# e-standardization

## The "nuts and bolts" of ISO's collaborative IT applications

*by Reinhard Weissinger, Group Manager, Project Management and Electronic Services, Standards Department, ISO Central Secretariat*

ISO is a highly decentralized organization operating in many sectors of technology and business with, currently, the participation of 157 national members. To support this large and diverse user community, and to fit the different national conditions and organizational structures, ISO's IT applications need to be highly flexible.

To give a good picture of the various applications involved, this article highlights the three main applications used in standards development and dissemination, and gives an overview and summary of all the ISO IT applications (*see* **Table** *page 10*).

### Principles of development

ISO's IT applications are developed through extensive consultation processes operated under its Information technology strategy implementation group (ITSIG), which reports to the ISO Council. All major ISO IT projects are steered by project teams operating under ITSIG with participation from many ISO members. Consequently, ISO's IT applications can be adapted to the national specifics of ISO members and at the same time provide the necessary integration and coherence to operate globally harmonized processes.

**"Consequently, ISO's IT applications can be adapted to the national specifics of ISO members."**

To support the use of its IT applications, ISO operates an extensive training programme with courses targeted to key staff in ISO committees and to ISO members. Information about ISO's training programme can be found on ISO Online (**www.iso.org/training**).


## Enabling standards development and document sharing – The ISOTC server

The ISOTC server offers a hosting environment for all ISO technical committees, subcommittees and working groups. Its primary purpose is to provide the secretariats of ISO committees with the tools to autonomously manage their electronic working environment in a decentralized manner.

The environment provided by the ISOTC server is aimed at enabling secretariats of ISO committees to make documents available to their members, send notifications, obtain input from their members and provide links to applications such as balloting, file submission to the ISO Central Secretariat, etc.

The role of the ISO Central Secretariat is restricted to maintaining the working environment, including helpdesk and backup services. The documents and other content on a committee's work area are under the complete responsibility of the committee secretaries and their support staff.

## Managing users and roles – The ISO Global Directory

The registration of users, as well as the management of their roles as members of ISO technical committees, subcommittees and working groups, is undertaken through the ISO Global Directory. User registration and role assignment are both organized in a decentralized manner under the responsibility of each ISO member body for the users in its country. Amongst the roles managed via the global directory are those of committee secretaries, chairs, members of committees and working groups, balloters, etc.

## Supporting national mirror committees – The ISONMC server

The ISONMC server is an important new development that provides ISO members with the ability to efficiently manage and control the read-only access of their national mirror committee (NMC) members to working documents in the ISO technical programme.

To adapt to the requirements of different ISO members, this service is made available in two options (see **Figure 1**).

### *Using the server to their advantage*

**Option 1** offers dissemination through the ISONMC server, maintained by the ISO Central Secretariat (ISO/CS). Choosing the ISO/CS-hosted NMC server is particularly useful for ISO members having little or no existing national electronic dissemination infrastructure for ISO working documents.

