I Hear the Train a Comin'

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The following is a transcription of a live presentation at the 2012 Charleston Conference on November 8, 2012. Video of the session is available on the Charleston Conference website at http://katina.info/conference/video_2012_train.php.

Greg Tananbaum: I am not going to spend much time here for introductions. I'll just say very briefly, as in past years, what we've tried to do here is gather two thought leaders in the scholarly communication space to discuss and debate some of the big issues that our industry faces. This year we're focusing specifically on the topic of innovation: how it applies to our space, where we excel, how we fall short, and where we go from here. And the plan is we'll talk for most of the time, but we'll leave a big batch at the end for what we hope is a good discussion and question and answer session.

I am very, very pleased to have two serial innovators here. Pete Binfield, who has worked in academic publishing for nearly 20 years and is the publisher and co-founder of *PeerJ*, which is a new open access publishing company. He has held positions at Institute of Physics, Kluwer, Springer, Sage, and most recently he ran PLOS ONE, helping to develop it into the largest and one of the most innovative journals in the world, and Pete holds a PhD in optical physics. Timo Hannay is the managing director of Digital Science, which is a division of Macmillan Publishers as some of us heard this morning. They incubate and invest in ideas that serve the needs of scientists. He previously has worked at the Nature Publishing Group, where he was the director of Nature.com, and in his former life, Timo was a research neurophysiologist at Oxford and in Tokyo, and a journalist at *The Economist* and *Nature*, and a management consultant at McKinsey.

So without further ado I'm going to dig in. The first question that I'll ask first is a very simple and a deceptively difficult one; I'll start with you, Pete. What does innovation mean to you?

Peter Binfield: I don't know how many people have young kids in the audience. I have a six-year-old and a four-year-old, and they like to watch *The Magic School Bus*. Ms. Frizzle runs the Magic School Bus and takes it on magical trips around the world, and her catch phrase is, "Take chances, make mistakes, get messy," which, I think, that applies here, actually. So innovation for me is taking risks, taking chances, trying something new, without a guarantee of success; and I think Ms. Frizzle encapsulated it perfectly.

Greg: Timo, how about you?

Timo Hannay: Well, I agree with that, in terms that, in no doubt, Ms. Frizzle wouldn't use. I would say what's required for it is a combination of brains, balls, and belief. You know, you're trying to strike out and do something new, as Pete rightly said; by definition innovation is something where you don't know whether or not it is going to work. You have to go about it intelligently, but it also requires a large degree of courage, and you have to be willing to take risks, and you have to take a leap of faith. There is this element that you need to have courage of your convictions. You need to have a vision for how you think things can change for the better, but then you have to be willing to take a risk and go for it; and I think that is unfortunately all too rare in our industry, but I'm sure we'll go into that.

Greg: That's an interesting point. At what point, Timo, do you feel as though the data collection and the risk management and the risk assessment ends, and the leap of faith begins? At what point do you finally say, "Okay, well, I know as much as I'm going to know, I'm going to jump in the pool?"

Timo: I come from a highly analytical background. I was a research scientist, as you said, and I was a consultant at McKinsey, which takes a very a fact-based analytical approach to decision making in business; and yet as I've gone through my career,

I've erred more and more on the side of the belief. I suppose, that's partly result of gaining experience, so you have some sense of what's likely to work and what isn't likely to work. So for me, of course, it's case-by-case. It's very hard to give a definitive answer to your question, but for me, as I've gone through my career, I've relied more on belief, probably, and less on analysis. That may not be a good thing, but it's certainly a trend I've noticed.

Peter: I think I would agree with that. A lot of it is, if you over analyze it, you're not going to take the risk; you're not going to take that job. A lot of it is gut, and trying to convince some other people that you've actually got a good idea rather than analyzing it to death. Anyone can analyze, but I think that gut instinct is special.

Greg: Timo, do you think that, we're speaking now about publishing, academic publishing and scholarly communication more generally, are we fundamentally an innovative or a conservative industry?

