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## **Task 3.2 Critical analysis of websites by partners**

### **Deliverable 11. Analysis of scientific websites by partners**

The first objective of the WP3 “In-depth and critical analysis of scientific websites” is to evaluate critically the websites selected in WP2 “The Mapping of current situation”.

Regarding this objective, in January 2009, 60 popular scientific websites selected in WP2 underwent an in-depth analysis by all project partners by means of the grid of critical evaluation (established in WP3 T 3.1), and the use of rating scales for the Image of Science and the Pictorial Image of Scientists (established in WP2 T 2.2).

### **Overview of general trends identified by partners’ national general conclusions**

We offer here, as a first step towards meeting the second objective of this work package (i.e. “to identify the best practices of the selected websites regarding the dissemination of images of science and scientists and its impact”), an overview of partners’ national general conclusions which aims to summarise some general trends identified through their analyses of the panel of selected Popular Science Websites (PSWs). Where appropriate, partners’ general comments on particular websites were also taken into account. The overview is not intended as an exhaustive analysis of the outcome of the evaluation, but rather provides a general signposting. It will be completed by a further analysis which will underlie the identification of the general trends and single initiatives in the dissemination of image of science and scientists by means in websites.

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## **I. Images of science and scientists**

### **1. Depersonalised science**

Unquestionably the most remarkable trend confirmed by the partners' in-depth analysis is that in around 25% of the selected popular science websites there is a complete, or almost complete lack, of pictorial representations of scientists.

Thus, as the French partner put it in their general conclusions, “science is not personalised : the results and processes are explained but people are not present” and this observation stands in sharp contrast to the situation in other media (e.g. cinema, music, literature) where the figure of the author is the first and foremost feature in the communication process.

The Dutch partner emphasised that “pictorial images of scientists are present, but not very prominently” exemplifying this with the fact that at the time of the analysis only one website in their selection shows a picture of a scientist on its homepage. Regarding the rare cases of available textual representation of scientists in certain news or articles, the partner draws attention to the fact that researchers are merely mentioned. In this way, the partner postulates that “the image of scientists which users perceive through these websites will be mainly based on “circumstantial” information”. Such as, are the (scientific) issues interesting? Is the information reliable? Is the website respectful to human beings and nature?

The Estonian partner has also found that scientific articles are usually illustrated with science-related pictures, as opposed to pictures of scientists themselves. However, sometimes larger PSWs in Estonia use photographs of scientists doing their work in their laboratory settings. These photos are mostly displayed on articles talking about a particular scientist.

Statistically speaking, the project partners from the UK, Bulgaria, France, and Netherlands report in their general comments that around 25 % of all selected websites provide, at best, insignificant numbers of images or pictures of scientists

which confirms the data from the preliminary analysis provided during the selection procedure carried out in WP 2.3.

In Bulgaria 5 out of 8 of the selected websites (all private ones) contain very few pictorial representations of scientists although “there are plenty of images and pictures of all kind of living/non-living creatures, technical products and instruments. Thus, scientists mainly report on their discoveries and stay behind the camera”.

The UK partner reports that 55 percent of their websites do not contain any images or pictures of scientists, even though. 3 of the websites are owned by public institutions (a university, a school, and a public media company). It is remarkable that the 3<sup>rd</sup> website in this group is an online project of ‘the world largest broadcaster’ which is dedicated to school students. 2 out of 3 privately owned UK PSWs does not contain any pictures of scientists. The only exception is a privately initiated website representing only one picture of ‘male stereotyped caricature’ of scientist, confirming that in the UK as well, Science is largely depersonalised.

One third of the websites in the panel of PSWs in France provide insignificant pictorial representation of scientists. All of these are private initiatives (60 percent of the selected privately owned French websites). The French partner reports that the most curious is “a website where there are no human beings”.

The partner from Netherlands reports that 2 out of 10 of their websites do not have pictures of scientists at all. One of them is a public initiative (university) and one is private (publishing house).

