

**Title**

Emerging challenge-driven approaches in contemporary research and innovation policies

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The study focuses on of policy making related to the perceived 'grand/global challenges' facing the world: examples of these are the 15 challenges referred to in the Millennium project. In this project policy concepts derived from selected policy documents are being used to analyze how the notion of 'grand challenges' may be addressed. Examples of specific policy actions and instruments will be used to illustrate how adaptation, accommodation and integration are grafted onto a field of established policies in research and innovation (R&I).<sup>1</sup>

The “rationale report” (EUC, 2008) incorporates 'grand challenges' into official EU policy through the Lund declaration (July 2009) as a framework for developing new forms of partnerships and joint initiatives (JPIs) within emergent ERA and Horizon 2020 policies. Similar features are present in the new OECD “Innovation Strategy” (OECD, 2010) and their report on international cooperation in science, technology and innovation. The Royal Society has also called for improvement and scale-up of international co-operation in ST&I (Royal Society, 2011). For these reasons the analytical aspect of this project is timely. The paper presents current developments in the project through a framework, which aims to analyze contemporary uses of the term 'grand challenges' and the framework's potential to re-shape science and innovation policy.

There are claims that “fundamentally new” approaches are needed to formulate R&I policy toward 'grand challenges' (Gassler, Polt, & Rammer, 2008) that exhibit major departures from the notions of “systems of innovation”. The shift towards a new mission-led policy oriented to cope with sustainable development (including demographic change, ageing society, (global) health care concerns, security, etc.). Characteristic of new mission-led approaches is the combination of societal needs and technological inputs to generate solutions for these needs and challenges; decentralized process of identifying and selecting priorities; involvement of multiple actors; and quick and broad diffusion of research results (Glasser et al).

Recent policy debates about research, technology and innovation towards societal challenges, rather than economic growth, indicate a new type of policy for “transformative change” (Weber and Rohracher (2012)), that addresses the key “failures” of systemic innovation policies and also *directional* failures. Policies for transformative change require innovations to be generated as efficiently and effectively as possible, and that they contribute to a particular *direction* of change involving the identification of major societal problems or challenges for which prioritized solutions need to be developed through shared visions and with the help of R&I.

The “new” mission-oriented approach to address threats of global climate change and other major challenges, differs in several respects from old mission-oriented projects, such as the Manhattan project and the Apollo programme (Mowery, Nelson and

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<sup>1</sup> The project “The emergence of challenge-driven priorities in research and innovation policy (CPRI)” is collaboration between researchers from NIFU, Norway, Manchester Business School and University of Leeds, GB, and VTT, Finland. The project is supported by the Eu-SPRI Forum as one of its “exploratory initiatives”. Corresponding author: Egil Kallerud, NIFU, [egil.kallerud@nifu.no](mailto:egil.kallerud@nifu.no)

Martin (Mowery, et al., 2010)): these were highly centralized designed, funded, and managed by federal agencies to achieve a specific technological solution for government. In contrast technological solutions to global climate change must be deployed throughout the world by many different actors. These deployment decisions will require decentralized design and management with "huge outlays of private as well as public funds" (Mowery, et al., 2010, p. 1012). The dominant supply-side research policies of earlier mission-oriented projects will not work in programmes for addressing climate change, where technology policy has to be supplemented with demand-side policies (e.g. to change human behaviour and halt the increasing demand for energy and degradation of biodiversity).

Some few 'model' analyses of ongoing changes in contemporary R&I capture key aspects of these changes most often using issues of climate change and clean energy production, and dealing inadequately with the development of "challenge-oriented" approaches. Policies to address climate, food security, global health, etc. are not fully developed given their nature and extent.

The challenge term is used with multiple meanings by different actors and in different contexts: this is typical of the uncertainties of the wide range of different challenges involved and where no well-defined *thematic* criterion exists to define candidate issues to be addressed by R&I. The project expects to identify a multitude of uses of the term 'grand challenges' that may diverge and appear to be mutually incompatible together with uses and meanings that may converge to form a novel, conceptual framework. The weak definition of the term 'grand challenges', used in multiple meanings and for different purposes, enables actors to frame problems in ways which make *their* contribution appear to be key to their resolution. In some cases they may be used as a mere re-labeling of policy objectives, priorities and instruments.

Grand challenges usually have some common threads forming an emerging core of issues that are sometimes explicit but often implicit in addressing issues for R&I policy. The wide range of divergent "solutions" to the questions raised by these issues has already been noted. Here the analytical space or framework developed in the project will look at "discourse" (documents, statements) in a wider sense and at funding, governance and policy instruments. The analytical framework may take the form of a taxonomy of key dimensions of challenge-driven R&I policies.

The multiple(ying) uses of grand challenges in agenda-setting in contemporary R&I policy internationally may reflect a search and need for novel policy approaches, priorities and instruments, that require the development of new analytical concepts and tools to develop new types of policies. An objective of developing the analytical framework is to identify and characterize in what ways and to what extent ongoing R&I policy developments involve intended and effective *policy change and innovation* varying from extensive to no change. Options at the latter end of the spectrum become increasingly frequent as the rhetorical success of the challenge term and discourse triggers "mere" re-labeling and re-packaging of extant policies or their rephrasing in the new rhetoric. Hence, a question for the challenge discourse is "are these developments really new?", or is it merely another case of "old wine in new

bottles?” Or are these discourses appropriated by incumbents to serve entrenched interests, blocking rather than facilitating policy change and innovation? The development of a framework for analyzing and describing challenge-driven developments may sustain a *critical* and normative interest to keep open, and enhance, the impetus towards policy change and innovation. No “right” solution can be derived from the *general* challenge discourse concerning the degree and type of policy innovation required for *specific* challenge-driven initiatives. However, positioning policy initiatives, that claim to be effective toward recognized grand/global challenges within key dimensions, may provide a basis for discussion of the appropriate solution/“location” of each intervention along each dimension.

From a preliminary overview of some policy documents and a number of national, European and global initiatives, a number of recurring issues or dimensions may be detected. At a yet preliminary stage of our work, we start from a draft list of analytical categories, encompassing *discourse/rhetorics*; *geographical scope* (global, regional, national); *scale of stakes*; *scale of effort*; *time-frame*; *governance* (stakeholder participation); *direction* (politics/markets); *steering* (top down/bottom up); *objectives* (social/economic); *location(s) in STI spectrum*; (horizontal/vertical) *coordination/integration*; and *interaction* (competition/ collaboration). The categories will be developed further by looking at how they may be used to characterize specific examples of policies, programmes and projects at various levels (national, regional, global) in terms of how and to what extent they deal with these dimensions.

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