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Open innovation in digital journalism: Examining the impact of Open APIs at four news organizations

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Abstract

This article examines the relative value of open innovation principles for digital media, exemplified by the emergence of Open Application Programming Interfaces (Open APIs) at four news organizations: *The New York Times, The Guardian, USA Today* and NPR. The use of Open APIs represents a shift toward an open innovation paradigm that may help address twin challenges facing the news industry: the need for improved R&D and the need for new revenue streams. This paper extends the interdisciplinary study of open innovation to digital communication. Findings indicate that the use of Open APIs has accelerated R&D through knowledge-sharing with web developers; generated new means of commercializing content by extending a firm's product portfolio; and forged innovation networks that function as external R&D departments. The article discusses the constant negotiation between openness and control, and open and closed paradigms in journalism.

Keywords

Business models, digital media industries, hackathons, innovation networks, Open APIs, open innovation, online journalism, product development, R&D, services innovation

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Introduction

The news industry is facing fresh challenges associated, in part, with the digitalization of news content; this is particularly true in the context of research and development (R&D) and business models. First, the R&D needs of news organizations have become increasingly complex, as digital content must be delivered on a growing number of platforms, such as mobile phones and tablet devices, instead of one primary medium. Compounding this problem is the number of operating systems to manage on any single platform − as in the case of iOS, Android and Windows requiring support on mobile alone. Second, media convergence has created more competition. News consumption habits are changing rapidly as audiences become more fragmented and people grow accustomed to gathering news from several sources rather than a single destination site. In effect, the attention that any one news organization gets is diminishing (Olmstead et al., 2011). At the same time, journalism's traditional advertising- and subscription-based revenue models are struggling, leaving news organizations with waning resources (Waldman, 2011).

These factors create many conundrums for the news industry, among which is: how can news organizations keep up with modern demands for R&D, not by increasing costs but by finding new revenue to offset declines in legacy operations − and, ultimately, discover new markets for content?[1] This kind of R&D challenge is not unique to the news industry, as firms in a number of fields struggle with a similar tension between two key factors changing the economics of innovation: the increasing costs of R&D for companies and the shortening product lifecycle (Chesbrough, 2006).

In response, companies increasingly are turning to *open innovation* strategies to enhance their business development and R&D. In his seminal work about open innovation, Henry Chesbrough (2003) refers to two complementary kinds of openness in the innovation process. One is 'outside-in', in which a company enhances the use of external ideas and technologies in its own business. This means moving past the 'not invented here' syndrome associated with the closed R&D model. Open innovation also entails 'inside-out' openness, in which the company encourages others to commercialize its technologies.

Open Application Programming Interfaces (APIs), as we argue in this paper, are an early manifestation of open innovation in the news industry. Open APIs serve as an interface between software programs, structuring the rules by which one program can access the information of another (cf. De Souza and Redmiles, 2009). Open APIs are software tools that enable seamless digital content-sharing between content providers and third-party developers (Bodle, 2011). With Open APIs, companies such as Facebook and Google invite external developers to build services such as web applications around their content − for instance, by republishing the original content in a new environment.

For much of the twentieth century, the news industry − in particular, the newspaper industry in developed countries such as the United States − was a highly stable and successful enterprise (Picard, 2008: 705), in which monopolistic control in local markets gave news organizations little need to invest in R&D or to hunt for creative business solutions from beyond their industry domain (cf. Nordqvist et al., 2010). In recent times, news organizations − notably *The Guardian, The New York Times, USA Today*, and NPR[2] − have deployed publicly available APIs. The emergence of Open APIs for news points

to the potential role for the open innovation paradigm in digital media, or at least reveals a form of experimentation (successful or not) occurring at the intersection of media business, digital technology and innovation processes. The academic literature, while investigating innovation within news organizations (e.g. Domingo and Paterson, 2011; Gade and Perry, 2003), has yet to address the practical and theoretical implications of the API phenomenon − both its potential to create value for journalism and its contribution to the understanding of open innovation in the services industry. Nevertheless, improved technologies or enhanced R&D by themselves cannot solve the news industry's woes. The diffusion of innovations is a complex process (Rogers, 1990), and the outcome of technology adoption is shaped by the interplay of organizational structures, professional culture and related contextual factors (Boczkowski, 2004; Paulussen et al., 2011).

This study extends the research about open innovation to services innovation in the context of digital services provided by journalism organizations. We examine the concept of open innovation in digital media, where the core product is information content − such as news, articles, databases and pictures − rather than hardware/software technology, which has been the focus of early research on and implementation of open innovation (Chesbrough and Crowther, 2006; Dahlander and Gann, 2010).

Theoretical background and key concepts

Open APIs, open innovation, and news organizations

Application Programming Interfaces (APIs) are software tools commonly used in organizations to divide collaborative and distributed software development work, streamlining the technological processes and human resources involved (Ananny, 2011; De Souza and Redmiles, 2009). APIs are a set of rules by which one software program can communicate with another software program. Companies can develop internal APIs for sharing content within their organizations, as well as public APIs − i.e. Open APIs − for sharing content with external publics. Open APIs are a tool for internet companies to exchange their content efficiently with external collaborators (Bodle, 2011).

