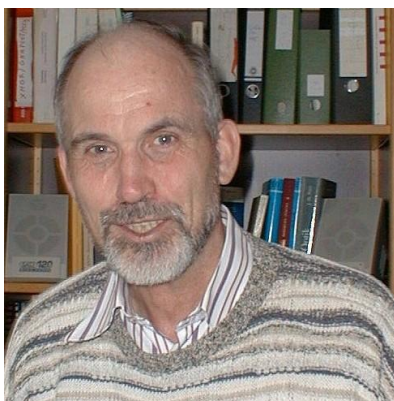


Open Access: Profile of Eberhard Hilf

***Eberhard (Ebs) Hilf** is a true [veteran](#) of the [Open Access \(OA\)](#) movement. A theoretical physicist based in [Oldenburg](#), Hilf began his advocacy at least eight years before the term *Open Access* was coined. Yet in contrast to prominent OA advocates like [Stevan Harnad](#) and [Peter Suber](#), Hilf was until relatively recently little known in the movement outside his native Germany. [Richard Poynder](#) explains why.*

6th October 2009



Eberhard Hilf

Although a dedicated OA advocate, Hilf's main focus from the very beginning has always been on the broader issue of how the Web can improve scholarly communication. OA, he says, is just the first step to enabling a bigger revolution.

Thus while he has approached OA from this broader perspective, Hilf's assumption has nevertheless always been that OA needs to be viewed as a given. As he put it to a group of physicists and mathematicians in [Halle](#) (East Germany) in June 1994, in an online world all scholarly papers "should be free for all to read".¹

The seeds of Hilf's advocacy were sown in an incident that occurred a year earlier (in 1993), when a student came into his office and remarked: "You professors sit in here while outside a revolution is going on — the World Wide Web."

The student in question was [Heinrich Stamerjohanns](#), at that time an assistant to [Tim Berners-Lee](#), the British computer scientist who — with [Robert Calliau](#) — is credited with having invented the World Wide Web in 1991.

When Stamerjohanns explained what he meant Hilf immediately saw the potential it offered to revolutionise scholarly communication and asked Stamerjohanns to create Germany's first web server, in his department at the [University of Oldenburg](#).

¹ By a strange accident of timing Hilf gave his presentation on the very same day that — on the other side of the Atlantic — Stevan Harnad posted his "[Subversive Proposal](#)" calling on all researchers to start making their papers freely available on the Web.

Hilf then embarked on a fact-finding tour of America. There he visited scholarly publishers, US universities and a bunch of technology companies — including Microsoft, where he was reliably informed that the Web had no future, and so there was no point in engaging with HTML!

Fortunately, Hilf took this advice with a pinch of salt, not least because one of his other stop-off points in the US was the Los Alamos National Lab ([LANL](#)), where he called in on fellow theoretical physicist [Paul Ginsparg](#).

In 1991 Ginsparg had created a centralised electronic service to allow physicists to share their preprints with one another. Subsequently renamed [arXiv](#), it began life as an email-based service, but was subsequently ported to the Web; there it went on to become an essential component in the process of scholarly communication for physicists — and today many physicists, as a matter of course, post their preprints in arXiv prior to sending them to a publisher.

Currently arXiv hosts over half a million papers, and around 5,000 new ones are added each month. Moreover, it is no longer restricted to physics alone: arXiv now accepts papers in mathematics, computer science, quantitative biology, quantitative finance and statistics as well.

Recalling his visit to Ginsparg, Hilf says, "At that time the entire content of arXiv was still on a single PC under Paul's desk in his office, a small room at LANL."

Arriving back from his trip in a jetlagged and somewhat febrile state, Hilf rushed to the lecture hall at Oldenburg University, ripped up the physics lecture he was scheduled to give, and enthused excitably for an hour about arXiv.

"As a result we all started reading papers on arXiv," says [Thomas Severiens](#), then one of Hilf's students." He adds: "They weren't much use to sixth term students, but we read them with interest nevertheless."

That trip, adds Severiens, had a huge impact on Hilf. "Ebs changed entirely after his meeting with Paul Ginsparg. From that point on he began scanning his articles into his computer and putting them on the Web. Suddenly you could move in his office!"

Himself energised by Hilf's enthusiasm, Severiens began collecting information from the servers that Stamerjohanns had by then helped to install in Germany's 65 physics departments, to create a national network of physics servers that became known as [PhysNet](#). And for this Stamerjohanns developed a search engine called [OAD](#) (Open Archive Distributed).

PhysNet was programmed to find and index all the data being put up on the Web by physicists, including information about physicists themselves, information about physics departments and their host institutions, available academic positions and, critically, the rapidly growing corpus of papers being posted on the Web by physicists, not just in repositories like arXiv, but on their home pages, university web sites etc.

As the Web grew so did PhysNet, and the service was subsequently adopted by the European Physical Society ([EPS](#)), becoming a global physics aggregation service. And it remains a key online resource for many physicists today.

Eternal needs of scientific research

As we shall see, PhysNet was just the first of many projects that Hilf was to become involved with over the next fifteen years as he embarked on his new mission of exploiting the Web to improve scientific communication, and to promote OA.

As we said, for Hilf the goal was always much more than simply making research papers freely available on the Web. "Right now we are going through a phase transition from the paper age to the digital age, and as a result we need to create a totally new global science information management system", he explains, "along with the appropriate services and culture in order to maximally exploit all the technical possibilities. We need to reinvent scholarly communication."

Hilf's first step, therefore, was to sit down with colleagues and, as he puts it, formulate what they saw as the "eternal needs of scientific research with regard to the management of scientific information."

Having done that they explored in detail exactly how the Web could meet these eternal needs. Their conclusion: "It was apparent that a new era of efficient research was about to begin; one that would create a paradise for researchers."

However, to realise that paradise Hilf and his colleagues realised that a series of fundamental changes in the way that scientists communicated their research would need to be made. In addition to providing "immediate free access to the full text of research papers", Hilf explains, it was clear that it would be necessary to devise effective ways of ensuring data readability, integrity, and long term preservation etc. This, they concluded, would necessitate providing a range of add-on services, including discovery tools, curation and print-on-demand services, plus new methods and mechanisms for refereeing papers.

What distinguishes Hilf's approach from other OA advocates, therefore, is that for him OA has never been a one-issue cause to be fanatically promoted at all costs; rather it is "just one prerequisite" for the migration of scholarly communication from print to online. Nevertheless, he concedes, OA is a vital "cornerstone" within the larger phase transition.

"Clearly OA as it was later defined was very important, since many of these possibilities and add-ons assumed the full-text documents would be immediately and freely available online", he explains.

It is interesting to note that Hilf had already articulated this broad vision of the future of scholarly communication as early as 1994. This he outlined in a [paper](#) he gave that year at a workshop organised by the American Physical Society (APS) at [Los Alamos](#). Nor has he changed his view of what is needed in any fundamental way since then, he says. "I still believe that the long-term acceptance of Open Access will depend on the creation of manifold professional services of the kind I described in 1994."

In short, Hilf had concluded that in order to maximally exploit the new digital environment nothing less than a complete re-engineering of scholarly communication would be required.

Having articulated his vision, Hilf busied himself with the task of creating and co-founding a series of organisations and initiatives intended to realise his goal — most of which were referred to by impenetrable acronyms!

Many of these initiatives were first cooked up in Hilf's research group at the University of Oldenburg, to which he had recruited both Stamerjohanns and Severiens.

At first the focus was on partnering with publishers and learned societies to create forums in which researchers could discuss the many issues (and opportunities) opened up by the Web with the primary intermediaries in the scholarly communication process. As time passed, for reasons that will become apparent, Hilf and his colleagues found themselves increasingly having to plough a lone furrow.

In July 1994, for instance, Hilf was one of the co-founders of [ElFiKom](#) (*Electronic Research Information and Communication*), an organisation intended to enable a creative dialogue with publishers. A year later he co-founded [luK](#) (*The Initiative for Information and Communication of the Learned Societies*) in partnership with a number of learned societies, including the German Mathematical Society ([DMV](#)), the German Physical Society ([DPG](#)), the German Chemical Society ([GDCh](#)), the Society for Computer Science ([GI](#)) and the German Society for Educational Research ([Dgfe](#)).

In 1996 Hilf was involved in the creation of [DINI](#) — the German Initiative for Networked Information. This was founded by a group of forward-looking librarians in Germany with the aim of exploring ways in which the Web could be exploited to improve scholarly communication. It is noteworthy that Hilf was the only researcher invited to DINI. Indeed, he says, he was the only one willing to join the organisation. "luK was rather sceptical about sending a representative, since DINI was a librarians' organisation, and luK was composed of scientists!"

In some cases the task was simply to re-focus pre-Web organisations. [AKI Arbeitsgruppe Information](#), for instance, was originally founded in 1987 as an informal workgroup within the DPG, with a mission to explore ways to make better use of proprietary online services. By 1991 this had morphed into a discussion about the possibilities of the Web. Then, in 2001, when AKI was formally recognised by the DPG, the name was changed to [AGI Arbeitsgruppe Information](#) and its focus broadened out to look at "methods, procedures and tools" for all aspects of scientific information and communication in physics in an online world. (And AGI remains active today).

