

The User as Prisoner: How the Dilemma Might Dissolve

Andrea Kohlhase

School of Engineering and Computer Science, International University Bremen
Dept. of Mathematics and Computer Science, University Bremen
a.kohlhase@iu-bremen.de

Abstract. Content objects are essential links between Knowledge Management and E-Learning systems. Therefore content authoring and sharing is an important, interdisciplinary topic in the resp. fields. In this paper, we want to critically elaborate on the “user as producer and consumer”-concept for content production and consumption. We address the subject by using the notion of content collaboration as example for the “*Prisoner’s Dilemma*”, in which the sensible way out (from a macro-perspective) is sensibly not pursued by an individual (from a micro-perspective). We will use this micro-perspective of a *user as prisoner* to analyze what the recently very successful Social Tagging processes can teach us about the user taking action as a producer and/or consumer.

1 Introduction

Knowledge Management (KM) systems as well as E-Learning systems are built on knowledge¹ blocks that contain reified knowledge, i.e. content or learning objects. As objects these knowledge chunks can e.g. be managed, shared, reused, or aggregated; as reified knowledge they can be used pedagogically as e.g. REINMANN declares them to be “*the link between learning and teaching*” [Rei05, 117]. In particular, software can construct or help to construct learning contexts based on them: knowledge contexts (like ontologies or intersubjective knowledge), didactical contexts (like learning paths), or subjective contexts (like personal learning environments), for examples and ideas we suggest [Koh06], [LG06], or [MHBR05, 53].

Unfortunately, KM as well as E-Learning weren’t as successful as expected (with occasional exceptions). Therefore a joint venture was undertaken to harvest synergy effects. The pedagogical approach of constructivism seems to fit well for such a venture because of its highly individualized construction potential (see e.g. [Sch05]). But constructivism posits that the construction has to be done by

¹ In [Kor05] KORNWACHS critically discusses the use of the terms ‘knowledge’ versus ‘information’ and points to their “*fundamental difference*” [34], in particular, he points to the “*self-referential characteristics*” [36] of knowledge that makes its handling via technological systems problematic. Keeping this (as well as [PRR97, 16] and [BD00, 125]) in mind, we use the term “knowledge” nevertheless.

the user herself. This can e.g. be accomplished by self-steered learning (which is tentatively antagonistic in E-Learning environments) or by enabling a learner’s adaption/accommodation processes to rebuild existing cognitive structure (PI-AGET) by envisioning the user as a producer of content. Fittingly, in recent years the needle’s eye for KM systems turned exactly out to be the generation of content. So the “user as consumer and producer”-scheme moved in.

In Section 2 we will argue that we can comprise this scheme to a “*user as a prisoner*”-concept (cf. the well-known “Prisoner’s Dilemma”). The dilemma consists in two competing perspectives on taking action: the micro- and the macro-perspective, where the first one is disabling content collaboration. In [KK04] KOHLHASE and the author discussed this phenomenon as “Authoring Problem”, in an educational context in [Koh05] as “User Riddle”: even though the advantages of using KM systems for content collaboration seemed tremendous, no action was taken by users to invest the additional energy and effort to produce such content. So, the real problem in the “user as consumer and producer”-concept is the *micro-perspective of motivation for action* and it is not clear, whether the one or/and the other is more helpful for this.

In order to get a clue though we finally turn in Section 3 to a micro-perspective analysis of the recently very successful Social Tagging systems like DELICIOUS, FLICKR, or CONNOTEA, in which the “user as prisoner”-dilemma seems to dissolve. We will conclude with the thesis that a joint venture is best done if the user starts her activities as a producer with specific expectations (like added-value services or Personal Knowledge Management) and then decides for herself when the time for consumption (like collaboration or E-Learning features) has arrived.

2 Content Generation as Prisoner’s Dilemma

Conventional wisdom (aka. “hope”) is that the added-value applications based on semantic annotations will create a stimulus that will entice common users to invest time and effort into content production within this exciting new technology. Unfortunately, respective communities experienced otherwise, e.g. the Semantic Web did not take off as expected even though it is still pursued because of its “believed” potential.