With these publicly available APIs, anyone with the technical capacity can use the interface to build a third-party service, such as a mobile application, using the API provider's content. To cite a few examples: Facebook invites third-party developers to create applications around Facebook data, enhancing the social network's presence across the web. Similarly, Amazon provides access to its product listings through its Open API so that developers can make that information available beyond Amazon.com. Google has an Open API for public use of its Google Maps functionality, thus allowing that mapping data to be used in a broad array of third-party location services. In all these cases, via their Open APIs, Facebook, Amazon and Google invite external developers to find new ways to package their content and serve it to customers. Open APIs typically work as follows: the external user registers on an API provider's website and applies for a key that unlocks the API features; thereafter, the user with a valid key makes a request of the API, asking it to deliver a particular set of content − for example, news content on a certain topic.

The characteristics of Open APIs resemble the principles of open innovation: by increasing the flow of knowledge to and from the organization, open innovation forges

new pathways for commercializing innovations crafted within and beyond the boundaries of a firm (Chesbrough, 2003). Open innovation involves three core processes, or ideal types: outside-in, inside-out and a coupled process. In the *outside-in* process, firms enhance their knowledge base by tapping into the wisdom of their suppliers and customers. This inbound open innovation leverages the discoveries of others, and organizations become less dependent on their internal R&D (Chesbrough and Crowther, 2006). For example Procter & Gamble increased its R&D productivity by 60 percent by employing open innovation, and more than one-third of the company's new products originated from outside the company (Dodgson et al., 2006; Huston and Sakkab, 2006).

Open innovation also engages an *inside-out* process of externalizing innovation processes to more quickly bring ideas to market. A company can do this by licensing its own intellectual property (IP), as well as by reaching new markets through spin-offs and partnerships − thus increasing overall revenue while at the same time saving R&D resources (Chesbrough, 2006). Thus, companies are no longer restricting themselves to markets that they serve directly, but rather are using partners to find new markets and business models for their technologies (Enkel et al., 2009). Technology transfer in the form of licensing is an example of outbound open innovation. Companies such as Hewlett-Packard and Dow Chemical generate annually hundreds of millions of dollars in royalties (Lichtenthaler et al., 2011). To cite another example, Amazon has successfully used the outbound flow in open innovation. Instead of keeping knowledge about e-commerce to itself, Amazon helped third-party retailers develop their own merchandising sites. Then Amazon began hosting these third-party retailers on its servers, becoming the infrastructure supplier in a way that allowed Amazon to leverage what it knows − how to organize and fulfill retail orders online − and get paid for that knowledge in the marketplace beyond the boundaries of Amazon.com (Chesbrough, 2011a).

The third ideal type in the open innovation process is a *coupled process*, in which companies create alliances, partnerships and joint ventures, thus co-creating value for both parties. In these cases, companies combine the outside-in and inside-out processes, commercializing innovations with partners and sharing complementary resources (Enkel et al., 2009). By applying the open innovation strategy, the company can move toward an open business model (also called a platform business model), in which the value (and revenue) is co-created with collaborators (Chesbrough, 2011b). Compared to the other ideal types in open innovation, the coupled process has been under-examined in the literature on open innovation.

Open APIs are a relatively new phenomenon for news organizations. In the United States, NPR was believed to be the first major news organizations to launch an Open API when it did so in 2008, heralding the step thus:

> An Open API lets NPR offer our content to the public in infinite ways. The public has always been an essential part of what we do − we have 'Public' in our name − and the API concept will advance that relationship in a transformative way.[3]

To date, the use of Open APIs in the context of journalism has been limited to the largest national and international news organizations. Open APIs have not been used broadly, if at all, among local news organizations (Sullivan, 2010). That may change as newsrooms

alter their content management systems (CMS) or adopt new ones that have built-in Open APIs − as in the case of one open-source CMS, called Armstrong,[4] which is being developed by the news startups *Bay Citizen* and *Texas Tribune*, and which is expected to be used widely by smaller news organizations. Thus, Open APIs are poised for potentially rapid diffusion in the news industry.

Research questions

We argue that the emergence of Open APIs at news organizations represents a shift toward an open innovation paradigm that, in theory, might help address the R&D challenges facing the news industry, as well as the challenges in finding new revenue models. Through a study of four leading cases of Open API deployment − NPR, *The New York Times, The Guardian* and *USA Today* − this paper examines the evidence for and implications of open innovation in the context of Open APIs and news, structured around the following research question:

> How are the elements of open innovation manifested in news organizations' Open API initiatives?

Thus, we analyze what elements of the three ideal types of open innovation (inside-out, outside-in and coupled process) are evident in the news organizations' deployment of Open API initiatives. We treat the principles of open innovation (1) across formal organizational boundaries, (2) distributed across actors, and finally, (3) embedded in the repurposing of existing value artifacts (such as news content) to create value for existing or new actors. Furthermore, we consider the implications of Open API initiatives for news organizations' digital business strategy and R&D process, and the challenges that news organizations face in engaging open innovation principles in their R&D. The goal is to gain early understanding about the possibilities and challenges of open innovation in the digital media industry.

