FuseNet Project - Final Report





Grant Agreement Number :	224982
Project acronym :	FUSENET
Project title :	FUSENET – A European Fusion Education Network
Funding Scheme :	As described in ANNEX 1
Period Covered :	Oct 01, 2008 – Sept 30, 2013
Name of the scientific represe and organisation :	entative of the project's coordinator, title Prof. dr. N.J. Lopes Cardozo
Tel. : Email :	+31-(0)40-2472253 <u>chair@fusenet.eu</u>



http://www.fusenet.eu/





1. Executive Summary

The FP7 coordination action FuseNet, which ran for 5 years starting in October 2008, has successfully developed an active European network on fusion education, and made this sustainable as the FuseNet Association. This new legal entity has already well over 40 fee-paying members – universities, research laboratories and industry involved in the development of fusion energy - and is still growing steadily.

The FuseNet Project has resulted in the development of new learning opportunities in laboratories and industry; the joint development of new educational materials, such as a book on fusion technology, an on-line course, web-based learning tools and hands-on experiments; the coordination and organization of joint educational activities such as summer schools; and the initiation of the annual joint PhD-event. As an important result of the network, joint academic criteria have been established for the award of the European Fusion Master and Doctoral certificates, with the first award ceremony having taken place in September 2013. Several pre-existing fusion doctoral programs have been brought under the FuseNet umbrella. The FuseNet website, which provides transparent access to all FuseNet functions and acts as portal to all fusion education in Europe, is visited by over 4000 unique visitors every month.



Figure 1: The general assembly of the FuseNet Association at its meeting in Sofia, in February 2013



Moreover, weeklong master classes have been organized in which students could work with the hands-on experiments that have been developed with FuseNet support, on the basis of which these plasma labs and courses were evaluated. The annual joint European PhD-event has been organized 3 times, each one benefitting from the experience of the previous edition, further establishing FuseNet as the joint European PhD umbrella. Finally, FuseNet has started a matchmaking service aimed at stimulating internships in industry, in collaboration with the Fusion Industry Innovation Forum.

With that the FuseNet project has delivered its targets, on budget. It has created an active network that runs a set of well-established activities with a large and still increasing membership. The network is ready to take on a central role in the implementation of the Fusion education programme under H2020.





2. A summary description of project context and objectives

2.1 Context: ITER - A new era in the development of fusion energy the need to educate a new generation fusion scientists and engineers

Nuclear Fusion, the energy source of the stars, holds the promise of clean and safe electricity, for all and forever. However, its realization is an immense scientific and technical challenge, so large in fact that for the past 50 years this development has been carried out in a worldwide collaborative effort. This has led to the ITER project, the first fusion test reactor that will produce about the same amount of power as a gas power station (500 MW), albeit as scientific proof-of-principle and not as production facility.

The reactor will work as power amplifier with a power amplification of 10. ITER is a collaborative project of 7 international parties: China, Japan, India, S-Korea, Russia, the USA and the host party EU. ITER, presently under construction in Cadarache (South of France), counts as one of the largest big science projects, similar in scale, of investment as well as collaboration, with the big accelerators for high-energy physics such as CERN.

Around the signing of the ITER agreement in 2006 and the acceleration of the development of fusion power that this brought along, it was realized that there was a strong need in Europe to educate and train a new generation of fusion scientists and engineers. The need comes forth from the upcoming construction and later exploitation of ITER on the one hand, and the age distribution of the present fusion staff on the other.

Moreover, a shift in the distribution of competences of the fusion professionals is needed: there will be an increased need for various engineering disciplines in view of the extensive design and construction activities, and the fact that in ITER nuclear engineering is much more important than in present day fusion experiments. Another very important factor is that ITER construction will mobilize some 5000 workers in industry, and part of them need to acquire some or extensive fusion-specific training. These developments will be reinforced by the phasing-in of DEMO activities. All these factors called and call for a human resource policy, including adequate education and training, with a long-term view.

