Analysis of the CERN Web Landscape
Web Task Force Report
A Web Task Force was created in summer 2005 with the mandate to analyse the situation of CERN web sites. This report summarizes results and suggested actions.

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1 Background: the image of CERN on the Web

1.1 Introduction

CERN is the world’s largest particle physics laboratory, a first-class research organization and leading example of worldwide scientific collaboration. Its web pages should convey this quality to the huge web audience worldwide. The Internet has over one billion users today and this number is growing at a rate of 18% per year (Nielsen//NetRatings, Computer Industry Almanac).

The CERN web landscape, populated by more than 7000 web sites, does not do justice to the importance of the Laboratory’s work. Characterized both by the absence of a common graphic style and by structural problems related to the lack of information architecture and navigation design, the CERN web space appears incoherent, unattractive and difficult to use.

If CERN does not project an image consistent with its mission and values, this may result in an ambiguous perception of CERN. What is at stake is the credibility of CERN, proud to be “the place where the web was born”.

1.2 The CERN web landscape

The CERN web servers host different kinds of web sites, including official, project-related, activity-related and personal sites. The term “web site” refers to any set of web pages hosted under the same “name” (e.g. www.cern.ch/lhcb or www.cern.ch/ts-dep) and carrying information about the same topic (the LHCb experiment or the TS Department). All of these sites have in common a “cern.ch” part in their URL, which identifies them as hosted at CERN, and which makes them all contribute to the Organization’s image on the web.

Historically, at CERN and everywhere else, the web has grown primarily from the bottom up, with web sites initially created by graduate students and administrative assistants. In most cases, the presentation of projects and experiments on the web was done by a single individual, with others becoming involved at a later stage, when popularity increased.

At present, the situation has improved. Much effort has been made in recent years by many groups, departments and experiments to provide helpful and attractive web sites. However, the overall result still leaves much to be desired.

The main problem is the lack of a coordinated and structured approach to web communication, as well as the lack of established guidelines behind the creation, organization and authoring of CERN web sites.

The first consequence is loss of valuable time by the users trying to accomplish various tasks on the web.

Another is the lack of a visual identity, often referred to as corporate image, which is the perception that people have of an organization. The corporate image reflects the corporate identity – i.e. the self-portrayal of an organization –, which should merge strategy, culture and communication to present the outstanding qualities of the Organization to its audience.

A third consequence is a waste of resources by many groups putting considerable uncoordinated effort into the design of new web sites without any common approach or guidance and thus contributing to the incoherent image of the CERN web space.
1.3 Mission of the Web task Force

To address these issues, a Web Task Force was created in summer 2005 as collaboration between:

- IT Department:
  - Internet Services group (CERN Web Services)
  - User and Documentation Services group (Web based tools)
  - Department Infrastructure group (IT and Grid project communications)

- SG Department:
  - Communication group (strategic and internal communication, public outreach)

The participants in the Task Force are: Rosy Mondardini (IT-DI), Tibor Simko (IT-UDS), Elena Symeonidou (SG-DSU-CO), and Andreas Wagner (IT-IS).

The goals of the Web Task Force can be summarised as:

- Analyse in a comprehensive and structured way the situation of CERN web sites.
- Define and prioritize aspects that can be considered as problematic (impeding effective usage of the CERN web sites, damaging the image of CERN, causing wasteful duplication of effort).
- Propose recommendations.
- Sketch and prioritize implementation scenarios – evaluating costs and feasibility.

This report is the outcome of this activity and should assist the CERN management in taking decisions about the most effective use of resources to improve the current situation.

2 Overview of web sites hosted at CERN

2.1 Definition of web site categories

The web sites hosted on the CERN servers can be broadly divided into 5 categories:

1. Official web sites
2. Web sites of projects/collaborations
3. Web applications
4. Web sites related to social activities
5. Personal web sites

A basic definition of these categories follows, together with the identification of the main target audience, for which the pages are intended and designed. However, it is important to consider that the potential audience for any one web site is much larger, including science communicators and the media, decision and policy makers, the entire scientific community and the general public.
2.1.1 Official web sites

Definition: pages about CERN as an organization (members, mandate, structure, etc.) and about its official activities.

<table>
<thead>
<tr>
<th>Include:</th>
<th>Main Target Audience:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intranet pages</td>
<td>CERN users</td>
</tr>
<tr>
<td>Web sites of all departments</td>
<td>CERN users</td>
</tr>
<tr>
<td>Users’ Office</td>
<td>CERN users</td>
</tr>
<tr>
<td>Web sites of CERN “flagship” projects (LHC, CLIC)</td>
<td>HEP community</td>
</tr>
<tr>
<td>Web sites for the general public, i.e. main public web site, CERN and the environment, sites for Microcosm, Globe, LHC, Press Office, sites developed for specific occasions and events (CERN’s 50th anniversary, GridCafé, Antimatter, etc.)</td>
<td>General public, press and media</td>
</tr>
<tr>
<td>Educational pages (summer students/teachers)</td>
<td>Students, schools</td>
</tr>
<tr>
<td>Courier, Bulletin, Computer Newsletter</td>
<td>CERN users, HEP community</td>
</tr>
<tr>
<td>CERN schools (CSC, HST, CAS, European Schools of Physics)</td>
<td>HEP community</td>
</tr>
<tr>
<td>Technology Transfer</td>
<td>Industry</td>
</tr>
</tbody>
</table>

Responsibility: CERN (SG Communication, Education, Technology Transfer, Departments).

2.1.2 Web sites of projects and collaborations

Definition: pages strongly related to CERN i.e. of experiments and projects hosted at CERN and/or in collaboration with CERN.

