

# A Portal-Based Tool for Developing, Delivering and Working with Guidelines

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**Abstract.** Guidelines and standards are gaining increasing importance worldwide. However, their process of development is still in a state of flux. The same stands regarding the means for spreading, retrieving and utilising such knowledge. A portal-based approach is proposed here for supporting all lifecycle phases of guidelines and standards. The proposed approach has significant advantages: (a) it allows contributors from all over the globe to form working groups, share virtual working spaces and, thereby, collaborate for the development of guidelines and standards; (b) it facilitates the rapidly spread and effective use of produced knowledge; and (c) it tackles the demand-supply gap by bridging developers and consumers of knowledge.

**Keywords:** Guidelines, standards, portals, working with guidelines.

## 1 Introduction

Guidelines and standards are gaining increasing importance worldwide. For instance, guidelines, as directives to perform certain tasks effectively and efficiently, provide designers and developers with a framework for making appropriate and sound decisions. Overall, guidelines can raise the awareness of new concepts, assist in design choices, offer strategies for solving design and development problems, and can support evaluation. On the other hand, standards, as a stricter form of guidelines in terms of preparation, presentation and use, aim at transforming values criteria (e.g., quality, safety, efficiency and effectiveness) into real attributes of products and services. In general, standards contribute to economic and social progress since they facilitate global trade, improve quality, safety, security, environmental and consumer protection, promote the rational use of natural resources, and disseminate technologies and good practices.

For many years, guidelines and standards have constituted an inexpensive and widely used tool. However, despite their indisputable value and importance, several studies investigating the use of guidelines and standards by designers and developers [e.g., 1] have concluded that they are frequently ignored. This is mainly due to the

way that such knowledge is developed, communicated and used. Guidelines are often developed by organizations as part of internal and time consuming processes and there are no specialized IT tools available for facilitating their. On the other hand, regarding the dissemination of such knowledge several issues arise, mainly due to the fact that they are not exploited easily [4], and partly due to the nature of their typical incarnation medium (i.e., paper based-manuals), which usually raises issues of ineffectiveness and lack of user-friendliness [2]. Other issues involve the fact that guidelines are usually context of use - dependent, they often conflict with each other, and they may need supporting references, best practice examples and illustrations.

These limitations, in combination with the emerging need for interactive tools to support development activities, have given rise to a new generation of tools, which are usually referred to as *Tools for Working with Guidelines* (TFWWGs). TFWWG [11] are interactive software application or service that offer support for the use and integration of guidelines-related knowledge at any stage of an IT product development life-cycle. In this direction, preliminary efforts were targeted to the integration of guidelines into hypertext-based tools [e.g., 4, 11] or digital libraries [e.g., 4]. TFWWGs were also designed to assist the user interface usability inspection process and provide active support to various phases of the development process.

The use of portal technologies is proposed as an alternative mean for developing, and working with (i.e., dissemination and deployment) guidelines, through the incorporation of several well-explored mechanisms, such as search and browse facilities, online communities, communication and collaboration mechanisms, project administration facilities and digital libraries.

## 2 A Process for Collaborative Development of Guidelines

Overall, efforts in the field of TFWWGs have mainly focused on the effective and efficient delivery of such knowledge to potentially interested parties, putting limited attention to the lifecycle (development, dissemination and use) of guidelines and standards. To address this issue, a portal-based approach is proposed here as an innovative mean for developing and using guidelines, thus promoting a paradigm shift, from TFWWGs to *Tools for Developing, Disseminating & Deploying Guidelines* (D<sup>3</sup>Gs). In this direction, this paper defines a generic framework for the Collaborative Development of Guidelines and Standards (CDGS) involving all major stakeholders, and the appropriate computerization of this consensus building process so that it can be accessed from anywhere at any time.

The objectives set during the specification of the process for CDGS were to facilitate guidance and standardisation activities in various application domains; support the remote and collaborative development of such knowledge; bridge the gap between knowledge developers and knowledge consumers; and avoid the under-utilisation and regeneration of existing knowledge. The processes followed by a number of standardisation bodies were reviewed, paying particular attention to processes that involve approval from the public and / or external standardization

bodies. The final outcome is instantiated into two slightly different variations, one for developing guidelines (brief) and one for standards (extended).

Research and development of guidelines and standards for a specific domain can be organised into general Working Groups (WGs) in order to ensure coherent coordination, planning and programming of all activities. The stakeholders involved in such a process are briefly analysed in Table 1.