Timo: I think we are fundamentally very conservative. Of course, it all depends relative to what. I think we're a bit more innovative than we used to be, which is a good thing. There are certainly some examples of innovation, but I don't think there's nearly enough. I probably spend more time hanging out with technologists, and technological startups, and entrepreneurs, and so forth; and when I compare the publishing world with that world, there just is no comparison. I mean, we are not an innovative industry as a whole, and I think we need more of it.

Peter: I would agree. I live in the San Francisco area close to Silicon Valley. Just the energy of innovation there is intense and incredible, compared to a lack of energy in our industry, and I think there has been some good innovation recently. It's almost like I feel like there is a bubble of innovation bubbling up in our industry right now, but if you look at it, a lot of that innovation seems to be happening around the open access end of the industry. You don't see a lot of innovation, I would say, from the subscription end, the more established large players, the big publishers, except where they are innovating into

the open access space. But you do see a lot of little startups that their ability to innovate is being enabled by open content, which is very interesting, and I think that the technology is allowing them to break up the process more than has been in the past; and so it is encouraging that there is a bubble of innovation, but it's absolutely a small bubble.

Greg: You're both saying, if I understand you correctly, that fundamentally you feel it is leaning towards the conservative side of things. I guess I will start with you, Timo. Why do you think that is?

Timo: Well, publishing is going through a profound revolution right now, but it hasn't gone through anything like this for a very long time. There was Gutenberg 400 years ago, where suddenly through organized capital and labor you could mass distribute information, and the industry was built around that; and now we're in this networked digital world where, actually, you don't need organized capital and labor to distribute. We need to add value in other ways, and we are still discovering what that means. so I still think there's a huge role for information specialists of all kinds, whether we call them publishers, or librarians, or whatever new terms we may come up with, because information is getting more important not less important. We need to find new ways of adding value. The traditional role of simply disseminating information is effectively commoditized, and we need to find other ways of adding value.

Now, to be clear, I think publishers do add lots of value beyond that in ways that are often not particularly well recognized, but we're just at the very beginning of this. We're sort of in the Cambrian Era where we are going to get, I think, explosions of innovation, or there are certainly possibilities, endless possibilities, for all sorts of new ways of disseminating, and analyzing, and sharing information. Pete rightly points out that there's been a lot of innovation around open access, but I think that even if you look in that sphere, most open access publishing takes peer review as a given; it takes the nature of the scientific article or the research publication as a given, so there's a lot of dimensions that haven't been explored yet, and I think that we're just in

the beginning of this. That is not a criticism of those organizations. There is only so much you can experiment with at any given time, but I think there are still lots of opportunities for doing things in profoundly different ways than we're doing at the moment and in much better ways. I think it is incumbent on all of us to experiment with that.

I think we should count ourselves incredibly lucky. It seems to me that publishing has been boring for 400 years, and then we're suddenly in this really interesting, profoundly fascinating era, and we can really make a difference. This is a historic shift, and we would be crazy not to make the most of it. Frankly, it's the reason I'm in the industry. I would've died of boredom otherwise. I think we all need to make the most of it.

Peter: I have a theory about your comment about open access not necessarily breaking apart everything at once. It feels to me like open access spent a long time innovating around one thing, the open access versus subscription debate, and that was its innovation. What I see now in the marketplace, at least talking within the open access universe, is that it's almost a given now that people within the open access world just assume the open access model is established, it's taking off, it's about to disrupt and displace the more traditional subscription models; and so now they are therefore able to free up their minds to start innovating around other aspects of what this means and what this now enables. I've totally agreed, up until now, the innovation has been perhaps one-dimensional, but I feel like now is the moment that the open access world is almost allowing itself to actually experiment a lot more than it has up until now.

Greg: I'll start with you, Timo: what challenges do you think scholarly publishers and technology companies in this space face as they try to innovate?

