Science communication distribution services in astronomy and planetary sciences outreach

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Abstract

In this paper I will present some of the first efforts to use virtual observatory methods and modern distribution services to enable access to science communication products, and how the use of new approaches, such as Web 2.0 can help to achieve the principal communication objectives more effectively. One notable example will be the upcoming Europlanet Integrated and Distributed Information Service (IDIS) which will offer common and user-friendly access to the data and information (including outreach products) produced by the various types of activities to the European planetary science community.

Introduction

Few can argue against the notion that the internet is becoming an important facilitator of interpersonal communication. Many science communicators are now figuring out the practicalities of the new reality recently described by the New Media Consortium (2007) in a white paper that discussed the evolution of communication: *We are seeing new means of communication, new places to communicate, and new avenues of interaction unfold at a rapid pace.* Services and applications like wikis, weblogs, photosharing and link sharing highlight the social aspects of a Web 2.0 world as reported by O'Reilly (2007). According to a Wikipedia entry, these sites *facilitate creativity, collaboration and sharing between users*. Tim O'Reilly recently reflected on a *major theme of web 2.0 that people haven't yet tweaked to. It's really about data and who owns and controls, or gives the best access to, a class of data.* (Tweney 2007) There are many varieties of data that can be accessed online: books, articles, images, podcasts, videos, etc. Increasingly, science data has also been made available to the public. Projects like Virtual Observatories[1], Skyserver[2], VirGo[3] are not only making data more easily available for scientists, but are placing it directly in the hands of the general public, communication specialists, educators, and students. In this manner, Web 2.0 will play an important role in future astronomy education and public outreach collaboration projects and in the dissemination of outreach products to the public.

[1] http://www.ivoa.net
[2] http://skyserver.jhu.edu
[3] http://archive.eso.org/cms/tools-documentation/visual-archive-browser

In addition to established science media organisations and higher research and education institutions, many other individuals and entities act as web publishers and content providers, including scientific societies, science centres, museums, public education initiatives, individual scientists, and even laypeople. The formats offered by internet-based outlets for science communication directed towards the general public include conventional forms of print (text, images, PDF) as well as Web 2.0 methods, e.g. Video-On-Demand, information portals, forums, podcasts, news feeds, audio clips, webcasts etc. These new ways of distributing information have transformed the way people interact with the content of science communicators. Individuals can easily express their opinions on topics or ask questions of the experts directly on science communication websites, blogs, and discussion forums. Online methods such as portals, news feeds also increase the speed of dissemination of information; see Minol et al. (2007). The resulting conclusions are obvious: formal and informal communication within the scientific community is increasingly overlaid with public science communication. In this paper I review the available online tools for science communication, the new challenges to archive and exploit astronomical data, with a special emphasis on the Europlanet Integrated and Distributed Information Service (IDIS), a European service to distribute resources amongst the research community as well as a planned project for the global International Year of Astronomy 2009 programme.

Internet tools

Here follows a general overview of different types of internet tools available for communicators.

Web portals offer comprehensive editorial content, which, as a rule, is composed by professional journalists and contains such items as magazine articles, opinions (columns etc.).
Example:

- www.space.com

Podcasting refers to the production and online subscription-based distribution of media files on the internet (as audio or as video podcast, also known as vodcast).
Example:

- **Hubblecast:** http://www.spacetelescope.org/videos/hubblecast.html
- **Hidden Universe:** http://www.spitzer.caltech.edu/features/hiddenuniverse/index.shtml
- **Planetary Radio:** http://planetary.org/radio/
- **Universe Today:** http://www.universetoday.com/category/podcasts/

A **weblog** is a digital journal. Commonly, a blog is “endless”, i.e. is a long, inversely chronological list of entries. It may be seen as an easily manageable website. It also easily serves as an exchange of information, thoughts and experiences between the blogger (writer) and the reader using “Comments” as the dialogue medium.
Examples:

- **Bad Astronomy:** http://www.badastronomy.com/bablog/
- **Science Blogs:** http://scienceblogs.com/

A **wiki** is a type of collaboration platform that allows many users to easily create, edit and link web pages using server-provided software tools. The users do not need any local software and only low level technology skills. Wikis are often used to create collaborative project websites and sites like Wikipedia have socially created content that rely on community moderation.
Example:

- **OpenWetWare:** http://openwetware.org/

Collaborative news websites with ranking systems that index and evaluate international news or posts.
Examples:

- **DissectMedicine:** http://www.dissectmedicine.com/
- **10x10:** http://www.tenbyten.org/10x10.html

e-print services are places to share pre-publication research, unpublished manuscripts, presentations, posters, white papers, technical papers, supplementary findings, and other scientific documents.
Examples:

