

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository:<https://orca.cardiff.ac.uk/id/eprint/128383/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Komorowski, Marlen , Coppens, Paulien, Van den Broeck, Wendy and Braet, Olivier 2016. Lowering the barriers for online cross-media usage: Scenarios for a Belgian single sign-on solution. *Telematics and Informatics* 33 (4) , pp. 916-924. 10.1016/j.tele.2016.02.005

Publishers page: <https://doi.org/10.1016/j.tele.2016.02.005>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



Accepted Manuscript

Lowering the barriers for online cross-media usage: Scenarios for a Belgian single sign-on solution

Marlen Komorowski, Paulien Coppens, Wendy Van den Broeck, Olivier Braet

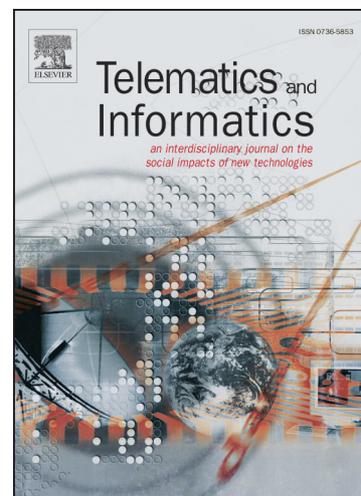
PII: S0736-5853(15)30118-0
DOI: <http://dx.doi.org/10.1016/j.tele.2016.02.005>
Reference: TELE 772

To appear in: *Telematics and Informatics*

Received Date: 10 December 2015
Accepted Date: 21 February 2016

Please cite this article as: Komorowski, M., Coppens, P., den Broeck, W.V., Braet, O., Lowering the barriers for online cross-media usage: Scenarios for a Belgian single sign-on solution, *Telematics and Informatics* (2016), doi: <http://dx.doi.org/10.1016/j.tele.2016.02.005>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



TITLE PAGE, VITAE and ACKNOWLEDGEMENTS**TITLE PAGE:****Lowering the barriers for online cross-media usage: Scenarios
for a Belgian single sign-on solution**

Marlen Komorowski^{a*}
marlen.komorowski@vub.ac.be,

Paulien Coppens^a
paulien.coppens@iminds.be,

Wendy Van den Broeck^a
wvdbroec@vub.ac.be,

Olivier Braet^a
olivier.braet@vub.ac.be

^a *iMinds-SMIT, Vrije Universiteit Brussel. Pleinlaan 9, 1050 Brussels, Belgium*

* *Corresponding author: marlen.komorowski@vub.ac.be*

ACKNOWLEDGEMENT

This research project has been supported by the Flemish Agency for Innovation by Science and Technology through the MiX-ICON project Media ID:

<https://www.iminds.be/en/projects/2014/03/20/media-id>

ACCEPTED MANUSCRIPT

Lowering the barriers for online cross-media usage: Scenarios for a Belgian single sign-on solution

Abstract:

The digitization has led to an ecosystem in which an online media portal has become an essential extension of traditional media and users are enabled to consume news and entertainment via different platforms. These evolutions pose some challenges for the media companies in terms of shifting business models, but they also bring them new possibilities in managing their relations with users. An important first step here is to identify the online users and turn anonymous users into registered ones. Today, however, there is a myriad of logins and passwords one needs when surfing the web, which can make the management of these logins a challenge for users. The Belgian media industry seeks to deal with this challenge by introducing a collaborative nation-wide single sign-on (SSO) system across their digital platforms, called Media ID. This paper provides four scenarios describing the potential outcomes in terms of user adoption and hence market potential of the integration of a SSO service into a regional media system. The scenarios are built upon focus group interviews with media users and in-depth interviews with the stakeholders from the involved media companies. They describe to what extent the innovative service can influence user's online media consumption behaviour but also to what extent the media companies can implement it, two factors that mutually shape each other. In the discussion of the scenarios, requirements to ensure the broad applicability of a SSO service by both media users and media organizations are identified.

Key words:

Media innovation; Single sign-on; Identity management; Scenario analysis; Forecasting; Qualitative user research

