

USEMP vision for privacy-aware digital marketing & advertising, a proposal for a useragent-centric model

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Abstract

In this position paper we present USEMP consortium vision with respect to how the digital advertising/marketing community should be supporting privacy for the end- users, what new business innovation can come out of it and a novice model for advertising/marketing for the open web that enables end-users to retain control over the use of their personal data, allows marketers to deliver performance-based targeted campaigns and requires some additional support (useragent, ontology framework, data model, APIs/bindings) from W3C-steered open web technologies.

Introduction

USEMP (<http://www.usemp-project.eu>) is an EU multi-disciplinary research project¹, integrating the perspectives of legal experts, engineers, computer scientists, marketing experts and social scientists, aiming at developing a framework and a set of tools that will empower Online Social Network (OSN) and online web users by enhancing their control over the data they distribute or interact with helping them understand what can be inferred from the personal data shared in OSNs and the web and what is the value of the data they are sharing. USEMP consortium has performed a number of studies investigating users' attitude towards privacy and has also developed a vision with respect to how digital advertising/marketing solutions should be supporting privacy for end- users and what new business innovation can come out of such support. In this position paper we present a summary of USEMP vision and how it relates to future work from W3C and the advertising/marketing community as well a novel scheme for digital marketing and advertising.

USEMP vision for privacy-aware digital marketing & advertising

USEMP consortium has investigated the concerns of end-users in EU countries towards privacy. We present shortly some of the results from interviews in Belgium and Sweden conducted as part of the USEMP project, that investigated attitudes towards online privacy. In these results, the majority of Belgian users acknowledge the existence of overall threats to their online privacy. As depicted by **Fig. 1**, only a minority of respondents (13%) is not concerned about threats to their privacy. Others feel it is an important force to be reckoned with and are sensitive to the way their personal information is dealt with by third parties. Similar results have been obtained for the Swedish case.

In order to address users concerns and empower them USEMP consortium has developed a vision for a set of privacy related tools that should be available by marketing & advertising solution providers:

- **Online presence awareness: feedback and control:** a set of tools should be available to improve online management of personal data enabling users to exercise their data protection and privacy rights and understand how their personal data are used and for what purpose

¹ USEMP is funded by EU FP7 R&D research framework

- **Economic Value Awareness: feedback and control:** a set of tools should be available to raise users' awareness concerning the economic value of the data they are sharing with digital marketing & advertising networks
- **Profile & Algorithmic Transparency:** a set of tools should be available to help users increasing their awareness how they are being targeted, categorized or profiled.
- **Data licensing agreement:** marketing and advertising networks should develop Data Licensing Agreement (DLA) that highlights the mutual commitment between the platform providers and the end-user following legislative framework in a clear and concise manner along with a set of tools to allow end-users to dynamically provide or withdraw their consent with for the use of their data under specified DLA.

