Co-production on the Web: Social software as a means of collaborative value creation in Web-based infrastructures

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The concept of co-production was originally introduced by political science to explain citizen participation in the provision of public goods. The concept was quickly adopted in business research targeting the question how users could be voluntarily integrated into industrial production settings to improve the development of goods and services on an honorary basis. With the emergence of the social software and Web-based collaborative infrastructures the concept of co-production gains importance as a theoretical framework for the collaborative production of Web content and services. This chapter argues that co-production is a powerful concept, which helps to explain the emergence of user-generated content and the partial transformation of orthodox business models in the content industries. Applying the concept of co-production to developmental policies could help to theorise and derive new models of including underprivileged user groups and communities in collaborative value creation on the Web for the mutual benefit of service providers and users.

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Introduction

While from its early days the Internet has been a place of social interaction (Rheingold, 1993), the increasing spread of Internet connections and improvements in the usability of (mobile) Web applications have lowered the participatory barriers for users to engage actively in virtual communities and the production of Web content. The tremendous success of Wikipedia as a communitarian project of high-quality content provision, the increasing popularity of blogging as a low-cost, personalised editorial activity and the rising importance of tagging platforms as referential architecture for the approval of relevance and quality have raised attention to how user- generated content (UGC) is affecting and altering orthodox business models in content industries.

Media companies – especially aggregators – but also public organisations have already begun to take advantage of the increasing availability of UGC on the Internet for various reasons, either by establishing their own collaborative platforms or by taking over established service providers. With the growing amount of UGC available, increasing attention is being paid to the question of how collaborative action on the Web can be used for value creation, while taking into account that service providers and users share production resources and facilities in a manner of enterprise collaboration for mutual benefit.

Web collaboration as a means of co-production

Theories of co-production have originated from public policy research. According to Ostrom (1996:1073):

Co-production is a process through which inputs from individuals who are not in the same organization are transformed into goods and services […] that transform citizens into safer, better educated or healthier persons.

Co-production implies that users (i.e. citizens) can play an active role in producing (public) goods and services of consequence to them. According to Incera et al. (2005:3), collaboration can be defined as a state of mutually beneficial relationships between two or more parties who work towards common goals by sharing

responsibility, authority and accountability for achieving results. Hence collaboration can be seen as a specific mode of co-production to improve structural deficiencies in production settings and value chains.

Empirical investigation in the development of open source software has revealed that co-production accounts for about €1.2 billion for freely available software, which leads to 36% in savings in corporate research and development per year, compared with conventional ways of software development in Europe (Ghosh, 2006).

Research in media economics has shown that co-production is used as an efficient means to shift the costs of content production from the service provider to the user (Hess, 2004). For example, the Japanese mobile mail magazine market is almost entirely built on the honorary engagement of users in the production and continuous provision of media content (Funk, 2004).

Research in human computing has focused on the improvement of collaborative infrastructures for value creation in service provision, such as the semantic enrichment of images through collaborative tagging (Golder & Huberman, 2006; Von Ahn & Dabbish, 2004). The trend towards using open access repositories (e.g. Wikipedia) to collect, organise and make available highly dispersed amounts of data in special interest domains characterises another field of application based on the principle of co-production (Winterbottom & North, 2007).

Over the past few years, microeconomic theory has increasingly paid attention to the role of the user in creating value in the innovation lifecycle by the application of cyber-infrastructures (Hsu, 2006; Leadbeater, 2006; Fichter, 2005; Franke & Piller, 2004). Widespread cyber-infrastructures like the Web are a necessary (but not sufficient) precondition to achieve economy of scale in co-production communities, where the users share production resources and facilities with the providers, in a manner of enterprise collaboration (Hsu, 2006).

Co-production has to be conceptualised as a two-level infrastructure consisting of the following (Ostrom, 1996):
- A (top-down) service provider, who provides the stable running, toolkits and marketing of content services
- A (bottom-up) content producer who adopts

the infrastructure to provide creative work in exchange for improvements in services, reputation, visibility, self-esteem, fun, etc. and tries to avoid underutilisation of knowledge, skills and time.

