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User-driven quality certification of workplace software, the UsersAward experience

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Abstract. This paper summarizes activities and results from the quality assessment project ITQ, “Quality certification of IT support at work”, which was performed by Swedish researchers in close co-operation with trade unions in 1999-2002. The ITQ project is part of a network, UsersAward, which continues to work for the goal to develop and maintain a strategy for good software products on the work floor through strong user influence.

A main result from ITQ is the first (2002) version of a user satisfaction based certification method, User Certified 2002, which is described in some detail. Other, parallel activities, large surveys of IT use in work places, user conferences, pilot projects, and a yearly IT Prize contest, are described more briefly.

Finally implications and plans for the future, especially international spread of the activities, and further development of the certification process, are described and discussed.

Keywords. User involvement, Workplace software use, Certification, User movement

1. Background

The UsersAward network of user oriented activities was launched in 1998, initiated by the LO (Swedish Trade Union Confederation) in cooperation with the TCO (Swedish Confederation for Professional Employees).

The ITQ project, which constituted a research part of the network, brought together a multidisciplinary team of researchers from four universities in Sweden: KTH in Stockholm (coordinator), Uppsala University, University Gävle, and Luleå Technical University.

The activities are in line with the “Scandinavian model” of involving users in IT development for and use at workplaces. In the seminal Utopia project in the 1980s [Bødker & al 1987] the focus was on user involvement in the design and development of the IT support. Since then the understanding has developed, that for IT support to work well in workplaces it is also crucial that users are involved and can influence the implementation, daily use and further development of the software, [Bødker & al 2000]. The results of ITQ, see below, confirm this.

Another inspiration for the Users’ Award activities is the TCO certification of personal computers, [Boivie & al 1997], [Sundblad & al 2002]. This union driven activity is extremely successful, literally hundreds of millions of users around the world use TCO certified personal computers.

2. Objective

The goal of the UsersAward network is *to develop and maintain a strategy for better workplace software through*

user influence, where union and consumer organisations cooperate with researchers, user companies and software providers *in a powerful combination of user movement and research*. This strategy for user influence has been manifested in a unique combination of user surveys, user conferences, pilot projects, a yearly IT Prize contest, and, last but not least, a *Users’ certification process for workplace software packages*.

3. Approach

3.1. The quest for a user-driven certification method

The prime challenge for the research in the ITQ project was to develop a certification process for workplace software. The inspiration for this goal was the successful certification program for display units, TCO’92, which had been launched by TCO through a broad cooperation with researchers, consumer and environmental organisations. This certification programme has been regularly upgraded (TCO’95, TCO’99) and by the year 2000 it had put its label on more than 200 million VDUs worldwide.

LO now wanted the ITQ project to develop a similar model for the area of workplace software. To be trustworthy in the eyes of end-users and the marketplace, each certification had to be based on end-user satisfaction with the software in question and a scientifically reliable process. In this respect, *the method is user-driven*, both in the sense that it is initiated and developed by two of Sweden’s biggest user organisations, and in the sense that the certificate each software package receives is based on end-users from at least two different

workplaces who, after having operated the software for more than a year, have given it their seal of approval.

It was not enough for the ITQ certification process to be able to qualify workplace software in actual use. *The certification process had to meet the criteria of usefulness itself. The reports from each certification should be concise and vivid enough to be read and studied in depth by end-users. The set of criteria and the questionnaires had to be short, relevant, and pointed so that people from all occupations of the typical workplace could recognize and engage in answering them. Therefore, the whole research effort had to be conducted in close contact with experienced users from a broad range of application domains, in order to get a direct feedback on relevance and language. This was the rationale for the network's elaborate combination of user movement activities and research efforts – to secure the usability of the certification method as such.*

3.2. The IT Map: a survey of how systems are actually used

One of the first actions taken by the trade union leaders involved in the ITQ project was to initiate a broad survey on the union membership satisfaction with the IT tools at their workplace. The survey was performed in 2000 together with five industrial unions organising the Forest and Wood; Paper; Food; Metals; Chemistry and Mechanical industries. By confirming the widespread discontent signaled by earlier studies, it provided an "IT Map" of the grave problems the UsersAward network had to deal with.

