The ATLAS Public Web Pages: Online Management of HEP External Communication Content

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On behalf of the ATLAS Experiment

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Abstract. The ATLAS Education and Outreach Group is in the process of migrating its public online content to a professionally designed set of web pages built on the Drupal [1] content management system. Development of the front-end design passed through several key stages, including audience surveys, stakeholder interviews, usage analytics, and a series of fast design iterations, called sprints. Implementation of the web site involves application of the html design using Drupal templates, refined development iterations, and the overall population of the site with content. We present the design and development processes and share the lessons learned along the way, including the results of the data-driven discovery studies. We also demonstrate the advantages of selecting a back-end supported by content management, with a focus on workflow. Finally, we discuss usage of the new public web pages to implement outreach strategy through implementation of clearly presented themes, consistent audience targeting and messaging, and the enforcement of a well-defined visual identity.

1. Introduction

1.1. The Flow of Scientific Communication

Communication is both central and essential to the scientific process. The size, scope and worldwide impact of scientific experiments, such as ATLAS [2] and the other experiments installed at the Large Hadron Collider (LHC) at CERN [3], require that it go beyond the dissemination of results between peers. Rather, key information needs to be communicated to non-specialized audiences, including those groups who might provide support for the projects and those most affected by the results.

Figure 1 offers a rough illustration of the flow of information through an experiment and on to three major target audiences (the science community, the public, and the decision makers with the power to advocate support for the experiments). The concepts conveyed by this figure are not meant to diminish the social and ethical obligation of scientists to communicate results to the world at large, but rather to underscore the pragmatic need for communication to leverage support for science. This support comes in the form of ideas (typically from others in the science community), monetary
resources (provided by the public via government decision makers and public funding agencies), and human resources (students, new scientists and engineers, etc.).

![Communication Flow Diagram](image)

**Figure 1.** Simplified communication flow diagram for a major scientific experiment.

1.2. Goals and Audiences

To effectively communicate to these diverse, non-specialist communities, scientific outreach teams develop communication plans that define priority target audiences and the messages they want to convey to those audiences. The ATLAS Outreach communication plan [4] defines the target audiences and goals presented in Table 1.

<table>
<thead>
<tr>
<th>Target Audience</th>
<th>Communication Goal</th>
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<tbody>
<tr>
<td>General Public</td>
<td>Develop an understanding and appreciation of ATLAS and the field of particle physics, and communicate the benefits of fundamental research for society.</td>
</tr>
<tr>
<td>Policy Makers in Science &amp; Technology</td>
<td>Communicate the impact of our research on society now and as an investment for the future, in order to sustain support for ATLAS and the field of particle physics.</td>
</tr>
<tr>
<td>Students &amp; Teachers</td>
<td>Convey the excitement of scientific discovery and an appreciation of the scientific method to help instil and reinforce these values in society, and to attract and retain the next generation of scientists and educators.</td>
</tr>
</tbody>
</table>

ATLAS outreach projects, public events, communication platforms, and content are designed to support these goals and deliver the messages as effectively as possible to the target audiences.

1.3. Content and Platforms

ATLAS outreach defines three classifications of communication platforms to deliver content to the public: Local, Remote, and Online.
1.3.1. Local. Local activities include public visits to the ATLAS Visitor Centre (AVC) [5], a permanent exhibition, including descriptions of the experiment, interactive displays, and a 3d movie. During LHC shut downs, visitors have the opportunity to take a short tour of the underground cavern and, on special occasions, open days or specially themed events, include temporary exhibitions aimed at the local public. Visitors to the AVC, which is located at LHC Point 1, adjacent to the ATLAS detector control room, are guided by members of the collaboration or by official CERN-trained guides. As ATLAS is the closest LHC detector site to the CERN’s main campus in Meyrin, it welcomes more than half of the guided visits (around 50,000 visitors in 2014). The majority of the visitors are students from European secondary schools, but also includes members of the media and the general public. VIP visitors, including politicians, artists, musicians, and occasionally heads of state, are organized at the AVC by the CERN VIP service, in coordination with ATLAS management.

1.3.2. Remote. A significant portion of the experiment’s outreach and educational activities are hosted outside of CERN and are organized by collaboration members at the external institutes. These include public seminars, media events, exhibitions, traveling exhibits, and Masterclasses [6] targeted at students in local secondary schools. These activities can be organized independently, but often include remote participation from an institute member located at CERN, via an ATLAS Virtual Visit [7].