Hilf also set about organising conferences, writing papers, and enthusiastically advocating for the changes he felt were essential if the research community was to make the most of the new medium.

For instance, annual and biennial conferences were organised under the auspices of the [AGI](#), along with international conferences like [CRISP97](#). The latter was able to attract major players in the evolving debate, including people like [Marty Blume](#), then editor-in-chief at APS.

Crunch point

However, what Hilf had failed to realise was that the changes he was proposing might not be in the interests of everyone involved in the scholarly communication process. More importantly, some of the players were powerful commercial organisations whose profits would be negatively impacted by the revolution envisaged by Hilf. And the most threatening change he was proposing was precisely what Hilf viewed as a necessary prerequisite — i.e. OA. As we shall see, it was not just commercial organisations who were to feel threatened either.

Today Hilf acknowledges that he should have anticipated this when he embarked on his project. And he should have foreseen the many traps and barriers between him and his objective. While both

publishers and learned societies were initially receptive to his ideas, for instance, as the consequences became apparent their views changed, and their resistance to change hardened.

The first hint of the struggle that lay ahead became apparent at the workshop in Los Alamos where Hilf gave his seminal paper. During the day, reports Hilf, the atmosphere was extremely upbeat, and delegates universally agreed that the APS should create an OA preprint repository like arXiv.

At the end of the day, however, APS officials retired to a closed meeting. There, says Hilf, they quickly concluded that the proposal that had been made by delegates would threaten the \$20 million dollars a year APS earned from its publishing activities.

We should, however, note that the APS official who organised the workshop — [Robert Kelly](#) — recalls the event somewhat differently. "My recollection is that the issue was that of doing peer review on a previously published article," he emailed me. "Marty Blume wrote a [piece](#) on the nature of publication basically describing a pre-peer review posting on the Internet as not giving the status of published papers when posted on a web page."

Kelly adds: "Shortly after the 1994 meeting I did hire a physicist to create an APS e-Print service. But as it was being developed we realised that it would be a substitute for the more universal application built by Paul [Ginsparg] and that an APS specific service would not serve as well.

"So we decided to abandon our development, and we entered into an agreement where authors could submit papers directly from arXiv. We also modified our copyright statement to allow authors to post not only their own version of the manuscript but also to post on their own site, and that of their institution, a copy of the APS formatted version, the pdf produced as part of making the article available in the APS service."

This demonstrates how much more enlightened APS has proved than most societies and publishers in responding to OA. Nevertheless, as Kelly tellingly concludes: "At that time the discussion was not on Open Access but on an earlier framing of the increasing availability of physics content. This is still an APS vision. The question is how."

Which brings us back to the nub of the issue: How could the revolution envisaged by Hilf and his colleagues possibly be realised without threatening the financial standing of important intermediaries, organisations that had become acclimatised to earning large sums of money from scholarly communication. And the primary threat was OA.

What is clear, insists Hilf, is that a historic opportunity was missed at the 1994 APS workshop. "And in a fittingly symbolic way the auditorium was ice-cold during the meeting, so we all had to huddle down in our winter coats."

What about commercial publishers? Surprisingly, Hilf reports that initially they also co-operated, and made positive contributions to the discussion via organisations like EFiKom and AGI. "In the beginning we had a constructive and open discussion with the large international publishers (the small ones, especially arts science stayed firmly in the print age)," he says.

For instance, he adds, he and his colleagues were invited several times to Elsevier's HQ in Amsterdam, and also to Springer, and to the UK Institute of Physics Publishing ([IoPP](#)). "We went to other publishers too."

And under the auspices of EFiKom they made joint funding applications to both the German government and the EU for a project called Multimedia scientific Distributed Document Database in Physics ([DDD](#)). Unfortunately applications were turned down.

Once again, however, after a honeymoon period things began to fall apart. As the discussion unfolded it became increasingly clear to publishers that migrating their services to the Web raised some fundamental questions, not just about their future profitability, but their very existence as intermediaries in scholarly communication.

At CRISP97, for instance, Hans Roosendaal — then Elsevier strategic planning officer — presented a [paper](#) in which he deconstructed the "value chain" of scholarly publishing, pointing out that the process of publishing a research paper consists of four steps: registration, awareness, certification, and archiving.

He then drew attention to the fact that in a digital online environment each step could be done separately and by different service providers. As Hilf characterises it today, "There is no need for one provider to be responsible for each step, and there is no need for the various links in the chain to be done in any given order."

The logical conclusion was that in the electronic age the monopoly that publishers had acquired over the entire value chain would come under growing threat. It was also apparent that the only significant role left to publishers was to manage the certification step (i.e. peer review).

Indeed, it was even scarier than that: the model that had emerged from arXiv had led some to conclude that even peer review (certainly peer review organised by publishers) might face redundancy. This was an argument already being [made](#) by some physicists — e.g. [Jean Zinn-Justin](#). Suddenly the future for scholarly publishers looked decidedly unrosy.

Events came to a head with a project called Global-Info which — like the Los Alamos meeting — was a turning point in Hilf's attempts to precipitate a seamless transition to the Web, in Germany at least.

The goal of Global-Info was to make a joint application to the German government — with publishers — to fund a series of projects intended to transition scholarly communication from a print environment to an online environment. Specifically, says Severiens, the objective was to develop 100 projects, each one of which should involve one publishing house and one university or research institute, and then obtain the necessary grants from the German Federal Ministry of Education ([BMBF](#)).

The plan began to unravel almost immediately. Hilf's view was that the logical way of doing things was for researchers to state their needs and then have the government fund publishers to go off and develop products that would meet those needs. It turned out, however, that the BMBF had different ideas. "The intrinsic problem was probably that the participants had been given tasks that were not in their areas of expertise," says Hilf. "So scientists were expected to organise this gigantic project, while the BMBF officer in charge claimed the refereeing for himself, etc. This was back to front, and caused enormous frustration."

The crunch point, explains Roosendaal, came when they attended a meeting at the Frankfurt National Library. The BMBF, it appeared, had succumbed to lobbying by publishers. As Roosendaal puts it, "it quickly became evident that the government had a fixed view on what proposals it

wanted to fund, and those were not the best proposals. There was also a lot of talk not of OA, but of pay-per-view."

At that point, says Roosendaal, Hilf walked out of the meeting in protest.

"Absolutely I walked out," confirms Hilf. "It was clear that the (German) publishers involved, together with the representative from the BMBF, had brewed the whole idea up. So certainly I walked out when they kept repeating the need for micro-pay-per-view."

"Many people were involved in Global-Info," recalls Severiens. "A lot of money was spent on travelling, but in the end only around five or six projects were developed, and only one — a metadata project called [CARMEN](#) — was successful. CARMEN was headed up by the late [Roland Schwänzl](#), an early advocate for OA in Germany, with a particular interest in mathematics.

Once again, says Hilf, a huge opportunity was lost. "With Global-Info we had gathered virtually every knowledgeable group — including some publishers — with the aim of building a truly professional digital scientific information service. But the BMBF had the concept (contrary to all of us, with the exception of the publishers) that rather than making research OA a micro-pay-per-view model was the way to go."

The absurdity of this proposal of course was that no research institution would be able to afford to pay for their faculty to buy research papers on a pay-per-view basis. Even more absurdly, it was hinted that it should be researchers themselves who paid, not their institution.

Further complicating the picture, by now research institutions were in the grips of the so-called [serials crisis](#) — the phenomenon in which the growing number of journals being published, combined with increases in annual subscription costs that were consistently above the retail price index ([RPI](#)), meant that universities were no longer able to buy access to all the journals faculty needed, and were having to cancel more and more journals each year.

The solution that eventually emerged, both in Germany and globally, was the so-called [Big Deal](#) — an arrangement in which libraries were offered bundles of electronic journals on an "all you can eat" basis. For by now publishers were independently making their journals available in electronic form. By bundling their journals in ever larger electronic collections, and offering them for a set annual fee, publishers were able to offer libraries access to a much larger portfolio of journals.

But as time passed, it was to become increasingly apparent that the Big Deal was a solution that only really suited publishers. As [Burkhard Fricke](#), a leader of the DPG for ten years and co-founder and head of ElFiKom puts it: "Publishers are clever; they adapted; they always tried to circumvent any proposals that did not suit them. They saw there was a budget problem, and that they would need to charge less, but they also realised that if a budget holder is offered what seems to be a good deal by a publisher then he will seize it."

So while the Big Deal initially provided research institutions with access to a larger number of journals at a lower price, it gradually became clear that The Big Deal would not resolve the [affordability](#) problem. As the cost of the Big Deal began to creep up each year, at a similarly unsustainable rate as print journal subscriptions, research institutions discovered that little had changed.

And since the Big Deal encouraged consolidation within the industry (so that publishers could offer ever larger bundles of journals) it led to a few very large publishers completely dominating the

market place. This monopoly power has allowed them to continue to ratchet up their prices, and this in turn has provided sufficient profits to enable them to lobby aggressively against OA.

"EIFiKom should have realised that the publishers would circumvent things," says Fricke. "What we really need is to cut publishers out of the business. My hope at the time (although I couldn't say it) was that the system would collapse completely. That no one would be able to pay. Then we could have started from scratch."

