

ModELing a Democratic green ecOnomy for a Sustainable Society (MEDOSS)

1. Relevance relative to the call for proposals

Trajectories of climate change are strongly linked to imminent environmental problems caused by over-exploitation of natural resources to ensure national and global economic growth and profit. At present, no credible solution exists for bringing under control a fossil fuel driven global economy draining global resources. The scenario project MEDOSS will explore how a democratic economy may contribute to society's **socio-political adaptation to climate change**, as well as other ecological crises. The Representative Ingroup Democracy (RID) hypothesis that we propose is based on modern behavioural sciences like game theory, evolved human behaviour, group strategies and how human universal behaviour is struggling to cope with the evolutionary new situation of mega-societies [1, 2]. We predict that the RID model will enable stable and democratic sustainable production, distribution, equality and social security in all human arenas, by giving each individual equal responsibility and influence. The RID framework will be contrasted with other current theoretical frameworks for social choice. We predict that the RID model will **enhance legitimacy and interdependencies and regulate the distribution of power and welfare** through democratic decision-making processes. By applying and evaluating this scenario, the project aims to investigate the socio-political consequences of climate change, and related changes in the natural environment. It will thus contribute to improved **insight into society's capacity to respond to either radical changes or gradual processes in its decision-making processes**. The project thereby addresses the sub-area of "*climate change transformation as a social phenomenon*". To test the robustness of the RID model, MEDOSS aims to integrate all major disciplines and dimensions (economic, political, legal, technological, scientific, social and cultural, normative and ethical), their actors and institutions in a **cooperative and interdisciplinary approach to assess future challenges, opportunities, costs and benefits**. From different disciplinary angles, the research consortium intends to substantiate the guiding principles and conditions of the holistic RID model and test its capacity of altering today's economy in order to pave the way for **resilient, low-emission and sustainable societies**. The proposed perspective of a **future-oriented and innovative government transformation framework** is envisioned to be of **national and international significance** for the society at large including economy (e.g. transport and agricultural sectors), trade (e.g. CO₂ quota), industry (e.g. (renewable) energy companies) and the local environment (e.g. empathic cohesion, harmony with nature).

2. Aspects relating to the research project

2.1. Background and status of knowledge

Warming of the climate system is unequivocal, and human influence is beyond doubt (IPCC's Fifth Assessment Report 2013). Climate change may affect food systems in several ways ranging from direct effects on crop production to changes in markets, food prices and supply chain infrastructure [3]. In addition the Millennium Assessment [4] and The Economics of Ecosystems and Biodiversity (TEEB) [5] have highlighted that ecosystems and natural resources are being degraded, and that these degradations have major socio-economic effects. Efforts to reduce such degradation are being made at several levels. Today, development is almost synonymous with economic growth. Early publications argued that capitalist economic mode of production inevitably would lead to environmental degradation [6, 7]. Now, almost 40 years later, IPCC's latest report shows how modern industrial society is still driven by capital accumulation, not coping with environmental problems like climate change. The puzzling paradox of why neither individuals nor societies change behaviour or economy towards real sustainability, has been subject to extensive research and many speculations, but has never adequately included evolved human behaviour [8, 9]. Through the last decennia of behavioural research, it has become clear that the paradox fits into a pattern of evolutionary mechanisms, which have evolved and shaped basic human behaviour. Human behaviour consists of universals (reward/lust, punishment/pain), observed to be cross-cultural through history, and these mechanisms are now being localised through brain scanning methods [10-13]. The consequences of this knowledge are crucial for understanding the common basis in

societies, in that the evolved inclinations predict strategic limitations of individuals within a society: All human cultures are not possible, and some cultures are more likely than others. Despite growing scientific consensus on major environmental threats as well as resource depletion, societies are largely continuing with business as usual, at best attempting to tinker at the margins of the problems [14]. Also, historical and contemporary data show evidence for over-exploitation, climate and environmental collapses in nearly every culture [15].

2.2. Approaches, hypotheses and choice of method

The main objective of the MEDOSS is, on the background of neuroeconomics, evolutionary psychology and game theory, to hypothesize a concrete model for a sustainable production (11-14). In the present global situation we need to analyse how large societies can be organised to act jointly to find solutions for production, consumption and justified distribution. Humans have inclinations to choose strategies of cooperation and contribution, as well as egoism and corruption. The first strategies dominate in ingroups, and the latter in outgroups. The science of game theory shows how strategies for just, solidarity, empathy and generosity flourish in the closeness found among acquainted peers and friends [17-20]. The Representative Ingroup Democracy hypothesis (RID) builds on the cooperative innate human universals, released through social control and ingroup effects by participation in a limited group size on workplaces, schools and institutions. Workers, pensioners, housewives, students, farmers, the unemployed, every individual over the age of 18 will