In Spain 3 out of the 10 websites do not have any images of scientists. These three are targeted mainly at young people, two of them being thematic ones.

In Iceland there is almost no pictorial representation of scientists on any of the websites. The only website that really shows any scientist is a website that has only videos and graphic material. Even the websites that provide direct contact with scientists, by having them answer questions, have no images of them.

## **2. Non-pictorial representation of scientists**

Even if scientists are not strongly represented on the French websites, the respective partner notes, it is possible to say that some websites try to give them a consistent place: for example, three websites present portraits of people working in scientific research such as scientists and technicians without pictorial representations but with their curriculum and their day to day activities. Two websites organise interviews with scientists about the issue: what are your motivations and objectives? Most importantly: three websites provide the name of the specialist (with sometimes a short presentation) who gave the information. In this case, it is interesting to note that there is a double influence: the influence of the journalist and the influence of the scientist (even if the scientist is not identified you can see that their presence was necessary for the article).

## **3. The stereotypical image confirmed?**

The partner from Spain confirms that most of the websites, in its national panel, provide stereotypical images or pictures of scientists which represent, as described by the Spanish partner, “good, intelligent, in general older than younger, of Caucasian appearance and more men than women”.

When portrayed on Dutch PSWs, the scientists “mostly appear to be ordinary people” and again there can be found “more pictures of male than female scientists”.

The UK partner records in their general comments that 3 out of 10 websites from their panel show one-sided representations of Science, by showing more men than women and more “classic” scientists than “modern” ones.

The partner from Bulgaria identifies 3 websites which mostly communicate the stereotypical image of scientist. One of them represents mainly black and white images of ‘renowned white men who are as well advanced in years as in science’. The second website represents mainly ‘renowned old scientists and Nobel Prize winners’, and very ‘few women and different ethnic groups’. The partner draws

attention to the fact that the last website is a blog owned by a leading business newspaper, is edited by a PhD student, and is a public/private national initiative, which is supported by state authorities and the most prestigious scientific local institutions. The third website provides only one picture of “an old and renowned” scientist and it is developed by university students.



#### **4. The Bold, the Beautiful, and Miss Q**

The partner from the Netherlands provided an excellent counter-example (the image of Miss Q, “the regular character who does scientific inquiries” on the Quest website) which “seems to be stereotypical for a scientists (but very stereotypical for women)”.

In the PSWs panel of France it is not easy to find such extravagant researchers, but more probably ‘young and working in the natural environment’ (usually archeologists) or a ‘young and beautiful scientist with a blue coat, a pipette and special glasses’. However, only the French partner identifies websites (3 out of 10) as providers of plenty of images of scientists in pictures and words that give “a consistent place to the scientists” through portraits and biographies of famous scientists as well as the scientific authors of the web articles.

In Bulgaria the archaeologists are also the super stars of science websites and as a rule bear a resemblance to Indiana Jones. Marine scientists are also represented (although rarely) on a website as “young-to-middle-aged good-looking and happy adventurers”. Only one website represents images of young and attractive scientists and this exception can be easily explained with the offline science communication activities of the editorial board and the organisations which support them.

While no page in the UK offers one particular character that represents scientists, one of the institutional pages offers a searchable database of real life scientists,

which contains pictures of all types of scientists, from Aerosol research scientists to a Wind Farm Manager. Each page shows a photo of the person, alongside a job description, biography and topics/interests.

### **5. Positive image of science and scientists: Too good to be true:**

Unanticipated and significant trends in representing science and scientists through popular scientific websites were identified by the French partner:

**5.1. Science is always represented in a positive way** by the French panel of websites. There is, paradoxically, almost no room for science-related ethical and socio-economical issues which are highly recognised by the EU policy makers and which shape all the worries and debates with respect to science and emerging technologies. This wholly positive internet-mediated image of science is also in full contrast with “the way science appears in the newspapers or on TV where controversies play a large part”. Science is always represented as positive in Spain as well.