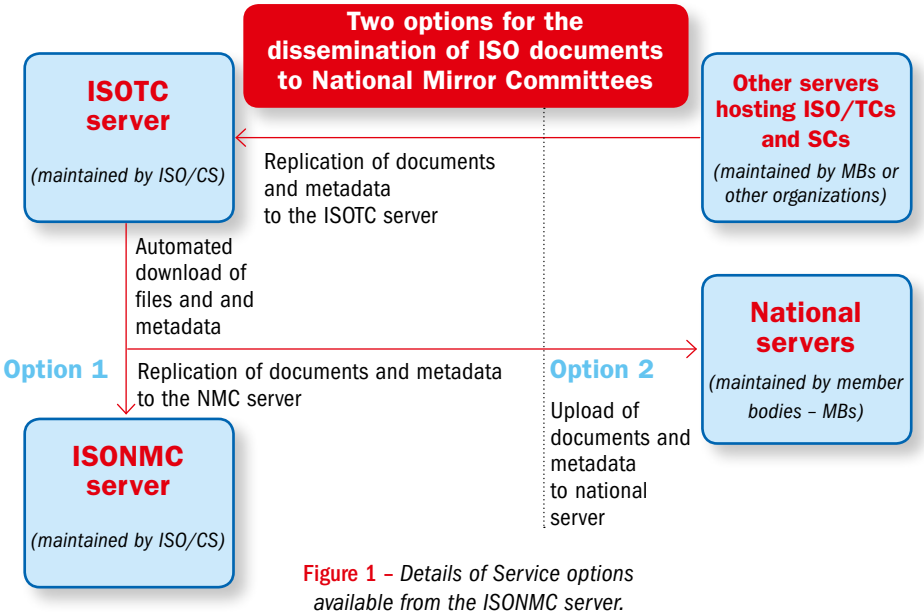


Figure 1 – *Details of Service options available from the ISONMC server.*

**"To support the use of its IT applications, ISO operates an extensive training programme."**

The service comprises the dissemination to national stakeholders of all documents under development in ISO committees and working groups, such as project management documentation, reports of meetings and resolutions, ballots and comments, working drafts, committee drafts, draft and final draft International Standards. The ISONMC server is, however, not intended for the dissemination of published ISO Standards, nor for the development of national standards.

All working documents developed by an ISO committee or working group are automatically copied to the ISONMC server. National users who have been registered by their ISO member body as a participant in one or more national mirror committees can access the documents of the corresponding ISO committees through the national mirror committees to which they have been assigned. The main function of the ISONMC server is to disseminate the documents developed by ISO committees or working groups to the corresponding national committees – it does not provide an environment to run specific national standards development efforts (e.g. developing national standards).

## About the author

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Two steps are required for this service to operate: firstly, national mirror committees must be created in the ISO Global Directory and mapped to corresponding ISO committees and working groups. In a second step, national users must be registered and assigned to the national mirror committees.

### *Making the most of existing infrastructure*

**Option 2** is for ISO members that wish to disseminate ISO working documents through their own national servers and not via the ISONMC server. To meet this need, ISO/CS provides access to the documents and their metadata to the ISO members for uploading onto their own national servers.

With this option, there is no need to register national mirror committees and their members in the ISO Global Directory.

## New horizons

ISO's IT applications are increasingly integrated into seamless, end-to-end processes. In particular, through the NMC services, ISO documents made available in a committee or working group can be disseminated nearly instantaneously to all stakeholders around the world.

**"ISO's IT applications are increasingly integrated into seamless, end-to-end processes."**

At the same time, tools – like the ISO Concept database and the XML-authoring template – are being developed with a view to exploiting content from standards by storing it in a more granular form and in re-usable formats. In addition to providing support for the standards development work, such tools allow standardized content to be integrated into computer applications run at the site of customers and clients, and will provide the basis for the combination of such content into new products and services derived from standards.

# Overview of ISO's IT applications

## ISO portal and general information on ISO standards and standardization

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| **ISO Online** | ISO Online is the portal to all information on ISO's activities, ISO standards and public project information, reference documents, policies, news and the ISO Store. All other IT applications can be accessed from ISO Online. | **www.iso.org** |
| In operation since **1994,** major upgrade in **2007.** | | Integrated "help" functions |
| *Publicly accessible* | | Information on ISO Online is maintained by the ISO Central Secretariat. |

## Standards development

ISO's core business. Standards development involves around 50 000 individuals worldwide, who participate as field experts or in other functions in the global standards development process. A majority of ISO's IT applications have been developed to support standards development, with continuing emphasis on decentralized and collaborative work.

The process starts with the registration of users to certain roles in ISO committees, working groups and other bodies (*see* ISO Global Directory). Committees have a collaborative, shared platform for their work (*see* ISOTC server). Key stages in standards development are the voting stages (*see* ISO electronic Balloting Portal). A list of all the links to ISO's IT tools can be found at **www.iso.org/eservices**.