1.3.3. Online. A number of platforms comprise the ATLAS online presence, including the public web pages, physics briefings, blog, social media, webcast channels, and virtual visits. The public web pages host news, features, descriptions of the experiment, and a large collection of multimedia material. Physics briefings, hosted on a separate site, include short summaries of recent presentations and publications. The blog site hosts articles written by collaboration members, describing an event or activity, as seen from a personal point of view. Social media sites include Twitter [8], Facebook [9], Google+ [10], and YouTube [11], used primarily to announce recent achievements, and to allow the possibility of direct conversation between members of the public and the collaboration.

1.4. The special role of the Public Web Site

The public web site plays a special and important role to the communication platforms described above. As the primary host of written and multimedia content, and as a gateway to additional external resources, the web pages provide support to the other platforms. For example, the content presented in the ATLAS Visitor Centre is available for viewing (and often for download) from the public web site. This is also true concerning access to material for Masterclasses, traveling exhibits, the webcast channels, and virtual visits. Social Media links are hosted on the public pages, sharing tools are available next to news articles, and much of the social media postings are designed to bring readers to more complete content hosted on the web pages. It is this central role to ATLAS communication that underlines the importance of developing a complete and effective design for the new site.

2. Existing Public Site and Motivation for Change

2.1. Existing Public Site

The current public site (atlas.ch) has served the 3000-person ATLAS collaboration quite successfully, with 39.7 million views since 1998. Its design has evolved over the years from one primarily dedicated to the hosting of educational material, to one that also serves the relatively dynamic communication needs of an experiment involved in exploration, scientific advancement, and discovery.

The design of the site is modular, with components dedicated to news and features, descriptions of the experiment, and access to a large collection of written and multimedia resources. Each news article has a dedicated page that includes a listing of previous articles. The title, image and lead paragraph appear in a box, front and centre on the main page. Other updates, such as physics briefings or press statements, also get a window on the front page, in order to draw attention to new activities. An RSS feed is used to stream new material to the media and interested public.
Access to multimedia material is provided on the site, with the actual material (images, video, etc.) shared between the site and other hosting databases, primarily the CERN Document Server (CDS) [12]. In general, low and medium-resolution images are hosted locally, and links are provided to the high-resolution images on CDS, with the link-through requiring agreement to copyright terms of use.

2.2. Limitations
The primary limitations of the existing pages are technical in nature. Development has been made using standard web tools with a combination of static html and css. Given the large quantity of written and multimedia content that needs to be managed, as well as the dynamic workflow, and the need for timely updates during high-profile public events, it now makes more sense to employ a content management system. In addition, such a system would more easily allow for remote contributions, a highly desirable feature, given the global distribution of the collaboration and the dependence of the outreach group to distribute effort.

A more complete list of desired improvements includes the need for improved navigation, site-wide search, well-defined content workflow, multimedia handling, and integration with social media. The development of the web pages also gives the outreach group an opportunity to refine and consolidate its visual identity, something that has evolved over time, but remains ill defined. Proper web page design would force decisions on font, colour palette, and even refinement of the logo, all items that benefit the entirety of the outreach program.

Finally, in terms of development and maintenance, it makes sense for the site to be hosted at CERN on the IT web servers, which implies compliance with the CERN recommendations. Most recent recommendations by the ENTICE [13] initiative call for the usage of the Drupal content management system. It is an open source technology that benefits from a very large and growing worldwide development community and is currently deployed by groups throughout CERN.

3. Discovery and Design
ATLAS organised its development procedure into two distinct phases: Discovery & Design and Implementation. Table 2 presents the various components of the former:

<table>
<thead>
<tr>
<th>Development Stage</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Analytics</td>
<td>Collection of statistics from web-server based data and Google Analytics [14].</td>
</tr>
<tr>
<td>Audience Research</td>
<td>A questionnaire was attached to the current web site for several weeks and responses were tabulated.</td>
</tr>
<tr>
<td>Stakeholder Interviews</td>
<td>Key stakeholders were interviewed to identify common needs and goals. Participants included ATLAS management, members of the collaboration involved in outreach, communicators from the CMS collaboration [15], and members of the CERN education and communication groups.</td>
</tr>
<tr>
<td>Structure Proposal</td>
<td>Information from the previous three phases was compiled to construct a set of themes and messages. These then provided the basis for development of an organisational structure.</td>
</tr>
<tr>
<td>Design Sprints</td>
<td>One-week fast design phases were iterated between the development team and ATLAS outreach team. The outcome was a set of low-definition html prototype pages.</td>
</tr>
</tbody>
</table>
The Discovery and Design phase for the ATLAS public web pages was carried out in partnership with Mark Boulton Design [16], the same development team that designed and implemented much of the current CERN public web site. It lasted approximately 14 months, from Feb. 2013 to May 2014, although there was significant down time, to allow for collaboration input, iterations, and approval.