<table>
<thead>
<tr>
<th>Include:</th>
<th>Main Target Audience:</th>
</tr>
</thead>
<tbody>
<tr>
<td>International projects, experiments (ATLAS, CNGS, LCG, etc.)</td>
<td>HEP users, general public</td>
</tr>
</tbody>
</table>

Responsibility: Collaborating partners and CERN.
2.1.3 Web Applications

*Definition:* pages that host different web based tools used by CERN and HEP communities.

<table>
<thead>
<tr>
<th>Include:</th>
<th>Main Target Audience:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative applications: EDH, CFU, HRT, e-RT, PIE, Stores, etc.</td>
<td>CERN users</td>
</tr>
<tr>
<td>Scientific information and publications: CDS, Greybook, Gartner Group, e-bulletin, Computing helpdesk questions and answers</td>
<td>CERN, HEP users, media, general public</td>
</tr>
<tr>
<td>Conferences and meetings: Agenda, Indico, JAcoW, Webcast, CRBS</td>
<td>CERN, HEP users</td>
</tr>
<tr>
<td>Engineering documents and drawings: EDMS, CDD</td>
<td>CERN, HEP users</td>
</tr>
<tr>
<td>Directories: phone book, CERN buildings map, network database, web sites database, electronics pool</td>
<td>CERN, HEP users, general public</td>
</tr>
<tr>
<td>Bug tracking and software development: Remedy, Savannah, Twiki, CVSWeb</td>
<td>CERN, HEP users</td>
</tr>
<tr>
<td>Communication: web mail, SIMBA</td>
<td>CERN, HEP users</td>
</tr>
</tbody>
</table>

*Responsibility:* CERN Departments involved: IT, HR, TS, etc.

2.1.4 Web sites related to social activities

*Definition:* pages dedicated to social CERN activities

<table>
<thead>
<tr>
<th>Include:</th>
<th>Main Target Audience:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CERN clubs</td>
<td>CERN users, local public</td>
</tr>
<tr>
<td>Staff association</td>
<td>CERN users</td>
</tr>
</tbody>
</table>

*Responsibility:* CERN Staff Association.

2.1.5 Personal web sites

*Definition:* pages available for personal use of all CERN users.

<table>
<thead>
<tr>
<th>Include:</th>
<th>Main Target Audience:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pages with both professional and personal info</td>
<td>HEP users</td>
</tr>
</tbody>
</table>

*Responsibility:* CERN users.
2.2 Web support
In the current CERN structure, two units have a mandate related to web activities: Web Communications (SG-DSU-CO-MM) and CERN Web Services (IT-IS).

Web Communications (SG-DSU-CO-MM) - The task of the Web Communications service is to produce multimedia material for the web, including web sites, animations, games and anything considered appropriate in order to increase awareness of CERN and its activities. Because of limited effectives (1 FTE) the core of the activity is the maintenance of the intranet and public web sites. Due to the lack of CERN-wide web authoring support, this section often provides authoring aid and services to other units.

CERN Web Services (IT-IS) - The CERN Web Services’ mandate is to provide a managed infrastructure for CERN users to publish web content. While steering the web technology in use at CERN towards commonly used standard technologies, it also ensures for users the access to appropriate and widespread authoring and publishing tools, helping the creation of synergies within the lab. It should be noticed that this structure does not foresee any guidance and support to web authoring, in terms of help with site layout, structure and content.

2.3 Web hosting
The web servers managed centrally by IT-Web Services host 7340 web sites in about 10 web servers. 2151 of the web sites serve official purposes and belong to one of the first four categories defined in Section 2.1, while 4755 of them are personal web sites. Furthermore, there are several highly specialized applications servers (see Section 3.4), which are supported and maintained either by IT-Web Services or by the corresponding IT teams. These servers host more than 50 web applications and manage millions of documents.

Nevertheless, there are about 100 “private” –i.e. locally managed– servers hosted at CERN –i.e. using the cern.ch domain. Often these servers, and the web sites they host, are set up by short-term visitors and remain online but unattended after these visitors leave. Few of them provide consistent information about the applications hosted and about the people responsible for their maintenance.

The most serious problem with this situation is the potential security risk to the CERN network. In addition, the use of private servers implies very little control over the web sites they host and results in further confusion of the image CERN is projecting.

An important goal of the CERN Web Services is to avoid proliferation of locally managed web servers. While it is very easy to install a web server, it is not trivial and requires non-negligible resources to ensure its maintenance and stable operation during its complete life cycle. This includes securing the system and applying required patches in a timely manner. CERN Web Services’ role is to centralize and minimize efforts, taking care of these aspects for the web servers centrally managed at CERN.

In addition, CERN Web Services provides support for the hardware and operating system of a small number of dedicated web servers that run specific web applications.

2.4 Web sites ownership
Web sites hosted on the central web servers have a “site owner”. The “site owner” may or may not be the actual author and webmaster of the site. For sites hosted in private servers there isn’t any official record of ownership.

In case of problems (misbehaviour of pages, wrong or outdated content, etc.) going back to the person responsible for the site structure and content is not always easy or even possible. Responsibilities are often divided between different people and not clearly defined.
## Analysis of CERN web sites

### 3.1 Criteria

Users have three possible reasons for visiting a web site: surfing (entertainment), finding things (news and information), and doing things (web applications). The objective in building any web site is to help users achieve their goals.