Methods and context

Methods and data

Using a qualitative approach like that used in research on organizations, we chose a small number of highly visible 'objects' (in this case, elite news organizations) to gain understanding of the phenomenon and emphasize discovery, thus engaging a multiple-case study methodology (Eisenhardt, 1989; Miles and Huberman, 1994: 29, 172). The following four news organizations were chosen as objects for this study: NPR, *The New York Times, The Guardian*, and *USA Today*. These were selected not only because they are prominent, agenda-setting institutions, but also because they were the only news organizations that, to our knowledge, had deployed Open APIs when this study began in 2010 (cf. Ananny, 2011).

The data were gathered through interviews with at least one developer who has led the deployment of Open APIs at the four news organizations. Interviewees were chosen

based on their expertise, in line with the key informant approach (Kumar et al., 1993). The interviews were conducted during the course of a six-month period in 2010 and 2011. Two interviews were done in person and two via phone, and the average interview lasted about 45 minutes. The interviews were recorded and transcribed.

The same semi-structured interview scheme was used in the interviews, with questions focusing on the motivations for API deployment, the benefits and challenges associated with this deployment, and the consequences of this process for the news organization and its business and editorial practices. The interview scheme was constructed based on the theoretical framework of open innovation.

The interviews with the key informants were analyzed as follows. In the first round, open coding practice was used, allowing key themes and patterns to emerge from the data and thus guide further analysis (Lindlof and Taylor, 2002: 214). Qualitative data analysis software was used in the coding, and analytic memos were written along with the coding process to support the analysis. The key codes emerging from initial coding were grouped into the following four conceptual themes, which lend the most explanatory relevance about the phenomenon of Open APIs: Open APIs as a business development tool; Open APIs in R&D; tension between an open vs. closed model; redefinition of news organizations' role.

This thematic organization, acknowledging the potential partial overlap in the themes, was used as a framework in the second round of coding, in which a more interpretive level in the analysis was reached via theoretical coding practice (Saldana, 2009: 163). In theoretical coding, the themes are integrated systematically into the theoretical framework, which, in this case, is open innovation and its three ideal types. Through this inductive approach, we sought to describe and explain the manifestations of the open innovation ideal types in the sample cases. Member-checking was conducted with the key informants themselves and/or other representatives within their organizations to heighten the validity of the results, with the exception of one case where the informant declined to respond to requests for feedback. The informants received a copy of the article by e-mail for review, clarification, suggestions and updates. With one news organization, the original interviewee had changed jobs, and the member-checking was conducted by two other experts at the organization who were identified by the organization.

Sample profile

Before detailing the findings, we proceed first with a basic profile of Open API use at these four news organizations. In each case, there are differences in the number of Open APIs deployed, the amount of content available, and the paths for commercialization. The numbers of API calls (or requests to access a given API's data) in the sample profile below includes calls from both the news organization itself and external developers. For example, at NPR, most of the API requests come internally, and therefore most of the traffic derived from API-driven applications comes from NPR's own applications. This means that NPR is the largest consumer of NPR-produced, API-facilitated content − a process that developers refer to as 'eating our own dog food'.

- **NPR:** NPR's Open API includes audio from most NPR programs since 1995 as well as text, images and other web-only content from NPR and its member stations. The NPR Story API indexes all NPR stories according to several factors such as topic, programs, dates and music genres. The Transcript API gives access to full transcripts of stories airing on selected NPR programs. In 2011, NPR handled more than 200 million requests per month, delivering about three billion stories monthly. NPR has averaged 9 percent growth in requests each month for past year, and has served nearly two billion total API requests in three years. There were about 5000 registered API users as of December 2011. NPR allows only personal, non-commercial use of its API, or non-commercial use by a nonprofit that is not also a news organization. NPR also reserves the right to include sponsorship with its API content, and restricts the developer's own use of advertising alongside NPR content.[5]
- *The Guardian*: Headquartered in the United Kingdom, *The Guardian* launched its Open API for content in March 2009, giving access to more than a million articles published since 1999. *The Guardian* also provides specialized APIs: the Politics API includes information about political parties, elections and Politicians in the UK; the Data API allows developers to access data sets on the Guardian Data Store, which consists of government data from around the world. By 2011, more than 2000 applications had been built, and the API is handling 70 million API calls per month. Some 4000 external developers have registered to use the *Guardian* API.[6] The Open API is part of *The Guardian's* open platform strategy, in which the newspaper encourages the external developer community to build applications around *The Guardian's* news content and data. Of the four news organizations studied, *The Guardian* has the most sophisticated system to allow its public developers to generate revenue. The model is three-tiered, and *The Guardian* determines the conditions of API usage with levels of access to *Guardian* content.[7]

- *The New York Times: The Times* launched its Open API in 2008, and as of December 2011 it was offering 18 Open APIs covering a range of content: news, movie reviews, congressional data and user-generated content. These APIs, unlike those offered by NPR and *The Guardian*, do not include full-text articles, instead including links back to *The Times*'s website. By the end of 2011, there were some 16,000 registered API keys,[8] and the APIs handled about 20 million API calls monthly, representing a steady growth from the previous year. The APIs delivered about 9 million pieces of news content monthly.

  The New York Times does not allow its API to be used for commercial purposes, or with any service that competes with the products and services offered by *The Times*. The newspaper also has other restrictions: for example, *Times* content cannot be sold in any application, an app with *Times* content cannot be sold, nor can a third party charge a subscription fee.[9] One exception to these restrictions is *The Times*'s government APIs, which are allowed for commercial use.