Timo: A lot. I think one is, frankly, the kind of people that are attracted to this kind of industry. I think we do see quite a lot of conservative individuals in the industry who've been attracted to it historically, but now it's going through this profound change, and there are many people who are much more willing to take risks. I think there's

the challenge of actually being adept with the technologies that you need to be able to use in this new era. That is something that I am very heavily involved in, trying to make sure we developed the capabilities within Macmillan to be able to use information technology developed software and so forth. I think that is absolutely critical. There are many publishers who see themselves as never wanting to become a technology business, and in some ways I understand that, but publishing is an information business, and we're in the information technology era. You have to get good with technology or you are, at least, limiting your opportunities, and at worst, you may well be jeopardizing your future. Also, we didn't touch on this earlier, but we also serve a relatively conservative market and customers. So for those of us in academic publishing, academia is inherently conservative as well. There are very well-entrenched methods of assigning credit and promoting people and so forth that tend to work against new ways of sharing information, for example. A very simple example is still that really all the credit for scientific contributions accrues to those who publish peer-reviewed papers in prestigious journals, although that may be changing. But modern science isn't like that. There are global networks now with researchers. Some specialize in gathering data, some specialize in interpreting it, others still drawing insights from it and publishing the paper; and if the credit only accrues to those people who are at the end of that process, then we're not encouraging other people to make their contributions. My main point here is that we serve, in some ways, a fundamentally conservative market as well, so there's any number of different challenges to actually trying to disrupt the status quo. But you know, we have seen some progress, and I'm fundamentally optimistic; I don't want to sound pessimistic in listing all those challenges, but they are the things we have to live with every day.

Greg: (To Peter) So what about you? What is your feeling with the challenges that we face when trying to be innovative?

Peter: I think it is interesting when you look at Clay Christiansen's book *The Innovator's Dilemma*.

At the moment, we're quite a consolidated industry. We have four or five very large publishers sitting on a ton of, effectively, R&D money. They could be innovating quite proactively the Springers, the Elseviers, the Wileys of the world; but if you look at that *Innovator's Dilemma* thesis, they are fundamentally unable to. Their mindset is to serve their customer base as they understand it, improve their current product, and to basically innovate around increasing their margins and increasing their product offering to their current customer base, which is a very profitable industry for them, and its selling subscription journals to academic libraries. And what Christiansen pointed out, I think, was that you can have new markets bubble up underneath that are less profitable, and are therefore of no interest to that incumbent, and when they go out and market test it, and perhaps talking about open access to university librarians, for example, then the feedback that they get is that there is no money to be made there. Therefore, those incumbents are the incentive not to innovate, and therefore you get something like open access which might bubble up and serve a very small marketplace initially. Academics, individual academics, actually want to promote their work more widely and have it read more widely, and then as that innovation sort of gains steam, one becomes more effective and eventually, as this is the "Train A Comin'" session, it hits you like a train in the face if you are an incumbent, but and it's too late to make that change. So I think there is a real element to that.

Greg: You touched on the question of openness a bit here, but beyond just open access, there is a trend towards openness: open science, open source, open data; beyond what you just mentioned, how is that helping to drive innovation within academia?

Peter: I'm obviously an open access guy, so you know my answer to that one, but I think it's absolutely allowing this innovation to happen. It's an enabler. So open access was a thing: get every content open access; well, we're on a path towards that now. But once it is open access, what does that mean? If you start in the mindset that the world will be open access in 5 or 10 years,

whatever your number, then what new businesses does that enable? Perhaps it's a business like Mendeley. Perhaps it's an alerting business, or an author tools and services type of industry that allows you to promote your articles better to the world. I think openness is enabling at least a certain type of innovation in our industry; it's definitely not the only enabler of that, the Internet is another enabler, but it's there. I think what's also interesting though, is when you compare what open access is doing to the industry compared to the subscription model. I said earlier you've got these big incumbent publishers just sitting on a big pot of R&D money; they could be investing that in innovation, but they're not, mostly, at the moment. In the future, perhaps, in an open access environment, there's a big chunk of revenue probably taken out of the industry. It's no longer a ten billion-a-year industry, and so there's actually less R&D money to invest in that sort of future, which may or may not be a good thing. It may actually drive more efficient practices, for instance.

Greg: Timo, you're obviously coming from not just the publisher perspective, but from the Digital Science perspective. How do you feel this push towards openness influences or impacts innovation?