1. Introduction

The media industry is in the midst of disruption resulting from the shift in content from analogue to digital representation (digitization) and the ability of the Internet to deliver all forms of digital content in an unbundled fashion, together with real-time, interactive capabilities (Overdorf and Barragree, 2001). Digitization is especially driving transformation in how media are consumed (Doyle, 2002). Both print media companies and broadcasters are facing this challenge and have to rethink how to retain value in this digital environment. However, despite

its challenges, digitization offers also new ways for media companies to reduce costs and unlock more of the intrinsic value of their content (Kakihara, 2010). Also, new possibilities are created for media organisation to manage the relations with their customers and create a personalized media experience. An important first step here is to identify the online users and turn anonymous users into registered ones. However, within the divers media ecosystem, users have many ways and platforms to consume news, information and entertainment. These *silos of identity* amongst the different media organisations, services and platforms hardly interoperate and make it necessary for the user to create and hold multiple identities and profiles. This multitude of logins and passwords one needs when surfing the web can make the management of these logins a challenge. The registration, especially when obligatory, can form a barrier for the users to visit a website and adopt cross-platform usage. The Belgian media industry tries to tackle the challenges of the digitization and tap into the opportunities by integrating an innovative collaborative nation-wide single sign-on (SSO) system across their digital platforms, called Media ID (“Media ID,” n.d.). The SSO service aims to provide a common federated identity management framework for user authentication and advanced user management for a diverse range of major players in the Belgian media industry. With the launch, key brands of all media stakeholders (print as well as broadcasting) integrated the SSO service into their digital platforms. They hereby give Media ID the potential to have a market-wide impact by enabling the creation of value added services for the entire media industry. This project is unique worldwide, both in its collaborative nature and in the representation of different media sectors.¹

However, besides its disruptive potential, the actual outcome of this project is uncertain as both user adoption and the outcome of providing new value-added services within the stakeholders’ digital offer can be questioned. The stakeholders have to deal with this uncertainty while developing business strategies within this new SSO system. This paper focuses on limiting the uncertainty. The research question is: **Which impact can a SSO service have on the**

¹ The only quite similar initiative, which could be identified, is the Piano Media project (“Piano 12: Project Piano,” n.d.). This project, set up within the Slovakian publishing industry, addresses a payment system to provide paid access to small parts of a publisher’s site with one bill. However, a direct comparison seems not viable for the Media ID initiative as the Piano project is only a service towards media companies. Media ID however, includes also deep collaboration activities and data exchange between the participating stakeholders.

consumption behaviour and on the media industry? And which are the requirements to reach the best possible outcome for both users and media organizations? The service can enable the whole Belgian market system, which is based on the dynamics between the organisations and users (Hanssens et al., 2003). Therefore, we develop, based on user focus groups and interviews with all involved media organizations, future scenarios describing the potential outcome in terms of user adoption and hence market potential of the integration of a SSO service. The paper is structured as follows. The first part explains the concept of a SSO service as a media innovation. This is followed by the methodology section, in which we elaborate upon forecasting an innovation and the conducted user focus groups and expert interviews. Within the third part, the different scenarios are presented and discussed. The paper concludes by defining the user and professional requirements for a successful media SSO service.

2. The context of SSO as a media innovation

2.1. A single sign-on solution

The large number of online platforms and services that exists today, makes the management of online identities, user names and passwords a challenge (Stobert and Biddle, 2014). This creates a *password fatigue* among many users (Dhamija and Dusseault, 2008; Jøsang et al., 2007). Users cope with the overload of passwords in multiple ways, often by reusing the same or similar and often weak passwords for multiple accounts (Gaw and Felten, 2006; Stobert and Biddle, 2014). However, this can pose some serious security risks (Maler and Reed, 2008; Preuveneers and Joosen, 2015). Others write their passwords down or use password managers to keep track of them (Stobert and Biddle, 2014). Single sign-on systems can form a solution for the password management challenge.

SSO is widely understood as a session/user authentication and authorization process that permits a user to enter one name and password to access multiple applications (Pashalidis and Mitchell, 2003). *Authentication* is the process of verifying the identity claimed for by a system entity (Shirey, 2007). *Authorization* is the right or permission that is granted to a system entity

to access a system resource (Shirey, 2007). The SSO mechanism permits a user with one single authentication to access all content where he has access permission for after a login at one of the components and eliminates further prompts when they switch applications during a particular Internet session (Hursti, 1997). Multiple single sign-on solutions bridging different companies already exist in the market, with Facebook Connect, Google+ and OpenID as well-known services. Additionally, with the boom of software-as-a-service, web-based single sign-on mechanisms are being used by more and more commercial websites (Miculan and Urban, 2011). However, previous studies reveal that users are still rather un- or ill-informed about SSO systems (Stobert and Biddle, 2014). Also, there is a lack of trust with users not wanting uninvolved actors to be able to see their activities. Especially towards big online players such as Google or Facebook who already collect a lot of personal information, trust is low (Stobert and Biddle, 2014). This indicates a need for more independent SSO systems. The Belgian media organisations respond to these requirements by building a local SSO system for the Belgian media industry. However, as neither user authentication and authorization nor SSO are new to the media industry, one could ask the question: What makes Media ID as SSO media service in Belgium innovative?