- *USA Today:* As the latest of these organizations to join the Open API domain − with its first offerings appearing in late 2010 − the second-largest newspaper in the US offers nine APIs: articles, breaking news, bestselling books, book reviews, music reviews, movie reviews, snapshots (statistical graphics), sports salaries and census data. The Articles API includes news stories back to 2004 but does not offer full-text access. Roughly 600 developers had registered as API users by the end of 2011, and the APIs handles about 100,000 calls weekly. *USA Today* does not allow its API to be used for commercial purposes, or with any service that competes with the products and services offered by *USA Today*, nor can an application with content charge for access.[10] *USA Today* encourages developers to inquire about customized partnerships for commercial licenses and expanded access to the content. In late 2011, *USA Today* allowed three of its APIs (article, reviews and census) to be used for commercial purposes.

Findings

The manifestations of open innovation in news organizations' Open API initiatives are best described as (1) an accelerator of R&D, (2) an avenue for commercialization, and (3) an emergent network of innovation. Each of these elements is elaborated below, followed by a discussion of the tension between open and closed models in news organizations, and a concluding analysis regarding open innovation principles in these Open API initiatives.

Accelerating R&D

For the news organizations analyzed in this study, Open APIs have served to stimulate R&D processes both within and beyond the firm, but especially in quickening the pace of outside-in knowledge transfer − for example, as external initiatives built on Open APIs guide internal development. For example, at NPR, an external developer using NPR's API launched the first iPhone application for NPR content. The free app, called NPR Addict, quickly became popular, with hundreds of thousands of downloads. Developers within NPR learned from this external application and hastened to build their own official iPhone app. As a key developer at NPR described it: 'It really captured our imagination that, "Wow, if we don't do it, someone else is gonna do it. We'd better do it."' Later, the official NPR app surpassed the externally developed one in popularity.

In this way, Open APIs foster the inbound flow of ideas to the organization. For news organizations, this input has accelerated their R&D because they no longer must experiment with everything themselves; rather, they can lean on the work of external developers to help identify good ideas from bad ones. This enables more efficient R&D as the organizations draw on existing (external) experiments as frameworks for their own (internal) exploration. Ultimately, this saves resources by reducing a firm's risks during an early, crucial and costly stage of the innovation process − the testing and prototyping cycles (Gassmann et al., 2006; Piller et al., 2010). Thus, Open APIs serve as a way for the news organizations to do external prototyping, with the help of external developers.

For the news organizations, Open APIs function like an *external R&D lab* from which 'product development occurs organically', as one developer put it. External developers have built products by using the news content in a fashion that the organizations had not imagined. For instance, an external collaborator[11] drew upon *The Guardian'*s Politics API and information in the Guardian Data Store to create a 'Voter Power Index'. The index assessed the importance of a single vote in a given region, and thus indicated whether voting there would make a difference in altering the political power structure. Open APIs thus hold potential for new products that lend fresh perspective on the democratic purposes central to journalism's function.

The applications developed by these external R&D labs are not owned by the news organizations but belong to their *extended product portfolio*, through which shared revenue may be derived. The news organizations do not own these new products, but they own the core element in these products: the news content. In this sense, Open APIs serve as an ongoing search for new market opportunities. With these external R&D labs, news organizations can gauge the relative demand for content that could be recycled or repurposed. News organizations hope to find new ways to repackage their content, as described by a lead developer at *USA Today* in elaborating the reasoning behind creating an Open API for the list of bestselling books:

> Is there a demand out there for our bestselling books beyond [the] sort of the website where it's always lived? I mean, we're basically giving new life to this content, and we want to see if people out there bite and are interested in it.

Open APIs also enable developers to build products for niche audiences − or groups that initially may appear as minor but later evolve into a bigger market. This is an advantage for news organizations that must focus on bringing products to mass markets rather than targeting marginal audiences. In the case of NPR, a Google engineer developed an NPR application for the Android platform, which at that time was a smaller platform relative to iOS. Another external collaborator built an NPR player for the Unix platform. Even though Unix is marginal in terms of user volume, there was demand within that niche group for an NPR player, and a collaborator only needed the NPR Open API to be able to build the product and satisfy that demand. With Open APIs, external developers can customize the content within a framework they find useful. This, in turn, allows for enhanced customization for end-users, who increasingly expect greater control and adaptability as they consume news via aggregators, search engine referrals and social recommendations (Thorson, 2008; Thurman, 2011).

Open APIs also benefit news organizations' internal product development in other ways. The Open API initiatives are often tied to larger structural changes within the organization, such as a retooling of the newsroom's CMS along with systematic, organization-wide use of APIs. The API is a structured tool for product development, allowing the development team to focus more on the user experience and less on technological minutiae. This accelerates internal R&D and saves money. For example, *The Guardian* was able to build an iPad app with its internal API for a fraction of the normal cost.

Inside news organizations, product development with APIs has increased collaboration across departmental boundaries, for example by fostering collaboration between

technology and editorial teams. When the UK Treasury released the COINS (Combined Online Information System) data, *Guardian* journalists and programmers built a service to search the COINS database.[12] For *The Guardian*, using the API accelerated the analysis of data for news articles, and made the teams work more seamlessly in tandem.