ISN

But Hilf is not a man to give up. In the wake of the failure of Global-Info — and the growing hostility of publishers — he became even more determined to realise his vision. So when he reached compulsory retirement age in 2000 he chose not to hang up his boots, but simply to change focus.

Specifically, he spun his research group out of Oldenburg University to create the Institute for Science Networking ([ISN](#)). The objective: to develop all the ideas and projects that had been planned for Global-Info, but now in a private commercial environment.

Explains Severiens: "ISN was mainly a response to the failure of Global-Info. Many projects had been thought up, so Ebs set up ISN to realise those projects, all of them in the field of information science or information engineering."

During the subsequent nine years, therefore, ISN has developed a great number of projects, many of which have — often behind the scenes — played an important role in re-engineering scholarly communication in the way Hilf believes is necessary.

And to his satisfaction some of the more enlightened learned societies have continued to work with him — not least the DPG.

Indeed, on occasions some pretty radical proposals emerged from his productive relationship with the DPG. On 29th March 2001, for instance, its AGI workgroup published a recommendation calling for all publicly-funded research generated at scientific universities and Institutes, to be made freely accessible (to other scientists at least).

Like many of the other declarations that have characterised the OA movement, however, nothing came of it.

If asked to name ISN's greatest successes Hilf immediately cites the OA online thesis database [dissonline](#), which dates from 1995. Significantly, he adds that dissonline's success stems from the fact that at that time scholarly publishers had little or no interest in dissertations.

The service emanated from an IuK-subgroup. Explains Hilf: "[Martin Grötschel](#) [a professor of mathematics at [Technische Universität](#) Berlin, Institut für Mathematik], suggested that if we wanted to develop OA services it would be strategically advantageous to start with a document type that commercial publishers take little interest in, and so would be unlikely to try and interfere."

As we now know, Grötschel was prescient in appreciating early on the desire (and the ability) of publishers to impede the growth of the OA movement.

Ironically, the other initiative that Hilf cites as an ISN success story was a print on demand (POD) service that was abandoned shortly after launch. Funded by Xerox Germany, the service was already

up and running — courtesy of a 10 metre-long printing machine — and receiving a flood of orders when Xerox HQ in the US suddenly pulled the plug.

Had it survived, says Hilf, it would have been an ideal tool for researchers. "A reader could simply name several documents from different publishers and journals and have them printed out as single hard-copy booklet. Think about it: a service like that would be the best way of exploiting a fully developed worldwide OA environment. The problem was that we were too early in the game for a service like that!"

Maybe. But this could be a somewhat naive view since, as we now know, it is unthinkable that publishers would have allowed such a service to flourish, and would have had it shuttered on the grounds that it was infringing their copyright.

Budapest and Berlin

As we have noted, Hilf's starting point was not OA but the much larger task of re-engineering scholarly communication for the Web. Not only did his advocacy for this begin before OA became a defined concept, but even after the movement was launched he tended to work independently of the OA movement at large.

For instance, Hilf was not involved in the two key European OA events. He was not associated, for instance, with the 2002 Budapest Open Access Initiative (or [BOAI](#)), where the term OA was coined. And he was not associated with the 2003 [Berlin Declaration](#), a German-led initiative that called for scientific knowledge to be "made widely and readily available to society ... through the open access paradigm." The latter was organised by the Max Planck Society ([MPG](#)), which is headquartered in Munich.

One reason for his absence from these events says Hilf, is because he is sceptical about the benefits of making grandiose public statements that generate a lot of noise, but provide little practical advantage to the OA cause.

Of the Berlin Declaration he says, for instance: "It has attracted a great many signatories but it is voluntary, not mandatory, and so many of the signatories don't even yet operate an OA-IR." And of those repositories that have been created by signatory institutions, he adds, most are pretty empty today.

In other words, while the Berlin Declaration made a feel-good proclamation in support of OA, it did little to ensure that scientists actually made their research freely available on the Web — by, for instance, self-archiving their papers in a repository.

Indeed, even the MPG's repository remains practically empty today. And the content that it does contain is mainly composed of a mixture of reports, annual summaries, plus a smattering of Gold-OA papers (which in any case will have been made freely available by the publisher elsewhere on the Web).

Hilf even goes so far as to argue that the Berlin Declaration did more harm than good to the OA cause, since it served only to focus publishers on the threat they faced which, says Hilf, encouraged them to start organising "anti-OA campaigns" — particularly against self-archiving, which they view as the greatest danger to their profits.

As a consequence, argues Hilf, publishers have become actively hostile to the OA movement, and even to scientists at large. "Indeed," he says, "in 2005 the secretary of the German publishers' organisation ([Börsenverein](#)) directly stated in a Government press conference that 'scientists are our natural enemies'."

A far better strategy, argues Hilf, would have been for the movement to have worked for change through a silent revolution.

Whether this is correct or not is a moot point. After all, as Hilf's own experience demonstrates, once publishers realised the threat OA posed to their profits they began to resist it, and with considerable vigour.

Certainly not everyone agrees with Hilf about the impact of BOAI and The Berlin Declaration. For instance, [Katja Mruck](#), who works at the Center für Digitale Systeme ([CeDiS](#)) at the [Freie Universität Berlin](#), and edits an OA journal called [FQS](#), believes that the Berlin Declaration was very effective at raising awareness about OA. "Until the Berlin Declaration knowledge about Open Access had been very limited in Germany," she says. "Interest in and understanding of OA was mainly confined to a handful of forerunners like Ebs Hilf in the natural sciences, and a few early projects and initiatives — including the journal I am involved in."

To illustrate her point, Mruck adds that until the Budapest Initiative she didn't even know that she was editing an OA journal! "Stevan Harnad asked us if we would be willing to translate the Budapest Initiative into German. We agreed, and it was only at that point we realised that the journal we had been publishing since 1999 was actually an open-access journal. It turned out that we were already practising OA, although we didn't know we were. Certainly we didn't use the label Open Access until Stevan contacted me".

A small lake

An important consequence of Hilf's broader view of the revolution enabled by the Web was a firm conviction that it is important not to simply throw research papers on to the Web, but to ensure that they are properly discoverable, and that they will endure. In other words, they need to have structural integrity and they need to be machine readable. To help people locate papers, for instance, Hilf believes it is essential that sophisticated metadata are added to documents when they are posted online.

To help researchers do this Hilf encouraged Severiens to develop My Meta Maker ([MMM](#)) — a free web-based service that generates bespoke rich metadata that can be inserted into documents before they are placed online.

Due to his conviction about the need for good metadata Hilf believes that the distributed repository model adopted at the [Santa Fe Convention](#) in 2000, and which has become the standard for institutional repositories (IRs), is inadequate.

First, he says, the minimal set of Dublin Core ([DC](#)) metadata— known as the Open Archives Initiative Protocol for Metadata Harvesting, or [OAI-PMH](#) —utilised by the OAI does not allow for maximal discoverability. The use of richer metadata, he says, would have provided "a much more professional search and retrieve yield of scientific documents."

Second, he adds, the OAI protocol assumes a two-layered model in which there are data providers (institutional repositories) and there are service providers (e.g. [OAlster](#)). The task of the service

provider is to aggregate content from multiple OAI-complaint repositories (which expose their metadata to the world so that their content can be indexed by third parties). Another problem, of course, is that few service providers have emerged.

PhysNet, by contrast, acts as both data provider and service provider. So, like Google, it trawls the Web (but looking for physics information exclusively) searching not just for OAI-compliant metadata, but for any physics-related content, which (unlike Google) it then compiles into topical link-lists. As such it does not restrict itself to IRs alone.

It then indexes the information it has found (adding rich metadata in the process) in order to provide a much more comprehensive set of data than OAI-compliant harvesters are able to offer, and one that allows better searchability.

In other words, by doing the indexing itself PhysNet is not only able to capture a large amount of physics information that remains invisible to the OAI-PMH universe, but by adding richer metadata it improves the discoverability of that data.

The fact is, says Hilf, that "many authors have full-text copies of their documents available on their local web-server, but without any metadata." This means that these documents "are not integrated into (and so cannot be easily located by) the OAI-PMH service-provider network."

By contrast both PhysNet and [Math-Net](#) (a sister service that aggregates information about mathematics, and managed by the [Grötschel group](#)), collect all freely-accessible information from institutional web servers, including administrative information, document lists etc. "This is then sorted into topic-based sub-services: the administrative information is listed in a sub-service called PhysDep, the E-Learning material into the Phys-Education sub-service, and the documents into PhysDoc etc."

This is not just a matter of searching efficiency, insists Hilf: it is how you best aggregate and point to the full corpus of OA content. The OAI approach also means, he adds, that the OA movement consistently understates the amount of research that is already available on an OA-basis, since they mistakenly assume that the OA corpus is synonymous with content hosted in Open Access repositories (OA-IRs).

As he puts it: "It is problematic that the term 'Open Access' is often reduced to meaning posting a digital copy of a refereed paper in an institutional server obeying the minimal OAI-PMH DC standard of metadata, and which has been registered at the [Registry of Open Access Repositories](#)."

He adds, "Each individual OA-IR is a local document collection and in fact usually contains very few of the scientific documents written by local authors. Moreover, even today most physics departments do not have an OA-IR, and so most open-access full text documents available in the world are not visible to OA-IR service providers."

