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A Theory of Co-Production for User Generated Content – Integrating the User into the Content Value Chain

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Abstract: 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 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. Current research in human computation has adopted the concept for the semantic enrichment of web content by collaborative tagging. This article 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.

Keywords: user generated content, tagging, co-production, collaboration, content value creation, media economics, innovation cycle, business model
Categories: A.0, K.0, K.4, K.5, K.6

1 Introduction

While from its early days the Internet has been a place of social interaction [21, 23] increasing spread of Internet connections and improvements in the usability of (mobile) web applications have lowered the participatory barriers for users to actively engage 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 personalized editorial activity and the rising importance of tagging platforms as referential architecture for the approval of relevance and quality has raised attention of how user generated content (UGC) is affecting and altering orthodox business models in content industries.

Media companies - especially aggregators - have already begun to take advantage of the increasing availability of UGC on the Internet for various reasons, either by setting up 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 how collaborative action on the web can be used for value creation taking into account that users contribute time, skill and resources on a voluntary and honorary basis.

2 Foundations of UGC

Wikipedia.org defines user generated content 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." [24] UGC production embraces activities like programming, publishing, commenting, referencing, reviewing, rating, syndicating, tagging and querying.

UGC emerges out of a micro-content-based, self-organizing infrastructure. It is embedded within a "architecture of participation" based on the principles of bottom up networks, self-service, openness, self-regulation and decentralization. [18] 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 1st order editorial content and 2nd order meta-content which makes it applicable for reuse outside the context it has been created in. Tags and folksonomies are examples for meta-content which is being used to generate surplus statements, views and references within a domain. Semantic enrichment through 2nd 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 characterized by their excludability from use and their rivalry in consumption. [15] By applying these two dimensions to UGC the following matrix can be drawn:

		Rivalry	
		Yes	No
Excludability	Yes	Private Goods (i.e. Universal Resource Identifiers	Club Goods (i.e. Blogs, Tags, Mashups, Folksonomies)
	No	Common Pool Goods (i.e. water, air, space) – *not relevant to UGC*	Public Goods (i.e. Open Access Repositories like Wikipedia)

The matrix shows that although UGC can have several good characteristics it is best described as a club good, characterized 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. But taking into account that the use of web content is bound to production resources like hardware, software, Internet connections, skills and time, and the usage of the content is highly often bound to conditions of use like access fees, referencing, revealing personal data, agreeing to user tracking and profiling, and/or the exposure to advertisements we find an exchange pattern between service provider and content producer that makes the club good paradigm applicable.

3 Web Collaboration as a Means of Co-production

Theories of co-production originate from public policy research. [3] According to Ostrom [19] "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. [14] collaboration can be defined as a state of mutually beneficial relationships between two or more parties who work toward 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 the content value chain. Research in media economics has shown that co-production is used as an efficient means to shift the costs of production from the service provider to the user. [11]

Empirical investigation in the development of open source software revealed that co-production amounts for about Euro 1,2 billion for freely available software which leads to 36% in savings in corporate research and development per year compared to conventional ways of software development in Europe. [9]

In the case of proprietary software over 650.000 programmers tested and co-developed Windows 2000 representing as much as $ 500 million worth of effort. [5]

Investigations into the Japanese mobile mail magazine market revealed that it is almost entirely built on the honorary engagement of users in the production and continuous provision of media content. [8]

Recent research in human computing has focussed on the improvement of collaborative infrastructures for value creation in service provision like the semantic enrichment of images through collaborative tagging. [10, 1]

Over the past few years microeconomic theory has paid increasing attention to the role of the user in value creation along the innovation life cycle by the application of cyberinfrastructures. [2, 10, 16, 3, 7] Widespread cyberinfrastructures like the web are a necessary (but not sufficient) precondition to achieve economy of scale on co-production communities, where the users share production resources and facilities with the providers, in a manner of enterprise collaboration. [13] Co-production has to be conceptionalized as a two level infrastructure consisting of (1) a (top down) service provider, who provides the stable running, toolkits and marketing of content services and (2) the (bottom up) content producer who adopts the infrastructure to provide creative work in exchange of improvements in services, reputation, visibility, self-esteem, fun etc.

Service providers profit from the selective integration of users along the product life cycle which can significantly improve the overall production process [6] leading to lower transaction costs in information provision and search, and accumulating critical masses of data for service development, provision and the reduction of cycle times. [10] But to sufficiently enable and govern co-production service providers have to establish adequate incentive and remuneration models to encourage participation, promote trust and secure quality standards.

4 Examples: Collaborative Tagging in ESP, 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 pays account to the fact that certain improvements in quality of service are hard to achieve by machines, but easy to handle by humans. Hence the human is seen as an extension of the computing system.

According to Heymann [12] 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 Ahn [1] 5,000 people continuously playing the game could assign a label to all images indexed by Google in 31 days. To achieve this two or more anonymous players gather in a team to contest against time and higher score-holders in labelling pictures, locating objects within them and phrasing their content.

4.1 ESP Game

ESP (http://www.espgame.org) is a Java application for the 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 which 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. This means that just those tags are stored as legitimate annotations of an image that pass certain quota-indicators.