Commercialization

Business strategy is one of the primary motivators for launching Open API initiatives. The news organizations have discovered strategies for gaining revenue from Open APIs, usually in one of two ways: first, by letting collaborators use the content for free but expecting them to take the news organization's advertising key with them. In the case of *The Guardian*, this means that when an external developer builds an application around *Guardian* content through its Open API, the application must present advertising from the *Guardian* ad network.[13] *The Guardian* also allows developers to present their own ads. The second method for direct revenue via Open API-built products is to charge a licensing fee for the content. *The Guardian* and *USA Today* apply this method as one revenue opportunity.

Apart from direct revenue streams in the form of advertising and licensing fees, the news organizations have found other ways to strengthen the value of their product. They drive traffic to their website through the content available via Open APIs, as *The New York Times* does as part of its Open API business strategy. When external developers use content delivered through the *Times* API, *The Times* requires that links back to its own content be displayed. *The Guardian* uses a similar approach in its three-tiered business strategy: In one of the tiers, *The Guardian* allows an access to *Guardian* headlines but not the body copy of the article; at this level, the developer can publish *Guardian* headlines and metadata for free and keep the advertising revenue. This repurposing of content via new applications helps extend the news organization's presence online. For example, *The Guardian*'s 'Powered by the Guardian' logo has appeared widely across the web, and can be found on domains that utilize applications built around API-delivered content.

Amid this growth, however, it is difficult to quantify the revenue created via Open APIs because news organizations do not disclose such figures. Nevertheless, the business strategies behind Open APIs reflect a fundamental shift in how news organizations perceive their role and boundaries. News organizations have a strong view about the unrestricted, boundless web changing the nature of the news business: they want their content to be widely circulated and tightly integrated into the hyperlinked structure of the web, and they see Open APIs as a way to accomplish that. As a key developer describes the strategy:

> So that's where we came up with this kind of big, broad statement about weaving *The Guardian* into the fabric of the internet. It was because it was a realization that we needed to be a part of the internet and not just on the internet.

In this view, it is not enough to create content for a single domain; rather, that content needs to be spread across the web and on multiple devices, to keep pace with users who no longer settle on one destination site and platform. As a key developer described this

approach: '*The Times* has a great brand and great content, and the best way to get it to people and to get people coming back to our site is to get that content everywhere and to have eyeballs on it all the time.'

This strategy reflects a radical shift for news organizations that are used to controlling their content on their own platforms. However, in the digital era, news organizations have far less control over the distribution infrastructure − the internet − than they did when the news was delivered via paper, audio or video. In this new thinking, news organizations come to perceive the internet as a whole, rather than their site, as their publishing platform. They are ready to relinquish control, to some extent, and reach out to new markets through intermediaries. Letting go of control creates a new role for news organizations: rather than being passive information-providers, they claim a stronger, more active role in enabling users − in this case, the developer community − to re-use, interact with and experiment with the content. This means transforming 'news and information sites' into 'news and information *platforms*', as one developer described it.

Innovation networks

News organizations embrace the innovation ecosystem that has developed around their Open APIs. With external collaborators using their content through Open APIs, news organizations can identify and meet the changing needs of end-users. The developer community thus serves as an innovation network, which facilitates inside-and-outside knowledge flow, partnerships and business opportunities. *The Guardian* alone has a network of 3000 developers around its Open Platform.

As news organizations embrace these emerging ecosystems, the result is a virtuous circle of mutually reinforcing benefits flowing between the news organizations and the innovation network. The networks play an important role in knowledge-creation (Powell, 1990) and increase access to heterogeneous knowledge, which is crucial in services innovation in the digital media sector. For the news organizations, this dynamic has resulted in partnerships and business opportunities in connection with individual developers, start-up companies and established technology firms.

The 'self-service nature' of Open APIs enhances the capacity for collaboration with the innovation network. Before Open APIs, such collaborations required a complicated content-sharing process, one request at a time − whereas news content is available via Open APIs on an ongoing basis. This expedites the process of product development. News organizations push content through Open APIs in a constant flow, and that flow functions as a trigger for innovation.

Some news organizations have nourished their networks by organizing events to encourage collaboration among developers and journalists − as in the case of 'hack days', 'hackathons', and 'codeathons', which are marathon sessions of computer programming designed to kick-start projects and to develop partnerships.

Open vs. closed model in news organizations

The emergence of open innovation reflects a cultural and structural shift in these news organizations as they transition from a closed to an open business model. Open APIs are

seen as tools for business development and an important initial step in this move to an open model. However, news organizations face challenges in attempting to integrate this new open thinking into their business and innovation management strategy. The cultural mind-set of traditional news organizations hinders Open API deployment. Internal developers have run into resistance as they have reached up vertically to gain the buy-in of corporate leaders and reached across horizontally to convince journalists in the newsroom. Stakeholders have been skeptical about the nature of making anything 'open', as one developer explained:

> We made the push. We sold it internally. There was some apprehension; some wonder what you're talking about, 'Why are we going to give away the farm for free? This is our baby. We're giving away the content.' Our argument was, 'The content is on the website. Anyone can come and scrape it. Anyone can capture a stream. The content is out there. It's free anyways.'

