AN EYE-WITNESS REPORT ON
HOW THE WWW CAME ABOUT

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During the 1990s basic web technologies were developed at CERN. Seeking approval for the Large Hadron Collider (LHC) and being short of resources, CERN decided very soon to provide free access to the web technologies. This would ultimately lead to a revolution in communication.

O n the occasion of the 20th birthday of the World Wide Web celebration at CERN in 2009, the Editor of the CERN Courier, Christine Sutton, wrote: *Twenty years ago something happened at CERN that changed the world forever* [1]. Indeed, in the year 1989, Tim Berners-Lee presented a document, entitled: ***Information Management: A Proposal*** [2] to his group leader at CERN (see Fig. 1). This proposal outlined the basic idea evolving into the Web, the key technology popularizing the Internet around the world.

A detailed description of what was happening during the years 1989 and later can be found in the literature [3], including an authentic recording of all the technical and political ups and downs. This led finally in 1995 to the establishment of the World Wide Web Consortium (W3C) and already by 1999 to almost ten million Web-Servers operating around the world, creating more economic wealth and income than the cost of any government investment in basic research.

Eye witness

My eye-witness report on how the WWW came about concerns the crucial years 1993 to 1995, when CERN management had to concentrate most efforts on the approval of the LHC project. Before 1993 Information on

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web-related activities at CERN came to me from Carlo Rubbia, the then CERN Director General. He presented a transparency to the Finance Committee of CERN showing a spider network and explaining that "some CERN guys are working on an information management tool based on hypertext technology – whatever this means – which they want to call *World Wide Web* or WWW".

> **There are only very few crucial properties of WWW: it sits on top of the internet-naming scheme, it is such simple hypertext that it does scale up indefinitely, it uses a simple text-based format and it is guided by open, free standards that anyone may contribute to. And it was put in the public domain very early on.**
>
> *Definition by Robert Cailliau*

The web community grew fast because (i) in 1992 the portable browser developed by Tim Berners-Lee and collaborators was released by CERN as freeware and (ii) in April 1993 CERN declared the web technology and program code to be open software [4].

Two CERN divisions – Computing and Networking (CN) and Electronics and Computing for Physics (EPC) – were involved in web topics. The key players were Tim Berners-Lee (CN), his group leader Mike Sendall (ECP), and Robert Cailliau (ECP).

Both Tim and Robert (Fig. 2) were fighting for a decision at CERN to allocate resources and take the lead in developing and promoting the web. They evaluated that CERN would need to open some 35 positions for software developers and they tried hard to convince the CERN management to follow their vision.

CERN management had to disappoint them, forced by increasing pressure from Member States to reduce staff costs at CERN in order to free resources to build the LHC. Delegates argued that specialized institutes in CERN Member States would be able to step in.

Robert Cailliau managed to attract the interest of the Direction of the French Institut National de Recherche en Informatique et en Automatique (INRIA) for the web topic during the WWW conference at CERN in 1994. More recently, INRIA announced in a press release [5]:

> **"INRIA has supported W3C's mission since the inception of the Consortium in 1994, notably by hosting W3C's European branch".**
> **"INRIA now Hosts the First W3C Office in France"**

In spite of the rapid success of the web, CERN as a physics lab could not continue to invest effort in an informatics project without support. Already in 1992/93 Robert Cailliau started to enquire at the EU about possible support and funding.
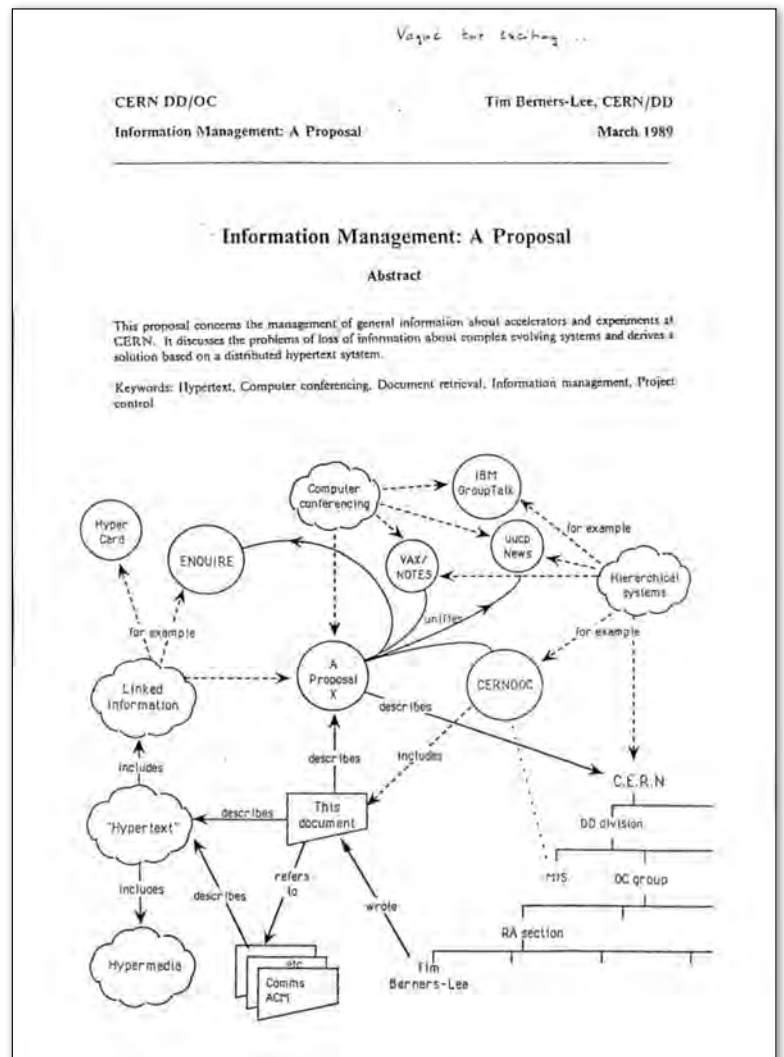
My personal efforts to establish contacts and to raise interest for the web technology with EU commissioner Martin Bangemann (*Europe and the Global Information Society (1994)*) and meetings with representatives of the Deutsche Post did not help. Similar efforts from colleagues in other CERN Member States showed that national monopolies in Europe were not yet allowing serious discussions on broader visions as expressed by Vice-President Al Gore in the US (*'Information Superhighway'*). So, while information networks in Europe were dominated by national monopolies, the US picked up the challenges rapidly, developed web tools such as Mosaic world wide web browser and triggered the Internet boom.