Timo: Well, I think before I answer the question about openness, which I will come back to, I did want to talk about the *Innovator's Dilemma*, and the point that Pete makes. I completely agree that publishing, like many other areas, is vulnerable to disruptive innovation, exactly the kind that Clay Christiansen describes. His remedy, actually, is to create separate businesses in order to innovate independently of the legacy business, which is exactly what we're trying to do at Digital Science, I think; and I would say to those publishers in STM publishing that STM publishing is generally in a pretty good state at the moment financially. If you compare it with other areas of publishing, such as trade books, newspapers, consumer magazines, that kind of thing, it hasn't been nearly so heavily disrupted, certainly from a financial point of view. But for those publishers, now is the time to innovate. Now is the time to invest, to reinvent yourself; don't wait until the revenue starts going

away because you're going to be in a much weaker position to do that. So this is exactly what we're trying to do. In terms of open content, open data, and so forth, of course that lowers barriers to entry. It increases opportunities for new entrants to come in and do new and interesting things. It means, once content itself is commoditized, that everyone needs to move up the value chain and do something new and different. Again, exactly the kinds of things we are trying to do within our business, but you see numerous startups trying to do the same thing. It's an unfortunate reflection on publishers, I think, that we are seeing so much of the innovation coming out of young startups, coming out of nowhere, effectively, and doing interesting things despite the fact that they've got no resources really to do it with; the publishers have the money, have the contacts, have the audience, and have the content, and I think should be doing even more to innovate than they already are.

Peter: Yeah, I totally agree. I think if you look at the innovation that is happening, a lot of it is happening from outsiders, basically; even just grad students saying, "Well, we can do this better," and starting Mendeley, for instance; that kind of outside innovation. It's almost depressing because we, within the industry, we're in the best place from a knowledge point of view. We know the industry, we know the trends, we go to these conferences, we see the talks, but somehow we don't, as an industry, generate these kinds of spinoff innovations that the outsiders bring to us. Even my company, PeerJ, we are financed by Tim O'Reilly. He's a computer book publisher and he's interested in innovation in the academic journal book publishing world. Why him? Why not Sprint?

Greg: It's certainly easier to ask the impertinent question from the outside, right? When you don't know why things shouldn't be some way, to ask, "Well, why?"

Peter: Well, we know the reasons that it can fail when you're inside.

Greg: Just shifting a little bit, what is the role of the Academy, generally, but libraries, specifically, in fostering innovation within scholarly communications?

Timo: Well, I'm glad you asked that question because I wanted to add some balance to what we've been talking about. We've sort of been beating up on publishers, and Peter and I are both publishers, so it sort of seems a bit odd. It's incumbent on all the players to embrace and to facilitate this change, so libraries, research institutions, and so forth each need to play their part, and each in their own way is being disrupted. If you look at Google's mission statement, that sounds like a library to me, right? All of these different players are being disrupted in different ways, and I think it is incumbent on all of us, not merely to safeguard our futures, although that's part of it, but in order to actually fulfill our missions, to be able to disseminate information and knowledge and to serve a useful purpose in the research process, to do our part in this innovation. First of all, it means supporting worthwhile innovation wherever you see it. If you see someone doing something that you believe is worthwhile, support it even if it means you personally taking a bit of a risk: publishing in a journal maybe that you wouldn't normally publish in, or trying a new service, or a new piece of software, uploading your data and sharing it with people even though you don't know what they're going to do with it, those kinds of things. But also, I say that for all organizations, big or small, for profit, not-for-profit; you don't actually have to have a ton of money in order to innovate. Technology now is really cheap. The first innovation unit I set up when I was working at Nature Publishing Group involved hiring a guy to do some rather menial work on our website that he was bright enough to be able to do in a day a week, and the rest of the time he and I were working on some skunkworks projects that ended up with us creating a new technology unit that grew from there. We didn't really spend any money on it. It was an issue of having some good ideas, having some smart people and then trying them out. We didn't spend any money on technology at the beginning.

Greg: Pete, what about specifically with the libraries? Where are they playing in this, how are they playing in this innovation?