Starting from a detailed look at the motivations of users to produce semantic data, we argued in [KK04] that the discrepancy between a content author’s excitement about the fascinating potential of semantically enriched data and her unwillingness to invest her time and energy to profit hereby is actually an author’s dilemma — an example of the well-known non-zero-sum game “**Prisoner’s Dilemma**” ([Axe84]). It is often used for analyzing short term decision-making processes in cooperation scenarios, where the actors do not have any *specific* expectations about future interactions or collaborations. Concretely two players are imagined in a prison scenario where they are independently confronted with cooperation offers by a public prosecutor. They can choose between two moves, either “cooperate” or “defect”. The idea is that each player gains

when both cooperate, but if only one of them cooperates, the other one, who defects, will gain more. If both defect both lose, but not as much as the 'cheated' cooperator whose cooperation is not returned.

For a user of semantic material, the motivation *for* preferring semantically rich data is simple: explicit document structure supports enhanced navigation and search, semantic markup yields context and search by content. Furthermore, the higher the degree of semantic structure, the more added-value services can feed on the material, the higher the benefit for the user. But this is only a standpoint from without, that is a *macro-perspective*. From within, that is a *micro-perspective*, there is also the motivation *against* taking action, as (generally) the cost of creating a document is proportional to the depth of the markup involved. However, the argument goes that — once the markup quality passes a certain threshold which supports flexible reuse of fragments — content creation costs may actually go down as they are dominated by the cost of finding suitable (already existent) knowledge elements. Thus, the author is interested in a high reuse ratio, provided that retrieval costs are not prohibitive. The benefits seem obvious for the author who has the opportunity to reuse her own content modules frequently, but the real payoff comes when she is part of a group of individuals that share content objects and knowledge structures freely.

The analogy of the “Prisoner’s Dilemma” to the content author’s situation is apparent: if the author decides to invest her time and effort and others contribute as well, everyone profits tremendously from this synergy of cooperation. On the other hand, if just the author works on semantic markup, then she will gain nothing in the short run, but some in the long run. Note that the micro-perspective is less than a subjective standpoint, it considers only the surrounding micro-cosmos, the here-and-now of a subject.

In the Prisoner’s Dilemma, if the decision-makers were purely rational, they would never cooperate (without at-hand incentives) as they should make the decision which is best for them individually. Suppose the other one would defect, then it is rational to defect yourself: you won’t gain much, but if you do not defect you will have all the work. Suppose the other one would cooperate, then you will gain (especially in the long run) whatever you decide, but you will gain more if you do not cooperate (as you don’t have to invest your time and effort), so here too the rational choice is to defect. The problem is that if all content authors are rational, all will decide to defect, and none of them will gain anything. In particular, *if we assume content authors to be rational, then we anticipate their non-cooperation based on the individuals’ micro-perspectives.*

3 Why does Social Tagging as Content Generation succeed?

What we are looking for is a way out of the “user as a prisoner”-scheme. We illustrated above that the Prisoner’s Dilemma is based on two competing perspectives: the micro- and the macro-perspective. Moreover, the micro-perspective turned out to be the limiting factor for an author’s content generation. There-

fore, if we continue to predominantly take the macro-perspective when developing software systems, then the “user as producer and consumer”-concept is reduced to the “user as a prisoner”-scheme.

Recently though, web software comprised under the term “**Social Tagging**” is celebrating enormous growth rates in terms of user access and acceptance rates (despite rather simple interfaces). Here, the users tag system-specific objects like bookmarks (e.g. DEL.ICIO.US or scientifically CONNOTEA) or images (e.g. FLICKR) to organize and share their resp. objects so that they become “*pivots for social navigation*” [Mor05, 137]. A closer look reveals directly that their users are not only producers of content, but also managing and learning content consumers. They take action in generating content and using other’s content by the emergent “self-organizing” web-effect of “*small pieces that then loosely join themselves*” [Wei02, 82, 23]. The question is why these social tagging systems succeed in attracting considerable amounts of (informal) content authors? If we look at the “Social Tagging” phenomenon from the macro-perspective, then there is not so much to be gained. Sure, there is the possibility that someone else’s bookmark might be of relevance to my personal knowledge and I would not have found it except using the social tagging software. But the finding of such a treasure seems rather haphazardly organized and therefore not to be the underlying motivation for using the software.