To meet this objective many disciplines are involved:

- **Information design and architecture**, the shaping of data into clear, meaningful, easily accessed information
- **Navigation design**, the way of connecting information and moving through web pages via hypertext links, buttons and images
- **Usability engineering**, the crafting of easy-to-use web sites, closely related to employee productivity
- **Graphic design**, the shaping of visual objects (colours, typography, layout, images)
- **Web writing**, editing meaningful content in a form suitable and engaging for online reading
- **Web accessibility**, standards compliance
- **Web information management and digital content persistence**
- All these aspects contribute to determining the overall success of a web site

### 3.2 CERN web sites

#### 3.2.1 CERN homepage

CERN has two official entry points on the web: the public homepage for people connecting from outside CERN (see Section 3.2.2.) and the intranet homepage for people connecting from inside CERN (see Section 3.2.3). These two homepages, and set of associated pages, have different look and feel (different logo, colours, navigation elements) without any common element (see Fig.1), and this can be confusing to the potential user. A well studied merging of the two entry points to a unique portal, which tends to be the preferred solution of similar organizations nowadays, might improve the user’s experience when visiting the CERN web space.

![CERN homepage](image1)

*Fig. 1: (a) Intranet and (b) Public home pages. Screenshot taken on 1st February 2006.*
3.2.2 **Public homepage and web sites for the general public**

The CERN public pages were renewed in 2002 and since then they have been regularly maintained. Their graphical aspect and navigation approach is consistent down to the last-level pages. In 2004 the Visits Service and the Education web sites were integrated into the main public site, and the Microcosm pages followed in 2005.

However, most of the other public sites targeted to the general public (see Section 2.1) suffer from considerable graphics/navigation/information design problems that will be mentioned in detail in Section 3.2.4.

In addition, it should be noticed that:

- Information on certain topics of major interest is present in different places, which implies a duplication of effort for the web authors and may result in confusion for the end users. As an example, there are 4 different sites that offer an introduction to the LHC: the public pages, the “LHC project” web site, the ALICE public site and the ATLAS public site. The case is similar for other general topics like “introduction to accelerators” and “the physics of CERN”.

- The texts are often the concept of single individuals. As a consequence, the content is frequently outdated and/or contradictory, as the “key messages” are modified or recycled from various sources, sometimes unofficial and old.

- Some of the sites, but not all, are available in English and French, with different ways to present the two language options.

3.2.3 **Intranet homepage**

The CERN intranet consists of the intranet home page plus a limited number (30) of second-level pages. This set of pages is basically a structured directory of the many independent sites existing at CERN, discussed below. Most sites linked from the intranet directories have different look and feel, where there is no common design or navigation element even the CERN logo, if at all present, varies widely in style on these pages. (see Appendix A for more on CERN logos).

3.2.4 **Department web sites**

The web sites of the eight CERN Departments are linked directly from the intranet homepage. Because of many significant problems they have in common, the department web sites have been chosen as the most representative and are discussed in some detail. The problems discussed occur frequently in the rest of the CERN web landscape:

- The eight department web sites have eight different graphic styles: different page size, colours, fonts, link appearance, etc. (see Fig. 2). Since these web sites are densely interlinked, it is quite possible that one click will take the user into a “different world”, i.e. a page with a totally different appearance.

- Some display only a “department logo” (see Appendix A) and display neither a CERN logo nor a CERN banner in their home page. It is hard for users to recognize that they are in a “CERN page”, especially if they are coming from a search engine.

- Two of them do not even have a link to the CERN homepage, an indispensable reference point in any web space.

- Each department has its own navigation scheme, tailored to the specific needs of the department and the services it provides. Most of the users external to the department will have trouble finding what they are looking for. Moreover, any user browsing “horizontally” through these web sites will quickly be confused.
- The organization of information is different in all cases (different basic info about the department’s structure, mandate, activities, services), which is a source of further confusion for the potential user.

- Most of the departments do not offer any “site map”, which is a standard way of providing an efficient overview into the web site content for casual visitors.

- Some of them do not respect any of the usability and design standards (size of pages, use of images, navigation bar position, coherent use of colours in links, etc.).

- The use of images is unsuccessful, with wrong format, size, resolution, etc. Web pages are “heavy”, slow at downloading and not pleasant to the eye.

- In almost all cases, the HTML code and CSS style sheets (if at all used) do not comply with web standards. This implies that people using different kinds of browsers and tools to access the web might see a completely different page than the one the webmaster meant to create. See Appendix B for a detailed analysis of the problem.

- HTML metadata information (keywords, description, creation date) is often missing, leading to bad findability and presentation troubles in search engines.

- When navigating deeper into the web sites structure, it is not rare to find a “page not found” problem. See Appendix C for detailed analysis.

- When navigating straight in the middle of the web sites structure, such as via a search engine or from a third party link, a “page found but outdated” problem is also frequently encountered. See Appendix D for detailed analysis.
Analysis of the CERN Web Landscape

**Director-General’s Services**

**Secretary-General (SG)**

H. Natther

**Safety Commission Unit (SCU)**

H. Wiesmann

**SG Department**

**Accelerators and Beams Department**

**AB Department**

**AT Department**

**FI Department**

**IT Department**

**HR Department**

**PH Department**

**TS Department**

**Fig. 2:** Different look and feel of the department web sites. Screenshot taken on 1st February 2006.
3.3 Web sites of CERN projects and collaborations

The web sites of the five LHC experiments are linked directly from the CERN intranet homepage, while other projects are linked at the first level pages and older experiments are linked through the “Greybook”. All the LHC and all the LEP experiments are linked from the Public web site as well.

These project web sites share the problems already mentioned for the Department web sites and also the absence of a “last update” reference on the page. Visiting the Aleph or Delphi pages today, one could think that the experiments (and LEP) are still up and running (see Fig. 3).