The IT-Map presented the opinions of 1124 users, of which 50% represented workers in direct production.¹

- Out of all users, just over 50% regarded the ERP system to be useful in their own work situation. For personnel in direct production, maintenance, and distribution this figure decreases to 40%.
- Less than half of all users found that the ERP systems gave them a satisfactory overview of the workflow. 9% of the women and 16% of the men felt that they could influence how the systems were deployed.
- Three out of ten agreed that the systems had helped develop the work organisation.
- Only one out of ten stated that they had obtained appropriate training.
- Out of the personnel working in direct production, just over 10% found that the ERP systems supported learning and experimentation.

An earlier study, from May 1999, had asked the membership and the local union leadership to prioritise a set of concrete tasks that the UsersAward network should engage in. 65% of the respondents argued that "Certification of software providers" was the most urgent task, followed by "Checklists for deployment" (62%), "Education and training on IT and work organisation" (58%), "User tests of systems" (56%), and "User conferences" (42%). [IT-kartan 2000, Delrapport, LO 2000].

¹ The survey is summarized in "IT-Kartan, Användare och IT-system i svenskt näringsliv", Torbjörn Lind, LO 2002.

3.3. The vision of the UsersAward network

Based on the depressing image the IT Map had revealed, and guided by the membership opinions on what to do about it, the following vision for subsequent actions emerged for the UsersAward network.

The network should:

- develop criteria and a procedure for *User-driven workplace software certification*.
- perform *Pilot projects* to underpin the articulation of those quality criteria
- perform periodic follow-ups of the *IT Map* to track membership satisfaction
- and initiate a series of user activities, such as yearly *IT Prize contests*, *User conferences*, the launching of a *UsersAward website*, and the convening of a *User panel* to mobilize and guide the emergent user movement

The prime challenge in this vision was to do what nobody had succeeded in doing before, to develop a viable quality certification process for workplace software. The project leadership at the LO, Peter Forss, Torbjörn Lind and Ove Ivarsen, were all strongly inspired by the successful TCO example. And the early survey on policy measures showed that this appreciation was grounded in the union membership. But the TCO had already tried out a quality assurance package for software at work, an initiative that did not gain sufficient momentum due to the turbulent character of software development at the time [Boivie, 1996]. LO's new strategy, developed in close contact with the TCO, was to underpin the development of the certification process with a broader range of supportive measures. Not only with well directed and thorough research efforts, but also with the mobilization of a broad user movement that could help spread the word about useful IT tools, and help articulate the new problems that emerged in parallel with new technological breakthroughs.

4. Results

To begin our account for the results of the ITQ project with the most general findings first, we can report that the strategy *to support the development of a certification process with a supporting context of user activities* worked as planned. The yearly IT Prize developed into a *general rehearsal* for the ultimate event for software suppliers, the successful certification of their software. The IT Prize also became an important *test-bed for trying out and refining new quality criteria*. The User conference provided opportunities for all parties to meet – for software providers *to demonstrate their software*, for user groups *to probe into quality issues* and for the researchers *to get feedback on their findings*. In this way, the research and the user activities were sufficiently well intertwined to become mutually supportive.



Figure 1. In the IT Prize Contest 2002, Stocka-Ström home healthcare for the elderly received an honorary mention. TimeCare, the winner that year was later to become the first software to receive the User Certified 2002 certificate.

Through iterative development of quality criteria – in eight pilot studies (see Table 1), in four yearly evaluations of a total of 20 nominees to the IT Prize finals, and in four project panel seminars – six groups of criteria emerged with a total of 36 criteria (criteria per group in parentheses): 1. Overall benefits (3), 2. Deployment method (9), 3. Technical features (10), 4. Work task support (6), 5. Communicative support (5), 6. Local assessment method (3).