The idea for dissolving the “user as a prisoner”-scheme consists in a micro-perspective analysis of this successful software to come up with more general conclusions for the design of software for KM and E-Learning. So we can rephrase the underlying question to be “Why do *people* use social tagging systems or what is their motivation?”. Even though all tags as a whole form a “folksonomy” [Wal04], this collaboration clearly isn’t the motivation for an individual user to take action. We believe that a user’s tags can be viewed from the micro-perspective as her *personal* knowledge management system that e.g. represents a personal information model (PIM, [MHBR05, 53]). At the beginning she doesn’t think of her tags as public objects but as private ones. It really doesn’t matter whether a user is aware that the tags are openly viewable as the experience of the Web itself constitutes global invisibility and irrelevance. This thesis is supported by many reports of bloggers, who are astonished how much publicity a blog de facto draws (for example: “*it’s recently become apparent that the vast majority of blogs are written by ordinary people with much smaller audiences in mind*” [SNGS04, 1143]) . However, as a personal knowledge management system the social tagging software support is definitely helpful in tackling today’s overly abundant information flow — the same idea that enlivens BERNER-LEE’s Semantic Web vision [BLF99] from a macro-perspective. But in contrast to the Semantic Web, people are willing to invest their time and energy to assign personal, semantic metadata to resp. objects as it makes sense from their very own personal micro-perspective. The interest for other users’ input comes later — whenever the individual user is ready. At that point in time we have a flowing transition from personal knowledge management to social E-Learning. Interestingly, the user decides *for herself* when she wants to change from being a

producer to becoming a consumer, i.e. it is a self-steered process. This fits nicely with the observation that an individual's competence development has a time component and therefore has to be viewed as a process (see [BW05]).

In accordance with the “Prisoner’s Dilemma”, social tagging can teach us that taking action is much easier as producer with specific expectations for consumption — that at first are typically rather private than public — than as consumers with unspecific ones as well as producers with specific ones for production. Actually, the same is true and long known for consumers. *Specific* consumption expectations of consumers like interface and interaction design are still a hot research topic. Moreover, the transparency of early personal computers (i.e. specific expectations of consumers for production) was replaced/complemented by Macintosh’s iconic style or graphical user interfaces (i.e. specific expectations for consumption) relatively early on (see [Tur97, 23ff]). Now, that the consumers are consuming “well enough”, the question of specific expectations of consumers for production comes into focus again.

As many users of social tagging systems have experienced in the mean time, once this dynamic spiral is in place, it enables much finer-grained semantic annotation. In general, once the first steps were taken by the user as a producer, at some point she will become a consumer and will strengthen the mentioned spiral.

4 Conclusion and Outlook

In the same way as knowledge and learning are dynamically interwoven, the according supportive technology can obtain synergies, but we as system designers cannot sensibly start with the macro-perspective and overwhelming, abstract potential, otherwise we support the “user as prisoner”-scheme. Rather we need to use the micro-perspective and provide specific expectations (like value-by-itself e.g. a personal KM system, short-term rewards e.g. occasional hits with recommender systems, and/or added-value services that don’t assume collaboration e.g. visualization of complex content) for content authors to draw them into the spiral of “users as producers and consumers”.

The analysis presented in this paper will form the starting point for the development of a stepwise process of content generation (working title: “Stepwise Blended Learning and Knowing”). We plan to implement and evaluate this in the context of the CPOINT system (implemented by the author)², leveraging a central aspect of the social tagging process: the transition from Personal KM up to a social, but self-steered E-Learning System.