be included in a group of manageable size, called an ingroup (*Figure 1.*). Ingroups will manage own workplaces. From each group, an elected representative enters the next level of groups, where he/she is presenting the views of the lower ingroup. Openness and mandate are following democratic rules. Not only what, but also where specific decisions are to be taken, will in themselves be democratically decided. We will use the Norwegian society as a model, but given the universality of human behaviour, the results will be applicable to other countries and societies. The RID model is hypothesized to release strategies of cooperation and contribution, as well as to curb egoism and corruption through social control and ingroup effects. Through democratic ownership, we predict that this will enhance legitimacy and interdependencies and regulate the distribution of power and welfare through democratic decision-making processes. Owning other's workplaces is one freedom lost in this model. We predict that freedom and influence will increase on most other areas, including sustainable production goals. Just distribution and equality is predicted to increase the overall acceptance of lowering consumption for every individual. An important point is the

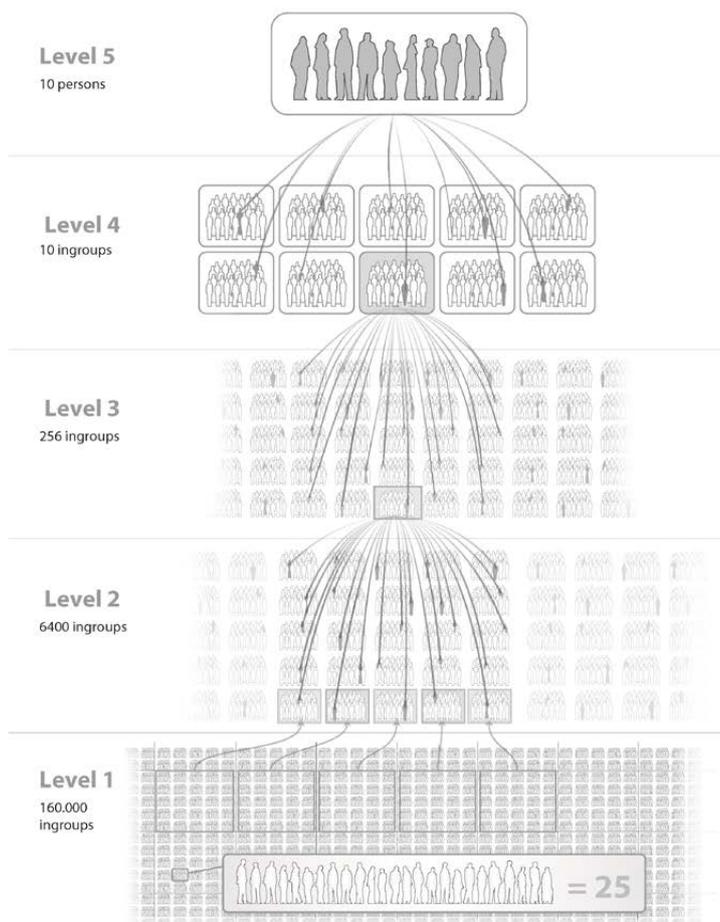


Figure 1. The RID model, applied for a society of Norwegian size. Because of the exponential factor, larger nations will only need one more level. Page 299 in [16] <http://www.bioman.no/document/ingroup-democracy-model>

model's handling of symbolic values, like economic monetary values. The human universal measure of value is related to short term exchange values. Money releases an evolved feeling of

security and content [9]. Consequently, it is extremely difficult to criticise capitalism's measure of success in terms of the money symbol, because the human mind itself masks the fact that future goods must be produced by Ecosystem Services (ES) and concrete resources present in the future. In case of shortage of resources and the ES they provide, the value of capital, gold, art or any other symbol will disappear. The MEDOSS project will address these paradoxes, and analyse them in the light of contemporary policies and quests for solutions. During the last three decades, serious efforts have been made to integrate social science and natural science, for example the concept of Sustainability Science (reviewed in [21]) and Complexity Science applied to social systems [38]. An important objective of MEDOSS is to achieve such integration by applying and exploring the RID scenario model through investigating the socio-political consequences of climate change and other environmental problems, and their impact transformation on societies at various levels. Researchers from a wide range of sciences and different disciplines will test and answer theoretical and empirical predictions concerning the RID model and its pros and cons, including the complexity methodology [39] that will be used to identify the multi-dimensional problem space of climate change. Cooperation and integration across disciplines will be achieved by investigating the capabilities of the RID model to cope with the socio-political impacts of climate change and shortages. By taking human behaviour research into consideration as a catalyst, each discipline will formulate predictions, and review them both theoretically and empirically. The RID framework will be contrasted with other current theoretical frameworks for social choice. By employing a matrix approach, whereby each discipline contributes to all work packages and are collated therein, we ensure the multidisciplinary and integrative nature of this project. Thereby we will be able to evaluate how the RID model might be suitable to manage sustainable production, resource economy, equality and solidarity; and thus provide a fruitful concept for future societal transitions. We divide the MEDOSS into four work packages:

WP1. Discipline-based assessments of today's societies and status quo (WP leader: Monica Guillen-Royo, SUM-UiO)

This WP will undertake a comprehensive review of all relevant literature for each discipline, in order to analyse today's situation related to climate change and natural resources, as a background for the main objective of exploring the RID. The reviews will include natural resource supply due to climate change, human wellbeing and health aspects, workforces in society and democratic processes. TEEB perspectives and national and international processes, the knowledge gain around the process of operationalization of the ES concept into practice will also be taken into account. Other relevant concepts suitable for each discipline may be added accordingly, all in order to describe the present situation for individuals and society. The different disciplines will conduct the review for their own disciplines whereas all reviews will be combined into an overall synthesis report.

Task 1.1 Each discipline conduct review for their own discipline

Task 1.2 Synthesis of the reviews resulted from task 1.1

WP2. Future discipline-based perspectives on today's societies given the IPCC and TEEB resource scenarios (WP leader: Gunhild Hoogensen Gjørsv, UiT)

Given the perspectives from WP 1, this work package will assess how today's policy and governance structure is expected to cope with, and relate to, future scenarios of climate change, ES supply and scarcity of natural resources. Assessments of time perspectives for change, expected tipping points and abruptness/gradualness of consequent change will be assessed. The impacts these will have on infrastructure, food supply, expansion of urban areas into rural areas and its implication for human health and wellbeing are examples. Current reform systems and processes (e.g. the reform of the Common Agricultural Policy, Energy efficiency policies, local initiatives when it comes to own food production) will be addressed for analysing possibilities for adaptation, and/or conflicts, within each discipline. We will explore the relationship between values and power, where certain powerful interests "securitize" values (economy over environment; state interests

over community needs) where social values and priorities compete and certain "security" (economic security, state security, environmental security) discourses are entrenched over others [22-24].

Task 2.1 Assessments future discipline-based perspectives on today's societies given the IPCC scenarios

Task 2.2 Synthesis of the assessments resulted from task 2.1

WP3. Possible functionality and feasibility of the RID model (WP leader: Terje Bongard, NINA)

WP3 will build on WP1-2 in the scenario studies assessing the possible functionality and feasibility of the RID model at different micro, meso, and macro governance scales. Here other current theoretical frameworks of social choice will be considered. Applied to Norway or another Western society, the functionality, problems and advantages of the RID model within each discipline will be explored and analysed. Empirical case studies include St Olav Hospital in Trondheim, Norway (i.e. concerning organization of health care); Worker-owned software company Kantega, Norway (see <http://www.kantega.no/>); Mondragon (see <http://www.mondragon-corporation.com/ENG.aspx>); two worker-owned factories in Europe and USA (1 per continent) (see http://en.wikipedia.org/wiki/List_of_employee-owned_companies); and a rural community in Tanzania.

Task 3.1 Scenario studies on functionality and feasibility of the RID model for each discipline

Task 3.2 Integrative study of the scenario studies resulted from task 3.1

Task 3.3 Conducting the case studies, including Strength, Weaknesses, Opportunities and Threats (SWOT) analysis per case study using the outcomes of task 3.2

WP4. Societal adaptation to climate change and socio-political transition processes (WP leader: Aksel Tjora, NTNU)

With knowledge and concepts, developed through WP1-3, WP4 explores changes and possibilities for transition, with emphasis on detailed understanding of social processes, on micro, meso, and macro levels. WP4 will conduct truly long term scenario analysis with Norwegian policy-makers and business leaders at different governance levels to explore socio-political transitions. Key questions include how core institutions and practices (law, central/local government, education, farming/food/markets, technology, health, urban/rural planning/units, etc.) are governed and may be transformed towards a RID model. Such institutions/practices have emerged over time through bottom-up as well as top-down processes. With basis in deeply interactive inter-disciplinary concept-development, the effect of various social change-processes will be assessed. While WP4 is heavily dependent on the previous WP's, it is also based on a theoretical core that will be developed during a document study throughout the project.

Task 4.1 Holistic and integrative work process elaborating possible socio-political transition processes

Specification of the contributions of the disciplines which will be integrated in the WPs (for abbrev. of institutions, see under references):

• **Human behavioural ecology, game theory, neuroeconomics, evolutionary psychology**

Lead: Terje Bongard (NINA); Collaborators: Eivin Røskaft (NTNU), Anders Skonhoft (NTNU), Eve Mitleton-Kelly (LSE), Jiska van Dijk (NINA).