**Table 1.** Stakeholders of the CDGS process

<b>Working Group Members (WGMs)</b>	Persons <sup>1</sup> with expertise or direct interest in a specific WG, and who can potentially participate in a new CDGS Project <sup>2</sup> . They can also be responsible for conducting collaborative an analysis of the state of the art within the WG, and brainstorm ideas for New Work Proposals <sup>3</sup> (NWPs).
<b>Working Group Leader (WGL)</b>	One person per WG, delegated to moderate (invite, accept, etc.) the corresponding WGMs and lead technically all WG Projects.
<b>Originator</b>	A person proposing the preparation of a new set of guidelines or standards (i.e., a new CDGS Project). This is achieved by means of editing and submitting a NWP.
<b>Editor</b>	Typically the same person as the Originator of a NWP. Upon the approval of the NWP, the Editor is responsible for drafting the new set of guidelines or a standard, i.e., for running a new CDGS Project and editing the corresponding CDGS Report <sup>4</sup> . The Editor is also responsible for co-ordinating the work of all involved Authors (see below).
<b>Authors</b>	Upon approval of a NWP, the corresponding Editor specifies the authors (i.e., a team of experts) to participate to the new CDGS Project and contribute to the preparation of the corresponding CDGS Report.
<b>Board of Executives (BoE)</b>	A group of persons responsible for any operational issues and general decision making across all WGs.
<b>External Experts (ExEs)</b>	External (i.e., other than corresponding WGMs) persons with technical expertise related to the topic of a CDGS Project, and who are willing to review and provide their comments upon (draft versions of) the corresponding CDGS Report.
<b>Interested Parties (IPs)</b>	Persons who represent the target market of a WG. Interested Parties are offered the right to vote and comment upon NWPs and CDGS Reports of the WG in question.
<b>Focal Points (FPs)</b>	A WGM, nominated by the corresponding WGL and required to administrate and act as contact persons to the WG's IPs.
<b>Guidelines &amp; Standardisation Experts (GSEs)</b>	Persons with expertise in procedural and normative matters. They act as peer quality reviewers of submitted CDGS Reports.

From the moment a WG is created, a **Brainstorming** activity begins and runs until the WG gets annulled. Throughout this activity, the members of a WG participate to special interest discussions aiming at reviewing the state of the art across the corresponding WG, and brainstorming ideas for new work proposals.

<sup>1</sup> Or organizations.

<sup>2</sup> CDGS Project: A project for the Collaborative Development of Guidelines / Standard.

<sup>3</sup> New Work Proposal (NWP): Is an abstract document specifying the objectives of a new CDGS Project and suggesting potential authors for the corresponding CDGS Report.

<sup>4</sup> CDGS Report: This is the main outcome of a CDGS Project, i.e., a collection of guidelines or (a set of recommendations for) a standard.

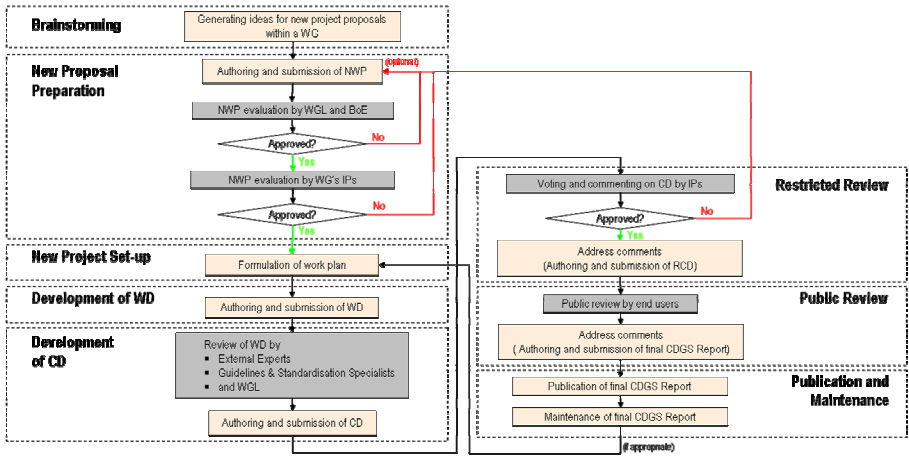


Fig. 1. Overview of lifecycle of guidelines development

The development lifecycle of guidelines and standards (see Fig. 1) involves:

