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Some user requirements of a remote reactor control analysed with UML tools

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Abstract

In this paper, we are dealing with remote participation in fusion experiments. The common problem of these different collaboration projects is the interactivity lack of the distant user. At the moment, remote participation in fusion experiments is still needed in the specification and analysis phases. In this context, tools which can identify the sub-systems involved and outside actors properly, and the dynamic views of the communications through use cases is very useful. We have experimented on Unified Modeling Language (UML) and found that it provides powerful diagrams for the conception of the future virtual control room.

Keywords: Virtual control room; Use cases; UML 2.0

1. Introduction

Today, with the perspective of ITER, the different countries participating have been working on the subject of remote participation in fusion experiment and they have been developing their own systems. In France, the Direction de la Recherche sur la Fusion Controlée (DRFC) also works on this remote participation subject in collaboration with the team that uses the tokamak JET established in Cuhlam in England, and with a Quebec team of the National Institute of Scientific Research (INRS), that can follow from afar the experiments on the TORESUPRA tokamak reactor.

While studying these different already developed projects or in the course of development, one rediscovers everywhere the same functions; accesses through Internet to a database where the results of the different shocks are stocked, and the following up in real time with the possibility to obtain data and to apply algorithms of treatment so as to analyze them.

The purpose of such a project is to be able to analyze in the best and quickest way as possible the results of a shock, while transmitting the results of the experiments through out the different specialized laboratories in fusion, in order to know their opinion.

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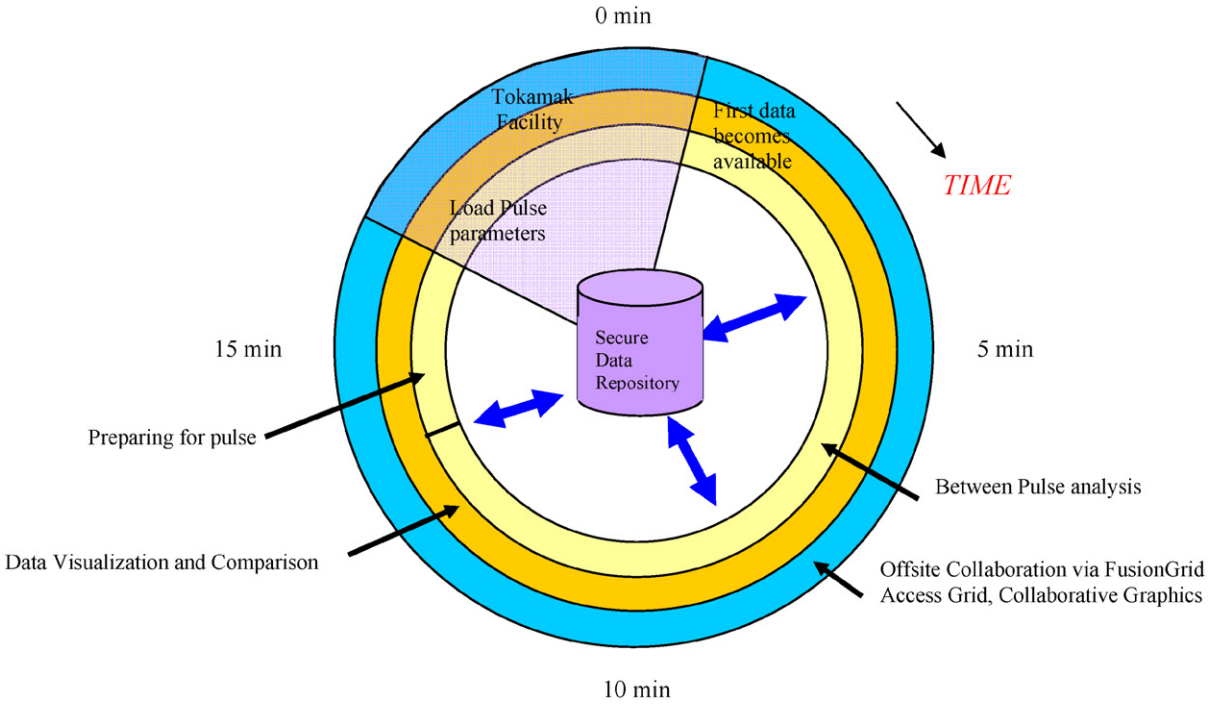

Fig. 1. Cycle for fusion experiments.

This type of remote participation was set up, for example in the United States, where 40 institutions grouping together 1000 scientists working on fusion came together within a same project, called "The US National Fusion Collaboratory" [1]. The objective of this project was to develop a system "The FusionGrid" allowing on ensuring the division of calculations, of visualization and of data through Internet.

The quick analysis of a shock is necessary so as to prepare and improve the parameters of the shock to follow so that, at the time of the experimental meeting, the shocks unfold in a cyclic way, as shown in Fig. 1.

The common problem of these different collaboration projects is the interactivity lack of the distant user. In fact, during the sequence of experiments, the user has more a role of spectator than of actor because the possibilities of interaction with the members of the control room are often limited to the possibility to communicate with them, either through a system of Visio-conference, or through simply an instantaneous package service or a telephone link.

At the present time, only the project developed by the Spanish team Centro of Investigaciones Energéticas, Medioambientales Tecnológicas (CIEMAT) of Madrid, offers the distant user some possibilities of better interaction with the control room with their Stellerator, named TJ-II [2–4]. This system is based on the use of Internet dynamic pages, enriched with JAVA applications and Labview virtual instruments [8], that can configure acquisition cards, generate bends, define diagnosis, see how for certain privileged users to define a shock. In order to make the experiments safe, they use a security system, called Point of Access to Providers of Information (PAPI). PAPI enables the authentification of the user and checks the access to the different Internet pages according to the profile of the user. The interest of this system is that it is used in the same way by the distant users and by those present in the control room.

The interaction of the distant user with the reactor is the principal problem encountered. For this purpose, we have firstly developed our study by looking for solutions for two problems:

- Define user's requirements for a virtual remote control room;