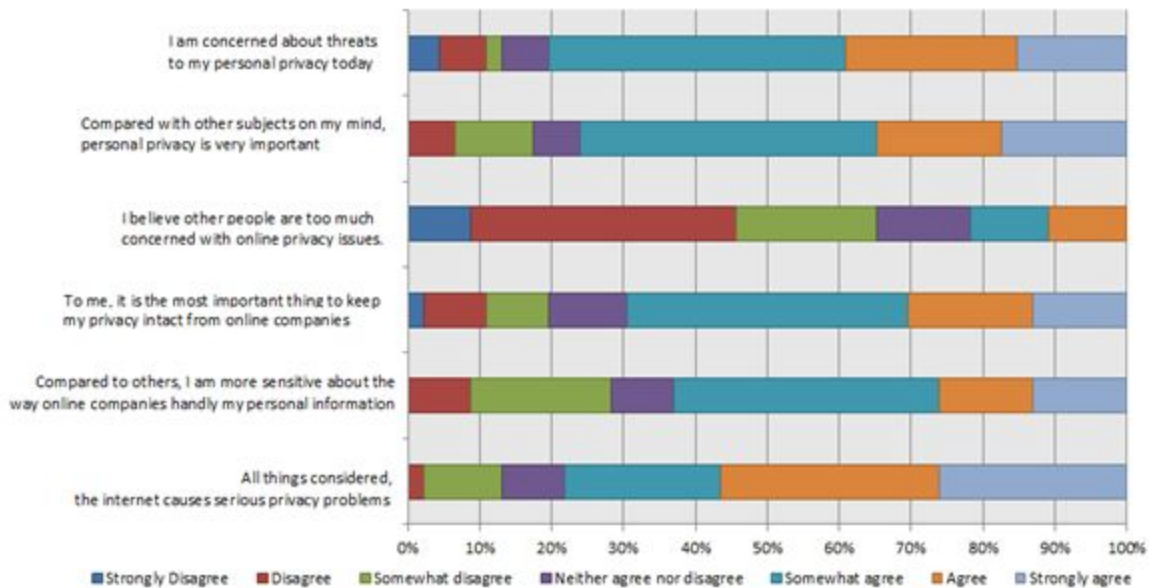


Fig.1 USEMP study on users' attitudes on online privacy (Belgium; n=46; %)

USEMP vision can be also translated to a number of use cases that should be supported from digital marketing and advertising providers:

- **transparency of personal data use to the end-user:** it should be possible for the end-consumer to understand which entity has access to which part of his/her personal data and for what purpose/action
- **transparency of value of of shared personal data to the end-user:** it should be possible for the end-user to understand the value that their shared personal data generate
- **end-user dynamic consent:** it should be possible for the end-consumer to opt-in/opt-out his/her data dynamically to 3rd parties that wish to use them declaring their purpose (for examples of prototyping such dynamic consent see also [OPENi](#) project and [PEAT](#) platform)
- **transparency of inferences & classifications to the end-user:** it should be possible for the end-user to access the inferences & classifications that are related to his/her personal profile based on the data he/she has shared but also based on data shared by other end-users
- **innovative business models:** it should be possible to develop new business models for digital marketing and advertising where part of the generated value can be directed towards end-user

In order to develop privacy-aware solutions that follow USEMP vision, such features should be introduced by data ecosystem and ad-ecosystem players in their solutions. Given the multitude of service providers, the

introduction of such features will require W3C and digital marketing & advertising community standardization effort in the following areas: a) Framework & Ontology, b) Platform APIs, c) Data Model and Exchange.

A useragent-centric model for data-driven advertising

In the next few paragraphs we develop a new model for performing targeted digital advertising & marketing with open web technologies, in which end-users' collected data (namely user behaviour in the browser) are used for targeting in the web browser itself rather than an external 3rd party. This is an example of how USEMP vision for transparency in the use of personal data and their derivatives in digital marketing & advertising can influence new innovative solutions & business cases for personalized advertising and it will be further evaluated in the context of the USEMP project pilots during 2015-2016.

We assume this novel proposal will operate in an environment where:

- a. updated Do-Not-Track specification will be implemented & honoured by the advertising ecosystem
- b. more & more end-users will utilize either DNT or ad-blockers to reject advertisements (see for example **ref. 2**) due to their sensitivity in the way their personal data are tracked and used

The following concepts are used for the description of the proposed useragent centric advertising scheme:

- **property graph:** a graph of nodes and edges, both of which can have attributes and weights related to them (see also <https://www.w3.org/community/propertygraphs/>) - a property graph is used to model the interest graph of an end-user
- **interest graph:** the topics an end-user is interested in based on his/her browsing behaviour, they are modelled as a property graph
- **useragent extensions:** the web browser itself that will be extended to support personalized advertising where user behavioural data are not provided outside the browser itself
- **smart ads:** ads that will operate within the proposed scheme and will be able to interact locally with the proposed browser extensions to take decisions on which ad.units should be rendered based on the information they retrieve locally in the browser and the required targeting from the advertiser
- **transaction IDs:** IDs that will be stored by the ad.network and generated from the user agent as part of a ledger of transactions for the interest graph - these can be used in the absence of cookie tracking (if for example DNT is turned on by the end-user) as the identifiers of a request to use an end-user property graph and can also form the basis in providing the end-user a share of the advertising revenue

The following are the basic components of the proposed useragent centric advertising scheme:

- a. a web browser extension that will be able to
 - compute, update and store the interest graph of a user based on his/her browsing history
 - a browser API that a) will expose and manage requests to access the interest graph to smart ads running locally on the browser with the ability to generate and register transactionIDs. These registered transactionIDs can be used for developing novel business models where the media advertising revenue is split between the publishers and the end-user.
- b. a smart ads framework that will allow:
 - ads to request information for the end-user interest graph in the absence of 3rd party cookie support
 - to get a transactionID that is registered also with the browser and can be used for registering clicks with the ad.server and to be used for auditing (or reconciliation purposes)