## Authentication of users, registration to roles and access management

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| **ISO Global Directory** | The ISO Global Directory (GD) is a comprehensive management system for all users and roles involved in the ISO standards development process, which includes balloting for all ISO technical committees, subcommittees, working groups and other technical bodies. | **https://directory.iso.org** |
| In operation since **2005**, major extension in **2007**. | | User guide at: **www.iso.org/e-guides** |
| *Requires login* | | Data in the GD is maintained jointly by the ISO member bodies and the ISO Central Secretariat. |

## Collaborative work and document repository for ISO committees and working groups

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| **ISOTC server** | The ISOTC server hosts all ISO technical committees, subcommittees, working groups, policy development committees and other bodies involved in standards development. It is the most important site for collaborative standards development. | **www.iso.org/isotc** |
| In operation since **1998**, major upgrade to be released in early **2009**. | | User guide at: **www.iso.org/e-guides** |
| *Publicly accessible with protected areas* | | Files on the ISOTC server are maintained remotely by committee secretaries, their staff and other authorized contributors. |


## Support for voting and decision making

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| **ISO Electronic Balloting Portal**<br>In operation since **2000**, major extensions occurred in **2003** and **2007**.<br>*Requires login* | ISO has applications to support all instances of balloting in the ISO system. Most of the ballots are operated by the committee secretaries themselves in a decentralized manner (committee ballots). Other ballots are operated by the ISO Central Secretariat centrally, such as ballots on draft and final draft International Standards (DIS/FDIS). | **http://isotc.iso.org/livelink/eb3/home.do**<br>User guides at: **www.iso.org/e-guides**<br>Maintained by committee secretaries or their staff and the ISO Central Secretariat. |

## Project management and process control

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| **ISO Project Portal**<br>In operation since **2008**.<br>*Requires login* | The project portal provides access to up-to-date information about all ISO projects by project reference, committee, stage, registration dates and other criteria. It provides information about internal process stages in ISO/CS and gives alerts in case of exceeded deadlines. | **http://isotc.iso.org/pp**<br>User guide at: **www.iso.org/e-guides**<br>Data accessible through the project portal is maintained by the ISO Central Secretariat. |

## Meeting management

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| **ISO Meeting Management**<br>To be released in **2009**.<br>*Will require login* | ISO Meeting Management will support committee secretaries and working group convenors in calling meetings, and participants in registering for meetings and obtaining relevant working documents. | |

## Business event communication and alert functions

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| **ISO Business Notifications**<br>In operation since **2007**.<br>*Requires login* | The business notification application provides a customizable tool for the notification of users on any relevant event occurring in standards development. Users can customize their notifications; they can choose to opt out from receiving them or they can choose to access the information through reports. | **http://isotc.iso.org/biznotif**<br>User guide at: **www.iso.org/e-guides**<br>The settings of event notifications are under the control of each user. |

## Controlled input into the production of draft and final standards

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| **ISO Submission Interface**<br>In operation since **2006**.<br>*Requires login* | The submission interface (SI) constitutes a central access point for the transmission of draft ISO standards developed inside ISO committees to the ISO Central Secretariat for further processing, e.g. for preparation for balloting or for final publication. | **http://isotc.iso.org/livelink/si**<br>User guide at: **www.iso.org/e-guides**<br>Files are loaded into the SI by ISO committee secretaries and their support staff. |

## Support for standards writers and standards authoring

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| **Authoring template**<br>In operation since **1997**, new version to be released in **2009**.<br>*Publicly accessible* | The authoring template for the drafting of ISO standards (the ISOSTD template) provides a structured method for the writing of ISO standards and other deliverables. All standards need to be prepared with the template.<br>*Note: An XML-based template is under development for release in 2009.* | **www.iso.org/templates**<br>Guidance documents are available with the templates. |

Continued overleaf

## Storage, development and re-use of structured content

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| **ISOConcept**<br>To be released in **2009**. | The ISOConcept will contain a comprehensive collection of terms and definitions, symbols, coding systems, product properties and other concept items managed through a workflow-based database. It will provide search and download services for end users and serve also as a repository for standards writers (*see also article* page 18). | Content will be maintained by the originating committees. |

## Dissemination services

Dissemination of standards in the early drafting stages and of other information and documents guarantees that input from many fields and stakeholder groups in various countries can be obtained (*see* ISONMC server). Dissemination of published standards is key to their use and practical implementation (*see* ISOSTD server and ISO Store).