In a similar vein, another developer described how his team 'sort of de-emphasized the open side of things' in their discussions with executives, explaining that the open part of APIs was an unavoidable factor of having a public API for purposes of better R&D and thus for greater profits.

Ultimately, developers found that they could gain acceptance by framing Open API initiatives in two ways: in one sense, as 'Business Development 2.0', as one developer put it; and as a means of maintaining control over content.

> That was basically our sales pitch, that, 'This content is wide open anyways. Let's control it, and let's be able to track it and shut people down if they're doing evil things, and whatever else', and eventually people came around and we opened it.

However contradictory it may sound, these news organizations see the process of opening up as a way of helping them to wield greater control over content. As one developer described it:

> We don't want [our content] to necessarily be free. We want people to use it and attribute it and do all the good stuff with it. You treat it respectably. The API actually gives you an opportunity to control that in some ways that the website doesn't, and in fact the people who use the API have more respect for it anyways.

Another internal difficulty is the question of intellectual property rights. Traditionally, the licensing rights that news organizations have negotiated − for example, for the use of freelance photography − have been done with print or web publishing in mind; those rights are not optimized for the database-driven, multi-use nature of APIs. The issues with licensing rights have restricted the amount of content that news organizations can share through Open APIs. These considerations also have factored into determining whether news organizations can (and should) charge licensing fees, or whether content should support commercial applications created by external developers.

To this end, there is a tension about where to draw the line for openness: how much content should be free through Open APIs, and where should the line be drawn for commercial use? In one case, a news organization is providing free access to part of an

archive via an Open API and the rest is available for charge. This reflects the balancing act between the new open model and the traditional closed model in organizational structure and culture, and is an unavoidable part of the explorative stage described by one of the informants:

> [W]e're trying, at least, to monetize. And I think if the demand isn't there, then maybe we can sort of … we're open to reconsidering that. But for now we're going to see if we can't drive a little business through content licensing.

Open innovation processes in Open APIs

When news organizations deliver content via Open APIs, they can leverage the benefits of the three ideal processes in open innovation: the inbound flow, the outbound flow and the coupled process (see Figure 1). In the inside-out process of open innovation, the news organizations make their core product − news content − available for anyone to use. As a result, they can see their content take on a 'new life' in various applications created in the external R&D lab that is the developer community, through innovations in republishing that content. The results from the external community flow back to benefit the internal R&D within the organizations − thus providing the inbound flow. In the

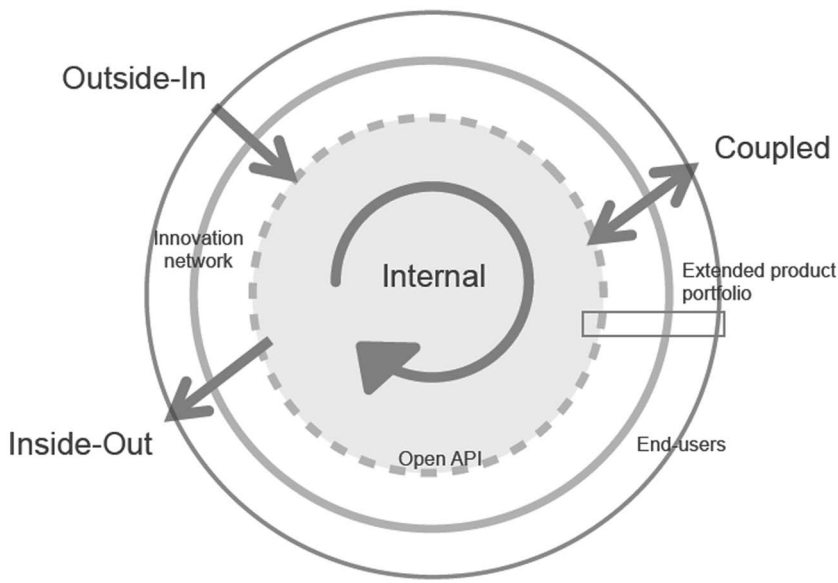

Figure 1. Open innovation in news organizations' Open APIs.
Inside-out: In the inside-out process, the content is pushed out from news organizations through Open APIs.
Outside-in: In the outside-in process, innovations flow from the innovation network into the organization.
Coupled: The coupled process boosts internal R&D and results in greater revenue, wider audience reach, and an extended product portfolio. The products (often services) are consumed by end-users.

inside-out process, news content finds new markets through the products built by external collaborators.

These new products and markets benefit a news organization in increased revenue, whether from licensing fees, advertising revenue, increased traffic to the news organization's website, or increased brand awareness and pervasiveness in the marketplace. From the perspective of the outside-in process, the Open APIs enable external collaborators to take up experiments and forms of exploration that would not (or could not) be done by the news organizations. The external collaborators can use the Open API to serve niche audiences by building products that the news organization would otherwise have overlooked because the niche market is too small to justify internal R&D resources.

Most of the value in the open innovation process comes through a coupled process, in which the value is co-created with the news organizations and the innovation networks. For example, Open APIs result in *an extended product portfolio*, in which the products are built on news organizations' content but the external developer takes care of the packaging, delivery and monetization of the content. The line between the other two ideal processes and the coupled process is blurred; this might reflect the fact that the core product in this case − news content − is not readily and directly monetizable online. Because the news content mainly is accessible for free online on the original news sites, and because the news organizations mainly do not allow third-party developers to charge for their applications either, the content creates value only through attention-brokering, which means selling advertising space or traffic.