In the UK on the other hand, one web-site purposefully searches out debates by juxtaposing competing ideas, such as the potential benefits and hazards of GM foods, while another one of the selected pages is especially dedicated to exploring ethics in the domain of physics.

**5.2. Scientists are always represented as “beautiful, clever, happy and passionate about their job”** in the analysis of the French popular scientific websites. However, the partner gives prominence to the fact that “for 5 years in France there has been a strong scientists’ movement contesting the organisation of research, the budget for research ... and there is nothing about that in the websites”. There is a large gap between what you can listen to, see or read in the daily news media and the images conveyed by these websites.

## **II. Content**

### **1. Bigger is better**

“The bigger organisations have more sophisticated websites” is the general and most important national conclusion for the UK’s panel. This comes as no surprise, especially in small countries as Estonia where the respective partner concludes that “better financed sites can afford more active updating and take better advantage of modern technologies to convey the message about science and scientists”. The Estonian partner reports as well “a significant correlation between the quality of the site (both in terms of content and functionality) and the availability of information about supporters”. However, as can be seen from the national conclusions of almost all the partners (especially those mentioned above), there are exceptions to this general rule (e.g. when a small organisation has a very sophisticated and imaginative website). These can be easily recognised as examples of good practices that can be established regardless of organisational resources and experience. On the contrary, it is surprising to see that a big and wealthy organisation, working in science, may also have relatively poor scientific information on its website, as highlighted by the French partner.

### **2. General vs. specialized PSWs**

The UK partner clearly identifies some key “differences according to the site purposes, in that the sites that focus exclusively on the curriculum do not feature news items and do not mention science as a career or show few pictures of scientists working. As such, they communicate science as a subject that is independent of the human intervention and is relevant to their scholarly activities only”. To the contrary, the partner provides telling examples supporting the concept that websites which aim to cover the science, in general, usually “represent science as a contextualised activity, where they show fields in which scientists work”.

The partner from the Netherlands suggests that the advantage of general-science websites is “that users who are looking for scientific information on several topics (at the same time) can stay on the same website and find (possibly) all the information in one search action. They may regularly use the same website for search actions and therefore become acquainted with what the website offers”. On the other hand, the partner clearly exemplifies the statement that “specialised websites often offer much more in-depth information about one topic, issue, or discipline than general-science websites”.

In Estonia general purpose PSWs tend to be more oriented towards presenting scientific news, whereas domain specific scientific websites are more focused on explaining scientific phenomena.

In Iceland there are hardly any websites that focus on the general promotion of science, most of them specialise in particular fields. What is interesting though is how much of the science promotion is focused on things that are native to Iceland.

### **3. Where is the science?**

This rhetorical question is asked by the French partner, but it could be related to every country in which science and science communication are too institutionalised or too commercialised. Thus, the partner reports that most of the websites are “the display window of an institution which wants to promote itself” and “there is very little scientific content”. Surprisingly, it is well exemplified that sometimes this content cannot be found easily even in websites of organisations which are “very generous” and sophisticated in providing varied and attractive content to different user groups. This is especially detrimental when the website is supposed to be dedicated to science and clearly identified as such (“science” in the title, for example).

#### 4. Mono/Multimedia

In Spain “the majority of the websites analysed supplement the textual content with pictures, mostly at a high level. Video and audio content is only provided by half of them but some multimedia content is included in each site”.

In France most of the websites of the sample are “monomedia: some rely more on static information (text + image), whereas others include video and others games”. The partner reports that only two websites exploit the full variety of the media allowed by multimedia technologies and explains this with the fact that both websites are very big in terms of pages and content.

In the UK, the use of multimedia is limited to the larger sites. In terms of relative comparisons, games and video content are more common than audio-only content or RSS feeds<sup>1</sup>.

In Netherlands only one website (of a former science TV program) “offers movies; the other websites do not provide any videos/movies at all or only a few”.

