

Hangout with CERN: Reaching the Public with the Collaborative Tools of Social Media

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Abstract. On 4 July 2012, particle physics became a celebrity. Around 1,000,000,000 people (yes, 1 billion) [1] saw rebroadcasts of two technical presentations announcing the discovery of a new boson. The occasion was a joint seminar of the CMS [2] and ATLAS [3] collaborations, and the target audience were particle physicists. Yet the world ate it up like a sporting event.

Roughly two days later, in a parallel session of ICHEP in Melbourne, Australia [4], a group of physicists decided to explain the significance of this discovery to the public. They used a tool called “Hangout”, part of the relatively new Google+ social media platform [5], to converse directly with the public via a webcast videoconference. The demand to join this Hangout [6] overloaded the server several times. In the end, a compromise involving Q&A via comments was set up, and the conversation was underway.

We present a new project born shortly after this experience called Hangout with CERN [7], and discuss its success in creating an effective conversational channel between the public and particle physicists. We review earlier efforts by both CMS and ATLAS contributing to this development, and then describe the current programme, involving nearly all aspects of CERN, and some topics that go well beyond that. We conclude by discussing the potential of the programme both to improve our accountability to the public and to train our community for public communication.

1. Introduction

Clear communication of the goals and accomplishments of the scientific programme at CERN can be challenging, given the complex topics and diverse range of audiences. Yet this challenge cannot be overlooked, as policy-makers who provide support for the programme are directly affected by public opinion. More importantly, scientists have a social obligation to accurately report the goals and findings, not only to their peers, via formal channels, such as journals and conference proceedings, but also to the general public, via open communication channels.

Fortunately, CERN [8] has always risen to this challenge. The platinum example is, of course, the invention of the World-Wide Web [9] – first designed to aid in communication between peers, but subsequently providing unimaginable (at the time) value as a communication channel with the general public. Today, CERN’s communications include high-quality written, audio and visual content, and a variety of platforms to disseminate information to the public at large. More traditional carriers, such as newspapers, popular journals, radio and television are now complemented with web-based social-



media platforms, including Twitter [10], Facebook [11], Google+ [12], and YouTube [13], on which CERN can converse directly with the public. This document focuses on the usage of the Google+ “Hangout On Air” tool, combined with the other social-media channels, as a platform to interest, inform and educate the public through both passive and interactive communication, using a regular, television talk-show-style format, hosted at CERN. We call this show “Hangout with CERN”.

2. A Brief History

A key precursor to Hangout with CERN, was an attempt during the Education & Outreach parallel session of ICHEP 2012 in Melbourne, Australia, to use Google+ “Hangout On Air” as a platform to answer questions from the public about the newly discovered (and rapidly becoming famous) Higgs boson. At the time, the Hangout On Air platform allowed only ten simultaneous participants in videoconference, although an unlimited number of viewers could watch the event passively via YouTube. The Hangout was advertised on ATLAS, CMS and CERN social media channels and was held only two days after the announcement of the discovery of the Higgs boson, so a very large crowd (thousands of viewers) planned to participate.

The original idea had been simply to start the Hangout and to invite interested parties to join until the maximum of ten had been reached, with subsequent participants restricted to watching on YouTube. This strategy was a failure, as the simultaneous attempts of the viewers to join resulted in frozen browsers and broken connections, booting some participants off, or even at one point preventing the hosts from joining the meeting. The fix that was adopted was for the broadcast to include only one site (the conveners) with the audience watching on YouTube submitting questions via the comments section and other social media. This is essentially the recipe used today for Hangout with CERN.

Prior to the Higgs Hangout, both CMS and ATLAS had had positive experiences using videoconferencing, webcasting and recording to create an interactive discussion with the public. The ATLAS Virtual Visit programme [14] began in 2010, combining these tools to converse from within the ATLAS Control Room to worldwide audiences, including classrooms, outreach event participants, museum exhibition attendees, and national policy makers. The programme received a Digital Communication Award in 2012 for Best Online Event [15] and continues to broaden in scope and frequency, with audience size doubling each year.

CMS tested the waters of Google+ Hangouts in early 2012, with two Hangouts [16] connecting schools and members of the public with senior scientists in the CMS experimental cavern, located 100 metres underground. These Underground Hangouts proved to be very popular and received support from the Google+ marketing team. Recognizing the potential of simple browser-based video connections as well as the possibility to broadcast from virtually any place on the CERN site with only a laptop and a webcam, author Achintya Rao of the CMS Communication Group proposed to do more Hangouts, in conjunction with CERN, ATLAS and the other LHC experiments. This early CMS foray into Google+ put CERN in touch with the Google+ marketing team, who provided valuable advice on running a regular show via Hangouts.