The human behavioural ecology and related sciences will constitute a basis by providing the latest scientific achievements in this field (WP1). Integrating behavioural sciences into areas dealing with policy analyses, climate change, ES research and resource economy makes it possible to be more precise in predicting future reactions (WP2). By using the results from WP1 and 2, MEDOSS collaborators will have access to concepts from the behavioural sciences which are intended to enable a robust modelling of each research area, into WP3. Vice versa will the human behavioural ecology and related science disciplines be corrected and led forward by the diverse inputs from the other contributing disciplines. In close collaboration with all other disciplines, the human behavioural ecology will contribute in exploring predictions concerning how fast societies, opinions and governance may change (WP4).

• **Biodiversity, Ecosystem Services and Valuation**

Lead: David N. Barton (NINA); Collaborators: Jiska van Dijk (NINA), Anders Skonhoft (NTNU), Eve Mitleton-Kelly (LSE)

At the heart of conflicts of interest in environmental policy are different beliefs about rationality, what constitutes value of ecosystem services, and what aspects of policy frame choices. These dimensions give rise to a number of research questions. Recent research in behavioural economics indicates that people are not individually rational as posited by economic theory [25-27]. We will explore the extent to which current Norwegian environmental policy is adopting behavioural economics, experimental and adaptive approaches to account for constrained rationality and network effects in policy proposals (*WP2*). We will critically examine the extent to which the RID approach to decision-making is able to account for constrained rationality and networked group behaviour. In *WP3* we will use agent-based models to compare the resource outcomes of simple representations of RID group models versus models of individual rational choice. In *WP4* we will elaborate on earlier research into group deliberation techniques which has shown that sufficiently long time horizons and framing of citizen, rather than consumer rationality, enables groups to explore transformative policy options, to some extent unconditioned by present stakeholders [28].

- **Industrial ecology, including renewable energy**

Lead: Helge Brattebø (NTNU); Collaborator: Roel May (NINA)

Resource efficiency and climate change mitigation are inherently dependent due to the high use of energy in material cycles and calls for a life-cycle perspective when addressing production, distribution, consumption and (waste) management at system-wide scales. Status, trends, organization and challenges will be examined (*WP1*) for selected fields of application, chosen due to their resource importance and potential relevance regarding the RID model; urban water services, waste prevention, material loop closing (through industrial symbiosis and extended producer responsibility) and renewable energy. Current sustainability assessment methods and decision-making processes are examined in these fields of practice, with focus to role of users/consumers in criteria selection, target setting and performance evaluation (*WP2*). This is a basis for exploring how the RID model approach can better influence decisions in the field of industrial ecology (*WP3*), and support the transition process that is needed for a long-term shift towards more sustainable solutions for urban water, wastes, material loops and energy (*WP4*). Emerging holistic and user-oriented methods (LCA, AWARE-P) will be explored as candidates for linking up with the RID model.

- **Public Health, and General Practice**

Lead: Aslak Steinsbekk (NTNU); Collaborators: Steinar Krokstad, Steinar Westin (NTNU), Eve Mitleton-Kelly (LSE)

WP1: A review on the literature on especially the decision making regarding resource allocation in the hospital setting. *WP2 and 3*: Future decisions regarding priorities in the health services need to make the whole sector sustainable. Theoretical discussions on comparing the robustness of a RID model with models for decision making in the hospital setting in light of reduced resources, and on how public involvement and participation (citizen partnership) in the decision processes in hospitals influences resource allocation (*WP3 task 3.1 and WP4*). We will explore to what extent a RID model can be constructively applied at St.Olav Hospital, Trondheim (*WP3 task 3.3*). The health sector lends itself readily to this. A common description of how the processes of resource allocation take place today is that the head/leadership of each department, supported by their co-workers and staff, will look for any good arguments for more resources, alternatively to prevent cut-backs. This creates a battlefield within the hospitals mirroring that of the quest for profit in society in large. The hospital could thus provide social models, both in real life and as role plays, for exploring decisions processes under various organisational conditions, RID being one. In fact, the feasibility and effects of RID could be more readily observed in the hospital setting, where outcomes are sooner to occur than e.g. in processes related to climate changes. In short, health care units could provide laboratory conditions for exploring management models with reasonable time and resources. Lessons from such settings would be valuable in their own right, but in this project provide ideas and experience of relevance for better climate governance.

