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Inventing a shared Science Diplomacy for Europe

InsSciDE Work Package 6: **Security: Scientific and Technical Cooperation in the Context of European Diplomacy**	
Case Study n°6.3	**ITER and the changing role of security: European science diplomacy in nuclear fusion collaboration**
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Abstract

The actors and processes of cooperation around nuclear fusion are studied through the case of ITER, a large-scale fusion facility currently under development in Cadarache, France. The construction of this facility started in 2007, after more than 20 years of negotiation and deliberation between the involved partners: the European Union, India, Japan, Russia, China, South Korea and the United States. Currently, 35 states are involved in the project. Construction and assembly are expected to be completed in 2025. ITER is one of the largest scientific cooperations in the world today, and it entails scientific and diplomatic complexities on many levels. The case study is relevant because it shows the role of science diplomacy in negotiating and handling such complexity, but also because large-scale, long-term cooperation between global actors of the kind that is showcased can be a model for cooperation around other global problems, and there may be lessons learned from the ITER experience in this regard.

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The InsSciDE case study on ITER focuses on collaboration around nuclear fusion as a historical case of handling issues of nuclear and energy security through science diplomacy. By studying the diplomatic processes around international fusion research collaboration, the aim is to outline changes taking place in the practice and conduct of European science diplomacy in transnational energy collaboration, as well as highlight the complex and changing scientific, technological and political contexts to which science diplomacy actors must respond.

Fusion research has been a subject for international scientific cooperation for over 60 years. It was central already in the exchanges taking place when the Atoms for Peace program started at the Geneva Conference in April 1955. The Soviet Union was a prominent fusion research environment but also a major nuclear power, and for US and European actors nuclear cooperation was at seen as a crucial strategy for disarmament and weapons control. In 1982 and 1983, during a period of renewed Cold War tensions and nuclear security threats, fusion again became a vehicle of high international politics, with the goal of building trust in negotiations that would also include arms control. In 1985, at their first meeting in Geneva, Ronald Reagan and Mikhail Gorbachev initiated a large international cooperation around a fusion facility called ITER, together with the European Union (EU). The construction of this facility started in 2007 in southern France, after more than 20 years of negotiation and deliberation between the involved actors: EU, India, Japan, Russia, China, South Korea and the United States. Construction and assembly are currently expected to be completed in 2025.

The ITER project is an example of a project of Cold War diplomacy having to adapt to a post Cold War reality, and which has survived many political upheavals and crises. A study of the diplomatic process around ITER will allow deeper insight into how actors in science diplomacy adapt and relate to changing networks and contexts,

as well as how they participate in the creation of knowledge networks and negotiate the changing concept of security over time.

ITER moreover is unique in its organisation, with the use of an in-kind system for contribution. This means that the different components of the reactor are for the most part not built on site, but by national organisations in the different participating countries and then shipped to Cadarache to be assembled. Most of the funding is also handled on a national level, and not on the site itself. The reason for this is to allow each participating country to develop the competence needed to build a fusion reactor, however, it can be cumbersome when considering that an end-product needs to be delivered on a deadline, and that many of the components are "first-of-kind". The coordination of everything including the high-precision science, the parts and materials, the transports, international law and the transnational work on the site is a gargantuan endeavour in itself, and while there are those who criticise this organisation, it is the result of historic negotiations, which I will delve into in my work.

In my case study I will follow the institutions and the actors working to make the ITER project a reality. Member countries participate in ITER through a dedicated Domestic Agency, while the EU acts as a single partner in the project, through EURATOM. Including EU member states the full count of participating countries comes to 35. National and international organizations too have played important roles in the project, with IAEA for example being active in the early negotiations. Several important actors surrounding ITER started as scientists or engineers, and later ended up working in science administration, in state or private organisations. One goal of my study will be to follow these actors to look at how certain among them end up being science diplomats, and whether they consider themselves as such. Many of these actors have also been in the fusion field a long time and have strong networks on both a scientific and a political level.

The network surrounding ITER and fusion research as a whole is a tight-knit one, since fusion has to a large degree been an international endeavour since the 1950s. Many of those involved in the negotiations around ITER had earlier worked with other transnational fusion projects, and this historical connection is also something that interests me. I believe that these networks are crucial for the success of the ITER project, for several reasons. For example, US and Soviet scientists already knew each other closely before the summit in Geneva in 1985, and thus could discuss upstream how to present the project to their respective political decision makers. Many of my interviewees also cite trust as a central requirement when embarking on such a project, and some of this trust has been built over many years within networks. If the network is already there, it is also easier to grasp an opportunity when it arrives.

In the course of such long negotiations as those taking place around ITER, such varied actors as scientists, civil servants, diplomats of different ranks, lawyers and top politicians have all been involved and dealt with varied issues. My study will look at when and how different actors are engaged, and how priorities change with actors.

One interesting question in regard to the technoscience of ITER is, in my opinion, how the science and technology itself is influenced by the diplomatic discussions. As an example, due to the in-kind system many things decided at organizational level may not be ideal from a scientific or technical point of view, but must now be dealt with during the construction. I will look at some such instances and analyse the different priorities in play. One other interesting scientific issue is that depending on the culture of a given scientific field, negotiations and/or collaboration may look different. For example, nuclear fusion and nuclear fission, although being closely related scientifically, have very different cultures in terms of security and information sharing. How do such factors influence the possibilities for scientific collaboration?

ITER has been a political project from the very beginning, when the first agreement was signed in 1985 at a summit between the leaders of the two major parties opposed by the Cold War. Politics have also influenced who has joined or left the project over the years. It is therefore important to see ITER as a part of a larger negotiation strategy between countries. Often, diplomatic negotiations take a broad approach, and a given

scientific project is negotiated as a part of making deals concerning other industrial cooperation. This has also been true regarding ITER, and one part of my analysis will discuss the project as part of a broader political process.

I believe that there is a lot to learn from the ITER project as a whole. It is one of the largest scientific cooperations in the world today, and it entails scientific and diplomatic complexities on many levels. The case study is relevant because it shows the role of science diplomacy in negotiating and handling such complexity, but also because large-scale, long-term cooperation between global actors of the kind that is showcased can be a model for cooperation around other global problems, and there may be lessons learned from the ITER experience in this regard.

Disciplinary/methodological approach

Sources for the study will include archival material from the European Commission Historical archives, as well as oral history interviews with actors central to the negotiations. I have identified central actors with the help of contacts at ITER, and I have been able to interview them during a visit to the site. Some interviews have also been done on Skype. While I have access to written material, much of what happens during negotiations is not written down anywhere, and interviews are therefore crucial to fill in the blanks. Using the historical method, I will analyse the material, identifying actors, networks, strategies and concepts central to the ITER project.

Essential bibliography

McCray, W. Patrick (2010) 'Globalization with hardware': ITER's fusion of technology, policy, and politics. History and Technology, 26: 4, 283-312.