



## **Racket in the oceans and responsible innovation**

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## **L'institut interdisciplinaire de l'innovation** a été créé en 2012.

Il rassemble :

- les équipes de recherche de MINES ParisTech en économie (**CERNA**), gestion (**CGS**) et sociologie (**CSI**),
- celles du Département Sciences Economiques et Sociales (**DSES**) de Télécoms ParisTech,
- ainsi que le Centre de recherche en gestion (**CRG**) de l'École polytechnique,

soit plus de 200 personnes dont une soixantaine d'enseignants chercheurs permanents.

L'institut développe une recherche de haut niveau conciliant excellence académique et pertinence pour les utilisateurs de recherche.

Par ses activités de recherche et de formation, i3 participe à relever les grands défis de l'heure : la diffusion des technologies de l'information, la santé, l'innovation, l'énergie et le développement durable. Ces activités s'organisent autour de quatre axes :

- Transformations de l'entreprise innovante
- Théories et modèles de la conception
- Régulations de l'innovation
- Usages, participation et démocratisation de l'innovation

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*Ce document de travail est destiné à stimuler la discussion au sein de la communauté scientifique et avec les utilisateurs de la recherche ; son contenu est susceptible d'avoir été soumis pour publication dans une revue académique. Il a été examiné par au moins un referee interne avant d'être publié. Les considérations exprimées dans ce document sont celles de leurs auteurs et ne sont pas forcément partagées par leurs institutions de rattachement ou les organismes qui ont financé la recherche.*



## **The Interdisciplinary Institute of Innovation** was founded in 2012. It brings together:

- the MINES ParisTech economics, management and sociology research teams (from the **CERNA, CGS and CSI**),
- those of the Department of Economics and Social Science (**DSES**) at Télécom ParisTech,
- and the Centre de recherche en gestion (**CRG**) at Ecole polytechnique,

that is to say more than 200 people, of whom about 60 permanent academic researchers.

i3 develops a high level research, conciliating academic excellence as well as relevance for end of the pipe research users.

i3 's teaching and research activities contribute to take up key challenges of our time: the diffusion of communication technologies, health, innovation, energy and sustainable development. These activities tackle four main topics:

- Transformations of the innovative firm
- Theories and models of design
- Regulations of innovation
- Uses, participation and democratization of innovation

For more information: <http://www.i-3.fr/>

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## **Racket in the Oceans and Responsible Innovation**

### **Presentation of the Observatory for Responsible Innovation**

The Observatory for Responsible Innovation is an independent international think tank, created to reflect on and discuss new concepts, measures and methods meant to encourage responsible innovation. The Observatory is based in Mines ParisTech, presided by Fabian Muniesa and depends of the Interdisciplinary Institute of Innovation. This Institute was founded by the CNRS, in collaboration with Mines ParisTech, Ecole Polytechnique and Telecom Paris.

This think tank's approach is strongly linked to the notion of innovation that is both full of promises and also fraught with dangers, that is, negative externalities. The philosophy is also anchored in the question of technical democracy, in the sense of Michel Callon. The main objective is not to research the topic but to organize a debate around it, to animate a political discussion and to mediatize it. To do so, the Observatory mostly provides human resources.

### **Context of the project on anthropic marine acoustic pollution**

Oceans represent more than 70% of the earth's surface and constitute a crucial challenge for its future. The management of oceans' future is on the political agenda, and media discussed a lot some specific topics such as acidification, plastic and overfishing. However, a low-profile yet essential topic is emerging, marine sound, on which the European Commission has started to focus.

The Marine Strategy Framework Directive (MSFD) introduces underwater noise as an indicator for a good environmental status. This framework's directive echoes global concerns in the scientific community—concerns that have also reached civil society and political instances—over anthropic sound impacts on marine life. The directive was transposed in the French legislation in 2012. The European Commission fixed 2020 as a deadline for all implementations, reflecting on what has been done so far and what still needs to be done appears necessary.

Exposure to sound pollution may well result in a range of behavioral responses, physiological effects and physical injuries in marine mammals and other species (note that there is an impact not only on mammals but also fish and invertebrates), as well as ecological, population and cumulative effects, with dire consequences on the overall worldwide ecosystem.

There are natural sources of sounds in the oceans that originate from earthquakes, waves, rainfall, animal noises etc. Anthropogenic activities however introduce new sources of sound: shipping, seismic surveys, research activities, sonar, resources' exploitation in the sea floor, etc., all emit more or less strong noise. And evidence show that this sound pollution has greatly increased in the last 60 years.

Indeed, the growing number of off-shore extraction sites, the steady increase of worldwide maritime traffic, of cruising ships, the emergence of Renewable Marine Energies (RME), drastically increase anthropic pressures linked to noise.

By positioning itself on this question, the Observatory aims to be at the forefront of the discussions on the topic. As it is the case for more and more innovations nowadays, many actors are involved but do not necessarily feel concerned. This topic also raises technological and organizational issues.

### **Presentation of the project**

The project is starting at a moment when it is possible to leverage on both the works of European projects focusing on shipping noise (SONIC, AQUO) and the oil & gas industry initiative on sound measure, but also at a point where it is crucial to think of the implementation of innovative solutions.

The objective is to discuss with scientists, industrials and national or European public officers on the best way to develop these solutions. To do so, we will work on a position paper (to be presented during the final conference) which will be prepared thanks to three one-day workshops on the following topics:

- **Noise measurement:** two ISO groups and one in electricity are currently working on this topic. Our workshop on this topic will highlight the problems and stakes linked to the definition of an efficient standardized measurement instrument
- **Noise impact on marine life:** more knowledge and understanding of the negative impacts of underwater noise on marine life is needed, especially on mammals, fish, invertebrates, etc.
- **Innovative solutions and management devices:** industrial actors are developing many innovations to reduce underwater noise footprint of ships for instance: from internal machinery to propeller, including cavitation effects. This workshop aims to summarize and present most innovative solutions in different sectors. It will also present management devices designed to better deploy of these innovations: political and economic incentives, integration of noise footprint in the eco-conception processes, sound mapping decision tools, etc.

Provided we obtain the necessary funding, we could present a first version of the position paper during an international final conference. This conference would be the occasion to confront our results to existing worldwide experiences (for example, to the case of Vancouver Harbor). The conference could also be the occasion to address zoning questions for the supervision of underwater noise in a sensitive maritime area and the role of zoning as an incentivizing device.