- **Veterinary epidemiology and industrial food production**

Lead: Ane Nødtvedt (NVH)

WP1 and 2: Literature studies regarding the sustainability of modern food animal production. Analysis of time perspectives for continuing today's industrial food production. Modern animal farming is predicted to continue towards larger units and higher production levels. This presents challenges related to spread of disease animal welfare. Intensive farming depends on import of high-energy concentrate, dependent on fossil fuels in all aspects. In a world of scarcity, it will not be sustainable to spend limited resources on intensive farm animal production based on concentrates. The profit perspective makes sustainable production doubtful, in the sense that pricing resources correctly in accordance with ecosystem service charge is still lacking. We predict that time perspectives of today's industrial food production will be directly dependent on oil production and consumption rates. When oil production decreases and climate change alters production conditions, predictions will be an even lower focus on disease control problems, ethical household animal living conditions and sustainability.

WP3: In a model where decisions are taken by people with "closeness" to the production system, and independent of monetary economic gain, we could envision greater empathy towards production animals. Disease control: Under the RID model, a feeling of responsibility for neighbouring farms or units could lead to producers wishing to eradicate a disease in their herd to prevent spread to other locations even for "non-notifiable" diseases. Based on a sustainable economy not measured by monetary profit, we predict that such decisions will be easier to make within a RID model. Dependency on concentrates: By shifting the focus from profit towards sustainability the RID model could lead to better utilization of local resources in animal production. Choosing species which are suitable for the geographic conditions in Norway will be important. This would most likely mean decreasing the production of concentrate-dependent species like industrially raised broilers, and focusing on sheep, beef and wild game.

- **Human well-being and culture**

Lead: Monica Guillen-Royo (SUM-UiO)

WP1 and 2: The economics of happiness now have evidence that economic growth does not increase happiness in any case, neither for poor, transition or rich countries [29]. In contrast, high political, social and economic participation, transparent institutions, strong family ties and availability of leisure time increase well-being [30]. These are factors that give us a double dividend as they do not have (per se) negative effects on the environment and have positive effects on wellbeing. *WP3 task 3.1:* The functionality of the RID model will depend on the hypothesis that the in-group mechanisms and the triggering of cooperative behaviour will be flexible and adapt to the cultural, historical, economic and political background of the people to whom it will be applied in addition to the particular culture of each institution or organisation. *WP4:* Transforming society demands involving common people (not only researchers, experts and policy makers) in the development of the model and the critical appraisal of its functioning. The RID model is suggested as a general frame and developing it and transforming it in cooperation with the people who are going to use it will be necessary. We know that socio-political participation is an important determinant of people's wellbeing [31, 32] and it follows that any new system are not flexible enough to include people's involvement in its design and will not be sustainable in the long run.

- **Complexity theory**

Lead: Eve Mitleton-Kelly (LSE)

Building on *WP1* Mitleton-Kelly will contribute to *WP2* and *WP4* by using the developed methodology based on complexity theory to (a) identify the multi-dimensional challenges now and in the future; and to (b) formulate a set of recommendations for policy makers on setting up and enabling environments that will address the climate change challenge. Climate change as a complex problem can be addressed much more effectively by using the logic and tools of complexity theory. The Complexity Methodology identifies the multiple dimensions in a complex challenge by (a) identifying the multiple dimensions (social, cultural, ethical, political, scientific, financial, physical, technical, and other) that together create the challenge space; (b) identifying the links and

interactions, between the dimensions or the co-evolutionary dynamics; (c) when the key clusters of multiple dimensions are identified, then it is possible to address the challenge space by setting up enabling environments at multiple scales. This exercise will be conducted with the experts from the relevant disciplines, during a series of workshops, using the RID model. Mitleton-Kelly will also contribute to two of the case studies in *WP3*: the Mondragon and the hospital cases.

- **National and international labour and media studies**

Lead: Andreas Ytterstad (HIOA)

WP1 and 2: Global economy and moving of production and workplaces towards cheap labour create alienation and increasing conflicts over wages: Neoliberalism is becoming increasingly institutionalized [33]. Workers are corresponding with a growing awareness of the pressures of free trade, structural adjustment, new public management and fiscal policies by organizations like the WTO and the EU. The RID model addresses national and global paradoxes of today, like the conflicts between workplaces, sustainable production and over-consumption. Unions in the private, oil and gas based sector and public sector have voiced opposition to carbon trading and demand to scale down not only oil production but even economic growth in itself. A crucial question for the near future will be whether the transition away from oil can come as a planned, democratic response - or as a chaotic and autocratic one, reinforcing competition and alienation between workers. A concerted campaign for climate and green jobs may be one way of strengthen the first possibility, and it also demonstrates a bottom up attempt at implementing the RID model (cf. Monica Guillen-Royos project).

