Payday on the Social Semantic Web

Fabian Abel and Geert-Jan Houben

Web Information Systems, Delft University of Technology
{f.abel,g.j.p.m.houben}@tudelft.nl

Abstract. One of the key principles of the Social Web is that users are the ones that add value. People are compiling Wikipedia, the largest encyclopedia in the world, they upload videos to YouTube, promote news on Twitter, or help organizing content by means of tagging. While few companies and individuals succeed in obtaining monetary benefits from the Social Web, mostly from the supporting technologies, there are yet no fair solutions that value the contributions of individuals within the crowds that add wisdom to the Web.
With a fair appreciation of contributions, opportunities for stimulating and distributing creativity and its benefits across the world come within reach, also for the less privileged. Every contribution to the Web has a certain value to certain people. Transforming this value into a monetary value so that everyone earns what she deserves is a non-trivial problem. Therefore, providing technologies and mechanisms for a microfinancing infrastructure on the Web that allows anyone on the world (also people with low incomes) to participate in the value creation chain is an important challenge.
It is a challenge for which the Semantic Web community will hold the key with a value-enhanced perspective on large-scale distributed knowledge, in collaboration with other disciplines from exact and social sciences. In this paper, we therefore discuss issues and future perspectives on a microfinancing infrastructure on the Web where semantics can support the social process of valuing. We identify key research challenges that can be tackled by the Semantic Web community to realize a fair, voluntary monetary micro-cash-flow on the Web.

Key words: semantic web, microfinance, social web

1 Introduction

The Web lives from the content and services that are provided by people and companies all around the world. Over the last two decades, the Web evolved from a hypertext system that is maintained by a few highly skilled Web developers towards the so-called Social Web where one can observe a culture of participation [1]. Social Web systems live from the content that individuals contribute. For example, Wikipedia relies on smart people who collaboratively create the world's largest encyclopedia, Flickr and YouTube live from the pictures and videos casual users upload and share with the public, and Twitter becomes a valuable source of information because people post and discuss news, thoughts and opinions for all the world to see.

Today, monetary value creation is not fairly organized. There are only a few companies that earn money by leveraging Social Web data and services, mostly

by hosting the platform, whereas the crowds who breath life into the Social Web go away empty-handed. Voluntary participation is applaudable and calls for high respect. However, being able to offer voluntary services is also a privilege of those people who do not need to worry about their daily income. Therefore, the voluntary nature of the Social Web does not give incentives to less-privileged people from poorer regions, to participate in shaping the Web. Thus, we observe a 'big divide' on the Social Web that mimics the current uneven distribution of wealth across the globe.

Every single contribution — ranging from tagging activities to editing of Wikipedia pages — has a certain value to certain people. Microfinance initiatives illustrate that tiny transactions can — despite high transactional costs — foster new business opportunities, increase social capital and give hope particularly to those one billion people in the world that have per capita incomes of less than one dollar a day [2]. Therefore, a major research challenge that requires interdisciplinary research organized and put into action by researchers from the Semantic Web and Web Science [3] community is to bring an effective microfinancing infrastructure to the Web:

> How can the value of individual interactions on the Social Web be transformed into monetary value that allows people across the world to earn what they deserve and that moreover stimulates people to further improve services and content on the Social Web?

2 Requirements and Research Challenges

From 'real' life we know how tipping can foster the spread of recognition and appreciation. On the Web, micro-payment services such as Flattr[1] prove that also there people are willing to voluntarily donate (tiny amounts of) money, in this case to other people who provide content. For example, bloggers can put a so-called *flattr button* next to their articles so that readers can give a tip to the author if they like. On the Social Web where data becomes — thanks to Semantic Web technologies and Linked Data principles — more and more connected and is being re-used and shared across application boundaries, implementing a fair micro-payment cash flow is however a more complex problem and one that requires thorough interdisciplinary research.

2.1 Social Challenges

On the Social Web, *products* often emerge from the *wisdom of the crowds*. For example, social tagging systems benefit from the structures — so-called folksonomies — that evolve when many people collaboratively annotate content. Wikipedia can be considered as one of the most successful *products* of the Social Web. The Wikipedia platform itself is financed via donations. However, the contributing editors of Wikipedia do not receive financial support for their efforts. With collaboratively created social data such as Wikipedia pages, further challenges arise for a micro-payment infrastructure on the Web.