2.2. A local SSO system as a media innovation

Most of the widely used definitions of innovation focus on novelty and newness (with an element of valorisation or utilisation) (Johannessen et al., 2001). Innovation is a concept central to economic growth and can be a source of sustained competitive advantage to businesses (Anderson et al., 1997; Schumpeter, 1934). From the managers' perspective, the primary purpose of innovation is to introduce change in the organisation to create new opportunities or exploit the existing ones (Leifer, 2000). Bleyen et al. (2014) propose a typology, in which they differentiate between process innovation and product innovation and where they situate consumption and media innovation in the middle. The main contribution of this typology is that they hereby also incorporate the users and their new consumption patterns as a type and/or source of innovation. This is especially relevant for the media industry, where users' changing

consumption habits force organisations to change and innovate the user value proposition in order to survive. Users can drive innovation and users' perception of the characteristics of innovations can also determine their adoption. Many studies have explored the most decisive factors, of which many are in line with the five main characteristics identified by Rogers (1995): relative advantage, compatibility with the existing system, complexity, testability and visibility of the innovation.

The innovativeness of the Media ID SSO service is therefore in its collaborative nature, the nationwide scope and the bridging of different media sectors while having the potential to influence the consumption patterns of media users. There are advantages for both the media users and media organisations. For the media users, the main asset is the creation of a more frictionless online experience. Today, each time users want to consume news, information or entertainment online and/or mobile, manage media subscriptions online or access other media services, they have the possibility (or sometimes are required) to login to access the media content. This myriad of logins and passwords one needs when consuming media online, can make the management of these logins a challenge for the user. Through a secure SSO service, separated accounts are unnecessary, since users need not to fill in their username and password for each new session or when switching devices. This increases the ease of use and creates a more simplified and more secure online experience. A SSO service thus can lower the threshold for (longer) logged-in sessions at the online and mobile platforms of the media organisations, which benefits media organisations. The SSO service has the potential to turn anonymous users into registered ones and foster more and longer logged-in sessions. It thereby creates better opportunities for media organisations in managing the relationship with consumers, e.g. by creating a personalized and customized media experience and adding new services. However, even though the benefits seem apparent for both the media users and organisation, the success and the actual outcome of the introduction of a SSO service are uncertain. User adoption will not only depend on the frictionless online experience but also on the value added services offered on top of the SSO services by media organisations. On the other hand, the creation and integration of extra services will mutually depend on level of user adoption. This research

therefore has the goal to map these uncertainties and identify the requirements for success for both the media users and media organisations.

2.3. Requirements for a successful SSO solution

Multiple factors influence the acceptance and adoption of a SSO service. Security, privacy, control over the flow and sharing of personal information and an optimal quality of experience are essential (Dhamija and Dusseault, 2008; Sun et al., 2011). However, the requirements often are mutually exclusive (Jøsang et al., 2007; Maler and Reed, 2008). Even though a SSO helps in managing a multitude of online identities, registering and logging in are still often the secondary goal of users online. It is thus important to simplify the processes of authentication since “users follow the path of least resistance” (Dhamija and Dusseault, 2008, p. 25), but it is important that this ‘path of least resistance’ is also the secure path. Though, the more secure authentication procedures still score low on user convenience, especially when using a mobile device (Preuveneers and Joosen, 2015). It stays a challenge to create/design an authentication process with an optimal quality of experience for the user, without losing in on security and privacy.

3. Research methodology

3.1. Forecasting the impact of an innovation

Forecasting is used to cope with uncertainty in areas with long planning horizons, such as the introduction of an innovative new service, like Media ID (McDowall and Eames, 2006).

Forecasting has been widely accepted not only in scientific literature but also especially within companies to plan the market introduction of a new product or service (Hanssens et al., 2003).

There is a wide variety of forecasting methods available that can build both on quantitative and qualitative analysis.² Even though many methods have been developed and tested, finding the right forecasting method is still very difficult, especially for the media industry given the on-going transformations (Meade and Islam, 2006). In order to grasp the on-going processes and its

² See MEADE & ISLAM (2006) for an extensive analysis of forecasting methodologies for innovations.

pathways sufficiently, we combine forecasting with scenario thinking. Forecasting shows the major themes in a specific domain, while scenarios cover the possible future worlds considering the potential behaviour of all involved groups (Meade and Islam, 2006). Scenarios are defined as ‘hypothetical sequences of events constructed for the purpose of focussing attention on causal processes and decision points’ (Kahn and Wiener, 1968). Further, scenarios contain elements that can be judged with respect to importance and desirability (Greeuw et al., 2000). The scenario methodology used in this study implements these features. We build the scenarios on decisions and behaviour with specific attention on the desirability for the success of a SSO service of the involved media organisations and media users. Since both media organisations and users play an important role in the development and success of new ICT-based information, communication, transaction and entertainment services (Meade and Islam, 2006), we gathered data from media users as well as from the media stakeholders to develop the scenarios.