4.2 Peekaboom

Peekaboom (http://www.peekaboom.org) is a Java application to identify the location of an object within an image. Peekaboom is an extension of the 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 either presenting an object within 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. The object of the game is for the second player to type the word associated to the image from whose perspective, the game consists of a slowly revealing image, which has to be named. Once the second player has guessed the correct word the team moves on to the next image and switches roles.

4.3 Phetch

Phetch (http://www.peekaboom.org/phetch/) addresses accessibility problems of images by visually impaired people. It was designed to produce descriptive captions of an image so that screen readers – programs that convert the text of a webpage into

synthesized 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 3 - 5 person game to generate explanatory phrases for randomly chosen images from the Web. The players are grouped with others from the Web. 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 image corpus by typing strings related to the captions. Given only text from the describer, the seekers must find the image using a search query which presents the seekers 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.

5 Success Factors in Co-production Environments

Successful co-production builds on reciprocity between service provider and content producer. The following success factors are crucial to lead co-production to its full potential.

5.1 Non-Monetary Reciprocity Systems

For the service provider co-production engagement aims at fostering customer binding, market penetration and service visibility, providing higher customer value and means of differentiation. It is also a means for market development by nurturing communities that provide the critical mass of data to support product and service development, improvement, diversification and personalisation. The viral, community-based nature of co-production is an efficient test-bed for community driven innovation [20, 5] that is dependent on lead users who are acting as (honorary) trend scouts and opinion leaders in highly risky markets partially cannibalizing orthodox market research.

For the content producer engagement in co-production is slightly less utilitarian. Co-production engagement can be seen as an attitude, a way of life mixing personal interest with mutual progress in a means of self-marketing trying to avoid underutilization of knowledge, skills and time. [19] In the case of gaming users experience fun in competing against time and higher score holders by contributing to the qualitative improvement of the service. Empirical investigations in other co-production of public services have shown that the acquisition of self-esteem, skills, social reach and higher visibility are important drivers to engage in co-production. [4]

5.2 Monetary Reciprocity Systems – The Case of Second Life

Co-production gains are difficult to quantify. Nevertheless some authors argue that financial incentives can play an important role in deepening the relationship between service provider and content producer. [4] Elaborate remuneration models take account of the fact that increases in productivity can be achieved through coupling voluntary engagement with material rewards. In the case of Second Life (http://www.secondlife.com/) the co-production architecture is built in a way that rewards users with the possibility to capitalize their engagement by developing

services on their own. The precondition to this is the establishment of a virtual market based on a currency (the Linden Dollar) that enables surplus transactions between service providers and content producers. The coupling of the virtual currency to "real word" financial transactions by stable exchange rates (the LindeX) further deepens the remuneration value users acquire by participating in the co-production setting.

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

5.3 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 the 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.

A business model could take the following form: A user contributes content to a service by registering at an "accounting server". Any other user who is subscribed to the "accounting server" is able to rate the contributed content for quality, validity, relevance etc. Each feedback is being collected and transformed by an algorithm into a score incorporating indicators like number of tags, downloads, references, reuse etc. taking in consideration the position of each user in the collaboration value chain. The collaboration value chain is built on the principle that all contributors gain rewards measured by the value their contribution adds to a virtual community. To enable market conditions the score acquired by each user in the value chain is transformed into a virtual currency mutually accepted by service providers within a business web to grant access to surplus goods and services, i.e. premium services, personalization, discounts, downloads etc.

Rewarding models based on bonus systems could promote the spread of cyberinfrastructures by giving users the possibility to gain material rewards through collaborative engagement and simultaneously acquire literacy and skills in the use of advanced web technologies. They could work as an incentive to lower the acceptance barriers for paid content and services offered by media companies on the web. Bonus systems could also be seen as a metric for productivity in co-production settings, which is a necessary precondition to allow the evaluation of user participation and centrality within a given domain or community. Nevertheless fraud behaviour has to be taken serious as it might spoil the business model as a whole.

6 Conclusion

Co-production is a powerful concept. Transformations can 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 maybe even the socio-economic conditions in industrialized societies (i.e. from desintegrated to reintegrated production). [22]

To secure quality of service knowledge about motivational aspects and desire for privacy preservation are crucial as trust into the service provider and positive feedback are indispensable success factors in any co-production setting. [17] Further on empirical evidence has shown that from the content producer's side the perceived product satisfaction correlates strongly with process satisfaction. [20] Created solutions – previously unmatched by existing offers on the market – must provide the configuration that matches the user's preferences. Data about failed co-production projects revealed that one of the biggest challenges in co-production is to integrate the content producers' data adequately along the product life-cycle and pool the benefits back to the users. [ibid]

With the ever growing penetration of cyberinfrastructures among public information systems co-production settings could be used to foster the integration and balancing of interests between citizens, businesses, policy makers and administrations by improving access to information, consultation and participation. Evidence from the physical world shows that tax benefits work as a strong incentive to co-production.

To achieve this, advances in digital rights management technologies and policy aware computing might lay the technological foundations to develop software-based business models and privacy preservation mechanisms in co-production settings enabling new forms of employment and public services ideally based on a social contract.

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