Discussion

The deployment of Open APIs is one of the first steps in applying open innovation principles in digital media. Open innovation functions as a strategic tool to enhance innovation processes within and beyond news organizations' boundaries. Furthermore, by fostering innovation networks, news organizations can reach out to new markets, create extended product portfolios, and meet the needs of increasingly fragmented audiences. This opens new paths for commercializing the core product (news and information), thus generating revenue at a crucial time for the news industry.

Open APIs serve many roles: for one, they function as an external R&D lab for news organizations, allowing the developer community to experiment and innovate with their content, and do prototyping for news organizations' needs. If these efforts succeed in finding novel markets and business models, a news organization can use that knowledge in its operations. And, by observing the developer community more closely in this process, a news organization can discover what skills and knowledge are currently needed for innovations in digital media.

Furthermore, with Open APIs news organizations gain greater brand leverage, as their branded content is spread more widely across the web. For news companies, this is a transition from simply being *on* the web to being of the web − from merely publishing online to being integrated into the networked structure of the internet. This reflects a major shift in both the culture and business strategy of news organizations, a shift needed because of the new paradigm brought by the digitalization of information. News

organizations have come to understand that specialized knowledge alone − whether in journalism, business or web development − is not sufficient to succeed in the new value ecosystem. Journalists increasingly are gathering information from readers through crowdsourcing efforts to harness the collective intelligence of the audience (Aitamurto, 2011). Similarly, to thrive in the digital marketplace, organizations must learn to tap external pools of heterogeneous knowledge found in diverse innovation networks. Many of the benefits generated from open innovation practices come from the coupled process, through which value and revenue are co-created with collaborators, such as through accelerated R&D and revenue-sharing from the external product portfolio.

These findings point to the utility of an open business model, as described by Henry Chesbrough (2011b) − one based on continuous engagement of both inbound and outbound flow of innovations, ideas and knowledge. This open business model presents a fresh opportunity for a news industry beset by challenges. By developing more sophisticated structures around their open innovation practices, news organizations can improve their R&D processes at a critical juncture for the journalism field.

As yet, Open APIs have not been transformational to news organizations. These Open APIs have not resulted in major commercial success. Overall, the influence of open innovation processes is relatively small but still evolving, as news organizations continue to expand their Open API offerings and grow their extended product portfolio. Furthermore, it is clear that the value derived from Open API deployment will not solve the myriad problems facing news organizations and their R&D imperative.

This fledgling start may reflect, in part, the difficulty that news organizations have had in acting openly. For example, by restricting external developers from fully commercializing the applications they build with Open APIs, news organizations perhaps have hindered the full breadth of experimentation that might otherwise have occurred. Overall, the looming challenge for news organizations is figuring out which is the most successful strategy in a complex and fast-changing environment. This involves negotiating a line between openness and control, between free and paid licensing, between what is permissible under APIs and what is not, and whether acting openly can lead to greater revenue.

As the use of open APIs diffuses beyond a cluster of elite news organizations, future research is needed to examine the impact of this phenomenon longitudinally, as metrics emerge for assessing the relative success of applying open innovation principles to digital media. Furthermore, news organizations' capacity to fully utilize the benefits created by their open API initiatives requires further research. This would contribute to a wider study of the open innovation paradigm as it influences R&D in digital media industries at large.

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Notes

1. In this article 'content' refers to information published by news organizations, such as news, feature articles, photographs and graphics.
2. NPR was formerly known as National Public Radio. It announced the shift to an abbreviated form in 2010.
3. See 'NPR launches Open API: New programming tool enables digital media users to integrate and share NPR news content'. Available at: www.npr.org/about/press/2008/071708.API.html.
4. See http://armstrongcms.org/.
5. Terms and conditions for the NPR Open API are available at www.npr.org/api/apiterms.php.
6. The number does not necessarily reflect the number of active developers.
7. For *The Guardian*'s three-tiered business model for Open APIs, see www.guardian.co.uk/open-platform.
8. On *The New York Times* developer platform, users register for a new key for each API. A single user is likely to have multiple API keys, so the number of keys does not equal the number of users.
9. There are exceptions to these restrictions as well as contradictions in *The New York Times*'s public statements about the Open API conditions, as noted by Ananny (2011: 300). The terms and conditions are accessible at http://developer.nytimes.com/api_terms_of_use#fec_tou.
10. Terms and conditions for *USA Today* Open APIs are available at http://developer.usatoday.com/API_terms_of_use.
11. In the interviews conducted for the study, news organizations referred to the third-party developers as 'collaborators'; thus that expression is being used in this article.
12. The COINS database, covering UK government expenditures, is used in reports to Parliament and in budgetary reports. It is accessible at www.guardian.co.uk/politics/coins-combined-online-information-system.
13. This is the case in the tier 2 in the *Guardian* API system. The first tier allows developers to present only the headlines of the article, and in that case developers can present their own ads and keep the advertising revenue. In the third tier the revenue sharing is negotiated.

References

Aitamurto T (2011) The impact of crowdfunding on journalism: case study of Spot.Us, a platform for community-funded reporting. *Journalism Practice* 5(4): 429–445.