Given the importance (in terms of image) of the LHC experiments, it is useful to notice in particular that:
- four of them display neither a CERN logo nor a CERN banner on the homepage.
- in two cases, there is not even a link to CERN on the homepage.
- one of the experiments’ web sites for the general public is not even hosted at CERN (it is not in the cern.ch domain).

One could object that these web sites do not really represent CERN, being the web sites of international collaborations using the facilities of CERN. But given CERN’s role in the LHC project, CERN management should at the very least consider the impact on the corporate images of CERN, the experiments and the LHC project.

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![Welcome to ALEPH](https://example.com/aleph.png)

**Fig. 3:** The ALEPH page for the general public. Screenshot taken on 1st February 2006.
3.4 Web Applications

The nature of the web applications web sites makes them a special case.

It is useful to distinguish the concept of “shallow” web sites, serving mostly static content, vs. “deep” web sites, where content is dynamically generated by a web application that presents various outputs based on the end user interaction.

One particularity of deep web services is that they normally run on dedicated servers with special software, not using central services. The deep web sites usually provide homogeneous look and feel and suffer less from the symptoms described in previous shallow web sections. However, the Web Applications at CERN do not share common look and feel between each other, which leads to less user-friendliness and time losses for the end users. The use of common style elements such as header, footer, navigation trail, and the use of common functional elements such as the way of getting help, common login and authentication mechanism, could easily enhance the usability of these web sites. Web applications potentially used by media and public and not only by CERN or HEP users need special attention and should be easy to access and use.

“Deep” web content is sometimes called “invisible” because the usual web-oriented site crawlers do not automatically harvest the dynamic content that is stored “deeply” in the database. It is therefore important to provide means that facilitate search for information to the end users, both within the application itself as well as across all the various deep web services. Let us underline the interest of having a powerful and usable CERN-wide search tool, a goal towards which the IT department is already actively working.

Concerning the highly maintained nature of web application sites, they usually provide well-defined means for the digital content preservation (see Appendix D). It is therefore preferable to promote use of these services when compared to creating static web pages, if the same goal can be achieved. For example, instead of maintaining minutes of meetings in a set of static web pages, the use of the CDS Indico web application may be recommended in order to retain the information for posterity, avoiding page-not-found problems later in the lifetime of the project and beyond. Similarly for the use of the CDS photo database as opposed to the construction of web image galleries. The complete digital preservation issue, including archiving of web pages for posterity, is an important issue but is out of the scope of this task force.

3.5 Web sites related to social activities

Again, many issues raised in preceding sections also concern the social activities web sites.

It is to be underlined, though, that the “informal” nature of these web sites puts them in a different position when compared to the official web sites discussed above. Nevertheless, while the diversity of look and feel could make the CERN social landscape look alive and cheerful, the use of common design guidelines (such as pointing back to the common CERN Clubs page that lists all the other clubs) would significantly improve the user experience.

3.6 Personal web sites

Personal web sites are typically used as personalized web portals containing description of work, curriculum vitae, coordinates, academic qualifications but also hobbies and links of personal interest. They are also very often used for collaboration purposes, document sharing, presentation of results and ideas. Despite this very similar use, they do not have any common element, such as the CERN logo, and it is often difficult to identify the person as a CERN user.

In some cases (see Fig. 4), the interest and appropriateness of the content is questionable. When a web site is created via the registration mechanism of the CERN Web Services the
following information is displayed: “Site for personal information (Home Page, description of work, curriculum vitae, coordinates, academic qualifications, hobbies…). By selecting Personal you have more freedom, but the contents must still not be offending outside CERN. You should delete your personal sites when you leave CERN definitely”.

Fig. 4: Just one example of questionable personal pages. Screenshot taken on 1st February 2006.

3.7 Summary of analysis results
All of the problems mentioned in this analysis, which are common to most of the CERN web sites, are summarized in the following table.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inconsistent look and feel</td>
<td>Absence of CERN corporate image, browsing difficulties, time losses</td>
</tr>
<tr>
<td>Inconsistent presentation of content</td>
<td>Difficulty in finding specific information in some sites, proliferation of similar content in others</td>
</tr>
<tr>
<td>Highly inconsistent navigation between sites</td>
<td>Navigation mostly reduced to the use of “search” and of the “back” button in the browser</td>
</tr>
<tr>
<td>Bad HTML and CSS markup, use of non-standard technologies</td>
<td>Difficulty in visualizing pages, low accessibility in certain browsing platforms</td>
</tr>
<tr>
<td>Missing HTML metadata information</td>
<td>Bad findability and presentation of pages in search engines</td>
</tr>
<tr>
<td>Pages not signed and not dated</td>
<td>Doubts about information relevancy</td>
</tr>
<tr>
<td>Insufficient content maintenance</td>
<td>Dead links, page-not-found problems</td>
</tr>
<tr>
<td>Non-persistent URLs, outdated information kept alive</td>
<td>Limited lifetime of pages, difficulty in localizing the most up-to-date information</td>
</tr>
<tr>
<td>Non-professional design of pages</td>
<td>Usability issues, overall bad image of CERN</td>
</tr>
<tr>
<td>Private web servers installed and left unmaintained.</td>
<td>Security threat to CERN intranet</td>
</tr>
</tbody>
</table>
If we assume that a CERN employee (currently 3156 effectives including international staff, local staff, fellows and paid associates) loses an average 3 minutes a day (an optimistic estimate) while performing tasks or looking for information on the CERN web space, the result is a loss of about 20 FTEs per day. This is not taking into account the frustration generated when users do not succeed in finding what they look for!

One of the main conclusions of this study is that all of the above can be traced to the same origin: the absence of an overall web policy and coordination at CERN.

4 Comparison with similar organizations

It is informative and inspiring to briefly analyse the presence of other international scientific laboratories and organizations on the web (see Fig. 5).