[1] `http://flattr.com`

Fairness Given the principle that every contribution has a certain value to certain people which can be translated into a monetary value, a key question is: how to fairly distribute available monetary resources on the Social Web so that everyone earns what she deserves? To what degree can and should the donating party be involved in decisions regarding the distribution of the monetary donations?

Incentives A Web where people are forced to pay for the usage of information and services is not desirable. Hence, it is important to study how people can be motivated to donate money to individual information providers and how information providers can be stimulated to rather improve the quality of their contributions instead of maximizing their monetary revenue.

Impact on Society The *payday* on the Social Web should have a positive effect on society and welfare of individuals across the world. To avoid bad impact on society and economy, it is important to research how different societies may react when introducing a voluntary micro-payment market on the Web where every single user interaction might be monetarily valued.

2.2 Technological Challenges

Developing a value-aware Social Web infrastructure that meets requirements such as fairness and legal constraints and allows anyone on the world to earn credits for her contributions is a complex challenge. For example, the value of a Wikipedia page depends also on how people make use of the content. Some consumers might just read an introductory sentence to get to know what the page is about while others exploit the same page as an important learning resource during their studies. Furthermore, and this is where Semantic Web really adds to the complexity, other people may not use Wikipedia directly, but benefit from Wikipedia indirectly. A good example is an application like *dbrec*[2] which provides music recommendations by exploiting DBpedia[3], which is the RDF representation of the Wikipedia corpus. In such a distributed setting, it becomes particularly difficult to decide who deserves what fraction of the cake and moreover to ensure that the participating content and service providers receive their part of the donation.

Moreover, content creators may not be the same people who also contribute the content to the Social Web. Imagine that someone is recording a movie of a musician on the streets and then uploads the video to YouTube. How can Social Web users who enjoy the music performance be enabled to donate money to the musician? Hence, mechanisms for detecting involved individuals and for inferring the provenance of social data are required and will particularly be beneficial to people from poorer regions so that they can participate in the value creation chain as well.

Technological challenges for realizing a fair, voluntary micro-payment cash flow on the Web thus require an appropriate technological infrastructure that features:

[2] `http://dbrec.net`
[3] `http://dbpedia.org`

Value Awareness To bring the monetary values into play, the data and its storage, querying and reasoning all need to be value-aware. Considering value, possibly at a level of granularity close to RDF triples, poses significant challenges for current day semantic technologies.

Real-World Awareness To also involve contributors who are not directly involved in the publishing process of data and services but are involved in creating the content in 'reality', another challenge is to better connect the knowledge infrastructure to things that happen in the real-world.

3 Implications for Semantic Web Research

Semantic Web researchers are very well positioned to contribute to this challenge for a micro-payment infrastructure when they are able to weave several lines of research within their own community as well as from other scientific disciplines into a coherent infrastructure for value-aware semantic data processing. They can investigate enabling technologies that allow for embedding a donation infrastructure on the Web across system boundaries.

- Appropriate RDF *representations* of social data which describe how data was generated (provenance) will need to allow for efficient reasoning about the value of the data for a given individual. Effective storage, querying and reasoning of *value-aware* data will have to be developed, to operate at a global scale. Linked Open Data and its processing needs to be enhanced with facilities for value representation.
- Strategies for *automating* payment processes and respecting personal preferences and policies will be required to reduce the efforts that people have when donating to others.
- Trust and privacy mechanisms are required to avoid fraud and prevent disclosure about micro-transactions and to support people in comfortably making their decisions regarding *whom* they should donate *what*.
- The integration with technologies concerning sensors, RFID, barcodes, face recognition, entity resolving services, etc. have to be investigated, to make the *inclusion* of value-aware semantically annotated content seamless.

We see that the Semantic Web can play an enabling role in bringing us to this new Web, in the form of a new socio-technical system with an embedded semantic infrastructure for a distributed micro-payment cash flow, that can make anyone earn what she deserves.

References

1. Ankolekar, A., Krötzsch, M., Tran, T., Vrandecic, D.: The two cultures: Mashing up Web 2.0 and the Semantic Web. Journal of Web Semantics **6**(1) (2008) 70–75
2. Morduch, J.: The Microfinance Promise. Journal of Economic Literature **37**(4) (1999) pp. 1569–1614
3. Hendler, J., Shadbolt, N., Hall, W., Berners-Lee, T., Weitzner, D.: Web Science: an interdisciplinary approach to understanding the Web. Communications of the ACM **51**(7) (2008) 60–69