In short, by limiting metadata to a minimal DC set when there are far richer DC-registered sets available, and by assuming that the OA universe is limited to content hosted in OA-IRs, the OA movement ignores a large amount of relevant scientific information that is already available as OA, but which is not in a repository, or does not have metadata attached to it.

As such, says Hilf, "The world of the 'OA movement' is essentially a small lake within the landmass of Open Access to scientific refereed documents, which in turn is a small island within the ocean of material that needs to be Open Access if scientific research is to be maximally efficient."

Not only does this limited view overlook many OA research papers already available, but it ignores other types of data that need to be OA — for instance, says Hilf, e-Learning material should be freely available on the Web if academic teaching is to exploit the Web properly. Amongst other things, he adds, this means that it is important to create specialised domain-specific metadata sets to ensure that e-Learning material is more discoverable, and more easily incorporated into state-of-the-art online teaching modules.

Similarly, there is growing appreciation of the need for Open Data, which is [sorely in need of the research community's attention](#). "It is clear that effective research requires having access to freely available digital copies of all scientific information — not just refereed scientific documents, but the data too," says Hilf. "It also implies the need for open source code. After all, how can a physics experiment be repeated if you don't have the raw data, and how can theoretical results be checked if you don't have access to the relevant computer code? The fact is that toll-access hampers the progress of science in a multitude of ways."

And that, says Hilf, is why services like PhysNet are more all-encompassing and useful than a set of local OA [institutional repositories](#).

On the other hand, as Severiens points out, in the long-term the IR is the logical vehicle to enable scientists to make their research OA: They provide a central locus within an institution for all the papers generated, and they enable researchers to hand off the technical work to local specialist librarians and/or IT people. The PhysNet model, by contrast, requires that they do the work themselves. IRs also offers a better long-term guarantee that the papers will be curated, and preserved for the future.

To this end, in 2005 DINI began to issue [certificates](#) to libraries able to demonstrate that their institutional repository meets a [certain service level](#). This includes requirements concerning the level of metadata used, and defines appropriate policies on concerning things like copyright and preservation.

Unsurprisingly, Hilf is a firm supporter of this [certification system](#). And Severiens is directly involved in the refereeing and upgrading of the DINI certification system.

Root and branch overhaul

But metadata is not the only topic about which Hilf has a slightly different perspective to the mainstream OA movement. And his contrary views stem from a concern that the narrow focus of the movement could end up limiting, rather than expanding, the opportunities the Web enables for significantly improving scholarly communication.

As a physicist with a high regard for what arXiv has achieved, Hilf's starting point is that researchers should not only post copies of papers that have been published in traditional journals online. Rather, he suggests, they should also be encouraged to make their preprints available prior to publication. In fact, he adds, it may not even be necessary for them to publish their papers in a journal at all. The key thing, he insists, is that they make their research freely available online, in whatever form.

Once again, this stems from his view is that if we assume the only goal is to make papers published in traditional journals OA, it underestimates what is already available — not least the hundreds of thousands of preprints that have been posted online. And it underestimates what is possible.

Moreover, it implies that the goal is simply to port the journal model to the Web, not to reinvent scholarly communication for a digital networked world. This is an important point, he says, because it is highly likely that the traditional journal is not appropriate or desirable in such an environment.

To those who argue that this is to conflate preprints with postprints, and would lead to chaos, Hilf responds that all that is required is that authors signal the unrefereed status of their preprints. Once again, this can be easily achieved by the use of metadata.

In short, for Hilf the danger of seeing OA simply as a matter of making papers published in regular journals available on the Web is that it blinkers the OA movement to the possibility (or, more likely, the necessity) of undertaking a root and branch overhaul of the scholarly communication process.

By simply porting the traditional model to the Web, for instance, the OA movement could end up properly addressing another important question: when, how (and even *should*) peer review take place?

"The advent of OA would seem to imply using a model that says: 'publish first, let a paper be discussed in an online forum, then let the author polish the document in order to arrive at a final version suitable for long-term reference and archival. That seems the best model in an online world."

Additionally, it is not certain that every paper will even need to be peer reviewed in the future, as Paul Zinn-Justin has argued. Hilf's views on this latter topic have evolved over time. Speaking to me in 2000 he said, "With the Web, we have an open democratic and competitive market for information. Anyone can post anything on the Web, anyone can read it, comment on it, or demonstrate that it is right or wrong. The author can also annotate third-party contributions. Any adult person is allowed to read any information, even if he/she is poor."

This would seem to imply that in an online world peer review becomes supernumerary. Today, however, Hilf has a more nuanced view. As he puts it, "The question is: What is good for the advancement of science? I have no reason to retract or change the thoughts I had in 2000 about the future of scholarly communication. They still seem accurate and appropriate. I would, however, add that refereeing is useful and necessary for 'bystanders'. That is, scientists who have to know about the content, but are not exactly experts in that specific field, and so not able to judge themselves. These people have to be told whether a paper is relevant or not."

The important point, he adds, is: "We do not know which system will dominate in the future [so] you need to assume OA applies to any document that the authors designate as scientific output, and then establish how you will make those documents OA".

He adds, "This makes a difference because all kinds of refereeing (blind/open, voluntary refereeing as in [overlay journals](#), etc.) [have to be kept in mind](#). OA-first would lead to a much more varied and wider corpus of OA material. And it might well sweep away the need for a journal at all, because one could collect on the OA web the documents one wants to read to an online folder, (or let it be filled by an assistant, or even search engine) with a filter that set its 'refereed' status to yes or no and a learned field filter set to my specific field. Today's paper-oriented journals are much too static to allow for that variety."

Once again, we detect the influence of arXiv, which has always had a non-doctrinal view on whether a paper posted to it is a preprint or a postprint. Interestingly, the development of [PLoS ONE](#) (and

more recently [PLoS Currents](#)) suggests that others in the OA movement are coming around to a similar view.

Unlike hardcore self-archiving advocates, therefore, Hilf takes issue with the notion that researchers should simply carry on publishing in traditional journals and then self-archive their papers, without giving any thought to the many issues that naturally arise from the phase transition scholarly communication is currently going through, and the many opportunities for improving things.

Unlike Harnad, therefore, Hilf does not believe it is enough to first achieve 100% OA, and then think through the many issues that confront scholarly communication in an electronic world. We need to think them through today, he says, including issues like metadata, copyright, preservation etc. etc.

Hilf, in short, is no OA purist. So where some OA advocates insist on very tight definitions of what OA is, and what kind of material it should apply to, Hilf adopts a far more catholic approach. True, he stresses the differences between OA and what he prefers to call "free access" (that is the landmass of OA material, not the small pond), but he does so in order to broaden the OA church not to limit its scope. And he does so in a pragmatic, not a dogmatic, way.

"There is a specific model of Open Access," he says. "We, however, continue to use the term free access. For us this implies access to the full text digital copy of a document by any means."

Points of departure

In other words, like the de facto leader of the OA movement [Peter Suber](#), Hilf has always been keen not to take sides in the various factional disputes that have bedevilled the OA movement, not least the often-heated discussion about the relative virtues of [Green vs. Gold OA](#).

As he points out, OA can be achieved in a number of different ways: researchers can publish in OA journals, where by paying a publishing fee they can ensure the publisher will make their paper freely available on the Web for them ("[Gold OA](#)"). Alternatively, they can themselves [self-archive](#) papers that they have published in traditional journals — either in an [institutional repository](#) or in a central subject-based repository like arXiv ("[Green OA](#)").

When I asked Hilf directly what he thought of the respective merits of the Green and Gold routes to OA he replied sharply: "What do you mean by 'merits'? These are two distinct ways to achieve OA. And each has its advantages. For Green OA the author has to act or initiate activity; for Gold OA he pays, or someone else pays."

Then, in common with Harnad, Hilf adds: "The point is not to wait until a beloved journal becomes Gold, but to act now."

But as we've suggested, given his broader perspective on how scholarly communication needs to change, Hilf's views on OA do not always fit neatly with the OA movement at large. So what are the points of departure?

We've mentioned his views on metadata and preprints for instance. And we've discussed his attitude to peer review. Hilf is also keen to encourage the research community to think about digital preservation — on the grounds that information is far more fragile in a digital world. This issue, of course, is not restricted to scholarly information alone, and many believe that unless a general solution is found soon the world could find itself plunged into a [digital dark ages](#), with information effectively evaporating over time (as, for instance, technologies and file formats change).

Like so many people, says Hilf, OA advocates take too little interest in such matters. This, he adds, is misguided as it is a very serious problem. In fact, he suggests, Long-term archiving becomes more of an issue in a global OA environment, not least because documents are likely to proliferate on the Web, and we will end up with multiple copies being posted on a range of different servers. That is just great, since it enhances access in ways not possible in a toll-access world. It does, however, call for greater care when it comes to archiving."

As Hilf points out, some in the OA movement are inclined to wave aside such concerns. As self-styled [archivangelist](#) Harnad [puts it](#) in his self-archiving [FAQ](#): "This worry is misplaced. It is not really a worry about self-archiving at all, but about the online medium itself. As such, it needs to be directed toward the primary database in question, which is the toll-access refereed journal literature, currently in the hands of publishers and libraries, and most of it already in both paper and digital form. That is the official version of record."

Once again, this reflects the common assumption that the traditional journal model will persist in the online environment.