Key findings from Web Analytics of the existing site include the following numbers from 2013:

- Average number of page views per month = 95,000
- Average number of visits to the site per month = 1,500
- Average duration of a visit = 1m 40s
- Bounce Rate = 73%
- Viewing: Home page (44%), Photos (15%), News (14%), rest under 3% each.

The Bounce Rate is defined as the number of visitors who only view the first page they reach. A rate over 50% is considered to be poor, as it means the visitor did not spend time to view other content.

Key findings from the Audience Research indicate that most of the users are seeking news and updates (typically during major events or announcement) or information about the experiment, itself, together with supporting resources, such as images, videos, animations, etc. Primary drivers of web traffic to the site include CERN, social media, and the Google search engine [17].

The Stakeholder interviews provided a more qualitative, but valuable assessment of the expected usage and functionality of the new web site. There was a general re-affirmation of the audiences: Students & Educators, Educational Institutions, Scientists from outside of the field, “Scientifically Interested” Public, General Public, Diplomats, and VIPs. However, it was also noted by several of the interviewees that a significant amount of the viewers would be colleagues both from within the ATLAS collaboration and from competing (complementary) collaborations, as these audiences visit seeking material and resources for the preparation of general plenary talks and public presentations. This fact was confirmed in the Web Analytics by the large number of visitors coming from the cern.ch domain (the web domain of CERN). Stakeholders also noted the importance that ATLAS maintain an independent identity from that of CERN, but that it profit from the strong name recognition of the lab, perhaps through usage of the phrase “The ATLAS Experiment at CERN”. Finally, many of the front-end design issues that drove the decision to launch the initiative (structure, navigability, search) were re-iterated by the interviewees.

4. Implementation

The Discovery & Design phase was long, requiring patience and effort, but it was absolutely essential for developing an implementation plan. By the end of the process, the team had clearly identified the primary target audiences, the corresponding messages, the topics and content types to deliver those messages, and the organisational structure of the content presentation.

Interestingly, at the highest level, the organisational structure mapped fairly closely to that of the existing web pages, with three main themes: Discover (information about ATLAS), Resources (access to written and multimedia material), and Updates (News, Briefings, Blogs, etc.). This is somewhat reassuring, as the new structure was arrived at independently from the existing pages, which benefited from 17 years of evolution.

There was universal agreement to adopt the Drupal content management system, and the following additional requirements were identified:

- Ability to browse on any size screen from phone to tablet to laptop to large desktop screens;
- Multilingual capability at least for specific articles, potentially for any part of the web site;
- RSS feed for updates;
- Links to social media sites, as well as possibility to share articles;
- Easy access to images, video, and other media hosted on CDS;
- Automatic indexing of frequently updated material (News, Briefings, Blogs, etc.);
- Site-wide search capability.
Concerning the back-end implementation, several guiding principles were adopted to ensure the necessary functionality and long-term maintainability of the site:

• Define the publication workflow: write $\rightarrow$ edit $\rightarrow$ approve $\rightarrow$ publish (or iterate);
• Use existing databases for educational and multimedia material: CDS (ATLAS material), IPPOG Database [18] (general outreach material);
• Adopt (and adapt) CERN content guidelines (word counts, title handling, language);
• Enforce a graphic charter, including colour scheme, open-source font, and a refined vector format of the logo;
• Re-use material across platforms (public web site, social media, brochures, posters, visitor centre, etc.), as much as is reasonable;
• Comply with CERN guidelines for usage of Drupal modules and keep the versions in synch.

Table 3 presents the various components of the Implementation phase of development.