Peter: Where they are playing is perhaps different to where they should be playing. As Timo says, where they could be playing is actually being innovators themselves. They have a central role in this industry. They understand both sides of the equation, the publisher side and the academic side, and they do have an opportunity to innovate, and I don't see much of that happening in the library world. But if we sort of put that aside, which is basically accollating what Timo said, they can help incentivize, of course. so if they see somebody innovating, they can go and subscribe to it, or they can encourage their academic community to publish in this journal that has no impact factor because it's innovative, and actually the end result will be a good thing. So they can definitely be great advocates, and they have been for the open access world, of course.

Greg: That strikes me as potentially a reactive role that libraries would be playing, and I'm wondering to the extent that we are talking about the wide availability of open information, whether it's the articles themselves, or the metadata that support them, or the raw data on which the articles are based, or the metrics that are associated with those articles, what is the role that the library can play in taking that information and doing something with it? I'm not suggesting you give a product to the masses right here, but I'm sure there a lot of librarians in the audience who are wondering, "Well, we would like to be playing a proactive role here." What are some thoughts about how to do it?

Peter: I think you can give the products to the audience. Historically, libraries have been curators of content, collectors of content, information specialists that filter content for their audience. In this brave new future of everything being open access, the possibilities of curating, filtering, discovering a universal open access content are immeasurably better than the more traditional established library program, and librarians should, and I know they are, be really excited about the possibility of building information specialist-oriented tools to filter. You shouldn't cede the ground to Google in that sense, for instance, or Amazon.

Timo: I'm not a librarian, so I find it very hard to say exactly what a librarian should do, and I'm sure they're already doing a lot. One thing I would say, a bit self-serving, librarians should work closely with publishers and with other players in this space. At Digital Science, of course, the business I run, we're all trying to discover what our roles are in enabling the dissemination of knowledge and so forth in this new era, and I think we don't have all the answers. I don't think anyone has all the answers. We have a number of initiatives where we work closely with institutions and with librarians, the University of Utah initiative that Annette (*Annette Thomas, CEO, Macmillan gave a plenary presentation earlier that day*) mentioned this morning, for example, and I think we should be collaborating more, to be honest. Again, we don't all have the answers, but I think various of us have various bits of the answer and we can work it out in collaboration, because ultimately we serve a common end which is to facilitate the dissemination of knowledge.

Greg: Shifting gears slightly, talking about and bringing back to something you've mentioned before, both of you talking about innovation coming from outside, so people who are maybe not as established in the industry asking those impertinent questions as I mentioned before. I'll start with you, Timo. What are some examples of motivated newcomers to this market, and what are they doing, and what do you think is motivating them? **Timo:** Well, it would be remiss of me not to mention the fact that at Digital Science we work with a range of startups. We've got eight portfolio companies now, so we very explicitly have gone out and said we don't have all the answers within Macmillan; we don't actually think the best way of developing the right skills and the right mindsets in products is just to try to do everything ourselves. In fact, a minority of our projects involve internal development right now, and a majority of what we're doing involves investment in external start-up businesses and entrepreneurs. We've voted with our budgets and our wallets on the skills and ambitions of these people, but of course, you only need to go and look at our website to see the people that we've backed and obviously we believe in those people wholeheartedly. Pete already mentioned

Mendeley, and there are all sorts of other players out there. Science Exchange, Academia.edu; and you see, just statistically speaking, most of them are not going to succeed, right, and I'm just listing a few that are more prominent, so they're already doing better than most. But out of that kind of experimentation comes the eventual successes, comes the eventual new business models and the new giants of the industry; and that's why, as I said earlier, it is an unusually exciting time. I think those of us who are incumbents need to learn from the innovators, from the people, as you said, answering the naïve questions about why things can't be done it in a different way, as well as bring our own strengths to the mix in the terms of resources, and understanding the market, and experience, and so forth.

Greg: Pete, what do you think about that? What are some examples, some things you are intrigued by and say, "Well, gosh that's an interesting approach?" Or, "That's a new tool to address a problem I hadn't thought of?"