Oddly enough, in Bulgaria “the weaker a web initiative is in terms of institutionalisation and invested resources, the better is the use of multimedia”. Thus, the web project intended as “the richest source of multimedia” in Bulgaria contains only a handful of pictures and audio files in its “Multimedia galleries”. Alternatively, the smallest volunteer initiatives of school and PhD students offer plenty of audio-video files and initiate interesting and innovative practices, e.g. audio analogues of some content items and original video lectures created on user’s demand.

In Estonia a website focusing on physics offers significantly more multimedia content than the other sites analysed. This is also logical, given that multimedia adds a lot of value to explaining physical phenomena. 3 of the analysed 7 sites include games, designed for children, helping to introduce scientific concepts to them.

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<sup>1</sup> RSS (an abbreviation for Really Simple Syndication) is a family of Web feed formats used to publish frequently updated works—such as blog entries, news headlines, audio, and video—in a standardised format. [http://en.wikipedia.org/wiki/RSS\\_\(file\\_format\)](http://en.wikipedia.org/wiki/RSS_(file_format))

In Iceland almost all the websites offer images and some of them are of excellent quality. A few websites also have videos but their use is usually very limited. One website consists purely of graphics and videos with live commentary as well as text.

### **5. Editorial choice**

The French partner draws attention to the fact that in its panel “very few websites choose to have a dedicated infrastructure (like an editorial charter) regarding their editorial and scientific choices”. The institution behind the website is represented instead. While the smaller, personal websites in the UK make authorship/editorial clear – in that the person running the site usually combines the triple role of host, author and editor, the larger organisations do not draw specific distinctions between these roles, and while some of them mention names, the largest sites do not give any personalised details. In Iceland 4 out of 6 websites have featured editors and editorial boards.

### **6. Scientific credibility**

The French partner also draws the conclusion that in France “the explicit presence of a scientific credibility depends on the status of the institution editing the website”. If the institution is not recognised as scientific, it should supply a “double credit one for the scientist, one for the journalist”.

This is not the case in Bulgaria where the scientific institutions do not develop PSWs at all, and the private or public/private initiatives simply state or suggest the use of reliable scientific advice.

In the UK, scientific credibility can be derived either from the author of the site (teachers, scientists), or is implied through the organisation. Only a few pages however comment on expertise in Science communication.

In Iceland the material on the websites is edited and the author and their background named on 4 out of 6 websites. The websites that do not have an editorial board do not seem to name their authors nor identify their background.

### **7. Relevance to the target groups**

In France “most of the websites have a part dedicated to young people”, usually to young people up to 15 years old. The partner underlines the fact that “special efforts are made to adapt content for very young people aged 8 to 12 (very playful activities with funky design) but not at all for content targeting young people aged 15-18, although this is a turning point regarding school orientation”. There is no website from the panel which offers boy/girl sections. However, in France “lots of websites have a section dedicated to teachers” which is not the case in Bulgaria where only one website provides useful information for school students and teachers, and the other initiatives are relatively new and highly underdeveloped.

In Spain the majority of the selected websites are “targeted at a general audience, there is only one specifically targeted at secondary school students and two that seem to be addressing the younger generation in general”.

The partner from the Netherlands describes the good practise of a website which is highly “popular among 16-18 year old high-school students who are looking for accessible information on science to be used for their homework and school projects”. It is also helpful for teachers in preparing their lessons.

While three of the websites analysed in the UK would be suitable for older secondary school students only, the majority of websites supply material that is relevant to all students of secondary school age, and at times even younger ones. One website focuses on younger secondary school students only. Some websites additionally contain sections for teachers, offering lesson plans and material.

Most of PSWs in Estonia are targeted to a general audience, which is also logical for such a small country. Some topic-specific sites have a subsection for school-students.

There is however one site, which is particularly targeted at school-students and provides information categorised according to school curriculum in different subjects.

Almost none of the websites analysed in Iceland focus particularly on young people. Some of them did have certain features that were aimed at a younger audience, such as shorter or easier versions of the material. The only website aimed particularly at young people is a website that only has videos and graphic material.