Service providers profit from the selective integration of users along the product lifecycle, which can significantly improve the overall production process (Fichter, 2005), leading to lower transaction costs in information provision and search, and accumulating a critical mass of data for service development, provision and the reduction of cycle times (Hsu, 2006). To enable and govern co-production sufficiently, however, service providers have to establish adequate remuneration and incentive models to encourage participation, promote trust and secure quality standards.

Foundations of user-generated content

Wikipedia (n.d.) defines UGC as "various kinds of media content that are produced or primarily influenced by end-users, as opposed to traditional media producers, licensed broadcasters and production companies". UGC production embraces activities such as publishing, commenting, referencing, reviewing, rating, syndicating, tagging and querying.

UGC emerges from a microcontent-based, self-organising infrastructure. It is being embedded within an "architecture of participation" based on the principles of bottom-up networks, self-service, openness, self-regulation and decentralisation (O'Reilly, 2005). In monetary terms, tools and services are cheaply available and cost-effective, being designed not just for the production of content, but also for the management of relationships and shared resources.

UGC embraces first-order editorial content and second-order meta-content, which makes it applicable for re-use outside the context in which it has been created. Tags and folksonomies are examples of meta-content that is being used to generate surplus statements, views and references in a domain. Semantic enrichment through second-order content therefore is a crucial, indispensable means in the improvement of content services.

According to media economics, goods that are being traded on a market can be characterised by

their excludability from use and their rivalry in consumption (Kiefer, 2001). By applying these two dimensions to UGC, the matrix shown below can be drawn. The matrix indicates that although media content can have several good characteristics, it is best described as a "club good", characterised by non-rivalry in consumption but excludability in use. The latter aspect might be intriguing to those who think of Web content as a public good because of its free availability in terms of monetary costs.

		Rivalry	
		Yes	No
Excludability	Yes	Private goods (i.e. universal resource identifiers)	Club goods (i.e. blogs, tags, mash-ups, folk-sonomies)
	No	Common pool goods (e.g. air, water, space) – not relevant to UGC	Public goods (open access repositories, such as Wikipedia)

However, taking into account that the use of Web content is bound to production resources such as hardware, software, Internet connections, skills and time, and the usage of the content is frequently bound to conditions of use, such as access fees, referencing, revealing personal data, agreeing to user tacking and profiling, and/or exposure to advertisements, we find an exchange pattern between service provider and content producer that makes the club good paradigm applicable.

Examples: collaborative tagging in ESP Game, Peekaboom and Phetch

The following section introduces applications that have been developed by Carnegie Mellon University School of Computer Science. The examples illustrate some low-level approaches incorporating the idea of co-production for the semantic enrichment of images on the Web by collaborative tagging. The empirical set-up takes into account the fact that certain improvements in quality of service are hard to achieve by machines, but easy to handle by humans. Hence the human being is seen as an extension of the computing system.

According to Heymann (2006), collaborative tagging systems are:

... a good way to leverage large numbers of users to help organize very large, rapidly changing corpora which would be difficult to organize automatically. Often, this works because users are working in their own self interest as they mark an object with a particular tag, and when all of these tags are aggregated together, the system can make assumptions about objects based on the aggregate activities of hundreds of thousands or even millions of users.

The basic idea behind the following applications was to let users do the semantic enrichment of images in their spare time by playing it as a game. According to Von Ahn & Dabbish (2004), 5 000 people continuously playing the game could assign a label to all images indexed by Google in 31 days. In the game, two or more anonymous players form a team to contest against time and higher scoreholders in labelling pictures, locating objects in them and phrasing their content.

ESP Game

ESP Game (http://www.espgame.org) is a Java application for collaborative tagging of images. A team of two randomly chosen anonymous players come together for a limited amount of time to describe images by using tags. For each matching tag, both players collect grants that are added to their individual score. The purpose of the game is to improve image search by collecting annotation data on a lexical level based on a quota model. Only those tags that pass certain quota criteria are stored as legitimate annotations of an image.

Peekaboom

Peekaboom (http://www.peekaboom.org) is a Java application used to identify the location of an object within an image. Peekaboom is an extension of ESP Game, as it deepens the semantic enrichment of images from a lexical level to a spatial description of objects located within the image. Two randomly chosen anonymous players take turns at either presenting an object in an image or guessing what the object could be. The first player gets an image along with a word related to the image (i.e. cow). By clicking on certain parts of the image the first player reveals little portions of the image to the second player. For the second player the game consists of a slowly revealing image, which has to be named. Once the second player has guessed the correct word, the players move on to the next image and switch roles.