² CPoint is an open source, semantic, invasive editor from within MS PowerPoint that attaches semantic annotation to PPT-objects and converts this micro-content into a web-capable format. More information and download site is available under <http://kwarc.eecs.iu-bremen.de/projects/CPoint/install.html>

References

- [ADB⁺05] Klaus-Dieter Althoff, Andreas Dengel, Ralph Bergmann, Markus Nick, and Thomas Roth-Berghofer, editors. *Professional Knowledge Management*, number 3782 in LNCS. Springer Verlag, 2005.
- [Axe84] Robert Axelrod. *The Evolution of Cooperation*. Basic Books, New York, 1984.
- [BD00] John Seely Brown and Paul Duguid. *The Social Life of Information*. Harvard Business School Press, 2000.
- [BLF99] Tim Berners-Lee and Mark Fischetti. *Weaving the Web: The original design and ultimate destiny of the World Wide Web, by its inventor*. Harper San Francisco, 1999.
- [BW05] Maximiliane Bönnighausen and Uwe Wilkesmann. E-Learning meets Wissensmanagement: Wie Qualifikations- und Kompetenzentwicklung in Betrieben zugleich erfolgen. online at http://www.diezeitschrift.de/22005/boennighausen05_01.htm (seen at 2006-08-21, February 2005).
- [KK04] Andrea Kohlhase and Michael Kohlhase. CPoint: Dissolving the Author's Dilemma. In Andrea Asperti, Grzegorz Bancerek, and Andrej Trybulec, editors, *Mathematical Knowledge Management, MKM'04*, number 3119 in LNAI, pages 175–189. Springer Verlag, 2004.
- [Koh05] Andrea Kohlhase. Overcoming Proprietary Hurdles: CPoint as Invasive Editor. In Fred de Vries and Graham Attwell and Raymond Elferink and Alexandra Tödt, editor, *Open Source for Education in Europe: Research and Practise*, pages 51–56. Open Universiteit of the Netherlands, Heerlen, 2005.
- [Koh06] Michael Kohlhase. *OMDoc: An Open Markup Format for Mathematical Documents*. Springer Verlag, August 2006. ISBN 3-540-37897-9.
- [Kor05] Klaus Kornwachs. Knowledge + Skills + "x". In Althoff et al. [ADB⁺05].
- [LG06] Paul Libbrecht and Christian Gross. Authoring LeActiveMath Calculus Content. In William Farmer and Jo Borwein, editors, *Mathematical Knowledge Management, MKM'06*, LNAI, pages 251 – 265. Springer Verlag, 2006.
- [MHBR05] Heiko Maus, Harald Holz, Ansgar Bernardi, and Oleg Rostantin. Leveraging Passive Paper Piles to Active Objects in Personal Knowledge Spaces. In Althoff et al. [ADB⁺05], pages 50–59.
- [Mor05] Peter Morville. *Ambient Findability*. O'Reilly, 2005.
- [PRR97] G. Probst, St. Raub, and Kai Romhardt. *Wissen managen*. Gabler Verlag, 4 (2003) edition, 1997.
- [Rei05] Gabi Reinmann. *Blended Learning in der Lehrerbildung*. Pabst, 2005.
- [Sch05] Andreas Schmidt. Bridging the Gap Between Knowledge Management and E-Learning. In Althoff et al. [ADB⁺05], pages 203–213.
- [SNGS04] Diane J. Schiano, Bonnie A. Nardi, Michelle Gumbrecht, and Luke Swartz. Blogging by the Rest of Us. In *Late breaking result papers*, pages 1143–1146, April 2004. ISBN 1-58113-703-6.
- [Tur97] Sherry Turkle. *Life on the Screen: Identity in the Age of the Internet*. Touchstone, 1997.
- [Wal04] Thomas Vander Wal. Folksonomy? Information Architecture Institute Members Mailing List, July 2004.
- [Wei02] David Weinberger. *Small Pieces Loosely Joined: a Unified Theory of the Web*. Basic Books, 2002.