- **New Proposal Preparation.** Once the concept for a new CDGS Project has been formed by an Originator, the preparation of the corresponding NWP is initiated.
  - a. First, the Originator drafts a NWP and submits it to the relevant WG. The NWP must specify the Editor and Author(s) of the new CDGS Project.
  - b. Then, the NWP is assessed by the corresponding WGL and BoE.
  - c. Upon approval, the NWP is disclosed to IPs for their comments.
- **New Project Set-up.** Upon approval of a NWP by the IPs, the WGL announces the launch of new CDGS Project. At this point, the Editor, in communication with the Authors, formulates an appropriate work plan (i.e., stages, deliverables and deadlines).
- **Development of Working Draft (WD).** The Editor and the Authors are responsible for the development of the first draft of the CDGS Report, namely the Working Draft (WD), which is the submitted for review.
- **Development of Consensus Draft (CD).** Then, the WD will undergo a review by ExEs, GSEs and the relevant WGL. The comments of these people are then addressed, leading (through iterations) to the Consensus Draft (CD).
- **Restricted Review.** The CD is put to the ballot among IPs, gathering their comments. The outcome of this phase is the Revised Consensus Draft (RCD).
- **Public Review.** Then, the RCD is made publicly available (e.g., to industrial users) for gathering further comments, which are addressed accordingly leading to the creation of the Final CDGS Report.
- **Publication and Maintenance.** The final stage of the CDGS Process is the publication and maintenance of the Final CDGS Report. Publication makes the Final CDGS Report available for public use, and -if appropriate- submitting it to external standardisation bodies. On the other hand, maintenance is concerned

with keeping a Final CDGS Report up-to-date. Depending on the results of evaluations (e.g., annual), one of the following processes can be initiated:

- a. Collaborative Revision of Guidelines and Standards (CRGS). This process aims at revising a CDGS Report (similar to the CDGS Process).
- b. Withdrawal. This involves archiving and removal from public view / use.

Guidelines- and standards-type documents produced by means of the CDGS process (i.e., CDGS Reports) are developed according to strict rules that ensure transparency. However, it can take time to achieve consensus among the interested parties and to go through the public review process. In some cases thought, and particularly in cases related to fast-changing technology sectors, it may be more important to agree on a technical specification and publish it quickly. Therefore, a range of different categories of reports can be produced, allowing publication at an intermediate stage before full consensus (see section 3.2).

### 3 Toward a Support Tool

This section presents some of the main aspects of a D<sup>3</sup>G tool (see section 2).

#### 3.1 Generic User-Requirements

In terms of functional requirements, the development of knowledge (i.e., the CDGS process) requires the employment of technological solutions for the development of *online communities* [8], including communication and collaboration facilities. Additionally, the process of knowledge development, in order to achieve consensus and quality, entails formal and informal reviews of the developed documents by a number of parties. Therefore, a flexible reviewing and annotation mechanism is also required. Consensus in the context of an online WG can be achieved through the incorporation of voting mechanisms.

The CDGS process constitutes of a complex workflow that needs to be computerized integrating a mechanism that facilitates the administration of projects. Such mechanism shall enable Editors to breakdown the activities involved in the development of report into sub-tasks, and assign specific responsibilities to authors and deadlines for each task. Another crucial issue is notifying participants, e.g., about pending tasks. This can be achieved through a notification facility for sending messages to each member of the process personally and according to their assigned roles. Finally, a specialised task manager mechanism is required to provide to each participant, upon demand, a detailed overview of the process.

Another critical issue concerns the dissemination and use of developed knowledge. One of the most effective ways to organize knowledge in the context of a web portal is the provision of a *digital library* [1] with facilities such as browse, search, rating and bookmarks. Additionally, *user profiles* can be used when performing knowledge retrieval operations in the digital library for filtering the retrieved results [6, 9]. Finally, online communities can support the *social navigation* [2] of knowledge.

On the other hand, the administration of knowledge entails the need of mechanisms used for administrating the available collections of knowledge and the types of

resources stored in the knowledge base, and for enriching the knowledge base by adding new resources.

### 3.2 Resource Classification and Organisation

There are two main types of resources (i.e., digital documents) that can be developed and disseminated throughout the process:

- *Single Elements*. These constitute resources that can be perceived as stand alone sources of knowledge and include: (a) Single Guidelines or Rules; (b) Code Templates; (c) Design Patterns; (d) Experiments; (e) Best Practice Examples; (f) Hardware products; (g) Software products; and (h) Reference materials.
- *Compilations*. These are compilations of Single Elements in the form of the following document types produced following the CDGS process: (a) NWP<sup>3</sup>; (b) Publicly Available Specification; (c) Technical Report; (d) Technical Specification; (e) Internal Workshop Agreement; (f) Guidelines Collection; (g) Recommendations for new or revised standard; (h) Draft Standard; (i) Internal Standard.