This set of criteria provided the basis for the certification procedure, in which interviews and questionnaires at three reference workplaces, chosen by the software supplier in his self-declaration, constitute the basis for the final evaluation. The fact that, in both certifications carried out during 2002, only two out of the three evaluated reference workplace installations made the test, confirms that the set of criteria and the chosen level of approval was sufficiently balanced. Furthermore, the fact that both software providers experienced strong gains in sales after certification, and that they both credited this to the certifications, confirms that the gaining of a user's seal of approval can become an important competitive advantage in the marketplace.

or break for developing business and work?	user participation in deployment of the IT tool
Enterprise Resource Plannings systems from the users' point of view	To what extent does the software support new ways of learning and working?
Seminar with the Danish IDAK-project (DTU)	Personal integrity, integration of IT tools
Seminar on Enterprise Application Integration with IVF	Integration of IT tools

Table 1: Pilot studies performed within the ITQ project. (All reports are in Swedish and can ordered from CID. Short summaries are given in Sundblad 2002).

5. User Certified 2002 – rationale, procedure, and criteria

5.1. Rationale

The quality aspects deemed relevant to assess apply to both the software as artefact and the method in which the software has been deployed in the client organisation. Hence, the aim of the set of criteria is that it should embrace both tangible characteristics of the software package and its associated documentation (declared design principles, principles for deployment, functionality, cost, documented efficiency measures etc) as well as end-user experience of how well the software provider has managed to live up to the declared levels of performance.

5.2. Procedure

A software provider, who has applied for certification of a certain software package, is asked to fill out a self declaration regarding the package and its intended use. The self declaration is based on the set of criteria for assessment of user satisfaction (see below). But it has additional headings under which the provider is asked to specify the methodology used for software development (experiences from user domain, compliance with standards and accepted developmental procedures etc.), methodology for software deployment (processes for user participation and training etc.), as well as details on technical and marketing aspects. In this declaration the provider is also asked to suggest three workplaces at which the user satisfaction of the package can be assessed. After that, the evaluator team carries out interviews and questionnaires at the three workplaces.

In the interviews and questionnaire, each criterion of the defined set of 29 quality criteria (36 criteria in the management version) is presented in the form of a statement to be confirmed on a value scale between 1 (total dismissal) to 6 (total agreement). The assessment is done on the three workplaces, out of which two workplaces have to qualify to the stipulated level (see below). At each workplace, three end-users are interviewed and asked 1) to confirm the statements in the questionnaire with a value between 1 and 6 and, 2) to give a short motivation to their level of agreement. Then three representatives from management are interviewed in the same way. (All interviews are sound-recorded.) These interviews are then accompanied by a questionnaire to a panel made up of ten percent (or at least ten users) of the end-users at the worksite.

Pilot study	Criteria highlighted in the study
Arvika Foundry – Simulation for daily planning: Arvika	Exploration of alternatives by individuals and teams
3D-visualisation for user participation in requirement specification: Arvika Foundry, Sandvik Steel	User participation in design and deployment of IT tools
IT-jetty – Webb support for overview and systems integration: Volvo Truck Umeå	Overview of IT tools, User participation in design, deployment and follow-up of the plants total IT resources
Mobile care - Mobile systems for planning health care: Nybro	Recording and access to data when and where it is needed
Implementing Movex – Driver	Clear shared motivation for,

The last step of the certification process is a hearing, conducted by the UsersAward evaluators, in which the software provider gets the opportunity to answer complementary questions from the evaluators. Based on all this information the UsersAward evaluation team makes the evaluation and assessment in cooperation with the CID researchers, who verify the interpretation of results.

The users are considered satisfied as a whole, and a certificate is issued, when at least two of the investigated workplaces meet the following levels of confirmed criteria statements in the questionnaires:

- a mean value of at least 4.0 on 80 percent of the statements for all users
- a mean value of at least 4.0 on 67 percent of the statements for each user category*
- a mean value of at least 4.0 on 67 percent of the statements for both men and women*

* The criteria on user categories and gender are only applicable if there are at least 5 users in each group.