For the purpose of computing & making the interest graph accessible the following ideas are proposed to the digital marketing and advertising community as food for thought (these will be further explored during USEMP project pilots):

- interest graph is the data model of a set of topics of interests based on the history of pages visited by the user
- connections between the interests are decided: a) algorithmically (for example if topics are identified with a page they can be connected with a minimum weight) b) as part of an ontology defined by advertisers
- weights of connections between the various interest are decided based on the history of visited pages in the browser and additional criteria (for example each topic in a page can have a defined weight from its publishers or the time spent in a page can also affect weights)
- example algorithm for computing the graph is can be the family of ant-colony optimization algorithms and the principle of stigmergy where:
 - all edges have weights modeled as digital pheromones
 - all digital pheromones strength decays gradually in time (“evaporate”)
 - if a user visits a page the digital pheromones connecting nodes to its identified interests are increased by an amount related to the amount of time a user spends on the page
- it is envisioned that different algorithms will be developed for the computation of the interest graph
- all personalized ads are expected dynamic javascript and include a loader part where the loader may requests if a set of interests are included in the user interest graph from the corresponding browser API; for each request they receive a unique transactionID and the browser registers the request
- for developing novice business models where part of the advertising revenue can be shared with the end-user the registered transactionIDs can be used - for example a blockchain database can be generated to maintain the transactionIDs between end-users, publishers and advertisers and be used for auditing and reconciliation purposes
- publishers add json-ld descriptions in their pages to describe context for different applications and advertising (for example IAB categories) so that these can be used by the interest graph computational algorithm

An additional consideration is the generalization of the property graph model for useragents so that different applications that require personalization can be developed based on the premise of accessing a locally accessible & computed version of the end-user interest graph for a specific domain (for example books interests’ graph).

The overall proposed concept for a useragent-centric advertising scheme is further described in the following Figure. It is envisioned that a number of W3C technologies will be involved to develop and evaluate this newly proposed framework :a) a standardization of the interest graph ontology & data model, b) a standardization of the useragent API and platform bindings for offering access to the interest graph smart ads

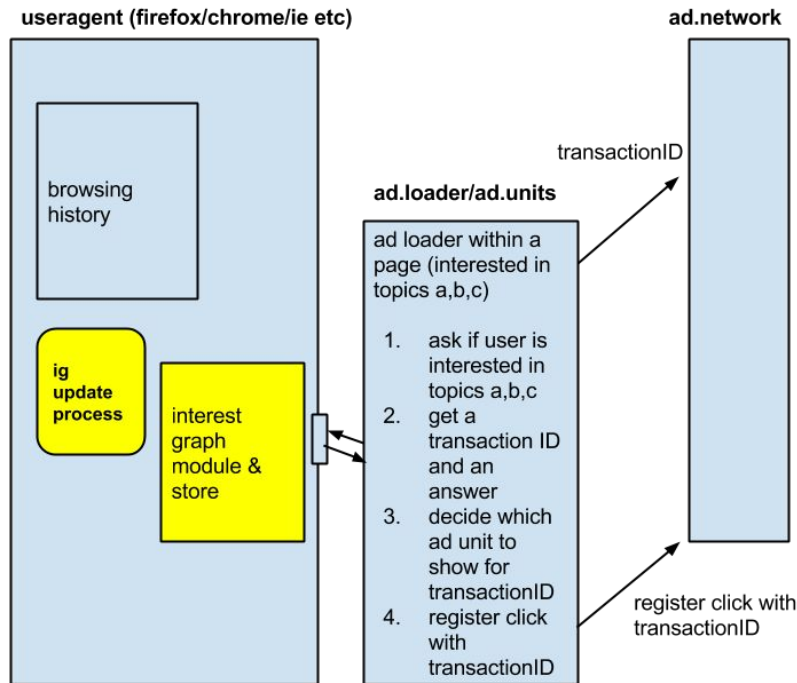


Fig.2 An overview of the proposer user-agent advertising scheme

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5. Additional **USEMP reports** are available at: <http://www.usemp-project.eu/documents/deliverables/>