4.1 ESA

The identity of the European Space Agency (ESA) comes out strongly in the entirety of its web space (http://www.esa.int). In particular, one should notice:
- The professional approach to graphics and in general to the look and feel of the pages
- The good and clear management of the information
- The consistency in navigation down to the deepest level
- A very large and attractive amount of content, well organised by project and target group, easy to track from the homepage
- Features such as news specific to the member states

The Agency has an Online Communication Section in-house, a publishing team consisting of 11 employees and, for the production of graphics and multimedia, has been collaborating until recently with LB Icon Group, a multinational enterprise that offers services on Business & Brand Strategy, Marketing & Communication and Information Technology.

4.2 Fermilab

Fermilab has a single entry point to its web space for users and the general public (http://www.fnal.gov). The pages, which have a harmonised look and feel, successfully incorporate a great portion of basic information about the laboratory that is common to both audiences (environmental policy, public events, safety, phone directory, users’ office, and search engines).

The pages more directly meant for Fermilab users are less consistent and unified, but:
- There about 3-4 templates used in general where the lab logo and name is prominent.
- Links to the homepage and to the intranet homepage are always provided.
- The Fermilab logo is never modified, transformed, or abused.

Fermilab works together with the web and multimedia design company Xenomedia, which helps implement the strategic communication goals of the organization on the web, provides templates, trains involved web authors and helps with web site creation and maintenance. In-house, the section responsible for the web space is the Office of Public Affairs working closely with the Visual Media Services that works on the visual presence of the lab in all media.

In April 2004, Fermilab published a set of Graphics Design Standards to “reinforce the lab’s graphic image in a consistent way”. At the same time, there is an extensive “Web Help”
section on the Computing Division web site that provides technical information, guidelines and templates, to facilitate web site creation and maintenance and to encourage compliance to the defined standards. Until today, about 65% of the units owning web sites have taken actions to follow the guidelines and apply the suggested templates, and the effort towards this direction continues.

In 2006, a new homepage is being prepared, to help focus on the physics made in the lab, to highlight achievements and to strengthen communication in the Fermilab community.

4.3 SLAC

The SLAC web site (http://www.slac.stanford.edu) is going through an evolution (started in May 2005) “to reflect the change in the organization of the lab and a new look-and-feel to encourage a consistent user experience” (http://www.slac.stanford.edu/slac/change.html).

There is a substantial ongoing effort to improve the overall information structure by “organizing existing pages around the various audiences that use the web site”, and these various audiences are Users, Staff, Students, Educators, Media and Press.

The core group of producers and technical staff consists of six members but “dozens of staff from every division at the Lab were involved in this effort”. A web design company did the graphic design and some initial coding for the top-level pages, and more recently a full time contractor was hired.

Since this effort is in full progress, any assessment of this web site is premature.

4.4 EPFL

The “École Polytechnique Fédérale de Lausanne (EPFL)” (http://www.epfl.ch) is composed of about eight schools and 200 different laboratories working in all domains of scholarship. The web landscape is therefore much more heterogeneous than the one at CERN. Yet the EPFL homepage and the first few layers below the homepage provide a very homogeneous browsing experience.

The EPFL unit called “Knowledge and Information Services” (KIS) provides an infrastructure and guidelines for general web authoring at EPFL, including recommendations for style sheets, graphics, templating system, content management system, authentication system, and so on. Thanks to the common graphics chart, the first few layers of the EPFL landscape show the same look and feel, including common navigation trail, language selection methods, page dating and signatures, and so on. Major web applications like the phone book, the campus map, or the document server respect this chart too. Altogether this ensures very pleasant navigation.

It is interesting to note that going further down the web page hierarchy, the homepages of various laboratories and sub-units have a clear tendency to differ, but many units have chosen to stick to the EPFL-standard look and feel anyway.

The renewal of the EPFL web space happened in 2001 and was helped by two elements: (a) by an organizational change in EPFL (from Departments to Schools); (b) by an introduction of a Content Management System simple enough to be used by non technical people, coming with standard templates. Three external companies were invited to present a project. The winner helped in writing the guidelines, in providing example HTML pages, and in implementing the new graphical chart on level I and II (Schools) web pages. 1.8 FTEs were involved from EPFL (1.0 graphic designer + 0.8 webmaster). This initial step took about 6 months.

After the change, 1.8 FTEs have been responsible for maintaining the chart and implementing the guidelines further. Today, the core team is composed of 1.6 FTE, with a switch from 0.8 FTE webmaster to a 0.6 FTE person more involved in the communication and content
production areas. In addition, almost all KIS staff (14 people) may be involved in peak times in one way or another in promoting the graphical and functional guidelines: giving advice to clients, helping them to implement it, etc, as the situation requires.

To help maintain the coherence across the 8 schools and the 200 laboratories of the EPFL, there are two kinds of organizational structures in place: (a) the Web Faculty, which is a small group of people where each School has 1-2 representatives; (b) the Webmasters Conference, which is a monthly conference open to any interested person where KIS presents projects, applications, (new) technologies, web related questions (security, how to reference a web site, etc.).

It is interesting to note that the guidelines are compulsory for all central web applications such as LDAP, Tequila, etc.

**Fig. 5: Screenshots taken on 1st February 2006.**
5 Recommendations

While a lot of time and effort has obviously been spent in the last years from many people at CERN to provide helpful and attractive web sites, the results are not satisfactory. We believe there are three main reasons for that:

- the absence of a clear policy to contribute to a coherent CERN corporate image.
- the absence of an overall strategy and established guidelines for the CERN web sites, which would also imply overall coordination and unambiguous responsibilities.
- the fact that people with different competences and responsibilities, often without any web design and usability background, contribute to the sites creation and maintenance.

