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# Pervasive sociality: advanced social objects recommendation

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## ABSTRACT

This paper makes a focus on social objects and stresses the importance of object-centered sociality in emerging technological context. Actual digital object centered sociality limits and related challenges are reviewed. We propose to foster social interactions through advanced social objects recommendations. In this context the Object Centered Sociality Ontology (OCSO) is presented. The paper concludes with research perspectives and a promising approach for social object recommendation through spreading activation algorithm.

## Categories and Subject Descriptors

E.1 [Data Structures]: Graphs and networks;  
J.4 [Social and Behavioral Sciences]: Sociology;

## General Terms

Algorithms, Human Factors.

## Keywords

social web, semantic web, social semantic web, pervasive web, pervasive sociality, social object; object centered sociality, OCSN, object centered social network, OCSO ontology, object centered sociality ontology, OCSN ecosystem

## 1. INTRODUCTION

These days, the content on the web is being socially augmented through functionalities like recommendation, comments or ratings. In addition, the success of social networking mobile applications (eg. [facebook.com](http://facebook.com)) and location-based social networks (eg. [foursquare.com](http://foursquare.com)) shows that social networks are accessed from anywhere and progressively benefit from bridges between the digital and the physical worlds. Based on these observations and considering the development of pervasive computing we envision the pervasive sociality era when online social networks will be omnipresent, accessible anywhere about anything. Pervasive sociality is based on [Weiser, 91] vision and on an extrapolation of actual social networking strong trends: mobility, increasing connectivity, content-centered interactions practices.

Today social platforms are multidimensional, connecting people to various entities. [Knorr-Cetina, 1997] identified the growing importance of social objects into human communication. A social object is "*the reason why people affiliate with each specific other and not just anyone*" [Jyri Engeström, 2005]. It is anything that provokes, supports or maintains an interaction and creates social link: events, multimedia content, people, interests, activities, things, etc. On the web, object centered sociality can be observed on platforms which propose socially augmented contents (eg. [youtube.com](http://youtube.com), [flickr.com](http://flickr.com)). Digital social objects are at the same time interaction triggers, context providers and communication anchors. Object-centered sociality [Knorr-Cetina, 1997] constitutes today a specific and widespread kind of numeric communication coexisting with others like micro-blogging, mail, forums, etc.

This paper stresses today's object centered sociality limits and several related challenges we propose to address.

## 2. DIGITAL OBJECT CENTERED SOCIALITY TODAY'S CHALLENGES

### 2.1 Defragmenting social networking user experience

Due to business reasons social applications and their respective social objects are often isolated in data silos. The resulting fragmented experience limits a lot user experience regarding access and interactions. This issue is not specific to social applications and is often called "walled gardens" problem [Halpin, 2008]. It is quite hard to know "where" to interact. Switching between different platforms is very time consuming and counter intuitive.

One of most evident consequence is that equivalent entities are replicated into concurrent platforms. For instance, Eiffel tower or any famous place is replicated into Foursquare, Facebook Places, [gowalla.com](http://gowalla.com), [whrrl.com](http://whrrl.com), etc. Despite this replication phenomenon another limit is that user's interests are often distributed through several social objects hosted by isolated platforms. Getting social information like collective mood, opinion, reaction about a topic forces users to switch between numerous interfaces. It is very time consuming and totally inefficient in mobility situations. Social objects could be efficient cross-platforms articulations and should not be platform dependant.

### 2.2 Multidimensional and context-sensitive sociality

Increasing amount and variety of social objects lead to information management challenges. In fact, it is difficult to prioritize social information and by extension social objects which

are interesting for a user in a context. There is no existing simple model and process to address this issue.

Furthermore, mobile social networking is now a commonplace 21st-century activity. Communication is more and more situated in time and space. As a result, user's communication goals can be driven by many interests on many dimensions (eg. conceptual, temporal, physical, social) which can be combined. To each of these dimensions corresponds a relevant set of social objects. Additionally the development of environment connectivity (QR code, NFC/RFID, sensor web, etc.) will increasingly input information and influence information needs. An efficient social object recommender has to be multidimensional and context sensitive.

### 3. SOCIAL OBJECTS INTERLINKING

#### 3.1 Object Centered Social Network

An object-centered social network is a social structure formed by people interacting synchronously or asynchronously on a single common social object. The corresponding canal is explicitly associated to social object. Services proposing socially augmented content are supporting as many OCSN as content it contains. Thus we consider them as OCSN platforms. Our definition aims to formally define this today widespread social structure and to "forget" their embedding platforms.

#### 3.2 OCSO Ontology

[Breslin and Decker, 2007] stressed social web need for semantics. Semantic web relies on standard knowledge representation like RDF [Lassila and Swick, 1999], RDFS [Brickley and Guha, 2000] or OWL [MacGuinness and Van Harmelen, 2004] that bring solution to face the walled gardens issue. Nowadays, main social semantic web works include FOAF<sup>1</sup> (persons), SIOC<sup>2</sup> (online communities) and OPO<sup>3</sup> (online presence). We propose OCSO<sup>4</sup> ontology (excerpt on figure 1), which is the formal description of OCSN concept. The model is aligned with FOAF, SIOC and OPO ontologies:

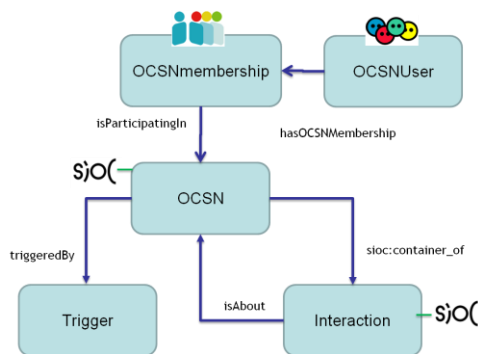


Figure 1. Excerpt of OCSO ontology, main classes

The OCSN class is central and proposes several properties related to social activity inside the OCSN: overall rate, rate count, view count, interaction count, etc. OCSNUser is a foaf:Agent subclass. The link between OCSNUser and OCSN is mediated by OCSNmembership. This indirect link allows us to attach specific properties to the membership (e.g. date, implication type). The

<sup>1</sup> <http://xmlns.com/foaf/spec/>

<sup>2</sup> <http://rdfs.org/sioc/spec/>

<sup>3</sup> <http://online-presence.net/opo/spec/>

<sup>4</sup> <http://ns.inria.fr/ocso/>

trigger class corresponds to entrance points when they are defined (location area for instance). Finally interaction class is a subclass of sioc:Item.

### 4. CONCLUSION AND PERSPECTIVES

We proposed to renew powerful concepts as social objects and object centered sociality through the prism of semantic web. The resulting formal model is the OCSO ontology. We will now focus on the application of spreading activation to support multidimensional and context-sensitive social objects recommendations.

Spreading activation theory comes from cognitive psychology [Collins and al., 75] and provides algorithms used to represent value propagation on a semantic network [Anderson, 83]. It was applied for information retrieval purpose [Preece, 81] or to mine socio-semantic networks [Troussov et al., 08] for instance. Its adaptation to typed networks is interesting regarding our context with graphs capturing several dimensions such as social relationships, geographical proximity, conceptual proximity, etc. Polycentric queries on typed graphs (several concepts activated at the same time) should allow us to combine dimensions and to integrate the context "on the fly" through new customizable activation propagation functions.

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