3. The Pilot Year of “Hangout with CERN”

3.1. First Hangout (S01E01)

The first official “Hangout with CERN” was streamed to the CERN Google+ and YouTube sites on 1 November 2012. It was titled “Welcome to CERN” and featured an informal discussion hosted by author Steven Goldfarb, CERN theorist Alvaro De Rujula and Mick Storr of the CERN’s Education group, with technical and production support by authors Achintya Rao and Kate Kahle. The initiative to create the programme was taken based on positive feedback from the Higgs Hangout audience and positive discussions with colleagues already active in outreach at CERN. This included informal commitments for active participation in hosting and production of Hangouts for a pilot series by key players from the experiments, Communication and Education Groups.

Prior to the first Hangout, discussions were held with Google+ education and support staff to better understand the technical issues, as well as with other large scientific organisations using Google+ Hangouts to reach the general public. One organisation, the SETI Institute [17], had seen an exponential increase in audience size in the first few months of regular Hangouts. This was one compelling reason that drove the authors' decision to proceed with regular weekly Hangouts. Topic-based Hangouts appealed as a good balance of interaction, time and resources. Questions from CERN's social media followers could be focused on the specific topic and answered in real-time by relevant experts. Not only did this engage with an appreciative online audience, it also provided valuable communication training for the participating scientists, with YouTube comments clearly indicating what worked well and what could be improved.

A complete archive of Hangout with CERN recordings can be found online [18]. The year was divided into three series, to allow for breaks to evaluate previous shows and plan new content.

3.2. Goals and Target Audiences

Before launching the first shows, the authors, together with colleagues, including Kenneth Read of the ALICE Experiment and Patrick Koppenburg of the LHCb Experiment, discussed the target audience, the project goals, and messages. It was agreed to maintain a level of conversation understandable (and enjoyable) to the general public. The primary metrics of success include the number of live viewers, the duration of their visit during the show, the number of views of the archives, and the quality of questions and messages on the CERN Google+, Twitter, and YouTube channels.

The messages to be put forward were simple, but required effort not only in the selection of topics, but also in the tone of conversation and the diversity of the participants. To begin with, we sought to convey a sense of openness and accessibility: we wanted the audience to understand that those of us working at CERN are a diverse and international mixture of physicists, engineers, technicians and support staff, all of whom are regular people with families, hobbies, etc., and that we are happy to "talk shop" with anyone who has an interest. The feel of the show was meant to be informal, low-tech, and laid back, but with content based on accurate information on the scientific programme.

Having set that stage, we focused on the more traditional messages of CERN and the experiments: the importance of fundamental research, improving our understanding of the universe, aiding humanity with direct applications, educating future generations, providing R&D for industry, etc. The idea was to choose a different topic – typically based on current events at CERN – for each show, and then to include these various messages in the conversation. The primary goal, however, was to answer the questions of the audience.

3.3. Implementation

Implementation of each show required several key components: selection of topic, identification and solicitation of participants, creation of a programme outline (not an exact script), coordinated rollout of announcements, gathering of support information and images, site location, equipment installation, technical coordination for the launching, orchestration of the show, social media monitoring before, during and after the show, linking and communication of the video archive, comment response, evaluation in preparation for the next show.

For each series, a listing of potential topics was developed ahead of time, with selection for a particular week often based on current events or hot topics in the media. The authors, themselves, took on several roles, most often with Kate Kahle as the show's Producer, Achintya Rao as the Director, and Steven Goldfarb as Host. One other key role identified early on was Social Media Monitor, often taken on by Kenneth Read. This person was on-screen watching the stream of questions coming in through Twitter (#askCERN) or as comments on Google+ and YouTube and picking out key questions to ask to the participants. The other participants typically included a theorist who specialised on the week's topic, and one or more members of the experiment(s) involved in the work being discussed. In addition, we often found a non-expert guest to ask questions and join in the conversation. The main goal here was to keep the conversation at a level suitable for general public.

3.4. Equipment

The show was typically hosted with participants at computers in several different locations at CERN or in their home institute. Between one and three participants could effectively join on one computer, with the limit driven by the usage of standard webcams and echo-cancelling microphones. It was found early on that most laptop internal microphones and webcams were insufficient for the quality expected by the audience. In fact most early negative reaction had to do with poor audio or video quality (so much for staying low-tech).

Rooms with interesting, well-lit backgrounds, such as the webcast facility at ATLAS, were selected for the main hosting locations. Additional facial lighting was required to ensure proper focus and a clear image of the participants.

Wired high-bandwidth connections were also required for each of the connecting computers, but most importantly for the one broadcasting the Hangout on YouTube. Lack of sufficient or inconsistent bandwidth resulted in packet loss, causing degradation to the quality and/or fluidity of both audio and video. Occasionally, quality connections were sacrificed in order to include special video access to a remote site, such as a detector hall or accelerator facility. The interest of having a “roving reporter” was felt to outweigh the need for perfect quality. The show’s director would monitor for any loss of quality and try to make adjustments, when possible.