WP3 and WP4: The Norwegian Trade Union Movement (NTUM) has tried to respond to the combined challenge of climate change, the need to transcend to a “green” economy, and the more immediate task of safeguarding jobs. These challenges are facing the same paradox of profit need, income need and unsustainable production based on monetary profit. A common denominator is the idea of a *just* transition. *How can the NTUM develop a just transition perspective in practice?* A prediction will be that the RID model can be a platform for achieving this goal. A Norwegian transition away from oil needs to pay respect to workers in the offshore industry, guaranteeing that they will not be faced by the choice of saving their income or the planet. Democracy cannot be an optional extra in such a labour led transition, assuming larger democratic control over the economy itself will be explored in the perspective of the RID model. Predictions are that civil salaries set by the democracy itself, will secure safety for job and future, and influence on all levels will increase well-being and health.

- **Sociology**

Lead: Aksel Tjora (ISS-NTNU)

WP1-WP3: A comprehensive study of status quo must rest on a firm methodological basis, quantitatively as well as qualitatively. Resources from sociology will be of value for systematic (inductive as well as deductive) studies of society at various levels. Inductive theory-building (e.g. Grounded Theory (GT) [34] and Stepwise-Deductive Induction (SDI) [35] and deductive concept-testing will be applied during the WP's to ensure a systematic approach across disciplines. Especially *WP3*, which consists (among other activities) of case studies, needs to be well grounded in systematic analysis, in an interpretive tradition. It will be a major task to establish methodological approaches across the project to maintain systematic interdisciplinary work. Tjora has during 15 years developed concepts of qualitative research that have diffused across many disciplines.

- **Experts in Teamwork**

Lead: Lars Øystein Ursin, Department of Public Health and General Practice, and Department of Philosophy and Religious Studies (NTNU)

In RID, descriptions of human nature from biology, psychology and related natural and social sciences are put to work to create dynamics of deliberation that are capable of dealing effectively with our current global challenges. The interaction of fields like genomics and evolutionary psychology with fields like sociology and political philosophy is promising. At the same time, the move from descriptions of human nature to normative statements on how societies should be

organized and decisions should be made, is a complicated one. The history of such efforts on the grand scale in the 20th century is rather discouraging. Thus, a thorough reflection on the relation between the descriptive and the normative level in addressing human political behaviour is vital to the MEDOSS project. *WP1*: An exploration of the research question: What is the normative adequacy of current democratic models of arriving at sustainable societies? *WP2*: An exploration of the normative robustness of a RID model compared with other models for decision making. How to promote the autonomy of citizens will be a case in point in such an analysis, as well as our obligations towards future human beings and animals. *WP3*: Experts in Teamwork (<http://www.ntnu.edu/eit>) at NTNU is a course in which students apply their academic competence in interdisciplinary project work to learn teamwork skills to prepare them for working life. The learning method in Experts in Teamwork is experience-based. Reflections are shared by the team and are stimulated by facilitation, reflection writings, interaction exercises, and feedback to each other. Ursin is the village supervisor of the *Public Health* group of the project course *Experts in Teamwork*. His group will be ideally suited to be a reflective “test lab” for the RID model versus other models. *WP4*: The obligation to arrive at a sustainable society is a normative challenge. We will analyse the origins of this obligation, in order to assess which organizational changes in society that could be appropriate and legitimate.

- **Bioeconomy, biomass and bioprocessing, including renewable energy**

Lead: Svein Jarle Horn (UMB); Collaborator: Roel May (NINA), (in coll. with Helge Brattebø)

WP1 and WP2: Status on fossil resources regarding consumption, resource depletion and greenhouse gas emissions. Description of renewable alternatives for energy, fuels, chemicals and materials, and the current status of bio-refining. Analysis of the near future trend regarding the transition from a fossil to a bio-based economy and energy demands.

WP3 and WP4: Analysis of how a society organized after the RID model would affect priorities in R&D and technology development regarding the transition to a sustainable bioeconomy. The transition itself will be studied using integral frameworks [36] to spot the most important obstacles.

2.3. The project plan, project management, organisation and cooperation

The project plan and milestone schedule are provided in the application form. The project will be coordinated by the Norwegian Institute of Nature research (NINA). Central coordinating participants will be Dr. Jiska van Dijk (project coordinator, PhD in 2008), Dr. Terje Bongard, and Jørn Thomassen. The coordination team has wide experience in directing research as well as managing complex projects addressing a wide variety of interdisciplinary issues involving both natural scientists, social scientists and humanities. Van Dijk has been coordinator for ALTER-Net (www.alternet.info) (2009-2012), is currently strategic advisor for ALTER-Net and co-leader of 3 EU-FP7 biodiversity and ES related projects (KNEU, BESAFE, OpenNESS). Van Dijk has a good track record when it comes to the operationalization of ES through involvement in the EU FP7 project OpenNESS. Bongard has wide experience on life history strategies, mate choice, and parental investment and is the first author of the book ‘The biological human being - individuals and societies in light of evolution’ (preliminary in Norwegian) [16]. Thomassen will be responsible for the dialogue processes in MEDOSS. He has successful projects previously with stakeholder involvement, and has wide expertise with stakeholder dialogue processes and scenario-building [31].

