

1. Final Report WP2, main S&T Results

WP2: User Needs and Policies

Main S&T results:

WP2 work on user needs consisted in a series of activities ranging from initial discussions for the determination of the tools needed to the generation of the Umbrella prototype (D 2.5) as final result.

First steps were wide-spread discussions within WP2 and with further experts in the field leading to the '*Review of Science Cases and their Requirements*' evaluating the *Needs of the User Community* (Deliverable D2.1). It was followed by the evaluation of the *EuroFEL Concept for the Integration of the User Needs* (deliverable D2.2). A further preparation was the *Evaluation of Existing Access Policies and Panels* (Deliverable D2.3). All these evaluations were quite helpful for proper positioning the new tools within the existing IT environment.

It was seen from the beginning that because of the strong overlap between the user activities at the new FEL facilities and the those at the existing photon and neutron facilities island solutions have to be avoided and new features must be interesting for all partners. Furthermore the introduction of any novel, common EU-wide tools affect in part the autonomy of the individual facilities and thus have to find unanimous agreement of these facilities.

The result of the intense discussions within the WP and with interested partners was the Umbrella concept with the following key requirements:

- *Keep proven functionalities:* In practically all cases the new FEL facilities are constructed at sites which have already synchrotron and/or neutron facilities in operation with a large overlap between the respective user communities. Well-advanced web-based user office (WUO) systems are in operation at these facilities with a wealth of applications. The new system should be designed such, that these applications are kept and new functionalities added on top (Umbrella concept).
- *Parallel implementation:* Because of the large number of users in the photon / neutron community (order of 30'000 in Europe) it is organisationally not possible to swap all WUO to the Umbrella system in one step. Instead, Umbrella is developed first as prototype system for the FEL facilities and further facilities can join as they want. This requires, however, that the system is designed such, that a parallel operation between old and new systems is possible.
- *Slim structure:* The manpower at the existing WUOs is limited and there is no possibility for additional manpower in the context of the Umbrella system. That means, that aside the introduction of Umbrella should not require additional and ideally even less operating resources.
- *Confidentiality:* As these facilities are running at the forefront of the scientific research, competition and confidentiality between users and also facilities plays an important role. The proposed solutions have to take that into account already in the design of the tools.
- *Open for future developments:* Research at the photon / neutron facilities experiences presently a revolution in detector development. These new detectors offer novel and exciting scientific options but at the same time produce data volumes (petabytes scale) which are far beyond the present range. This will introduce a basic change in the way, measured data are analysed and any new system will have to take that into account.

The answer developed in WP2 was the Umbrella system with the following main characteristics:

- *Unique user identification:* In order to protect confidentiality, the identity of a user has to be guaranteed in an European scale. In order to keep at the same time the administrative load as low as possible, a multi-level authentication is provided ranging from a Google-type handshake to in-person identification at a local facility user office.
- *Shibboleth as underlying layer:* Authentication is a hot topic in many fields, e.g. building access control or in the banking sector. Basing the new tools on a professional system provides the advantage that new developments in authentication techniques can be automatically taken over. Because of its superior security features (SAML2) and because of its widespread use in the commercial and academic sectors the decision was to choose *Shibboleth* as underlying layer. The present configuration, however, where a person identifies itself by entering username + password + affiliation is not suited in this case, as affiliation is not a stable identifier. In addition, unique identification is not provided. It has, therefore, been decided to go for a special pan-European federation with one identity provider (see below), where the existing user offices at the partner facilities take over the role of in-person identification.
- *Hybrid databases:* The confidentiality aspect was taken into account by a hybrid structure of the respective databases. Only that information is stored centrally, which is necessary for the proper functioning of the tools. All other information is kept at the local WUOs. Compared to more straight-forward topologies this requires more synchronisation requirements; it lowers, however, significantly any data-protection requirements.

This led to the following construction:

- The *European Authentication and Authorization* (EAA) system. This is the basis of the Umbrella system. The central part of the hybrid system provides the user identification with access to username and password information. The remaining user information including any authorisation information is stored at the local WUO, where the user has registered. Personal address modifications are entered by the user himself. The EAA includes a panEuropean affiliation database, also with central and local elements.
- The *European User Umbrella* (EUU) system. One unique authentication via EAA is provided various important applications are possible. The EUU consists of a bundle of applications which base in this way on the EAA:
 - o *Coaching:* There are many novice users coming to neutron and photon large facilities, which have no experience in this special environment. This is especially true for FEL facilities with users coming from laboratory laser sources. For these group of users the EAA includes a structured web-based coaching service, which puts these users over the threshold and helps them to write competitive experimental proposals.
 - o *Proposal module handling:* This is a good example for the hybrid approach. Proposals can be divided into a *general, scientific part* –describing e.g. scientific background, goal of the experiment – and a *local, facility-specific part* –e.g. specifying the proposers, describing security issues. All this information is stored at the WUO of the respective facility, and that will be unchanged with the Umbrella. The novel feature of the Umbrella is, that a proposer will be able to access the general part of his/her previous proposal, edit it and submit it again together with the local part. No information is stored centrally and the administrative burden for the user is reduced significantly. As by-product of this development the structure of the

general part is harmonised between the partners, which again eases the work of the referees in comparing and ranking the proposals submitted.

- *The Umbrella+ system: Coaching and Proposal module handling* are only first examples on applications based upon the EAA. A further example is *Remote File Access*, which will allow users to access their experimental data e.g. from the home institute for download of first processing. Another option will be *Remote Experiment Access*, where a member of an experimental team is able to inspect online and remotely experimental spectra. In this way, senior scientists are able to discuss the status of an experiment, even if they are not on site. The Umbrella+ features will be developed by EuroFEL in cooperation with related FP7 projects as PaN-Data, CRISP and NMI3.

The Definition of the Web-based Access Point (deliverable D2.4) was finalised in Spring 2010. It was the basis for the definition of the architecture of the prototype, which after a three-month work was available in August 2010. Again a consultation of the WP2 partners resulted in an unanimous agreement. Thus, coding of the prototype could start on September 1, 2010. In order to keep the partners involved, the development of the code was accompanied by several presentations (Berlin, Oct 7, 2010 as satellite meeting to the PaN-data FtF meeting and Hamburg, Nov 3, 2010, parallel to a EuroFEL FtF meeting, Hamburg, Jan 18 and 26, 2011, parallel to the DESY users meeting and the EuroFEL meeting, ESRF, Grenoble, Jan 20, 2011).

The prototype was installed on a special server at PSI and was available for remote testing. In order to demonstrate the proper functionality, the PSI DUO team provided a test installation of the PSI DUO system and the Umbrella prototype was linked to the DUO test system. From this test setup it was estimated that the modification effort to adapt DUO-type user office systems (majority of the European systems) to the Umbrella system was of the order of days to a week. A similar time estimate was derived by the SMIS (ESRF user office system) experts. The technical description of the Umbrella prototype is available. The presentation of the prototype was unanimously accepted by the participating facilities and it has been decided to go as a second step to the test installations at all facilities before proceeding to the final implementation.