In the following we list a set of recommendations, based on the actions we deem as necessary to improve the present situation. These recommendations aim first at eliminating the origin of the problems and then at curing the existing situation.

5.1 CERN Corporate Style Guide

CERN should place a high priority in developing and maintaining a consistent corporate image. To this end, a “CERN style guide” should be created, to provide all those producing PR and outreach material with details about how to correctly use the logo, images, illustrations, colours and fonts, both on and off line. The style guide should be enhanced by the creation of media resource repository (templates, images, media, etc.), available to CERN users. There is an ongoing effort in the DSU-Communication Group to provide this style guide for CERN, but due to limited resources, the project advances slowly. The involvement of an external company could also be envisaged.

5.2 Web Authoring Policy

The editing of precise “web authoring guidelines” is a critical task that should be carefully carried out by web and communication experts. Nevertheless, here are a few general points that should be included in such guidelines and that illustrate how they could help web authors.

Guidelines should:
- Provide a choice of professionally designed templates for different kind of pages (official pages, activities pages, personal pages). Templates should:
  - enhance and unify the Organization’s visual identity.
  - include consistent navigation schemes and a clean interface, according to usability standards.
  - conform to accessibility guidelines and to the current HTML and CSS specifications.
  - have a contemporary look and feel.
- Provide a set of accepted rules for web editing, advice and hints about graphics elements and their use on the web, helpful online resources.
- Provide content guidelines and a set of standard and agreed information about CERN and its activities.
- Provide a visual media repository with standardised versions of the CERN logo and other logos of major importance, frequently used icons, basic and frequently used illustrations.
- Provide webmasters with ways and tools to easily validate their HTML code and style sheets as well as to regularly scan their web sites for dead links.
- Define a standard set of information and links for each official activity (for example, standard information and links that the departments web sites should include).

- Make sure information is interlinked and not duplicated.

- Regulate the use and content of different categories of web sites, including introducing the use of disclaimers when needed (for example on personal pages).

- Create a common “Terms of Use” document, describing the way personal data is used in the CERN web space.

- Create and promote keyword thesauri for proper tagging of the web pages by the authors (HTML keyword and description metadata).

- Provide advice on long-term persistence of web information, on logical versus physical URL structure, recommending web applications when appropriate (e.g. to store documentation, meetings, workshops).

- Advertise and promote CERN central tools and services and ensure their functional user-friendliness.

5.3 Web Coordination Policy

5.3.1 Assignment of Responsibilities

Each web site (department, experiments, etc.) should have a known and unique webmaster, ultimately responsible for the overall structure and content of the pages. This person, well informed about CERN recommendations for web publishing, should coordinate the various “sub-web sites” within the department (experiment, group, etc.), participate in all coordination activities, collect and report relevant feedback and ensure the implementation of actions.

This approach is compatible with the editing being delegated to various people (for practical reasons), and it allows CERN to pursue a common web strategy in an easier way, restricting the number of persons involved when a new solution needs to be brought into effect (for instance, the implementation of common elements or the standardization of key contents).

5.3.2 Web cooordinating body

To improve communication among web authors at CERN, and to allow coordination of actions, regular CERN “Webmasters Meetings” should be introduced. The aim of these meetings would be:

- to coordinate and align the web-publishing efforts done in the different groups.

- to identify and address issues occurring in the process of designing, implementing, publishing and maintaining web sites.

- to help disseminate relevant information and guidelines to the web authors.

- to follow up the implementation of the new corporate style guide.

- to discuss other relevant web related topics.

The role of such a CERN Webmasters Meeting is crucial to the implementation and follow-up of any effort done to improve and harmonize the CERN web landscape.
5.3.3 **Web expertise team**

An efficient approach and long-term solution would be the creation of a web expertise team, with the mandate to guarantee the overall consistency of the CERN web structure and the homogeneity of its image, while acting as a resource for authors of CERN-related web sites. In particular, such a team should undertake the following:

- be in charge of the design and maintenance of CERN web templates and guidelines for web authoring.
- coordinate the activity of the Webmasters Meetings.
- help CERN webmasters in implementing any common harmonization actions that could be decided on existing web sites.
- help in the production of new CERN related web sites (experiments, activities, etc.), i.e. be available to give advice about all aspects of graphical design, information architecture, organization, layout and structure for CERN related web sites.
- whenever needed, take the lead in the production of new web sites related to major scientific and public events at CERN.
- maintain and regularly update the CERN intranet and public pages.

To professionally and thoroughly carry out its mission, this team should include expertise in the fields of web design, implementation and communication.

5.3.4 **Training**

All webmasters should have, or be willing to acquire, basic web design and usability knowledge. This will imply, if needed, the participation in a professional course, which could be organized in collaboration with HR.

5.4 **Implementation scenarios**

The above listed recommendations can be implemented in different ways, depending on the availability of dedicated resources, on the required “efficiency” of the resolutions, and on the timeline for accomplishing the required changes.

In all cases, the creation of “CERN style guides” and of “web authoring guidelines” is considered the indispensable first step prior to the following depicted scenarios.

5.4.1 **Minimal Scenario**

In this scenario, the new “authoring guidelines” are greatly publicized and made available in the CERN web site for all webmasters to use for the production of new sites and for “standardization” of the existing ones. While 0.5-1 dedicated FTE should be foreseen for the general coordination (webmasters meeting, regular update of the authoring guidelines, styles, aid to webmasters), this solution is mostly left to the effort, time and goodwill of existing webmasters. The concrete number of people involved, the implementation timeline and the efficiency of this approach are hard to quantify.