With guests joining from their home, home institute or even, at times, from a hotel room, when attending a remote conference, between four to eight of the allowed ten video channels were typically in use. The producer used an additional channel for presenting slides containing support material, titles, and credits. Images from various episodes can be seen in Figure 1.

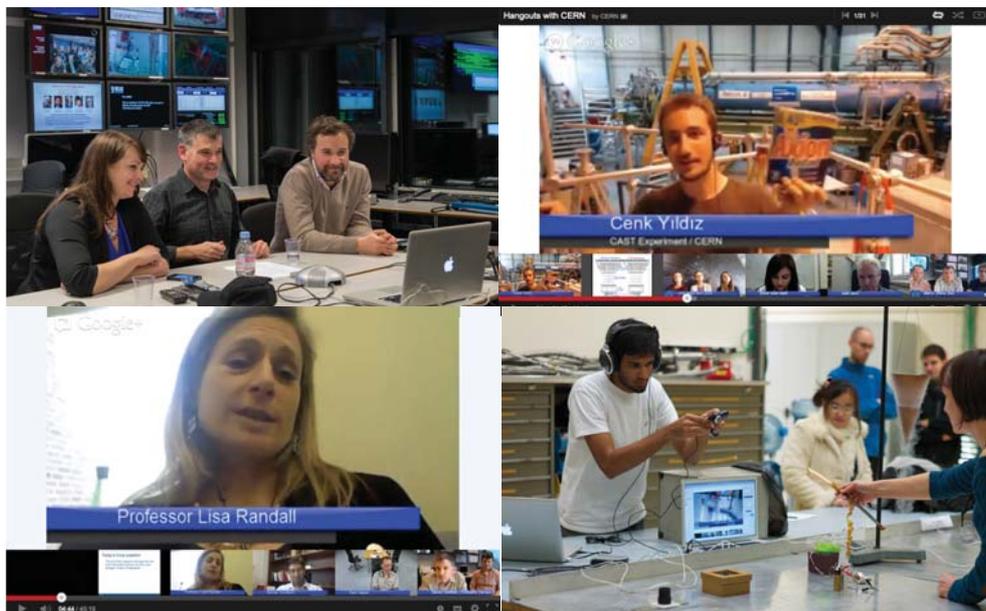


Figure 1. Clockwise from top left: guest, host and theorist in ATLAS Data Quality Centre; physicist from CAST Experiment, demonstrations in CERN cryogenics lab in joint episode with Google Science Fair, guest theorist.

3.5. Hangout Format

A typical Hangout lasted about 30-40 minutes and progressed as follows:

- Short introduction of topic and guests by host;
- Posing of trivia question on a relevant topic, often historical;
- A few questions and discussion with the theorist and experimentalists;

- Social media questions and answers, spurring more discussion and a few iterations;
- Answer to trivia question and announcement of winner (first to answer);
- Any recent CERN news items or upcoming events;
- Announcement of the next show’s topic, guests (if known), and conclusion.

The shows naturally evolved to this format after a few weeks and stayed that way for most of the year. Adjustments were made based on our evaluation of the audience participation. When it was noticed that the audience number was tapering down rapidly after the first few minutes of the show, for example, it was decided to limit the introductions, add a trivia question to keep viewers actively involved and go as quickly as possible to viewers’ questions.

More on this and other lessons learned throughout the year are presented in section 4.

3.6. Topics

A complete list of programme titles can be found in the video recording archives [18]. Table 1 shows a short list of the major physics topics covered in the pilot year. During most episodes, sub-topics about CERN, particle physics, or science in general, were included in the discussion, in an attempt to present the messages described in Section 3.2. In addition, several shows were based on special events or activities, including the LHC Long Shutdown, TEDxCERN, TED Ed animations, the TALENT project, as well as joint episodes with the Google Science Fair, of which CERN was a partner.

Table 1. Major physics topics presented in the pilot year of Hangout with CERN.

Topic	Episodes
Introduction to CERN	S01E01
Introduction to LHC	S01E02
Higgs Boson	S01E03, S01E04, S02E07, S02E08
Antimatter	S01E05, S03E01
Heavy Ion Collisions	S01E06
Cryogenics	S01E07
Proton-Ion Collisions	S02E01, S02E02
LHC Computing Grid	S02E03, S02E04
Extra Dimensions	S03E02
ISOLDE, Nuclei & Isotopes	S03E05, S03E06
LHCb, Penguin Diagrams	S03E07
SUSY, Dark Matter	S03E09, S03E10

When possible, relevant facilities were visited, using a “roving reporter” or collaboration member, presenting the apparatus. With the exception of networking technical challenges, such visits were greatly appreciated. This is discussed in Section 4.