And once again Hilf believes this to be too narrow a view, and has therefore proposed solutions. As part of the [nestor](#) project, for instance, he co-authored — with Severiens — two studies ([here](#) and [here](#)) on how scholarly digital content should be preserved into the future. In the process, he says, they made the disturbing discovery that "with the exception of [Czechia](#), no country in the world has yet developed a national long-term archiving policy for digital content."

This is worrying, he argues, not just because it is essential to preserve research, but because long-term archiving ought to be viewed as the responsibility of national governments (who should delegate the responsibility to national libraries by means of a national archiving policy), not publishers. After all, he explains, publishers come and go over time and have little interest in long-term archiving as most research has a reasonably short shelf-life, and once the revenue stream falls away publishers have little incentive to preserve research papers.

Hilf also takes an active interest in copyright, which he believes offers a real obstacle to OA, especially in Germany (as we shall see in a moment). For that reason in 2004 (with multimedia specialist at the [University of Siegen](#) Hartmut Simon), co-founded the Coalition for Action: Copyright for Science and Education ([AB](#)).

Explains Simon: "When I first met Ebs Hilf he was president of the IuK-working group. We quickly saw our respective interests and activities were but two sides of the same coin (which is free or open access to research information for science and educational users). Ebs' work was within the OA movement: my interest was in advocating for copyright reform, with a view to adapting the legal environment to make it more appropriate for the information society. Together we were able to persuade our DINI colleagues, and the German research community, to look at both sides of this coin."

Their first initiative (in 2004) was the [Göttingen Declaration](#). This emerged from a DINI work group on copyright, and was issued as a response to the maximalist manner in which the Germany government was implementing the [European Copyright Directive](#). The Declaration called on people to sign a petition demanding that in implementing the Directive the German government adopt the principle that, "In a digitised and networked information society, access to global information for the purposes of education and science must be guaranteed at all times from any place."

Explains [Dr. Johannes Fournier](#) of the DFG: "Issued in the midst of intense discussions between libraries, researchers, research organisations and publishers about the reform of German copyright laws (the so-called "[Second Basket](#)" [or [Zweiter Korb](#)]), the Declaration advocates for research-friendly copyright law. And if you do look at the list of subscribers you will get an impression of the document's influence."

"We had an overwhelming response to the Göttingen Declaration," says Hilf. "Virtually every large science organisation signed it, including the Helmholtz Society, the Max Planck Society ([MPG](#)), the German Council of Science and Humanities ([Wissenschaftsrat](#)), and the German Rectors' Conference ([Hochschulrektorenkonferenz](#)). In addition, 350 learned societies, research institutions, universities, and over 7.000 individuals from the research community also signed."

Nevertheless, he adds, "there was very little response, or even interest, from journalists, and no reaction at all from politicians to the petition."

Consequently Hilf and Simon decided to decouple the AB from DINI and turn it into an independent organisation. It then embarked on a media campaign, distributing [press releases](#), issuing letters to member of the Bundestag, and publishing regular information updates to keep both the public and signatories of the Declaration informed about developments. This has proved very successful, says Hilf, a success that owes much to the inspired leadership of the present chairman [Rainer Kuhlen](#), and to a committed and proactive executive board.

On the issue of copyright too Hilf tends to be out of sync with the wider OA movement. In his list of what he calls [34 prima facie concerns that are not really concerns](#), for instance, Harnad [dismisses](#) copyright as a concern, insisting that there is, "No rational deterrent to immediate self-archiving in copyright worries."

True to his ecumenical approach Hilf does not generally engage in public debates with those who disagree with him, or seek to convert them. So while many are tempted to take Harnad on in public, Hilf simply insists that he and Harnad have different roles to play, and that is just fine. "Harnad's role is to be the disciple in the desert calling on people to increase the speed with which 100% OA is achieved (by mandating researchers to self-archive) and to stress the ease with which this can be done ([four keystrokes...](#))," he says. "I fully agree with him on that, but my thinking and my approach as to what needs to be done is much broader."

Consequently, he adds, there is no real disagreement between them. Indeed, of Harnad's frequent online postings on OA Hilf admits: "The more I read them, the more I agree."

He adds, however, that while Harnad's logic is impeccable, it is based on certain assumptions; assumptions that Hilf does not share. For instance, he says, "Stevan assumes we will maintain the present system of peer-reviewed publications (hand them in first, referee then, and then publish them in a traditional journal). This automatically restricts the OA corpus to those papers that have been sent for refereeing, and are then made OA one way or the other after refereeing."

Yet again, he says, the danger is that by making such assumptions the movement risks failing to develop the full potential of the Internet for scholarly communication. While it is important not to delay taking action now (by, for instance, self-archiving research papers) the research community needs to peer into the future too, and start putting the right building blocks in place, not hope that the current infrastructure can somehow be retrofitted.

As we saw, what Hilf and Harnad do agree on, however, is that researchers should be doing something right now — most obviously by self-archiving their papers — rather than waiting for the future to arrive. And since researchers have shown themselves to be surprisingly reluctant to act, then funders and research institutions should be mandating them to self-archive.

Copyright and mandates

In fact, many OA advocates now believe that mandates are essential if OA is ever to be achieved. The issue of mandates, however, is a particularly controversial one, and inevitably gets entangled in a bitter and confused wrangle about copyright. This confusion reached the height of absurdity in Germany earlier this year.

What turned into a peculiarly bitter debate appears to have been sparked by the distribution of a questionnaire to science organisations by the [German Federal Ministry of Justice](#) in connection with a planned "Third Basket" (Korb) of changes to German copyright law. The Third Basket is intended to address the needs of science and education. (More information is available [here](#)).

In response [an initiative](#) dubbed the [Heidelberger Appell](#) was launched. This was accompanied by the creation of what German journalist Richard Sietmann describes as "a rather dubious" institute called the [Institut für Textkritik](#) ("Not a university institute, just a bunch of professors of literature"), along with the publication of a flurry of irate articles in German national newspapers, weeklies and magazines.

The Heidelberg Appeal begins by claiming that an "[Alliance of German Scientific Organisations](#)' wants to obligate authors to use a specified mode of publication. This is not conducive to the improvement of scientific information."

What these scientific organisations are doing, the manifesto continues, is "propagandising for wide-ranging interference with the freedom of the press and the freedom to publish, the consequences of which are contrary to basic constitutional law."

It adds: "it must be writers, artists, scientists, in brief, all creative people themselves, who decide if and where their works should be published. Any constraint or coercion to publish in a certain form is as unacceptable as the political toleration of pirate copies, currently being produced in huge numbers by Google."

Further increasing the heat, a series of postings appeared on a German library mailing list called [INETBIB](#) written by the publisher Matthias Ulmer and the academic [Roland Reuss](#) — a science historian and researcher (e.g. on the work of the writer Franz Kafka).

As the debate unfolded a number of confused and inflammatory statements were made, including the claim that the German authorities intended to force scientist to publish in OA journals. And in doing so, it was added, the state would be behaving like the Nazi regime.

Explains Fournier: "Reuss as well as some other authors and publishers argued that science institutions want to dictate where researchers can publish. This is not true. Researchers are simply being asked to make their works open access wherever possible. They are not being told: "Look, here is an open access journal, you have to publish there".

Nevertheless, says Sietmann, within a week the manifesto accompanying the Appeal had been signed by almost a thousand people, "including many students but also public figures like the former

Federal Representative for Culture and Media, [Michael Naumann](#), who is currently the publisher of the weekly [Die Zeit](#)". (Today the number of signatures stands at [2,663](#) and continues to grow).

What further muddied the water, points out Fournier, is that those behind the Appeal did not distinguish between "researchers (i.e. those producing publicly funded research) and authors of novels, filmmakers etc. This is a pity because it then seems as if research organisations would like to force novelists, movie makers, and artists (who live by their art) to make their works open access."

In short, a number of different and distinct things were conflated, including OA, the [Google Books](#) project, growing use of P2P file sharing services, and the impact of video sharing services like [YouTube](#).

The debate, maintains Hilf was not only confused, but "consisted primarily of heavy polemic and explicitly false statements".

The hyperbole, he adds, played to German sensitivities about the way in which the Nazi regime practised censorship. "Under the Nazi regime, for instance, authors were often forbidden to publish and distribute scientific findings. So modern copyright law in Germany is formulated specifically to prevent such censorship happening again — to stop authors from being threatened and pressured over what they could and could not publish."

That a simple questionnaire about proposed changes to copyright law designed to ensure the free exchange of scientific information should morph into a panic about online piracy, censorship and state oppression underlines both the degree to which the OA debate has become polarised, and the specific sensitivity of Germans to some of the issues.

As further evidence of the level of confusion about OA, in May Hilf [revealed](#) that Reuss has made his own scholarly articles freely available on his institutional web server. As he put it: "Mr. Reuss, in his role as professor of history, has of course posted digital copies of all his scholarly articles [on his institutional server](#) (with a link to the publisher for ordering a printed copy if wished)."

"Right now there is a danger of a backlash against OA looming because many prominent scholars from the humanities and famous writers signed Reuss' infamous and uninformed 'appeal' asking to curb the 'Open Access madness'," says [Matthias Spielkamp](#), a columnist and project manager of [iRights.info](#).