To support ISO's governing and policy bodies, ISO operates a server especially for these groups (*see* ISODOC server).

## Global dissemination of ISO committee documents for wide national stakeholder input

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| **ISONMC server**<br>In operation since **2008**.<br>*Requires login* | The ISONMC server is used to disseminate documents developed by ISO technical committees, subcommittees and working groups to national stakeholders around the world. The server functions according to mapped relationships between ISO committees and corresponding national mirror committees. | **https://nmc.iso.org**<br>User guide at: **www.iso.org/e-guides**<br>Files and metadata on the ISONMC server are synchronized automatically from the ISOTC server. ISO members can add national metadata to the ISO documents. |

## Standards distribution to ISO members

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| **ISOSTD server**<br>In operation since **1996**, last upgrade in **2006**.<br>*Requires login* | The ISOSTD server hosts all ISO standards and other deliverables as well as their drafts in various electronic formats (revisable, non-revisable, SGML and others). | **www.iso.org/isostd**<br>A user guide is available on the ISOSTD server.<br>The ISOSTD server is maintained by the ISO Central Secretariat. |

## Sales and standards distribution to commercial end users

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| **ISO Store**<br>In operation since **2000**, new version to be released in **2009**.<br>*Requires registration* | The ISO Store is accessible from ISO Online and allows commercial end users to purchase ISO standards or other deliverables, including draft International Standards, for immediate download as PDF files. | **www.iso.org/isostore**<br>Guidance is available on ISO Online.<br>The ISO Store is maintained by the ISO Central Secretariat. |

## Support for ISO governing and policy bodies

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| **ISODOC server**<br>In operation since **1996**, last upgrade in **2005**.<br>*Requires login* | The ISODOC server hosts documents of the governing bodies of ISO (General Assembly, Council, TMB) as well as of policy development committees (CASCO, COPOLCO, DEVCO) and other strategy groups (such as ITSIG). | **www.iso.org/isodoc**<br>Guidance is available on the ISODOC server.<br>The ISODOC server is maintained by the ISO Central Secretariat. |

# Re-engineering the ISO standards development process

*by Daniele Gerundino, Strategic Advisor to the ISO Secretary-General*

In a recent article[1] presenting the results of a workshop organized by ISO's Information Technology Strategies Implementation Group (ITSIG) in Milan, Italy, in May 2008, I underlined that the electronic infrastructure supporting the development of International Standards is "near to completion".

Indeed, the deployment of the ISO national mirror committee (ISONMC) server by the entire community of ISO members can be considered as the key final step in a long journey that started about 10 years ago.

## A step back – 10 years ago

When the case for computerization of ISO standards' development was analyzed about 10 years ago, ITSIG observed that the process could be roughly divided into two phases[2]:

- **the development of the draft standard** with all related aspects: cooperative work, selection, classification, delivery and exchange of documents, management of meetings, etc. – in this phase, technical committees (TCs), subcommittees (SCs) and working groups (WGs) are the principal players;
- **the completion of the International Standard**, including the end of the development process and its production chain – here national standards bodies (NSBs) and the ISO Central Secretariat (ISO/CS) play the key role.

At that time, ITSIG realized that to reduce the overall development time and the total amount of work, the approaches to be taken for the two phases had to be somehow different.

In the first phase, the essential concern was to minimize the amount of work needed and to remove any obstacles so that the project can progress. The basic assumption was that the "administrator" of the process – e.g. the Secretary of a TC/SC or the Secretary/Convenor of a WG – had the most critical role.