Phetch

Phetch (http://www.peekaboom.org/phetch/) addresses the accessibility problems that visually impaired people have with images. It was designed to produce descriptive captions of an image so that screen readers – programmes that convert the text of a webpage into synthesised speech – are capable to process the content of the image and visually impaired people can share a common experience of the Web.

Phetch is a game played by 3–5 people who generate explanatory phrases for images from the Web. The players are randomly grouped with others. One player is chosen as a describer and the others are the seekers. The describer gets an image and has to help seekers find it in a given corpus by typing search strings related to the captions. Given only text from the describer, the seekers must find the image using a search query that presents them with a collection of possibly matching images. The first seeker to find the correct picture wins and becomes the next describer. Each session of the game lasts 5 minutes, during which all players should go through as many images as possible.

Remuneration models in collaborative environments

The examples described above illustrate how gaming can be applied to set up a remuneration model between service providers and content producers. Users experience fun in competing against time and higher scoreholders by contributing to the qualitative improvement of the service. To secure quality of service, anonymity and knowledge about motivational aspects are crucial, as trust and positive feedback (e.g. satisfaction, pleasure) are indispensable factors in this specific co-production setting (Lieberman et al., 2007). Nevertheless, in the case of collaborative tagging to extend the level of productivity beyond mere entertainment, more elaborate remuneration models are required.

Virtual currencies

Elaborate remuneration models take into account that increases in productivity can be achieved through coupling voluntary engagement with material rewards.

With Second Life (http://www.secondlife. com), the co-production architecture is built in a way that rewards users with the possibility to capitalise on their engagement by developing services on their own. The precondition to this is the establishment of a market based on a virtual currency (the "Linden Dollar") that enables surplus transactions between service providers and content producers. The coupling of the virtual currency to "real-world" financial transactions by stable exchange rates deepens the remuneration value users acquire by participating in the co-production setting and promotes productivity.

Second Life provides a hierarchical, multi-level remuneration model incorporating the infrastructure providers (Linden Labs) at the top with various service providers down the taxonomic functionality of the game. In addition, Second Life theoretically enables its users to switch between various roles, thereby taking full advantage of either being a service provider or a content producer.

Bonus systems for collaborative content production – a scenario

Bonus systems – here defined as the deliberate rewarding of positive feedback – could be a powerful means to encourage UGC and participation in co-production settings. In the case of collaborative tagging, scores acquired through a game or any other form of mutually positive interaction could be assigned material value for exchange and trade outside the production setting. The score could be transformed into a virtual currency that is mutually accepted by service providers to grant access to surplus goods and services, such as premium services, personalisation, discounts, downloads, etc.

To enable market conditions, the currency must be accepted among various service providers from a business Web transcending the validity of the virtual currency into "real-world settings" by offering material exchange. Rewarding models based on bonus systems could promote the spread of cyber-infrastructures by giving users the possibility of gaining material rewards through collaborative engagement and, simultaneously, of acquiring literacy and skills in the use of advanced Web technologies. Bonus systems could also be seen as a metric for productivity in co-production settings, which is a necessary precondition for allowing the evaluation of user participation and centrality in a given domain or community.

Conclusion

Co-production is a powerful concept. Transformations will take place along various dimensions, including the modes of production (i.e. from design to co-design), the relationship between producers and consumers (i.e. from consumer to prosumer), and possibly even the socioeconomic conditions in industrialised societies (i.e. from disintegrated to reintegrated value chains) (Weber & Fröschl, 2006).

To benefit from co-production from a service provider's perspective means to incorporate it at the right level at the right scale and scope, based on trust and mutual benefit. To benefit from co-production from a user's perspective means to ensure that one's creative work does not get harvested without one's permission by at least claiming fair remuneration and privacy, ideally based on a social contract. In a co-production environment, however, content producers have to take account of the fact that, due to structural reasons, corporate actors are in a more privileged position when it comes to exercising power and enforcing legal rights. Hence, the individual user is in a much weaker position under co-production circumstances than the corporate actor. This unequal distribution of power might be one of the hampering effects in the deployment of co-production concepts and should therefore receive close attention.

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