The 'knowledge base' of the pilot D<sup>3</sup>G is organised as follows: At a first level, the knowledge base consists of Datasets; each Dataset has an administration team, user group and may contain one or more Compilations and/or Single Elements.

## 4 An Interactive Prototype

This section presents some of the main aspects of a prototype D<sup>3</sup>G developed in the context of the EC<sup>5</sup> Network of Excellence (NoE) INTUITION<sup>6</sup> ("Virtual reality and virtual environments applications for future workspaces". The rationale and motivation for developing the *Portal for guidance and standards for Virtual Reality*<sup>7</sup> is to take advantage of the spread excellence shared among the INTUITION partners, and establish an *online communication and collaboration community* for developing, spreading and working with guidelines, including recommendations for standards. The main objective of the portal is to bridge the gap among all key stakeholders (end-user from the industry, VR developers, academia and research, standardisation bodies and other experts) and to facilitate the coordination and smooth operation of their collaborative activities.

The INTUITION portal is the first platform worldwide of its kind, and serves as a leading platform providing, among others, consensus building mechanisms, multi-sector coverage and ability to efficiently disseminate and promote a range of deliverables relied upon by industry. Notably, the ISO Strategic Plan 2005-2010, in identifying the actions to be pursued from ISO towards realising the global vision for the organization in 2010, consists of seven key objectives, among which stands the following: "*Providing efficient procedures and IT tools to support the development of*

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<sup>6</sup> Project website: <http://www.intuition-eunetwork.net/>

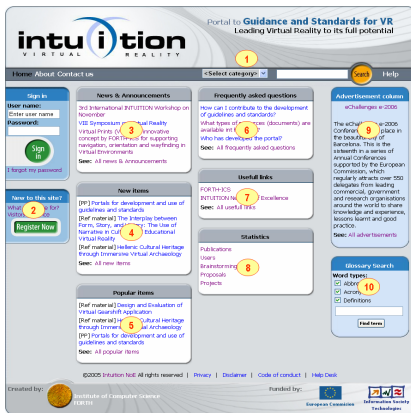
<sup>7</sup> Currently available at: <http://hci-web.ics.forth.gr/Intuition>

a coherent and complete range of deliverables ... implemented by members and participants in the technical work".

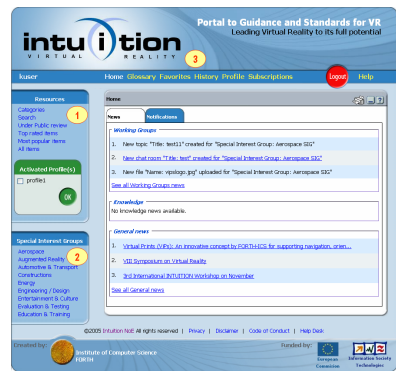
The developed portal consists of three main areas with different looks-and-feel in term of presentation, functions and navigation models.

The **Dissemination Area** is an open area informing the public about the scope and objectives of the INTUITION work on guidelines and standards. In addition, a visitor's entrance has been implemented for increasing the user-perceived usefulness of the tool (see Fig. 2) along with a public module introduced for gathering user requirements and feedback, which enables users to communicate, anonymously, their comments and ideas to relevant WGs and, ultimately, further inspire knowledge developers in their brainstorming activities.

The **Deployment Area** is a restricted area that builds on previous practices on TFWWGs and which provides personalised services to knowledge consumers. Users of this area can explore and exploit the knowledge stemming from the development activities, participate to public reviews and user forums, and take advantage of social navigation and other facilities (see Fig. 3). In particular, access to available knowledge resources is provided, along with a personalisation mechanism for filtering information to specific interest areas. Resources are in the form of data (e.g., a guidelines collection), accompanied with supporting metadata (e.g., applicability, user reviews, reference materials) for enhancing the usefulness and usability of provided knowledge. Finally, facilities of traditional online communities are incorporated in order to promote socialisation and consultation among consumers.



**Fig. 2. Dissemination Area:** (1) Search area, (2) Registration, (3) News & Announcements, (4) New items, (5) Popular items, (6) Frequently asked questions, (7) Links, (8) Statistics, (9) Advertisements and (10) Glossary



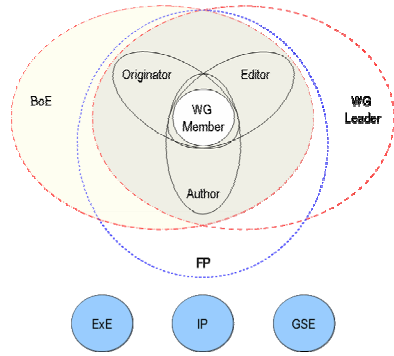
**Fig. 3. Deployment Area:** (1) Resources, (2) Special interest groups and (3) Additional Functionality