In order to comply with the criteria that had been set up for the certification process itself – that the reports from each certification should be concise and vivid enough to be read and studied in depth by end-users – a detailed protocol is published for download at the UsersAward website www.usersaward.com, (see Figure 3). Here, a small set of "realization factors", derived from the successful deployments, are presented. These guidelines are intended to be used as guidelines for how this particular software should be deployed in this particular environment.

5.3. Criteria

1. Total benefit: 1.1 Business benefit, 1.2 Customer benefit, 1.3 *Owner benefit* (Criteria in italics are only included in the interview/questionnaire to management.)

In sum: the benefit of the deployed IT support is satisfactory from the point of view of better quality, higher productivity, development of competence; for customers and clients; and for owners.

2. Deployment process: 2.1 Deployment motivation, 2.2 User participation in deployment, 2.3 User participation in work redesign, 2.4 Training, 2.5 Competence development, 2.6 *Enterprise application integration*, 2.7 *Deployment timeplan*, 2.8 *Deployment user-procurer-supplier cooperation*, 2.9 *Human resource allocation*

In sum: the IT support is deployed from a clear rationale, taking the users' ideas into account in an active process, giving the users adequate training and possibilities for competence development.

3. Technical design: 3.1 Overview of functionality, 3.2 Flexibility & robustness, 3.3 Trust in the system, 3.4 Security, 3.5 Personalisation, 3.6 Help facilities, 3.7 Redo facilities, 3.8 Adaptability to other IT tools, 3.9 Access to system information, 3.10 System access for registration

In sum: the IT support provides good overview, flexibility, adaptability, integrity, help, redo, and access of information.

4. Support for work tasks: 4.1 Overview of work tasks, 4.2 Task support, 4.3 Engaging to use, 4.4 Stress reduction, 4.5 Supports exploration, 4.6 Supports follow-up of work

In sum: the IT support provides good overview of work tasks, means for testing alternatives and doing follow-up, is engaging, and reduces (rather than increases) stress.

5. Support for communication and cooperation: 5.1

Extends individual authorization, 5.2 Extends team authorization, 5.3 Internal communication, 5.4 External communication with suppliers, 5.5 External communication with customers

In sum: the IT support helps enhance the individual's and the team's levels of authority and independence, the level of cooperation in and between teams, with other parts of the organisation, and with suppliers, customers, and clients.

6. Quality assurance: 6.1 Feedback from users, 6.2 *Supplier self declaration conformance*

In sum: their is a continuous feedback of user needs to the relevant support organisation.