The project coordination team will be supported by the work package coordinators as well as discipline leaders to ensure adequate and relevant knowledge flow across and within the disciplines. The project coordinator together with the work package leaders and discipline leaders can be seen as principal investigators for the project. Guillen-Royo (SUM-UiO, WP1) has an outstanding track record on human wellbeing and sustainable consumption. As a political scientist, Hoogensen Gjørsv (NUPI-UiT, WP2) has worked with security, gender issues and equality, while Tjora (SVT-NTNU, WP4) works with social organization and sociology of science and technology.

The advisory group consist of both international and national experts. International cooperation is ensured with the involvement of European experts and North America expert: Prof Harold Mooney (Stanford University, USA), Dr. Eeva Primmer (SYKE, Finland), Dr. Leon Braat (Alterra, The

Netherlands), Dr. Ben ten Brink (NEAA, The Netherlands), Christoph Schröter-Schlaack (UFZ, Germany) and Dr. Simron Singh (IFF, Austria). In addition, key national advisors include Erik Solheim (OECD, Norway), Rasmus Hansson (Miljøpartiet De Grønne, Norway) and Peter Johan Schei (Fridtjof Nansen Institute, Norway). All work will be executed in tight cooperation between the core research group and the advisory group, thus further promoting (inter)national network-building on this research topic. Each year two progress meetings will be held with the advisory group (one virtual and one physical).

MEDOSS will from the onset seek to harmonize the project with, and actively participate within the global change programmes DIVERSITAS and IHDP. Submission for endorsement as joint ESSP-project within the DIVERSITAS and IHDP programmes will support national and international recognition and publicity among the natural and social science and policy stakeholders.

2.4. Budget

Budget details are provided in the online application form.

3. Key perspectives and compliance with strategic documents

3.1. Compliance with strategic documents

The Norwegian Institute for Nature Research (NINA) is Norway's leading institution for applied ecological research, long-term strategic research and commissioned applied research. The project will strengthen NINA's applied research activities, network and knowledge in this cutting-edge and interdisciplinary field with clear relevance to climate change issues, conservation of ecosystems and their services to society. Major strategic aims of NINA are to produce and disseminate research-based knowledge needed for sustainable management of resources, and to contribute to active use of this applied knowledge by government, management authorities, industry, commerce, non-governmental organisations and the general public. In particular, this application reflects the stated priority aim to enhance our knowledge base for socio-political adaptation to climate change.

3.2. Relevance and benefit to society

Given the nature of the project and its goals, we predict that results will lead to ground-breaking new perspectives in debates over new and possible political ways of governing societies and production. Building upon the knowledge base from a diversity of disciplines, MEDOSS will provide policy makers the tools to prioritize alternative political-societal strategies including sustainable use of natural resources and to a climate change resilient society with reduced potential societal conflicts.

3.3. Environmental impact

The project is likely to have a significant and beneficial impact on the environment.

3.4. Ethical perspectives

Not applicable

3.5. Gender issues

In this application, the project team has been solely selected based on their areas of expertise and includes both men and women. The project leader is a well-established and experienced female research scientist. Also the advisory group includes both genders.

4. Dissemination and communication of results

4.1. Dissemination plan

A plan for scientific and popular dissemination activities is provided in the online application form.

4.2. Communication with users

During the second stage of the project, organisations representing various industries, national public institutions and relevant NGO's (e.g. tourism, farming, forestry, renewable energy) will be invited to discuss implementation of the knowledge gained. Relevant results will be communicated continuously through presentations, national and local television and national and local newspapers. The website www.bioman.no will act as a display window for results from the project to schools and general public. A possibility for a discussion forum and sign up function for interested persons

will be added to the website. Results will be communicated to the scientific community in international peer reviewed journals and at conferences.