This scenario would also involve launching the Webmasters Meetings (see Section 5.3.2), which would serve as the place to promote, discuss and get advice on possible implementation problems, and would possibly motivate webmasters in the pursuit of the common effort.
5.4.2 Moderately Centralized Scenario

In this scenario, the creation of new web sites and the implementation of common elements in the existing ones would be performed under the control of a central web expertise unit (see Section 5.3.3). Acting on the basis of an established web strategy, developed in collaboration with key communication people at CERN, the unit would take responsibility of the evolution of the CERN web space, helping webmasters in the implementation of new solutions, taking direct actions when needed, in full collaboration with the Webmasters Meetings. This approach, which would require 2-3 dedicated FTEs, would leave the responsibility of the overall structure and image of the web space to a few people, while ensuring a “long term” solution for the creation of new web sites at CERN.

5.4.3 Fully Centralized Scenario

A fully centralized solution, adopted by large companies and by some of CERN’s peers in the academic world (see Chapter 4), is the implementation of a centralized content management system, which would take care of the common aspect of all pages hosted at CERN. While leaving ample freedom for the creation of the content, these systems do not allow users to touch and modify the structure of the web page, which stays under the control of a limited number of editors. Such a solution would guarantee a much greater coherence of the corporate image. A careful evaluation of available solutions, the implementation of the chosen product and the migration of all pages would require 3-5 FTEs over two years, which will reduce to 2-4 FTEs for the successive maintenance of the system. If the responsibility includes content creation and management, this could go up to 10 FTEs or more.

6 Conclusions

The status of CERN web sites has been carefully analysed and found to suffer from three major limitations: absence of a coherent corporate image, lack of information architecture that reflects to an inconsistent navigation system, absence of a common look and feel that would enhance and improve the presence of CERN on the web. The reasons for the current unsatisfactory situation have been traced to the absence of corporate style guides and of clear web coordination. The main impacts of these shortcomings are the ineffective usage of the CERN web sites, the wasteful duplication of effort and the damage of the image of CERN.

To improve this situation, a list of recommendations has been produced, some or all of which may be put into practice depending on management priorities. To emphasize the possible options, a few implementation scenarios have been sketched to help management evaluate the required resources and their corresponding effectiveness.
A. Misuse of the CERN logo

Below are shown different versions of the CERN logo as they are encountered in the CERN web landscape.

It is important to notice:
- the different tones of blue
- the arbitrary presence of the square that frames the rounds
- the arbitrary choice of typeface of the word “CERN” (the font officially used is “Optima”)
- the poor resolution of some images, that renders the word “CERN” not readable

Below are shown the logos of the CERN departments.

AB experimental areas  AB-PS accelerator  AB Operations group  AT

HR  TS

It is important to notice that:
- Not all departments have a logo.
- The CERN logo is mistreated, often chosen as starting element for poor graphic manipulation.
- There is no common graphic concept or identity behind the creation of these logos.
- Colours, fonts, sizes, resolution, image format are used arbitrarily.
B. Web standards compliance and usability

Web pages should be designed to work in any browser. To quote Tim Berners-Lee: “Anyone who slaps a ‘this page is best viewed with Browser X’ label on a web page appears to be yearning for the bad old days, before the web, when you had very little chance of reading a document written on another computer, another word processor, or another network” (Technology Review, July 1996).

For example, about 70% of network traffic of the CERN Document Server comes from outside CERN, with as many as 200,000 distinct client IP addresses per year, with users using various sorts of mainstream web browsers but also text clients (W3M) and even WebTV. The best assurance that the document will be readable in various user-browsing contexts is standards compliance. By being compliant to standards and by paying attention to technologies using least common denominator, the web author enhances the impact of the content.

A scan of CERN Department homepages, the Intranet and the Public homepage, performed on 15th March 2006, has revealed the following picture:

<table>
<thead>
<tr>
<th>Homepage</th>
<th>Number of errors</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HTML</td>
<td>CSS</td>
<td></td>
</tr>
<tr>
<td>Intranet</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>20</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>AT</td>
<td>18</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>FI</td>
<td>29</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>20</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PH</td>
<td>9</td>
<td>N/A, not used</td>
<td></td>
</tr>
<tr>
<td>TS</td>
<td>66</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>DSU</td>
<td>6</td>
<td>N/A, not used</td>
<td></td>
</tr>
<tr>
<td>LHC</td>
<td>20</td>
<td>N/A, frames</td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

It can be seen that no department page is free from errors.

The situation could be improved by regularly scanning at least the most important entry points in the CERN web space. Wider-scale standards compliance could be improved by offering a central CERN validator service that might be linked to from the page footers. A central validator could also serve as an invitation for web authors to use central services.

A related problem is the use of “special technologies” that may diminish the accessibility of web pages on certain platforms. Whenever possible, CSS should be preferred to provide “fancy effects” on top of simple HTML. Special web technologies such as Macromedia Flash or dynamic HTML have their place for special purposes only, e.g. for web sites created for educational reasons.

The CERN Department web sites are not immune to this problem (one of the departments uses Macromedia Flash for navigation buttons, making their homepage unusable to non-Flash-enabled browsers, see Fig. 6).
The situation could be improved by raising awareness of general web usability guidelines, providing and promoting common CSS stylesheets and web templates and icon library, promoting resources such as Jakob Nielsen's books and web sites about web design (a recognised authority on these issues).

Fig. 6: One of the many examples of the consequences of non-compliance to web standards: the CERN Finance Department homepage as seen from a browser (a) supporting (b) not supporting Macromedia Flash. Screenshot taken on 1st February 2006.
C. Typical problems with “top-down” navigation

Every web user knows the frustration of receiving the error 404 (“page not found”) or the error 500 (“internal server error”) while browsing.