The **Development Area** is a restricted area too, and serves as virtual space for collaboration among knowledge developers (see Fig. 4). In essence, this area constitutes the implementation of the CDGS process briefly described in section 2. A

fundamental requirement, emerging from the process itself, is the need to support multi-roles per user (see section 2). To address this issue, an incremental portal structure was developed. The initial level provides knowledge developers with two different views; the developer’s view (working area) and the users’ view (in order to be able to quickly check on the way artefacts are presented to knowledge consumers). Then, the developers view is structured around the core role of WGM (see Fig. 5). This way, WGL, Originators, Authors, etc. are presented with supersets of the functionality for simple WGMs. As it can be seen in Fig. 5, contributing roles such as IPs, ExEs and GSEs are horizontal and distinct. Nonetheless, all views have consistent and similar designs in order to avoid confusion, as one user may participate to more than one WGs undertaking each time different roles.



**Fig. 4.** *Development area:* (1) The role - layout switching bar, (2) Working Groups, (3) Role based options, (4) Stage based options, (5) Statistics regarding knowledge development and use, (6) Additional functionality and (7) News & Notifications



**Fig. 5.** Incremental functionality in order to support multiple roles per user (within a single WG). For instance, a WGL is offered a superset of the functionality for WGMs, and can act as Editor in one Project and as Author in another one.

## 5 Discussion and Conclusions

Our early experience with the proposed approach, thought the presented prototype system in the domain of virtual reality, has provided valuable feedback in all of the three major aspects of this work: (a) the employment of advanced portals technology for guiding and facilitating the collaborative *development* of guidelines and standards, (b) the integration of various information retrieval, communication and collaboration mechanisms for empowering various interested parties in *deploying* the available knowledge appropriately, and (c) use of the same platform for achieving easy and rapid *dissemination* of knowledge, as well as direct user support and feedback.

Towards the first of the above objectives, one of the main challenges encountered was the specification of an appropriate process. A generic process for the *collaborative development of guidelines and standards* (CDGS) was elaborated and



computerised in order to be operated via the Web. The difficulties involved were: (a) the need to ensure that the process is generic and adaptable to increase its applicability in various application domains, (b) the need to be solid and compliant with the processes followed by a number of standardisation bodies, (c) the need to be easily operated also by people with little experience in the field of guidance and standards development, and (d) the necessity to be configurable and capable of producing a wide range of documents. Additionally the computerisation of this process was itself a major challenge. The difficulties involved included: (a) a wide range of user roles with different goals and tasks in the context of development activities had to be supported, often in combination, leading to an increased complexity of functionality and user interface, (b) the development of a mechanism for implementing the various sequential and conditional stages and tasks involved in the CDGS process, and (c) the design of an appropriate mechanisms for collaborative document editing and reviewing, as this incorporates various issues of privacy, authorship and intellectual property rights, and coordination of read and write rights. Overall, a potential drawback is the current lack of mechanisms for tracking document changes; especially in cases where a large number of authors are involved.

The second of the above objectives was addressed by providing a wide range of services for knowledge retrieval, such as search and browse facilities, user profiles for results filtering, as well as mechanisms for maintaining personal collections of knowledge, social navigation and community based communication. The main challenge involved here was the provision of mechanisms for role layout switching for the case of knowledge developers where the role of developer and consumer may coexist. Another major challenge was the design and development of the knowledge base of the system so that the process could be applied in various application domains. This implied: (a) the development of a knowledge base that can be extended to support new resource types and (b) the provision of a mechanism that enables the translation of process outcomes to comprehensive and structured digital publications.

Finally, concerning the third objective, several mechanisms were implemented and made available to web-surfers and visitors of the portal. More specifically, a number of alternative ways for accessing metadata regarding available publications were provided, accompanied with peripheral facilities such as news, dictionaries, advertisements, useful links, frequently asked questions, etc.

Planned enhancements of the existing mechanisms include process customisation, which can be of particular importance for integrating the system in various contexts and generating alternative processes. In order to fully support the development of standards, additional steps of the CDGS process should also be incorporated. Furthermore, semi-automatic classification of the knowledge stored in the system's database could be investigated and implemented, based on various existing cross-referencing techniques for ergonomic resources (e.g., [4]). The provision of enhanced accessibility features and user profile adaptation could be considered in order to accommodate the needs of users with disability.

Finally, in order to evaluate the prototype tool, identify possible shortcomings, and provide suggestions for potential improvements, expert-based and user-based evaluations have been planned.

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