Peter: What I do see is, and maybe PLOS ONE sort of broke the mold on this bit for people, is a lot more effort towards negative results, and reproducibility, and results that aren't published, basically. so there's a few interesting groups, and again, usually they're being done by almost academics in their spare time because they see a problem here, but there's one called Psych File Drawer: Psychology File Drawer; and the concept there is every psychologist has a file drawer at the bottom of his desk with five papers that he never published; and if only those were out in the world, other people wouldn't have to reproduce the same mistakes, and then there's this reproducibility initiative that was recently announced. So I do see some interesting experiments going on in that space, which I think is very interesting. It wasn't possible to publish that kind of content in a subscription model because who would pay to read that kind of stuff? Or who would fill their journal with that kind of stuff? And so again, that's being enabled and being driven by people who actually have their feet on the ground in their fields trying to make that better for themselves.

Greg: You both have made careers as innovators in the industry, and I guess I'll ask a final question which is, what are the lessons that you've learned, maybe the hard way, about trying to accelerate big picture change?

Timo: Well, when you say we've learned it the hard way, it's hard. Change is really hard. In established organizations that have their own priorities and their own established businesses, it's hard, and there is challenge at every level. There's the technical level of trying to introduce new software solutions or whatever. There's the challenge of developing new business models. There's the challenge of dealing with the potential conflict with existing business models. There's the challenge of trying to get, as we discussed earlier, sort of a fundamentally conservative group of people in academia to try newfangled ways of doing things. But over time things do change. If I look back to when I joined Nature Publishing Group, which was about 15 years ago now, we were just starting to put full-text content online. That's been revolutionary already, right? When I was in the lab 20 years ago, I would go to the library every day or twice a week to scan the journals. Now that's just completely changed. So I think we often underestimate how far things have already come; and admittedly, just like being a researcher, when you're at the coal face just chipping away, it feels like pretty hard work for not much progress. But I think when you step back and look at the big picture, actually, we are getting there.

Greg: What about you, Pete? What about some lessons you have perhaps learn the hard way?

Peter: I think, whether or not it was the hard way, one of the biggest lessons I took out of PLOS ONE was "stretch the envelope but don't break it." PLOS One was innovated around this one concept of changing the peer-review editorial criteria, and otherwise looks and feels like a real journal. It has peer reviewers, and it has DOI's, and it publishes articles; and it was enough of an innovation to drag the world along with it and actually be very successful, but not so much of an innovation that nobody would submit to it. It's a conservative

market we've got, very conservative academics and audience, and you can't be too out-there and innovative or nobody will submit to you, and you'll have no content. If you're in the content business, that's a problem. That's one of the lessons that I took into PeerJ. It's like, let's take PLOS ONE and stretch it a little bit further. Now PLOS ONE has sort of enlarged the envelope, as it were, but don't go so far that you break through. That's a lesson I've seen, at least, from PLOS ONE. Another one, just in general for me, 20 years at the end of academics, is that they are very conservative; they do actually fight innovation, but it may actually be better for them, because they're stuck within various structures and have a tenure system. For example, they won't submit to innovative journals that don't have an impact factor, and so you get into this weird Catch-22. But as it were, the capacity of academia not to help itself out of some of the problems it's got is quite impressive sometimes.

Timo: I think one of the answers to that is to actually try and nudge the incentive system as well, and it's very much one of the things we're

trying to do. We're trying to provide tools to make, for example, data sharing easy. Now most scientists don't want to share their data, because they don't feel they get credit for it. On the contrary, they may be beaten to the punch in publishing a peer-reviewed paper on the findings from that data. But if we can make it very easy for them to share perhaps data they're not going to publish, negative data or whatever, and at the same time we can provide quick and easy metrics on what kind of an impact that's had, how many download it's had, how many citations it's had; by providing both the means to do it easily and the incentive by providing the metrics, we might be able to nudge them along in the right direction. so for us actually, it's what we do, and it's not just the software tools that are important for us; it's also the whole metrics side of things, which I think is another exciting area, and one that will be completely new revolutionized in the digital age. But now we can measure pretty much anything and I think the administration of science itself will become much more scientific through the use of much richer, more varied metrics that we've ever had in the past.