### **8. Frequency of update**

The partners from Bulgaria and France clearly identify the frequency of update as problematic for a significant portion of the websites panel. Some of them are “almost dead” or in a “waking coma”. However, the French users should be delighted by a website which “is extremely well updated, with news every hour”. In Bulgaria the main reason for the low update rate is the unprecedented lack of financial and human resources and institutional support.

The analysis of updates is made difficult, as clear information is not always available. Only one web-page in the UK included clearly dated news items that were regularly, though infrequently updated, at intervals of weeks rather than hours.

The majority of the Spanish sample is updated regularly and frequently.

In Estonia PSWs, directed on particular subjects, seem to be mostly updated pretty infrequently after they have been initially made. These sites are more oriented towards explaining science than bringing newest scientific news to the public. There is one site, which is aimed at publishing science-related news, where several new articles are published every day by 2 professional journalists.

In Iceland about half of the websites are updated frequently, at least every day. With the others it is more sporadic and seems linked to economic ability as in Bulgaria. The only website however that is never updated is the one that only has graphics and videos. The partner supposes that this website is very expensive to make so that it probably becomes impractical to be updated even though it is hosted by an economically sound company.

### **9. Closer to reality**

The French partner notices “the choice made by an independent website which has to find the way to its economical independence: a large part of the website is dedicated to practical questions (like: how to repair my washing machine? or: In which situations may I take aspirin?)”.

### **10. Entertaining writing style or catchy enthusiasm**

In Bulgaria and France most of the web editors and authors of PSWs demonstrate “almost complete lack of sense of humour and imagination” and seem too “blinded by science”, i.e. it seems that they somehow restrict themselves in being creative and witty out of reverence for science which is obviously conceived by them as the antithesis of the excessively parodical pop culture, thus leaving no room for irony or metaphorical expressiveness when communicating science to wider audiences. The partner provides two good examples of “entertaining and concise writing style and creative (metaphorical and not simply illustrative) use of images and pop icons”. However, some editors compensate for the lack of entertainment and somehow attract younger audiences through “simply radiating catching enthusiasm and genuine passion for science and love for nature”.

In the UK on the other hand, websites use simple vocabulary and interesting pictures and videos to make the site entertaining. Only two sites used language that was potentially too dull or difficult for teenagers, and it is interesting to observe that these two sites were specialist topic sites, rather than general science web pages. These sites were explicitly aimed to develop a deeper understanding of one particular topic, and were aimed at older students. The web designers therefore may not have perceived the need to make their sites entertaining.

### **III. Visual appeal**

#### **1. Sight appeal**

Most of the popular-scientific websites in the panels of Spain, France and the UK are rated as aesthetically very appealing with a good choice of colours and original decorations, plenty of photographs, pictures and graphics. This is not the case in Bulgaria where the lack of investment in online science communication is clearly visible precisely through the amateurish graphic design conceptions of the majority of the analysed websites.

#### **2. Two ways**

The French partner notices that the typical popular-scientific website in France looks “classic, quiet, and a little bit austere colours, nothing moving, a lot of white or emptiness, not original”. As a rule all pages are organised with right angles, horizontal lines and squares, quiet colours and is all very neat”. There are two exceptions: one website that “is full of colour, original typography and round shapes”, and another one that “uses fashionable colours and saturates its pages with them”.

In Bulgaria there are two good exceptions from the generally poor and non-professional web and graphic design and they seem to represent the two trends already described by the French partner. The minimalism and simplicity are contrasted with experiments which utilise a provocative use of colours and graphics, unusual layout and interactive navigation elements.

In Iceland the websites are generally very conservative with regards to colours and visual appeal. Things are categorised and boxed. There are perhaps one or two theme colours combined with white. Even websites with many graphics and features are very muted in colours. This actually gives the impression that science is a bit stiff

and boring. Even the website that has only videos and graphics is very formal, even though some of the graphics are light.

### **3. The big illustrates, the small draws**

The UK partner notes that the bigger organisations prefer to “include a large amount of attractive photographs, whereas the smaller providers focus more on drawings or cartoons”. Alternatively, in France the partner appreciates an interesting single initiative of a website whose editors ask an artist “to illustrate three different parts dedicated to children”.



