevance for Europe’s environment and

sustainability', and ultimately, a series of briefings titled: 'Narratives for change'. While some of these initiatives had better fortune than others, the EEA's growing sensibility towards PNS main arguments and practice is encouraging. Yet, the uptake of PNS tools and practices in institutional contexts is all but free of difficulties; public institutions are still anchored to the logic of 'science speaking truth to power' and such projects represent the exception rather than the norm.
Keywords: boundary organisation, quality appraisal, framing, uncertainty

Ângela Guimarães Pereira, Paulo Rosa, Tessa Dunlop, Ventseslav Kozarev, Anna Paola Quaglia, Mateusz Tokarski. The Competence Centre on Participatory and Deliberative Democracy at the European Commission: involving the citizen in science and decision-making
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The European Commission has a new Competence Centre on Participatory and Deliberative Democracy. The underlying ambition is to mainstream citizen engagement across the European Union policy cycle, changing the way of working of the institution. The Centre is iconic to the post-normal science idea that when facing complex issues, where "facts are uncertain, value laden, stakes high and decisions urgent" the design of policies to address such issues cannot rely on scientific knowledge alone. This Competence Centre creates the institutional space to engage the relevant extended peer community in the policymaking processes.
Keywords: public participation, citizens, post-normal science, EU policies