In fact, adds Spielkamp, there was no suggestion of anyone being coerced to do anything: There was no plan to introduce a self-archiving mandate, and there was no proposal to force researchers to publish in OA journals. "Reuss presumably heard about the questionnaire and got the (wrong) impression that there is a danger of an OA mandate for all scientific publications." Spielkamp adds: "A mandate could never become law in Germany, but it is perhaps the reason why he started his destructive activities."

Hilf, however, suspects that in the long run the rumpus will help the OA cause, since it has seemed to clarify the situation, and focused the discussion on the need for copyright laws to treat scientific information separately from what he calls *belletrist* writing.

In other words, most research is publicly funded, and since the sole desire of scientific authors is to maximise the number of eyeballs that read their work they happily give it to publishers without payment. This, says Hilf, makes the situation regarding scientific research unique; and for that

reason it is not appropriate that publishers should be able to appropriate it for private profit by insisting that authors sign over copyright when they publish a paper.

Above all, he adds, as a result of the debate, "OA is now seen as a public issue, and journalists, political parties and other professional organisations are much better informed. Likewise, decision makers now understand that it is essential for science. We never dreamt that we would be able to achieve so much in such a short period of time. There is still a long way to go, but it is now much easier to explain to a university president why OA is necessary, and why it can help a research institution to market itself etc."

Sietmann agrees that the debate has been helpful: "Time will tell if there is a backlash against OA. My personal assessment is that it is more likely to help since it will become increasingly clear that these people — under the umbrella of author's rights and academic freedom — are really arguing for the proprietising of the results of publicly funded research."

The timing of the [recent election](#) in Germany has also helped, says Hilf. "In the run up to the election science organisations and the AB sent every political party [written questions](#) about their plans with regard to OA."

And while a centre-right coalition consisting of the [CDU](#) and [FDP](#) emerged from the election — a result that can be expected to see the German government continue down the road of IP maximalism so far as copyright is concerned, and to be firmly against any talk of OA mandates — Hilf believes that it will serve to further polarise the debate, and so "lead to a sharp increase in OA deposits by researchers, who are now much better informed, and apparently prepared to take a tougher stand when it comes to signing away their rights when presented with a contract by a publisher."

Indicative of this new attitude, he says, is the fact that the [German Pirate Party](#) got 2.5% of the vote, "mostly from university people". The Pirate Party, he adds, "wants open access for all information on the Internet".

But if the key to success lies in the introduction of OA mandates, what hope is there of seeing mandates introduced in Germany? That is far from clear. "Mandates may not be permissible under the German constitution," says [Sebastian Krujatz](#), an OA advocate who works at the [Max Planck Institute for Intellectual Property, Competition and Tax Law](#).

Hilf, however, is not convinced. Indeed, he says, "a national mandate for publicly-funded research to be made OA is inherent to the German Constitution, which says that scientific knowledge belongs to everyone ([Gemeinfreiheit des Wissens](#))."

Not in such good shape for OA

So how does the current state of OA in Germany compare to other Western countries? As will have become evident, the same issues that have dominated discussion in other countries have been replicated in Germany (although with a specific German theme). However, most agree that, like [France](#), Germany continues to lag behind countries like the US, the UK and the Netherlands.

"My impression is that the movement for OA in Germany is still very much a grassroots development, backed up but not in any way enforced by universities and the big research institutions," says Krujatz.

"Germany is not in such good shape for OA," says Harnad. "There are of course all the endless Max-Planck and Berlin Declaration and 'DINI Certification' people, but, frankly, they have next to no idea what they're doing and are just spinning wheels."

Fournier takes a more upbeat view, pointing out that more than 100 universities now have repositories. Moreover, he says: "Among other repository projects, the DFG has funded a number of discipline-specific repositories (e.g. the [Social Science Open Access Repository](#) and [Fachportal Pädagogik](#), the interlinking of [DINI certified repositories](#), and the building of added value services on top of repositories."

He concedes, however, that most repositories in Germany, as elsewhere, still contain very little content.

Nevertheless, he says, to help educate the research community about OA in May 2007 the DFG-funded information platform [Open Access](#) was launched, says Fournier. "It is important to note that this platform is supported by all research organisations in Germany. Thus it serves as a central, authoritative source on open access. In addition, it has become the platform for a network of people trying to move open access forward in universities and research institutes. The [Open Access days](#) initiative is just one example of how these people are trying to inform and lobby about Open Access.

In addition, he says there is growing interest in running open access journals. "The DFG funded a number of open access journals. Among the more recent ones are two journals in [economics](#) and [management](#)."

Meanwhile, the Max Planck Society has embraced the concept of [living reviews](#), "which are innovative e-journals," says Fournier. "The Open Access publisher [Copernicus](#), which specialises in the Earth Sciences, was also a Max Planck institute initiative. Finally, the federal state North-Rhine Westfalia established an [open access journals platform](#)."

Hilf, however, suggest that we take Fournier's upbeat view with a pinch of salt. "It is good that you interviewed Fournier and let him list the projects that the DFG has funded," he says, "but it would be a shame if the reader were to infer from that, that all is well in Germany so far as OA is concerned."

Hilf adds: "In reality, where applications for funding are made in, say, the UK or the Netherlands, they are likely to be approved in a matter of weeks. In Germany, by contrast, an application to the DFG is likely to take at least a year before a decision is made, and the money granted is inevitably much smaller.

"Moreover, once the money runs out the project is usually terminated, which means that these projects often have little real impact on future developments. This means that Germany is destined to be constantly running to catch up with the rest of the world."

What about the role of the German Government? As we've seen, in the wake of the election we can expect little change in the near future.

There is, says Sietmann, some irony in this. "Unlike the UK, where the government has taken a stand against OA, the German government in general, and the research ministry (BMBF) in particular, have carefully chosen not to get publicly involved in the issue. But, he adds, "Practically speaking, however, they are heavily influenced by the publisher's association (Börsenverein), and the recent reforms of copyright law followed precisely the recommendations of the publishers' lobbyists."

What the Heidelberger Appeal reminds us is that it is not just publishers who have been dragging their feet over OA. Nor are they the only ones to actively oppose it, as Reuss has demonstrated.

What the hullabaloo also tells us is that one of the greatest obstacles the OA movement has always faced is ignorance. And in retrospect, Hilf suspects that part of the problem he and his colleagues faced as they set about attempting to re-engineer scholarly communication was that rather than representing the interests of the research community at large they were in reality just a small group of technically-minded people who had failed to appreciate that the vast majority of researchers were ignorant, and surprisingly disinterested, in the issues. Even today, many of them have very little conception of what OA is, or what it aims to achieve.

Supporting this view, Fournier points out that a 2005 [DFG study](#) found that very few researchers knew what the "Berlin Declaration" was, and few had had any experience of publishing in an OA journal, or self-archiving. It is unsurprising therefore that still only 15% of research papers are being made OA (Although Hilf's broader view of what constitutes self-archiving would suggest that the figure is higher).

Confirms Sietmann: "Many scientists, particularly in the humanities, still are not aware of OA. And some continue to have reservations."

The future

So how does the future look for OA in Germany? Fournier sees reasons to be cheerful. "The first hopeful sign is the position of repositories at universities. Until now the main driving force behind repository developments came from people in junior positions, and library directors have been generally unaware of the issues."

He adds: "But today we see people like [Norbert Lossau](#) at [SUB Göttingen](#) taking a leadership role. Lossau is deeply involved with [DRIVER](#), and during the spring meeting of the directors of research libraries (the so-called section IV of the German Library Association — the Deutscher Bibliotheksverband, or [DBV](#)) Lossau suggested that they create a working group on repositories to look at the implications for library responsibilities in the university."

Fournier continues, "His proposal was well received, suggesting that interest in repositories is growing. And one of the reasons for that, I think, is their potential use for the assessment of a university's research output — and the need to assess outputs gets stronger and stronger each year. So it will help repositories to grow."

Like Krujatz, however, Fournier is sceptical about mandates. "It is important to note that no organisation in Germany requires open access with a mandate today." Even the DFG, he adds, does not have one, he adds. "Although many claim we have a mandate, it is not a mandate in effect. The actual wording says 'DFG-funded researchers are strongly encouraged ...' [in German '*Die DFG legt Wert darauf, dass ...*'] So it is a recommendation, not an obligation."

Likewise, he says, even the Fraunhofer Society does not have a mandate. "Stevan Harnad praised it as having a mandate, but if you look at the original German wording it is clear that it is only a recommendation."

The continuing problem, therefore, is that recommending researchers to self-archive has little effect — as has [been discovered](#) on many occasions — so mandates are vital if OA is to succeed.

Fournier, however, does see hope in Gold OA. After all, he says, depositing papers in repositories requires additional work on the part of authors; work, moreover, that is "not embedded in their traditional workflow."

By contrast, he suggests, Gold OA "is much more in keeping with their traditional publication habits", and new solutions are emerging for paying the author fees that Gold OA requires. Citing [the deal](#) between the Max Planck Society and Springer last year Fournier explains: "They just kept their subscriptions and continued to pay for them, but under the condition that every paper authored or co-authored by an MPG researcher will be made open access as soon as Springer publishes it."

Additionally, he adds, some research funders and many universities are starting to provide funds to help researchers to publish in OA journals — so called "[Gold Funds](#)".