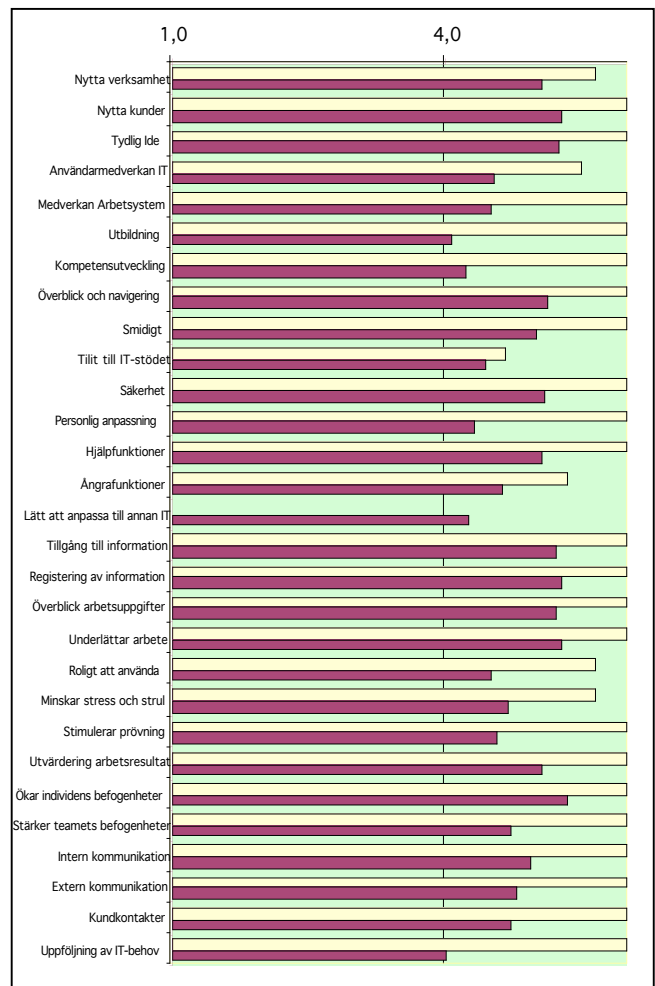


Figure 2: The summary diagram from one of the three workplaces investigated in the Monitor certification November 2002, (light bars account for the mean value of answers from the user interview, dark bars are the mean values from the user questionnaire.)

6. Conclusions

The research vision was that *a certification process based on user participation* could be one important step towards a faster and broader dissemination of good examples of IT use at the workforce. A stronger focus on quality-in-use could extend user participation from the level of being an element of exemplary development projects, to being manifested in an institutional framework for user-driven quality assurance. The two certifications that were carried out during 2002, and the favourable publicity they received, may be taken as a sign that the UsersAward network is heading in the right direction. However, there remains a substantial, continued research effort, and much work for the newly formed development company UsersAward AB, in order to establish the certification program in the marketplace and thereby to turn it into a stable framework for sustainable user influence on the design of workplacesoftware.

In the case of the TCO program, the process of reaching out into the marketplace was helped by a level of competition between hardware suppliers that proved to be most favourable for the suppliers that first applied for and passed the TCO'92 tests. Since then, TCO Development AB, the company responsible for the TCO certifications, has maintained a close relationship with such "frontgroup" suppliers which have shown a strong commitment to fulfill TCO's successively raised quality standards. It is the explicit goal of UsersAward AB to show a similar openness and understanding of the needs of individual software suppliers, an attitude that can be readily seen from how the certified software packages are presented at the UsersAward website, <http://www.usersaward.se>.

Another challenge for the research team and UsersAward AB is to establish international contacts through which national adaptations to the UC 2002 certificate can be developed. LO's user organisation counterparts in Germany and Austria (IG Metal, IG BCE, Verdi, DGB, ÖGB) have now made a strong commitment to build national networks for cooperation with researchers and consultants (Tibay, Technologie- und Innovationsberatungsagentur). It is very important that a corresponding international network of research exchange is formed in order to support the joint

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research and development process of the UsersAward network. This provides the research group with a strong motivation to engage fellow researchers, nationally as well as internationally, in a long term, inter-disciplinary exchange.

A sustainable international research exchange in the area of user quality assessment has to build on strong ties to the major user organisation and their international networks. In the case of the TCO programme, the evolving network that eventually helped to launch the first successful label, TCO'92, took ten years of trial and error to build. In order to improve the quality of visual display units, an alliance with the Swedish Society for Nature Conservation (SNF), the testing and technical certification institute SEMKO, and the governmental agency for energy conservation NUTEK proved to provide a sufficient negotiating power. (Hollander, 2001). In the case of the UsersAward certification program, the LO now has TCO as an important partner. The Swedish Agency for Innovation Systems (VINNOVA) is the sponsor of an initial five year period of R&D, and the KTH acts as a coordinator of national and international research.

Among the trends in Sweden that may play a favourable role for the development of the UsersAward network is that new health and safety regulations for work with display units has been introduced, regulations that lend itself to new innovative interpretations of how software should be used at the workforce. (ASF 1998:5). A similar favourable trend on the international arena is the broader view taken by the standards organisations on the rapid transformation of IT implementation and usage. The ISO standard "Human-centred design processes for interactive systems" (ISO 13407:1999) will soon be subject to a revision in which the Technical Report "Human-centred design lifecycle process description" (ISO TR 18529) may play a decisive role. This might provide an important common ground for an international cooperation in which user and research organisations could unite their efforts to enhance the way in which software is used at the workforce.

partner university departments have been involved as contributors and discussion partners in this work and we thank them all. Specifically we want to mention Per-Erik Boivie, Jan Gulliksen, Ove Ivarsen and Jenny Johansson.

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