Major improvements could thus be achieved by supporting administrators in performing the job faster – in particular, by allowing them to reduce the time and amount of work spent in administrative activities involving repetitive and redundant tasks such as reproduction, document circulation, committee/group membership and related user data management, vote management, and re-entering of data, among others.

1) "ISO IT strategy 2010 and beyond", *ISO Focus*, July/August 2008

2) In terms of the ISO/IEC Directives, setting out procedures for the technical work, the first phase would be equivalent to stage 20 through to stage 40, whilst the second phase would include stage 40 through stage 60.

For the second phase, the main concern was to minimize the amount of work needed to modify documents (manual conversions, editorial revisions, etc.) at any step of the process, and to remove the various obstacles that delay document circulation. Improvement in the ISO/CS production chain and in the ways that documents are created and exchanged between committees and ISO/CS, along with the introduction of DIS (draft International Standard) and FDIS (final DIS) electronic balloting, were considered key factors of improvement.

**"Major improvements could be achieved by supporting administrators in performing the job faster."**

Since then, ISO's main IT developments have been coherently focused on addressing these priorities for both phases. Among the achievements are the ISO templates for authoring standards, the document servers providing access to ISO documents (notably ISOTC and the ISONMC discussed below), the ISO Global Directory (GD) to manage users' and committees' data and roles, and the e-balloting applications.

## Towards a fully-computerized infrastructure

So why is the deployment of the ISONMC server considered as a key final step of this 10 year journey? Once the use of the server is fully consolidated, all parties concerned – notably NSB staff and national experts worldwide – will have (almost) real-time access to ISO documents, project data and related information at all stages of the standards development process, depending on the permissions associated with their role.

Key procedural steps such as notifications and balloting – including collection and management of comments – and the associated monitoring and control activities are already supported by other existing ISO eServices. Full deployment of the ISONMC server is thus currently a top ISO priority.

Another important requirement to complete the ISO computerized infrastructure concerns the systematic use of the committee internal balloting (CIB) application[3] – key to ensure a level of harmonization and efficiency in committee balloting comparable to that achieved with the DIS and FDIS balloting operated by the ISO/CS).

## A new era

Through this fully-computerized infrastructure, all the parties concerned[4] will be effectively "wired" and able to:

- access in real time information and documents as soon as they are made available;
- interact and execute tasks according to the permissions granted by their roles.

**"ISO's computerized infrastructure can support the optimization of processes well beyond what has been possible so far."**

This is a very different framework from the one in place when the ISO/IEC Directives were originally developed. At that time, the primary means of communication were ordinary mail and telephone, which had a significant influence, albeit indirect, on the procedures and ways of working.

Thus, at its workshop of May 2008, ITSIG concluded that the modern ISO computerized infrastructure constitutes a promising framework for supporting the optimization of processes well beyond what has previously been possible.

## Structural process bottlenecks

Whilst organizational improvements and IT tools have greatly helped to remove obstacles and eliminate or significantly decrease repetitive tasks, the structural aspects of the ISO standards development process have not changed.

In particular, some of the issues arising from the current structure are:

- at the working group level, the most productive work model is considered to be the "teamwork of experts" – usually relying on close contact between participants of the team. However, this presents problems in the international standardization scene, as experts are often scattered around the world and contact is thus difficult. More often than not, progress takes place mainly at working group meetings when participants have an opportunity to get together. At this stage, ensuring the quality of the working draft is also key, since badly written or unclear text can lead to failure of the project at later stages;
- all activities that can be categorized as "circulation of information" and "collection of comments" tend to introduce a strong sequential bias to the standards development process. By sequential bias, we refer to the fact that some activities that could be carried out in parallel are instead carried out one after the other. This can potentially cause unnecessary delay to the completion of the overall process.

## About the author

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3) In compliance with the TMB requirements.

4) National experts, representatives of NSBs to ISO committees, NSB and ISO/CS support staff.