3.7. Guests and Partners

A variety of guests were invited to participate in Hangouts, because of their expertise and contributions to the fields of particle physics, science communication and/or social media. CERN-based guests included physicists and engineers with leading roles in major experiments, accelerators or computing facilities (Fabiola Gianotti, Joe Incandela, Mike Lamont, Tim Smith et al.) and theorists (John Ellis, Gian Giudice, Nazila Mahmoudi, Alvaro de Rujula et al.). Well-known remote participants included expert physicists (Lisa Randall, Raman Sundrum) and science communicators (Elise Andrew, Frazer Cain, Liz Krane). Hosts and Social Media Monitors included physicists familiar with social media (Freya Blekman, Pauline Gagnon, Tara Shears, Seth Zenz et al.). Other guests included commentators on social media, students and local visitors, and an occasional classroom participating in activities remotely or at CERN.

Two episodes were organized and produced in conjunction with the Google Science Fair. These were co-hosted with the local organizers and shared on social media by the two partners, thus taking advantage of an opportunity to enlarge both audiences. In addition, one of the episodes featured remote participation from the Science Museum in London, with a “roving reporter” presenting local exhibits, while advertising the upcoming major exhibition on the LHC.

4. Future Plans

4.1. *Lessons Learnt from Pilot Year*

As with any pilot project, the authors learned a great deal. Here are a few key lessons:

- Hangouts can reach a large audience. Live attendance ranged from a few hundred to a few thousand viewers – of the order of 10,000 viewed each archive.
- Audience size depends at least as much on popularity of social media experts sharing the invitations, as on the topics. A link to the live show shared by the popular Facebook site “I Fucking Love Science”, for example, easily adds a thousand live viewers to any episode.
- Hangouts can get the message across. Comments and questions were often relevant and signalled at least a partial understanding of the content.
- A weekly Hangout programme requires a significant amount of time and effort to produce.
- Participants need a technical run through in advance, especially if they are new to Google+ Hangouts and need at least 15 minutes to set up before going live.
- A snappy introduction was needed to keep the audience engaged, with viewers’ questions being used in the introduction and explanation of a topic.
- Not all online questions can be answered in a hangout; participants were encouraged to also answer YouTube comments afterwards.
- Hangouts provide a means to discover individuals who are good at communication and to train the rest of us. The programme is helping to build a network.
- High-quality audio and video production is essential, even when trying to maintain an informal air. A certain level of quality is expected from an institution such as CERN.
- Most viewers prefer content focused on the scientific programme at CERN, rather than on peripheral projects (based on viewing attendance and comments). One can address social issues, such as the low percentage of women in the field (see S02E08), provided the primary focus remains on the science.

These lessons were taken into consideration throughout the year, allowing us to make some adjustments and to consider a new approach for subsequent years.

4.2. *Plans for Coming Series*

The programme for the coming series is still being worked out and the authors have not completely converged on issues, such as programme frequency and format. There is agreement that the past series was a success and online interactions between CERN people and the public merit continuation one way or another.

Future possibilities include using the CERN video studio as the primary hosting location and the use of high-quality lapel microphones, good lighting, HD cameras and professional audio and video mixing systems, which would provide a marked improvement over the current equipment (laptops, webcams, and audio-conference microphones). Large viewing monitors, earpieces, and Teleprompters would also simplify the work of the hosts and improve quality. All of these aspects require discussion about resources and feasibility, and also the effect on the informal nature of the pilot series that these changes could bring. It might be possible to split the audio and video streams, which could allow for the production of high-quality recordings and podcasts, to gain independence from the Google+ / YouTube platforms.

Another important technical addition would be the construction of a mobile kit for the “roving reporter,” for quality connections from remote locations. Such reporting was popular in the pilot year, as a way for remote viewers to get a virtual tour of CERN, but the audio and video were often poor and difficult to set up.

5. Summary and Conclusions

A small group working in communication at CERN and affiliated institutes launched a weekly talk-show-style programme this past year, called “Hangout with CERN”. Using laptops, webcams, and conference microphones, our team was able to produce a quality programme that drew weekly live audiences of up to a few thousand viewers, covering topics from the Higgs boson to pear-shaped nuclei. Most importantly the programme established a new platform to develop active conversation between the people at CERN, and a large public audience located around the world. In our opinion, this valuable new communication channel should be supported and developed in the coming years, as the science programme at CERN continues to deliver outstanding results, in order to fulfil our obligation to communicate these results to the public.

Articles about “Hangout with CERN” have appeared in several online publications [19][20].

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