Ananny M (2011) *A new way to think about press freedom: networked journalism and a public right to hear in an age of 'newsware'*. PhD thesis, Stanford University, USA.

Boczkowski PJ (2004) *Digitizing the News: Innovation in Online Newspapers*. Cambridge, MA: MIT Press.

Bodle R (2011) Regimes of sharing: Open APIs, interoperability, and Facebook. *Information, Communication & Society* 14(3): 320–337.

Chesbrough H (2003) *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Cambridge, MA: Harvard Business School Publishing.

Chesbrough H (2006) *Open Business Models: How to Thrive in the New Innovation Landscape*. Cambridge, MA: Harvard Business School Publishing.

Chesbrough H (2011a) Bringing open innovation to services. *MIT Sloan Management Review* 52(2): 85–90.

Chesbrough H (2011b) *Open Services Innovation: Rethinking Your Business to Grow and Compete in a New Era*. San Francisco, CA: Jossey-Bass.

Chesbrough H and Crowther AK (2006) Beyond high tech: early adopters of open innovation in other industries. *R&D Management* 36(3): 229–236.

Dahlander L and Gann DM (2010) How open is innovation? *Research Policy* 39: 699–709.
De Souza CRB and Redmiles DF (2009) On the roles of APIs in the coordination of collaborative software development. *Computer Supported Cooperative Work* 18(5): 445–475.
Dodgson M, Gann D and Salter A (2006) The role of technology in the shift towards open innovation: the case of Procter & Gamble. *R&D Management* 36(3): 333–346.
Domingo D and Paterson CA (2011) *Making Online News: Newsroom Ethnographies in the Second Decade of Internet Journalism*, 2nd edn. New York: Peter Lang.
Eisenhardt KM (1989) Building theories from case study research. *Academy of Management Review* 14(4): 532–550.
Enkel E, Gassmann O and Chesbrough H (2009) Open R&D and open innovation: exploring the phenomenon. *R&D Management* 39(4): 311–316.
Gade PJ and Perry EL (2003) Changing the newsroom culture: a four-year case study of organizational development at the St. Louis Post-Dispatch. *Journalism & Mass Communication Quarterly* 80(2): 327–347.
Gassmann O, Sandmeier P and Wecht CH (2006) Extreme customer innovation in the front-end: learning from a new software paradigm. *International Journal of Technology Management* 33(1): 46–66.
Huston L and Sakkab N (2006) Connect and develop: inside Procter & Gamble's new model for innovation. *Harvard Business Review* 84(3): 58–67.
Kumar N, Stern L and Anderson J (1993) Conducting interorganizational research using key informants. *Academy of Management Journal* 36(6): 1633–1651.
Lichtenthaler H, Ernst H and Conley J (2011) How to develop a successful technology licensing program. *Sloan Management Review* 52(2): 17–19.
Lindlof TR and Taylor BC (2002) *Qualitative Communication Research Methods*. Thousand Oaks, CA: SAGE.
Miles MB and Huberman AM (1994) *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks, CA: SAGE.
Nordqvist M, Picard RG and Pesämaa O (2010) Industry associations as change agents: the institutional roles of newspaper associations. *Journal of Media Business Studies* 7(3): 52–69.
Olmstead K, Mitchell A and Rosenstiel T (2011) Navigating news online: where people go, how they get there and what lures them away. Report, Pew Research Center, Project for Excellence in Journalism. Available at: www.journalism.org/analysis_report/navigating_news_online (accessed 20 December 2011).
Paulussen S, Geens D and Vandenbrande K (2011) Fostering a culture of collaboration: organizational challenges of newsroom innovation. In: Domingo D and Paterson CA (eds) *Making Online News: Newsroom Ethnographies in the Second Decade of Internet Journalism*, 2nd edn. New York: Peter Lang, pp. 3–14.
Picard RG (2008) Shifts in newspaper advertising expenditures and their implications for the future of newspapers. *Journalism Studies* 9(5): 704–716.
Piller FT, Ihl C and Vossen A (2010) A typology of customer co-creation in the innovation process. SSRN Working paper. Available at: http://ssrn.com/abstract=1732127 (accessed 20 December 2011).
Powell WW (1990) Neither market nor hierarchy: network forms of organization. *Research in Organizational Behavior* 12: 295–336.
Rogers EM (1990) The 'critical mass' in the diffusion of interactive technologies. In: Carnevale M, Lucertini M and Nicosia S (eds) *Modeling the Innovation: Communications, Automation and Information Systems*. Amsterdam: North-Holland, pp. 79–93.
Saldana J (2009) *The Coding Manual for Qualitative Researchers*. London: SAGE.

Sullivan W (2010) The big winner at ONA: APIs for news organizations. *Journerdism*. Available at: www.journerdism.com/the-big-winner-at-ona-apis-for-news-organizations (accessed 20 December 2011).

Thorson E (2008) Changing patterns of news consumption and participation: news recommendation engines. *Information, Communication & Society* 11(4): 473–489.

Thurman N (2011) Making 'The Daily Me': technology, economics and habit in the mainstream assimilation of personalized news. *Journalism* 12(4): 395–415.

Waldman S (2011) The information needs of communities: the changing media landscape in a broadband age. Report, Federal Communications Commission, Washington, DC.

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