- due to the intrinsically distributed nature of the ISO and member bodies system, national consultation is essential to ensure the due process of the organization and its transparency. However, national consultation takes place twice: at stages 30 and 40, with a further iteration at stage 50 for FDIS (final draft) approval. The double level of consultation and voting, at stages 30 and 40, is justified by the different nature of the participants (TC/SC members for the one, as opposed to the entire ISO membership for the other). It also adds value to the process by providing a further level of control and helping to reach the widest possible consensus. However, this advantage has a trade-off in terms of the time needed to accomplish these two instances of consultation and voting. Each time a national consultation is needed, a number of time-consuming activities are triggered, each one of which lengthens the entire process. Moreover, this is often a cause of misalignment, especially when human resources are scarce. For example, some organizations may decide to put more focus on one of the two steps, and ISO members from different countries can make different choices based on their specific cultural, social and economic backgrounds – leading to a duplication of the whole effort for the system.

## Further process improvements

To achieve further improvements, ITSIG believes that the time is ripe to address the above issues by re-thinking the standards development process itself, with a view to taking full advantage of ISO's computerized infrastructure.

In principle, this infrastructure can facilitate the following procedural and technical improvements:

- parallelization of tasks;
- harmonization of standards' development cycles across different sectors and geographies;
- more extensive use of automated workflows.

For example, it is possible to conceive of the following developments and improvements in the process [5]:

- when a new work item is registered in an existing committee, all the parties concerned, including national experts registered in the GD extension for the ISONMC server, could be immediately notified;
- all participating parties would have immediate, early access through the ISONMC server to relevant documents and related information, with appropriate comments from TC/SC secretaries, WG convenors and even national secretariats;
- national consultation and discussion could be immediately activated;
- contributions and comments would be organized, filtered and channelled through ISO members by maximizing the appropriate use of workflows to support the different phases of the development process;
- different models of electronic work could be envisaged. Except for the codified formal steps (e.g. DIS vote), the ultimate responsibility of how to organize the electronic work should be left to the chairs and secretaries of the ISO committees, possibly providing basic frameworks for guidance (as templates). In general terms, there could be at least two basic models:
  - communities/administered fora supporting informal document development and consensus building, applicable whenever the main objective is to collect information or create rough content; and
  - structured workflows restricted to authorized representatives (WG and member body voters), when formal enquiries and balloting are required.

In principle, such an approach seems to be promising. In particular, it should be noted that:

- by breaking the sequential bias, all dead times and delays related to the distribution of documents and information would potentially be removed. This may lead to a reconsideration of stage timeframes [6];
- structured "electronic patterns" to exchange information, combined with appropriate tools and services to better identify priority issues and simplify the work (organizing comments, providing more powerful comments editing capabilities, etc.), should increase the productivity of process administrators;
- in principle, balloting of committee drafts and of draft International Standards could be merged – or, at least, better alignment (i.e. the efforts and focus aimed at strengthening content and verifying possible objections during a standard's evaluation cycle) could be promoted and achieved.

## What the future brings

The impact of such changes has to be carefully considered, in terms of both IT support (e.g. tools for organizing structured workflows and supporting informal collaboration) and of their impact on existing structures at ISO/CS and NSBs.

The adaptation of the process of consensus building to a new process model and technical infrastructure has also to be taken into account.

As indicated after the May 2008 workshop, ITSIG will decide about proposing specific initiatives to address these topics in direct collaboration with the other relevant ISO bodies, particularly the ISO Technical Management Board.

However, despite the shape that these might take, it is undeniable that the rapid improvements in technology of the past decade have opened a universe of possibilities, with the potential to significantly impact the way standards are developed for the better. ■

5) This simplified brainstorming is intended only to provide "food for thought".

6) The typical "commenting" pattern consists of early critical submissions followed by little or no comments for most of the remaining time, and then last minute receipt of the majority of comments (mainly editorial, often marginal) at the deadline.