What will also help, he adds, "is that OA journals are starting to get impact factors. So some are now viewed as journals that can enhance the reputation of authors who publish in them."

It should be noted, however, that the signs are that the likely impact of Gold OA funds will be [minimal and short-term](#).

Hilf, therefore, continues to pin his main hope on the growth of mandates. Even if the German government is unable or unwilling to help, he points out, research institutions can introduce mandates themselves. "In March 2009, for instance, MIT [demonstrated](#) that university faculties are now prepared to vote for mandates themselves. Perhaps we can hope for a similar change of heart in Germany soon."

The MIT decision, of course, followed the historic mandate [voted for](#) in February 2008 by the Faculty of Arts and Sciences at Harvard. But since then we have learned that US-style faculty mandates are not quite what they seem. Indeed, it [turns out](#) that the Harvard mandate is no mandate at all.

Given researchers continuing ignorance of OA, says Hilf, education is vital. The good news, he adds, is that librarians in Germany have been more proactive about OA than their peers in other countries — a commitment demonstrated by the formation of DINI in 1996.

Notwithstanding Harnad's scepticism about DINI, Hilf argues that it has played an important role in educating librarians, both in OA-related topics like metadata and preservation, but also in the hardware issues associated with creating institutional repositories. It has highlighted the need to provide professional services to help researchers self-archive their papers.

The problem, he concedes, is that in Germany it is assumed that librarians and scientists should have little to do with one another. As such, transferring the necessary knowledge from librarians to researchers is likely to prove a slow process.

Too small to make a difference

So fifteen years after Hilf began his advocacy, what has been achieved? Not a great deal, argues Roosendaal, who co-authored a book with Hilf (and others) recently.

Called [From Vanity to Publishing](#) the book, says Roosendaal, elucidates "why the present open access model of either using a publisher to provide OA as a print add-on [i.e. Gold OA] or by using a university library without much in the way of add-on services [Green OA], has not resulted in a market penetration of more than about 15%."

Roosendaal adds: "We conclude that OA cannot succeed at this level of penetration. It is too small to make a difference."

Moreover, he says, OA is still not in a position where it can make much headway. "And the reason for that is that the value chain being utilised remains that of the print age, and none of the stakeholders are sufficiently incentivised to enable OA to move beyond this point."

In short, he adds, "the optimal business model has yet to be found."

Such a model, he explains, "would need to meet the needs of researchers while providing sufficient incentive for all the different stakeholder to co-operate together to provide an optimal sharing and division of labour, and in a way that allows professional add-on services to emerge that would encourage wide scale use of the service."

This is no doubt an accurate diagnosis, but as the serials crisis intensifies the status quo is coming under growing pressure, and will at some point surely collapse. "Publishers are doing everything they can to resist OA, but eventually universities simply won't be able to afford to pay for journals," points out Severiens.

Already, he says, we are witnessing the absurd situation in which researchers have to continue to publish in journals (in order to get tenure/promotion etc.), but find that both their own institution and other researchers' institutions are increasingly unable to afford to buy the journals in which they publish. This, says Severiens, has been dubbed by a colleague as "depublication".

In other words, publication is no longer about scholarly communication, but acquiring a proxy currency from publishers to buy tenure and/or promotion. As Peter Lawrence [put it](#) in a recent *PLoS ONE* article, papers are increasingly viewed not as a mechanism for communicating research results, but "as tokens to get jobs and funding."

Moreover, as Roosendaal points out, those publishers who have begun to embrace Gold OA are clinging to the traditional model of the journal in order maintain their current profit levels. While this may *eventually* provide a solution to the [access](#) problem, there is no sign that it can [solve](#) the [affordability](#) problem.

This suggests that the serials crisis will simply be replaced by what the University of Southampton's Steve Hitchcock [calls](#) an "author crisis". That is, researchers will find it difficult to afford to pay for Gold OA, and so will struggle to get their papers published.

Hilf, however, remains confident that, in the long run, OA will prevail. And when it does scientific information management will be based on the principle of what he calls, "open access first, and then publish".

How will this work in practice? First, explains Hilf, "Authors will make digital copies of their papers available in multiple central archives and in their local university IR. This will give them a timestamp, and provide unrestricted immediate discussion of their work by experts, plus the widest readership possible. This in turn will lead to a sharp increase in citations, and the assurance that their work will be archived, probably by means of a combination of their university and at the national library.

"Second, the author will choose from a range of add-on services that will be provided by many different service providers. For instance, we will see peer review clubs competing in terms of the

quality, speed and refereeing principles they are able to provide. Here I see learned societies thriving — by creating a high-quality refereeing market through registering refereeing groups. And they will be better at informing their members of the benefits of making their papers OA prior to publication. This will enable them to negotiate with publishers more effectively. We will also see service providers competing to offer add-on services like print on demand etc."

In short, he concludes, "a free market will develop, one much better equipped to adapt to new techniques, and one that is much more cost-sensitive. And if they get it right, he adds, commercial service providers can look forward to an enduring and prosperous future."

Moreover, says Hilf, "This development will be further driven by universities' desire to be seen, and to compete with one another, not least because governments will want to ensure that public money is used cost-effectively."

And the currency that will drive this market, he suggests, will be citations. In other words, researchers primary goal will be to attract as many citations to their work as possible.

Fifteen years after Hilf first outlined the "eternal needs of scientific research", however, the key question remains the same: How do we get from here to there?

"I am quite relaxed because it is clear the worldwide migration to Open Access is inevitable," responds Hilf. "As I said, Open Access is the prerequisite for the future development of science, since it will make science far more efficient and effective. So it is simply a matter of time, and of constant endeavour. In the end, it will be luck and perseverance that will determine how quickly we will get there."

Ebs Hilf

Since he is the subject of our profile there remains one final question to address: Who is Eberhard Hilf, and why did he become such a dedicated champion of OA? I am, he says, "a native German with no specific homeland".

In fact, Hilf was born in 1935 in the state of Brandenburg, and lived there until 1945. At that point he became a refugee at the Harz, and later lived at Reinbek in [Schleswig-Holstein](#).

And while he may have no specific homeland, Hilf is not without roots: He can trace his forebears back to at least 1150. One ancestor — [Montanus, or Brueck](#) — founded the [University of Jena](#) in Eastern Germany. Unfortunately, says Hilf, he subsequently found himself on the wrong side of the "Farmers' War", an ignominious position that was to see him "quartered" (cut into eight pieces).

His ancestor's fate, combined with his own experiences as a child during WWII, led Hilf to conclude early on that life is too transitory and inherently fragile to spend one's life always doing the "safe" thing, or simply striving for short-term recognition. Better, he decided, to try and have some impact on the course of history — however small a contribution that might be. "I think about my forefather, and I conclude that I would always prefer to be actively doing something rather than just being alive," he says.

But why has a theoretical physicist devoted so much of his life to the task of trying to re-invent scholarly communication? "It was always my belief that it is important in running a research group to create a good atmosphere, and to make the working environment as pleasant as possible," replies Hilf. "And it always seemed to me that this included providing the very the best tools e.g. good

computers ... enough money to enable researchers to travel... [and] ... *the best scientific information services we could get.*"

More specifically, Hilf is a firm believer in the need for constant dialogue between scientists. And what better way of ensuring that than seeking to maximise the way in which a dialogue can take place — this, after all, is what people mean when they talk about scholarly communication.

"What I like most is to have constructive communication with my colleagues," says Hilf, adding: "Having lived as a refugee I also feel at home wherever I am, and I like travelling."

To that end at one time Hilf was personally making over 20 trips a year, attending conferences and visiting colleagues. And with that end in mind he set about trying to re-engineer scholarly communication — so that it could make the most of the Web to further dialogue between scientists.

But how did it all begin? So far as his academic career is concerned it began in 1954, when he entered the University of Hamburg as a physics undergraduate. From there he went on to study at the [Technische Universität Berlin](#) and the [Ludwig Maximilian University of Munich](#), before completing his doctorate in Frankfurt in 1967.

Hilf then became a research assistant at the [University of Würzburg](#), and subsequently held professorships at the [University of Düsseldorf](#) (1971), the [Darmstadt University of Technology](#) (1972), and subsequently at the [University of Oldenburg](#) (1985).

Hilf is always instinctively drawn to new ideas and new ways of doing things, and if something new captures his imagination he tends to set himself the task of understanding it. "What interested me in physics were new and important unsolved questions," he told me. "So I would say that my speciality was in spotting new issues and topics destined to become important."

For that reason, he explains, the trajectory of his career as a physics professor consists of a journey from [nuclear physics](#) to [thermodynamics](#), to maths physics, [quantum field theory](#), [nuclear astrophysics](#), [atomic cluster physics](#), and eventually dynamic desorption.

What about Hilf's OA advocacy: When and how did it begin? While Stamerjohanns jibe about the Web was an important moment, in reality his conversion to OA appears to have occurred when he visited Ginsparg in 1994. "The first time I met Ebs was on October 15th 1990. It was my first physics lecture," says Severiens. "Ebs arrived and said he hadn't prepared a lecture as he had had to take a call in the elevator."

On his return from LANL, however, Hilf appeared to be a man truly inspired for the first time adds Severiens. "He had always been amused by physics, but now he was totally enthusiastic about something."