When navigating “top-down”, the users start from the homepage and continue down until they find the information they are looking for. During browsing, a page-not-found problem may be encountered, due to bad internal web site referencing or an insufficient maintenance of the web site. In this case, responsibility is clearly internal to the organization, which has full control over the sites links.

---

**The page cannot be found**

The page you are looking for might have been removed, had its name changed, or is temporarily unavailable.

---

Please try the following:

- Make sure that the Web site address displayed in the address bar of your browser is spelled and formatted correctly.
- If you reached this page by clicking a link, contact the Web site administrator to alert them that the link is incorrectly formatted.
- Click the Back button to try another link.

HTTP Error 404 - File or directory not found.
Internet Information Services (IIS)

---

Technical Information (for support personnel)

- Go to Microsoft Product Support Services and perform a title search for the words HTTP and 404.
- Open IIS Help, which is accessible in IIS Manager (inetmgr), and search for topics titled Web Site Setup, Common Administrative Tasks, and About Custom Error Messages.

---

Fig. 7: CERN Intranet → AT → Information & Communication web page. Only two clicks away from the CERN homepage! Screenshot taken on 1st February 2006.
A validation study of the CERN Department pages was carried out and revealed that this problem concerns even the department homepages themselves.

In the table below we list the number of errors found on these homepages as well as the Intranet, the LHC and the main Public web site:

<table>
<thead>
<tr>
<th>Homepage</th>
<th>DNS</th>
<th>301</th>
<th>403</th>
<th>404</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intranet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td></td>
<td>7*</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>AT</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>FI</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td></td>
<td></td>
<td></td>
<td>7*</td>
<td>2</td>
</tr>
<tr>
<td>PH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TS</td>
<td></td>
<td></td>
<td></td>
<td>2*</td>
<td>1</td>
</tr>
<tr>
<td>DSU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LHC</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[*] Usually when the page is accessed from outside CERN, which is acceptable from the usability point of view, if properly advertised next to the link.

- DNS = Domain Name System could not resolve link
- 301 = Moved Permanently
- 403 = Forbidden
- 404 = Not Found
- 500 = Internal Server Error

For example, if we dive more deeply into some of the sites, and take an inside-CERN point of view, we find:

- Intranet:
  - level 1: 153 links checked, 0 problems found
  - level 2: 3008 links checked, 5 problems found (1x403, 4x404)
  - level 3: 3951 links checked, 10 problems found (1x403, 6x404, 1xDNS, 2xtime)
- IT:
  - level 1, 177 links checked, 0 problems found
  - level 2, 1795 links checked, 2 problems found (1xConn.ref., 1x404)
  - level 3, 4087 links checked, 3 problems found (1xConn.ref., 2x404)
Analysis of the CERN Web Landscape

- SG:
  - level 1, 28 links checked, 0 problems found
  - level 2, 449 links checked, 0 problems found
  - level 3, 846 links checked, 3 problems found (3x404)

- TS:
  - level 1, 146 links checked, 0 problems found
  - level 2, 509 links checked, 5 problems found (5x404)
  - level 3, 1539 links checked, 18 problems found (17x404, 1x500)

One can see that the problem is rather limited in the upper layers but grows as we navigate more deeply into the web sites. Nevertheless, the picture may be quite different when one does not navigate from top to the bottom, but when one dives straight into deeper levels; see the problem “page found, but outdated” in Appendix D.

The situation could be improved by regularly scanning at least the most important entry points in the CERN web landscape. A CERN link-checking server could also serve as an invitation for web authors to use central services.
D. Typical problems with “in-medias-res” navigation

When navigating “in-medias-res”, users start from a search page (or any third-party bookmark or link) that direct them straight into the heart of the web page hierarchy, to the information they are looking for. In this case, users may again encounter the page-not-found problem, usually caused by the sites being moved. But this form of navigation often leads to a more confusing page-found-but-outdated problem, where the user is presented with an outdated content coming from an old version of a reorganized web site. The old content is still kept online, while its updated version is located elsewhere (on other URL), leading to the confusion as to which information source is relevant.

Indeed, many pages at CERN are neither signed nor dated, leading to doubts about page validity. Moreover, it occurs that certain information can be present in more than one place, leading to doubts about “canonical location” of information.

For example, a Google search for “CERN Solaris Installation Guide” returns several hits (see Fig. 8):

- the first hit is an outdated page from 2001.
- the second and fifth hits point to another outdated page from 1997.
- the third hit is probably the current version (2003)... or is it?
- further browsing reveals two other URLs concerning more recent information on Solaris.

One can see that the end user is offered a plethora of pages on the Solaris installation coming from a variety of CERN web domains (wwwinfo.cern.ch, wwwpdp.web.cern.ch, cern.ch/product-support, service-solaris.web.cern.ch, twiki.cern.ch) leading to confusion and time loss when localizing the truly correct information.

It is clear that such a proliferation of URLs for the same thing (Solaris Installation Guide) may lead to user frustration. Similar problems can be found for other services, e.g. search Google for “CERN text processing”.

The situation could be improved by promoting service-oriented rather then unit-oriented URL schemas, by differentiation between apparent logical location of a web page and its physical storage structure, by raising awareness of the concept of URL being the permanent identifier of the content its describes, and, last but not least, by making a clear procedure how to handle obsolete information (e.g. redirect to new location).
Analysis of the CERN Web Landscape

Fig. 8: Google search for “CERN Solaris Installation Guide”. One of the many examples of the URL persistence problems at CERN. Screenshot taken on 1st February 2006.