

6 Socio-economic Research

Social field of ITER, the analysis of discourse and the question of public acceptability; Scientific Practice in Fusion RTD – Distributed Cognition and Situated Problem-solving

Corresponding author **Piotr Stankiewicz**
piotrek@umk.pl

The research task conducted within the programme Socio-Economic Research on Fusion consisted of two separate projects: *Social field of ITER, the analysis of discourse and the question of public acceptability*, which was conducted in the field of sociology of discourse and *Scientific Practice in Fusion RTD – Distributed Cognition and Situated Problem-solving*, an ethnographic study in sociology of science. Both projects have been continuation of the research started in 2010 by the same team.

Social field of ITER, the analysis of discourse and the question of public acceptability

The overarching objective of the discourse analysis was a description and comparison of (1) ITER auto-presentation generated by the fusion community, expressed in its newsletters and bulletins with (2) auto-presentation and re-presentation of ITER in the national and local French newspapers.

The study conducted has been based on the assumption that a proper public representation and scientific communication with stakeholders is of utmost importance for the International Thermonuclear Experimental Reactor success. The research aimed at analysing discourses surrounding ITER construction. Both quantitative and qualitative discourse analysis methods have been applied to examine the communication developed around ITER in order to access the concepts, metaphors, frames and self-definitions of majority of the ITER scientific community. Because of the preliminary character of the study, the comparative examination is only partial. It concentrates on the analysis based on the presentation of ITER by internal discourse of the scientific community and external discourse of French press.

Analysed materials

Based on the methodology prepared in the previous phase of the project (conducted in 2010), two different types of the discourse have been analysed. Firstly, as mentioned above, we have focused on the inner discourse of the vast, multicultural and multinational community organized around ITER construction. We have reconstructed the auto-presentation of the ITER-centred community by analysing the official newsletters published by organizations such as EFDA, Agence ITER France, ITER. Secondly, in order to reconstruct the external representation of ITER and/or fusion technology, we have focused on the analysis of the French local and national press publications referring to ITER and/or fusion. The timeframe of the internal discourse analysis was June 2006 – December 2010. Parallel to our analysis, the French team from the CAE Cadarache conducted the analysis of the French press (external discourse).

The research procedure was divided into two steps:

Step 1. Classification of all texts according to prepared categorical matrix (coding scheme, its detailed description and instruction of usage). The aim of this step was to enable a quantitative and qualitative analysis.

Step 2. Qualitative and quantitative study of selected parts of the material, based on results of the matrix analysis. The materials for the analysis were sampled on the basis of sensitivity of texts identified in Step 1. We have decided to analyse texts with two and more sensitivities. In addition, during implementation of Step 1, we have identified some sociologically-interesting texts in database, which should undergo in-depth analysis. In total, we have conducted in-depth analysis of 52 texts representing internal discourse.

Conclusions

Results of external and internal discourses analysis suggest that:

1. Vast discrepancies exist between the external and internal modes of ITER representation which may make the communication of fusion community with various groups ineffective:
 - a. external and internal discourses concentrate on different topics;
 - b. both discourses pose radically different structures of sensitivities; ways of scientific communication concerning ITER seem incompatible with definitions, needs, and values of lay stakeholders;
 - c. internal discourse frames ITER as politically-neutral, technical issue which will bring benefits for various groups of interests; at the same time external discourse focus on such questions as costs and social conflicts.
2. There are also areas of incompatibilities and communicational 'breaks' in the domain of internal fusion community discourse as it is officially presented; two different types of texts have dominated the internal discourse. First type consists of strictly technical articles concentrated on specific issues, which present ITER as highly complex socio-technical entity (difficult technical problems, large organization etc.) – they are prospective in nature. Second type consists of texts presenting general outline of the project and abstract metaphors; these texts concentrate on motivating various actors; there is very weak connection between both ways of ITER presenting which creates cognitive dissonance; lay reader may be perplexed or confused, because, on the one hand, ITER is presented as complex, challenging entity, on the other hand, the internal discourse does not present resources and methods of solving complex problems and achieving ambitious aims.
3. Currently internal discourse of fusion community does not fulfil one of its important functions – it does not define and monitor main problems of the community. The concentration of discourse may seem an effective way of presenting ITER as a way to commercial fusion energy – it is beneficial as regards motivation to work and communication with taxpayers and investors; nonetheless, diagnostic framing is important if fusion community is going to effectively solve well defined problems – not only those local problems which are the focus of great part of texts, but also those general, far-reaching aims depicted by non-technical texts, which are more interesting to the public.

Scientific Practice in Fusion RTD – Distributed Cognition and Situated Problem-solving

The project addressed collective cognitive processes and joint problem-solving in the domain of fusion RTD. The research focused on: organizational and situational factors affecting cognition and problem solving, coordination of collective cognitive work and on the use of cognitive artefacts and other kinds of 'cognitive scaffoldings' – cultural, material or technological factors supporting or facilitating cognition. Research conducted in 2011 consisted of application of theoretical and methodological framework prepared in the previous year. 12 in-depth, semi-structured interviews with scientists and engineers representing different member organizations of Polish Association Euratom have been conducted. In addition, several informal conversations with representatives of Association and participatory observations have been conducted.

Results

Ethnographic research allowed highlighting several factors which are important from the perspective of daily practice of fusion RTD community members.

First of all, although fusion research is currently a research front, scientific and technical problems which community members are facing, are perceived by them as standard science/engineering issues. In general, interviewed researchers perceive the organizational and institutional setting of their work as a source of problems. They mention in this context not only the shortage of resources or the delays but also problem of 'generation gap', lack of motivation among graduates and PhD students to join fusion RTD, but also the instability of the whole setting and the problems associated with 'navigating' within.

As many respondents have stressed, the Polish Association have two important traits: it is relatively young and it is quite dispersed. Respondents involved in organizational issues and strategic decision making for Association frequently described situation of Polish Association using notions of competition, rivalry for resources, and group interests. According to respondents, older members of EFDA have several strategic advantages over younger, more inexperienced ones.

The interviewed scientists frequently, carefully and skeptically referred to the future prospect of fusion research. One should take into account respondents' definition of situation: the general prospect of fusion research is not of their direct strong interest; instead, they focus on specific technical issues, parts of the 'machine' and not on the whole of the system.

One of the most important issues in fusion RTD concerns research infrastructure and 'the big machines' around which the research activities and communication are concentrated. It is important that physicists discussed the issue of big machines not in terms of their 'cognitive' or 'epistemological' functions, but mainly as resources which enable the social integration and reproduction of the whole organization. One of respondents used strictly physical metaphor comparing 'big machines' in physics to 'centers of crystallization' – objects around which crystals form.

Conclusions

The current study shows that in order to study scientific collectives as socio-material networks one has to conduct the analysis of conversations and in-depth interviews, but also to carry out the long term on-site observations of the daily practices of fusion RTD community members. Only then tinkering and other activities associated with artifacts usage could be reconstructed. But it is still an open question if this kind of research could reveal something new about science and engineering, or fusion physics in particular.