And as we have seen, it was never only about OA. Hilf became a passionate advocate for a complete overhaul of scholarly communication, of which OA was just the beginning.

Nevertheless, says [Peter Diepold](#), former board member of the German Society for Research in Education ([Deutsche Gesellschaft für Erziehungswissenschaft](#)), "Ebs Hilf certainly was and still is one of the most prominent promoters of Open Access in Germany," "I have greatly enjoyed working with him in trying to get universities, libraries and my own society interested in OA."

"Ebs Hilf's role in the development of and the advocacy for Open Access has been very important," agrees [Elmar Mittler](#), former director of the SUB Göttingen and first DINI president. "Beside the group of librarians working within DINI, he was the leading (and sometimes only) person with scientific authority lobbying for OA. That's why I always liked partnering with him at hearings or panel discussion. [Wir spielten uns die Bälle zu](#) – to express it in German."

But it was Hilf's grasp of the technology issues that earned him the respect of Fricke (who was the official DPG representative at the 1994 APS meeting at Los Alamos). This, says Fricke, was particularly useful when trying to persuade decision makers. "Ebs always knew the details, and was strong on development issues. I was good at the politics. So Ebs would give me all the information I needed to go in and argue the case."

Roosendaal puts it slightly differently: "Ebs is stronger on technology than on business issues or management. He's the traditional distracted professor."

UK-based OA advocate [Alma Swan](#) expresses it slightly differently again: "Ebs was always a man of action rather than just a thinking-leader. "For instance", she adds, "he built a good group of computer scientists to do this work, including the young (and excellent) Thomas Severiens. He has also been involved in DINI which, despite some people dismissing it (based, I think, upon the rather unnecessary 'certification' requirement) has been instrumental in developing technical standards and infrastructure for Germany's repositories (and much else)."

While these views of Hilf could be seen to present a slightly contradictory picture of him, there is no disputing Hilf's influence on OA in Germany, even though he took a somewhat tangential road to that taken by the wider movement.

What is also clear is that Hilf is able to inspire both loyalty and lasting friendship. "I have known him for 20 years now," says Severiens. "He is the perfect colleague. He works 24 hours a day. He is a visionary."

And undoubtedly it has helped that Hilf is a very likeable character. About this everyone I spoke to agrees As journalist Richard Sietmann puts it, "He is a very amiable personality, and always enlightening to listen to."

Sietmann adds: "My contact with him began when he chaired a working group on electronic information systems within the German Physical Society in the eighties. With the rise of the Web in the early nineties he became one of the central figures (for me, *the* central figure) for all the issues surrounding electronic publishing in science as he had a clear vision where all this was heading: OA."

Hilf can be hard to understand in public adds Sietmann, "due to a tendency to mumble, and cut short the end of his sentences, and his thoughts." But on a one-to-one basis, he adds, Hilf is able to present scientific ideas in a very accessible way. "I owe to him the most vivid examples illustrating issues in open access, open data and long-term archiving."

For instance, he says, when he was writing about the issue of data preservation Hilf told that "[strong interaction](#)" was only discovered as a result of a number of ten-year-old data tapes being recovered from an earlier experiment at CERN.

In the process, Hilf explained to Sietmann how strong interaction binds protons and neutrons together, noting that what is distinctive about it (when compared to other natural forces) is that its strength increases (rather than diminishes) as the distance grows. "Hilf explained this

counterintuitive phenomenon by drawing an analogy with two lovers, who will tend to move close when, say, on an empty beach, but who are more likely to walk a bit apart on Oxford Street when bouncing into other people. As they pull apart, however, the strength of the attraction between them will increase, because they will miss each other."

Hilf's interactions with journalists have however sometimes got him into hot water. "I quoted him once in the 1990s in connection with the likelihood of researchers publishing their papers on the Web themselves," says Sietmann. "He replied: 'physicists are too lazy to do editorial work, and so would need the assistance of librarians or IT-staff.' For that he was heavily criticised by his colleagues!"

Long respected in Germany, Hilf has in recent years also begun to be appreciated on the international OA stage too. "After reading his emails on the [American Scientist Open Access Forum](#) I realised he is very knowledgeable about OA and very well informed," says French OA advocate [Hélène Bosc](#). "For that reason he was the first person I asked to participate in the [Euroscience](#) working group on science publishing for which I am convenor."

It could not, however, be claimed that Hilf has been as influential within the movement as, say, Peter Suber or Stevan Harnad. His pragmatic and diplomatic, approach — plus his unusual combination of scientific authority and technical knowledge — has nevertheless allowed him to engage in fruitful dialogue with both learned societies and publishers. And while that dialogue has too often prematurely stalled, Hilf has always managed to retain the respect and trust of all sides in the ongoing OA debate.

And in the meantime, he has continued to help build the infrastructure and tools that will be needed when scholarly communication is finally able to take full advantage of the networked world — once, that is, that it has been freed from its shackles.

One reason why Hilf is less well known than he might be, suggests Severiens, is that (unlike many OA advocates) he does not seek the limelight. "He has helped to create many organisations over the years, not least IuK, DINI, The Coalition for Action group etc., but after starting projects he usually slips into the background, and continues to work behind the scenes."

Hilf had to further lower his profile in 2007, after being diagnosed with the auto-immune condition [Churg–Strauss syndrome](#). Amongst other things this has meant curtailing his travel schedule, as the ongoing treatment of his illness makes travelling difficult. Today, therefore, he attends far fewer conferences than he used to. Nevertheless, he insists, it has not totally slowed him down. "I am now 74 years old and feel fine," he asserts.

If nothing else, Hilf's account of the past fifteen years provides a fascinating insight into the history of OA, not just in Germany but globally (since the issues are global). Listening to him one also discovers the extent to which publishers, learned societies, governments, and even the research community itself, have consistently failed to respond adequately to the digital revolution, and in many cases actively *fought against* change.

A conversation with Hilf also raises an interesting question: When did the OA movement really start? Was it in 1991, when Paul Ginsparg created the physics preprint server arXiv? Was it in 1994, when Stevan Harnad posted *The Subversive Proposal*? Was it in 1999, when [Vitek Tracz](#) founded [BioMed Central](#)? Or was its genesis in 2002, when the Budapest Open Access Initiative was launched, and the term OA was first coined?

Indeed, after talking to Hilf one is even tempted to suggest that it started even earlier. In 1991, perhaps, when Berners-Lee and Robert Calliau invented the Web at [CERN](#), the world's largest particle physics lab; or in 1969, when about 20 people gathered in the University of California lab of [Leonard Kleinrock](#) to watch as two bulky computers passed meaningless test data through a 15-foot grey cable in the process of establishing the world's first packet-switched computer network [ARPANET](#), the progenitor of the Internet?

Hilf even talks of a period that he characterises as Print-OA; a period, he says, that began in 1932, when Italian Nobel Laureate and physicist [Enrico Fermi](#) began distributing preprints to colleagues — a practice in which one can see the seeds of arXiv.

Huge eddy

For all his patience and *sang froid*, however, Hilf confesses to having been somewhat surprised at how slow progress has been made. And he concedes that he underestimated the forces for inertia: "As an expert in theoretical physics, and specifically on phase transitions (i.e. in small systems phase transitions are not abrupt but smooth, and take some time to perform, especially when there is no strong driving force), I should have known better. Here we are, 15 years later, and we see that OA has still not been realised to the extent that it has yet become useful."

The point is, he adds, that "'open access' to all the prior findings of colleagues worldwide has been an eternal dream for all scientists..."

With the Web this should now be possible. But as we've seen, the real challenge lies in making the possible happen.

This suggests that what is most striking about the history of the OA movement is not how it arose, or when, but why — eighteen years after the Web was first unleashed on the world — still so little of the world's research output is being made freely available on the Internet. That is the true story of OA, and its tragedy.

No profile of Hilf would be complete without mention of his passion for boats. "Ebs is also a real character", says EPS Secretary General David Lee, "and an avid sailor. You should ask him about his sailing: He tells a story that I never fully understood; an odd one that involves a phenomenon he experienced at sea. It has something to do with unpredictable currents."

The incident Lee refers to occurred when Hilf was sailing back to Europe from America many years ago. "It is a depressing story but a lesson to others," Hilf told me. "We departed from [Newport R.I.](#) and crossed the [gulfstream](#). I was in charge of the (then astronomical) navigation and one day I noticed that we had lost 30 miles in calm weather."

He continued: "I wondered about it but soothed myself with the thought that I had probably made a miscalculation the day before. But I should have persisted and combined my measurements with those of the next day. Had I done so I would have found that we were crossing a [huge eddy](#), a phenomenon that was not discovered until 25 years later. As they say in German: 'There I did not hear the grass growing'."

Perhaps this offers us an appropriate analogy for the changes scholarly communication is going through today: Publishers, learned societies, and the research community at large, are sitting at the helm of a large ship. As they sit there they are increasingly perplexed by the signals they are

receiving. Most, however, are inclined to ignore the signals, assuming they are simply misreading them.

In reality they are sitting atop a huge eddy, one whose true nature they cannot expect to fully understand as they pass over it, and which they will probably not fully understand for many years. What's not clear, of course, is whether — like Hilf — they will eventually arrive back on *terra firma*.

An extended Q&A interview with Eberhard Hilf will be available shortly.

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