Most of the tedious negotiations with the EU, and with the pushy US colleagues from MIT, were left to Tim and Robert, supported by their Group and Division Leaders.

Events that I remember very well

i. When Robert Cailliau wanted to organise a first International WWW Conference, we agreed that CERN could host this conference in its Council Chamber, since less than a hundred people were expected to participate. Instead, 600 web developers turned up and overfilled the main auditorium.

▼ **Fig. 1:**
The document that changed the world. Note the handwritten comment 'Vague but exciting' by Tim Berners-Lee's group leader.

ii. My intervention at a meeting in Geneva where I defended the WWW against the French Minitel people. As a result, I was invited by the representative of the Hewlett-Packard company in Geneva after the meeting.

iii. My lunch in the CERN Glass-Box restaurant with James Clark, who announced his intention to develop a "user-friendly" web browser. This became the basis for the NETSCAPE company [6].

iv. My meeting with people from Brussels and MIT, and finally the question put to me by Tim Berners-Lee, whether CERN could offer him the position of a Director, as was done by MIT.

I encouraged Tim to look after his career and to accept the MIT offer, since CERN would not be in a position to top this offer. We agreed, however, that CERN should stay in close contact. Robert Cailliau, Mike Sendall and P.G. Innocenti were of great help to finally get support from Brussels to set up the W3C, with INRIA taking the place of CERN as European partner of MIT.

In 1994, Tim Berners-Lee left CERN and joined the Laboratory for Computer Science at the Massachusetts Institute of Technology.

In December 1994, the CERN Council finally approved the construction of the Large Hadron Collider. LHC had to be built in the existing LEP tunnel with a tight budget. In January 1995, CERN and the European Commission invited INRIA to continue the European involvement. INRIA is heavily involved in European projects and collaborations with similar institutes in Europe and the world.

Robert Cailliau promoted the Web around the world (see Fig. 3). I very well remember the transparency he used to illustrate the many different connectors for electrical plugs one needs when traveling. The web technology allows ignoring all such hardware differences in communication via the internet.

The Tsunami of data from LHC experiments could not have been handled without the LHC-GRID, a natural extension of web-based Internet technology regrouping computer center hardware. Let me conclude my recollections by quoting Bob Jones, the CEO of the CERN Openlab, in his talk at the 2012 EPS-TIG workshop at Erice [7]:

> The World Wide Web provides seamless access to information that is stored in many millions of different geographical locations. The Grid is an infrastructure that provides seamless access to computing power and data storage capacity distributed over the globe. The grid now extends into the Cloud, and today a European Cloud Computing Partnership starts with big science teaming up with big business.

References

[1] CERN Courier: http://cerncourier.com/cws/article/cern/38707

[2] Berners-Lee's 1989 proposal http://images.iop.org/objects/ccr/cern/49/4/18/CCwww1_04_09.jpg

[3] A detailed history of the WWW can be found in the literature *e.g.*: Cailliau, Robert & Gillies, James (2000) *How the Web Was Born: The Story of the World Wide Web*, ISBN 978-0-19-286207-5, Oxford University Press

[4] CERN 20 Years of a free, open web http://info.cern.ch/

[5] INRIA Press Release www.inria.fr/en/news/mediacentre/w3c-france-office

[6] James Clark biography: www.biography.com/people/james-clark-9542204
"In 1994 James Clark sent an email to Marc Andreessen, a recent graduate of the University of Illinois who had developed a Web browser called Mosaic at a time when most people did not know the Web existed. Clark and Andreessen agreed to launch a new company devoted to Web software, and Netscape was born. The company had a phenomenal impact, quickly dominating the fledgling browser market and scaring industry giant Microsoft into changing its corporate focus."

[7] EPS Technology and Innovation workshop, ERICE October 2012 https://indico.cern.ch/conferenceDisplay.py?ovw=True&confId=215087