5. References

1. Gintis, H., *Game Theory Evolving: Princeton: Princeton University Press*. 408.
2. Henrich, J., et al., *Foundations of human sociality*. 2004: Oxford University Press.
3. Gregory, P.J., J.S. Ingram, and M. Brklacich, *Phil. Trans. R. Soc. B* 2005.
4. MA, *Millennium Ecosystem Assessment. Synthesis*.2005: World Island Press.
5. Kumar, P., ed. *TEEB. The Economics of Ecosystems and Biodiversity:2010, Earthscan*.
6. Meadows, D.H., et al., *The limits to growth*. . 1972: New York: Universe Books.
7. Foster, J.B., *Ecology against capitalism*. . 2002: New York: Monthly Review Press.
8. Penn, D.J. and I. Mysterud, eds. 2007, *Transaction Publishers, London*. 364.
9. Betzig, L., *Human nature: A critical reader* 1997, New York: Oxford University Press. 489.
10. Preuschoff, K., S. et al. *Revue D Economie Politique*, 2008. 118(1): p. 75-95.
11. Solnais, C., et al., *Journal of Economic Psychology*, 2013. 36: p. 68-81.
12. Gray, M.A., et al., *Neuroimage*, 2009. 47(3): p. 1105-1115.
13. Rachul, C. and A. Zarzeczny, *Int. Journal of Law and Psychiatry*, 2012. 35(2): p. 77-81.
14. *Kopnina JESD Forsaking Nature Contesting Biodiversity through ...pdf*. 2013.
15. Diamond, J., *Collapse: 2005, New York: Viking*. 575.
16. Bongard, T. and E. Røskoft, *Det biologiske mennesket - 2010: Tapir Akademisk Forlag*.
17. Perc, M., et al., *Journal of the Royal Society Interface*, 2013. 10(80).
18. Kugler, T., et al. *Wiley Interdisciplinary Reviews-Cognitive Science*, 2012. 3(4): p. 471-482.
19. Weirich, P., *Collective acts. Synthese*, 2012. 187(1): p. 223-241.
20. Petersen, M.B. and L. Aaroe, *Evolutionary Psychology*, 2012. 10(5): p. 802-817.
21. Mooney, H.A., et al. *Proc. of the Nat. Acad. of Sciences of the USA*, 2012. Early ed.: p. 8.
22. Buzan, B., O.W. O., and d.W. J., *Security: 1998, Boulder, CO: Lynne Rienner*.
23. Hoogensen Gjørvi, G., *Review of International Studies*, 2012. 38 (4): p. 835-859.
24. Hoogensen Gjørvi, G., et al., eds. 2013: London: Routledge.
25. Thaler, R.H. and C.R. Sunstein, 2008: Yale University Press.
26. Watts, D.J., *How Common Sense Fails Us*. 2011: Crown Business, New York.
27. Ormerod, P., *Positive Linking*. 2012: Faber and Faber, Croydon.
28. Soma, K. and A. Vatn, *Environmental Policy and Governance*, 2010. 20: p. 30-43.
29. Easterlin, R.A., *IZA DP No. 7187*, 2013.
30. Helliwell, J., L. R., and S. J., eds. New York: Earth Institute, Columbia University. . 2012.
31. Kaltenborn, B. P., et al. 2011. *Island futures- Futures* 44 (2012) 328–337
32. Max-Neef, M., *Apex Press, London*. 1991.
33. Frey, B.S., *Cambridge, MA: The MIT Press*. , 2008.
34. Harvey, *A brief history of neoliberalism*. 2007: Oxford Univ.Press. 249.
35. Glaser, B.G. and A.L. Strauss, 1967, *Chicago: Aldine*.
36. Tjora, A., *Kvalitative forskningsmetoder i praksis*. 2. ed. 2012, Oslo: Gyldendal Akademisk.
37. O'Brien, K., L. et al. , pp 392-401. 2013, London: Routledge-Earthscan.
38. Mitleton-Kelly E. 2003. In: Ed. Mitleton-Kelly E., Elsevier, ISBN 0-08-043957-8
39. Mitleton-Kelly E. 2011. 'Identifying the Multi-Dimensional Problem Space & Co-creating an Enabling Environment', Ch 2 p21-44, in *Moving Forward with Complexity* Eds. Tait A. & Richardson K.A. 2011, ISBN 9780984216598, Emergent Publications

Abbreviations of Institutes involved:

HIOA: Oslo and Akershus University College of Applied Sciences; IFF: Institute of Social Ecology; LSE: the London School of Economics and Political Science; NEAA: Netherlands Environmental Assessment Agency; NINA: Norwegian Institute for Nature research; NTNU: Norwegian University of Science and Technology (ISS: Department of Sociology and Political Science; SVT: Faculty of Social Sciences and Technology Management); NVH: Norwegian School of Veterinary Science; SYKE: The Finnish Environment Institute; UMB: Norwegian University of Life Sciences; UiO: University of Oslo (SUM: Centre for Development and Environment); UiT: the Arctic University of Norway (NUPI: Department of Sociology, Political Science and Community Planning)