The design and illustrations of Estonian PSWs seem to be correlated to the age of the “current design” of the website – it is obvious that some sites, which appear to be older, have not changed the design and illustrations for several years, which leads to a slightly “forgotten” look of the website.

## **IV. Usability**

### **1. Easy to use**

Most of the websites of the samples of Spain, Iceland and France are also professionally executed in terms of ease of navigation, simplicity and efficiency of content organisation. The only insignificant exception in the French panel is a website where the home page is too long due to the fine classification of its highly abundant content. The main user-friendliness flaw of the Spain sample is the lack of “adequate downloading and printing options”. In the UK, usability rarely poses problems, although sites are not always adapted to users with special needs, in that for example contrast between background and font may be insufficient and text is presented in columns which renders left to right electronic reading impossible.

### **2. Bigger is usually better**

The state of the art regarding the usability of the popular-scientific websites in Bulgaria is almost fully in line with the general rule identified by the UK partner (“The bigger organisations have more sophisticated websites”). There are only three websites that can be considered as professionally executed in terms of user-friendliness. Similarly, in the UK sample, the site maps are usually common on the websites of the bigger providers and the cross-linking between pages is considerably better developed whereas the “smaller providers show a more linear website structure”. However, the partner provides a good counter-example of a small individual website that “features mini-site maps for specific sections”. It also suggests the recommendation to “keep menus simple and unambiguous” in order to avoid a confusing experience with the website.

### **3. Our usability survey is not definitive**

It seems that in some cases the usability flaws of given websites can be neglected by the users in favour of some advantages that should be identified in the forthcoming project analyses. As the UK partner stresses “it is highly probable that these perceptions will not be shared among users” and gives the example of an individual website which is “perceived as somewhat cluttered by the coder, but is, judging from testimonials on the site, highly popular with the target audience”.

## **IV. Interactivity**

### **1. Moderate interactivity**

Not unexpectedly, the majority of the partners report a low to average level of interactivity of the analysed popular-scientific websites. In France these websites are “not very interactive: with very few web 2.0 technologies, and communication being essentially top/down”.

The same may be said for the UK, where two-way communication options are rare. If they do exist, this is usually via games, static message boards and polls, rather than chat rooms or social networking options which are virtually unavailable on science websites.

In the Netherlands’ sample there is “no website that offers the full range of interactivity possibilities”. A range of interactive features (e.g. opinion polls, feedback to editors, message boards, instant messaging, chat rooms, video streaming, podcasting, blogging and wikis) “are seldom offered to users, and all of these possibilities are never offered together on the same website”.

In Spain the popular-scientific websites are also not very interactive “except for the option for users to send in feedback or contribute to the website’s content. 40% offer at least satisfactory link sharing functions that enable the extension of social circles, and 60% stimulate the formation of virtual communities and offer streaming. Podcasting is only available on one website. 60% of the sample offers web feeds”.

In Bulgaria and also in Estonia only web forums and options to send feedback are relatively well-developed, but the overall level of interactivity can be considered as low.

However in Bulgaria, just like the multimedia feature, it can be noticed an opposite relation between the level of institutionalisation and invested resources, on the one hand, and the level of interactivity, on the other. On the contrary, the Icelandic

partner reports that “the websites with the most financial backing seem to have the most interactive features and graphics. However there are exceptions to this as some website developers are very clever with using free material that is easy to program, such as “post on Facebook” or “send to a friend”.

In Iceland the interactivity is mostly in the form of question and answer features which in some cases are very well developed. About half of the websites offer users link sharing and give the option to post their material on Facebook. There is a range of interactive features in the Icelandic sample but each of the websites only offers a few of them.

## **2. High interactivity but at what price?**

The French partner asks this question regarding the quality of “popularisation of knowledge and science” thus stressing the relatively low scientific level of users’ participation and of the user generated content on those websites of their panel which provide more or less successful interactivity.