- **arXiv e-Prints:** http://arxiv.org/
- **Nature Precedings:** http://precedings.nature.com/

Social bookmarking: Free online reference management, referrals, sharing, and tagging for all researchers, scientists, communicators and educators.
Examples:

- **Connotea:** http://www.connotea.org/
- **delicious:** http://del.icio.us/

Social network services are online social structures made up of individuals or organisations that are tied by one or more specific types of interest.
Examples:

- **Nature Network:** http://network.nature.com/
- **Facebook:** www.facebook.com
- **Second life:** http://secondlife.com/ (see Gauthier, 2007)

Crowdsourcing Markets: Online forums enabling major companies to reward scientific innovation through financial incentives. These types of service typically outsource work to a large group of people, often with “non-traditional” backgrounds, such as amateur astronomers or hobby inventors.
Example:

- **InnoCentive:** http://www.innocentive.com/

Publicly accessible astronomical databases

Online astronomical information can be divided into two largely separate, but complementary domains: scientific publications, now almost all available online, and databases, which in some

fields have become more important than ever. The line dividing publications and data is disappearing, see Hannay (2007). As scientific publications have moved online, they have taken on some of the characteristics of databases (searchable, structured and updateable). At the same time, some databases are starting to reproduce some aspects of online tools: (peer-reviewed, archival, citable and searchable). As these datasets become more available to astronomers, market forces will make software that processes and interprets data common, and inevitably more accessible to laypeople. This evolution has already started, but a revolution in this field may be coming in a near future. Tools like Stellarium[4], Uniview[5], FITS Liberator[6], Google Earth[7], etc. are already exploiting real scientific data in an unprecedented way. Standardisation (data formats, metadata standards) will help this task, and different communities are now working on the definition of various standards (see for instance Gauthier et al. (2007)). A secondary driving force for publicly accessible data is the educational benefits of using real science data in the educational settings. Data discovery projects like Skyserver not only make data easily available to educators, but also provide the instructional wrappers to make it useful in the classroom.

Europlanet: Integrated and Distributed Information Service

The European planetary sciences community is working on a long term solution to coordinate an Integrated and Distributed Information Service (IDIS). This service will offer a common and integrated access to data and information produced by the various research and EPO activities to the planetary science community. IDIS will provide a general platform for exchanging and accessing data and information, integrating and linking relevant data, databases, outreach products and other information systems, providing a more unified access to information, especially for European scientists and to the benefit of the dissemination of data produced in Europe. This implies, for instance, that IDIS must be compatible with, and complementary to data services existing in and outside Europe, like the Virtual Observatories (EPN IDIS Green Paper 2007).

The main building blocks of planetary science that will feed into IDIS and be combined, elaborated and presented to the end user are:

- Earth-based observations, including both ground and space telescopes in all spectral domains;
- Planetary data from space missions (remote and in situ observations);
- Planetary models: physical concepts and numerical simulations;
- Laboratory experiments: fundamental processes of interest and experimental simulations;
- Databases and information systems dedicated to given sub-fields;
- Outreach and educational products.

[4] http://www.stellarium.org/
[5] http://www.scalingtheuniverse.com/
[6] http://www.spacetelescope.org/projects/fits_liberator/
[7] http://earth.google.com/

The *Portal to the Universe*: An IYA2009 Cornerstone Project

Public astronomy communication has to develop apace with other players in the mass market for electronic information such as the gaming and entertainment industries. The problem today is not so much the availability of excellent astronomy multimedia resources for use in education, outreach and the like, but rather finding and accessing these materials. Laypeople, press, educators, decision-makers and even the scientists themselves deserve better access to press releases, images, videos and background information. We all need a single point of entry into all the cosmic discoveries that take place on a daily basis — a global one-stop portal for astronomy-related resources. Modern technology (especially RSS feeds and the VAMP — Virtual Astronomy Multimedia Project[8]) have made it possible to tie all the suppliers of such information together with a single, almost self-updating portal. The *Portal to the Universe* will feature a comprehensive directory of observatories, facilities, astronomical societies, amateur astronomy societies, space artists, science communication universities, as well as a news-, image-, event- and video- aggregator and Web 2.0 collaborative tools for astronomy multimedia community interaction such as ranking of the different services according to popularity as described by Russo & Christensen (2007).

Conclusions

The primary aim of a distribution service for astronomy EPO content was given by Christensen (2005) and may be defined as: *Excite, inform and educate the public about space science and astronomy through access to data, and serve as a catalyst for scientific and technological literacy*. If the new tools made possible by the internet are successfully implemented it would literally open a *Portal to the Universe*.

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