Table 3. Implementation stages of the development process

<table>
<thead>
<tr>
<th>Implementation Stage</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refinement of Prototypes</td>
<td>Low-definition html prototypes are refined, following feedback from the team and volunteers from the collaboration. Results are high-definition, but still html.</td>
</tr>
<tr>
<td>Finalisation of Design</td>
<td>Overall look and structure of pages is developed, including high-level fan-out pages and examples of low-level pages.</td>
</tr>
<tr>
<td>Drupal Templates</td>
<td>Templates are built in Drupal based on the defined requirements, use cases, and high-resolution prototypes.</td>
</tr>
<tr>
<td>Content Management</td>
<td>Infrastructure of the content management system is designed to handle work flow, requirements for security, access, content development, maintenance, etc.</td>
</tr>
<tr>
<td>Infrastructure</td>
<td></td>
</tr>
<tr>
<td>Population of Content</td>
<td>Selected content is ported from the existing web pages. New content is developed, based on recommendations of the Discovery &amp; Design phase.</td>
</tr>
<tr>
<td>Iterations</td>
<td>Probably the most important aspect of the process. Most issues are only identified after significant usage of the site. Some of these, regardless of the design effort, can require major re-writes.</td>
</tr>
</tbody>
</table>

The Implementation phase for the ATLAS public web pages is ongoing and is being carried out in partnership with the Vector Media Group [19], experts in Drupal web page development. Work began in Aug. 2014, hosted on local servers, and will be ported to the CERN servers in June 2015.

5. Status and Plans
The development is currently in a state of iteration involving the population of content, the revision of the content management infrastructure, and coding of the Drupal templates. A recent major iteration, driven by the need for increased design and content flexibility, required a complete re-write of both infrastructure and templates, but has resulted in a simpler and more powerful content development environment. No more major re-writes are expected before the porting of the site to CERN, although some fine-tuning of templates is inevitable. The graphic charter adopted for the new site is presented in Figure 2.
Following the porting of the core web site, efforts will turn to the completion of content development and porting. Much of this work should be completed by the end of June, 2015, allowing for a full six months of overlap between the new and existing web sites, before the latter is retired. The overlap will begin in an “alpha-testing” mode, with volunteer colleagues helping to stress test the pages and to identify issues in both content and structure. Once there is approval from the collaboration, the pages will be made public and available via a link on the existing pages. In the final stage, the existing pages will be made available to the public only via a link on the new pages, which will be accessible via the current domain, and eventually through the newly acquired CERN domain: atlas.cern. The entire process will be completed by the end of 2015.

Figure 2. ATLAS Visual Identity, including font choices, refined logo, and colour palette

6. Conclusions and Lessons Learned
Arguably the most important lesson in this undertaking is the value and necessity of the research. Regardless of the technological choices, the most difficult and important part of the process is the definition of the underlying organisational structure, which in turn depends on a clear identification of target audiences, goals, and messages to be delivered. The primary reason we spent over a year in the Discovery & Design phase was the need to converge on a solid structure that echoed the needs of the collaboration, while fostering an efficient and natural navigational organisation.

The development team was fortunate to have employed some of the leaders in the industry in web design and implementation. Web design is a science that involves much more than the choice of fonts, colour schemes, and vertical grids. It requires the objective analysis of audience behaviour and the effect of various choices on optimising the delivery of information. The partnership between professional web developers and physicists was challenging, but absolutely essential to the success of the project and resulted in much more than a set of web pages. Products of the development include:

- Communication themes now echoed in all of the experiment’s outreach content and platforms (Physics, Collaboration, Technology);
- Clear, enforceable guidelines for all written content;
• A well-defined workflow for the publication of all content;
• Policy for the storage and delivery of multimedia content on all platforms;
• A professional, recognisable, visual identity, complete with graphic charter, vector logo, colour palette, and fonts.

These items profit the entirety of the ATLAS Outreach & Education project, and provide the collaboration with tools for effective communication in all aspects of the experiment.

References

[2] ATLAS is an international particle physics experiment located at one of four collision points of the Large Hadron Collider at CERN, http://atlas.ch.
[15] The CMS Experiment is also located on the LHC at CERN and has similar goals and structure to ATLAS: http://cern.ch/cms.

Acknowledgments

We would like to acknowledge our ATLAS colleagues, who have provided important input and advice in the development of the web pages, including Peter Watkins and Christine Kourkoumelis, and many others participating in the various surveys and interviews. We also thank our partners in the CERN DG COM and EDU groups, CERN IT OIS and CIG groups, as well as our colleagues in the LHC Outreach Group and the International Particle Physics Outreach Group, for their cooperation, support, and innovative contributions to the fields of education and outreach in particle physics. Finally, we acknowledge and thank our institutes: the University of Michigan, the University of Birmingham, the University of Manchester, and the Abdus Salam International Centre for Theoretical Physics for supporting our research.