3.2. Data collection

Data was collected from the users’ side and the media stakeholders’ side. First, three explorative qualitative focus group interviews (n=22) with media users were organized to provide input to the developed scenarios. The focus was on practices and attitudes towards privacy, identity management and personalization/profiling as well as expectations with regard to a media SSO service. We chose to organize focus groups as this method is an easy way to quickly gather in-depth information and it is an adequate tool to investigate user motivations (Mortelmans, 2007). The three user focus group interviews were organized in July/August 2013. A purposeful sampling (Sandelowski, 1995) was applied, including a ‘maximum variation’ and a ‘phenomenal variation’. Maximum variation implies obtaining a maximal spread in characteristics. Phenomenal variation stands for a variation in certain phenomena that are relevant for the research. We distinguished the respondents based on their level of media consumption. The first focus group contained participants with a high media consumption³, the

³ These users have multiple subscriptions (paper, digital) to a newspapers/magazines, they visit multiple news websites on an almost daily basis and use social media to keep up with the latest news items.

second with average⁴ and the last group with a mixture of average and low intensity media consumption⁵. The respondents were between 20 and 70 years old. 4 participants were students, 16 were employed and 2 were retired.⁶ All 2-hour focus group interviews were recorded on video and transcribed ad verbatim. For the analysis, a grounded theory approach was applied (Glaser and Strauss, 1967).

Second, a series of in-depth interviews was conducted with media stakeholders (n=12) at the end of 2013. In order to develop future scenarios, a semi-structured interview protocol was used. This led to comparable responses across the media stakeholders, while providing the interviewer flexibility in focussing on areas of particular relevance to each interviewee (Rosenthal and Rosnow, 1991). The direct goals and (digital) strategies were discussed, as well as their motivations and major impact factors related to the SSO service. The media stakeholders represented all participating media companies in the Media ID project and included newspaper publishers, magazine publishers and broadcasters. Together these companies cover all market-leading Belgian media organisations. The interviewees were the senior-level management employees in charge of the implementation of the SSO service.

4. Results: The four scenarios of a single sign-on solution

4.1. Scenario development

In our analysis, we combined the opinions and motivations of the media users with the opinions and strategies of the media stakeholders by selecting themes that recurred across the two groups. Thereby, two similar extremes on both group's sides have been identified: either users and media stakeholders are looking forward to adopt or to implement the SSO service in an "advanced" way or they are not convinced of the new SSO service and are planning to adopt or implement the service in a "state-of-the-art" way (advanced vs. state-of-the-art adoption/implementation). The uncertainty of the future of a SSO service can be synthesised

⁴ These users have a subscription (paper, digital) to a newspaper/magazine and they frequently visit a news website.

⁵ These users don't have a subscription (paper, digital) to a newspaper/magazine and they rarely visit news websites.

⁶ Within each group, we tried to have respondents with a mixture of socio-economic characteristics but there was, however, an over-representation of highly educated and male respondents.

into these two axes, forming the framework for constructing scenarios (see Figure 1). The consequences of a state-of-the-art adoption/implementation and of an advanced adoption/implementation are described in detail within the analysis of the scenarios.

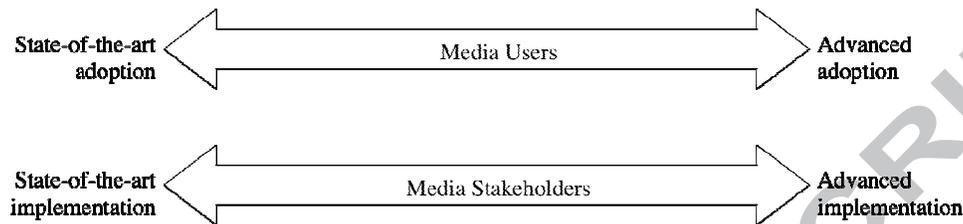


Figure 1 - The impact of a media SSO service: The axes of uncertainty.

4.2. Scenario analysis

Using the axes of uncertainty, a scenario matrix was created to depict the varying levels of how a SSO service could transform the strategies and behaviour of the media users and media stakeholders (see Figure 2). The scenarios are hypothetical and describe four different pathways based on factors of importance and desirability. With these scenarios, we attempt to provide a set of novel and divergent but also plausible stories on how the digital media landscape could be influenced by the introduction of a SSO service. Four scenarios are identified and defined: (A) the SSO fatigue scenario, (B) the SSO normalisation scenario, (C) the SSO polarisation scenario and (D) the SSO empowerment scenario.

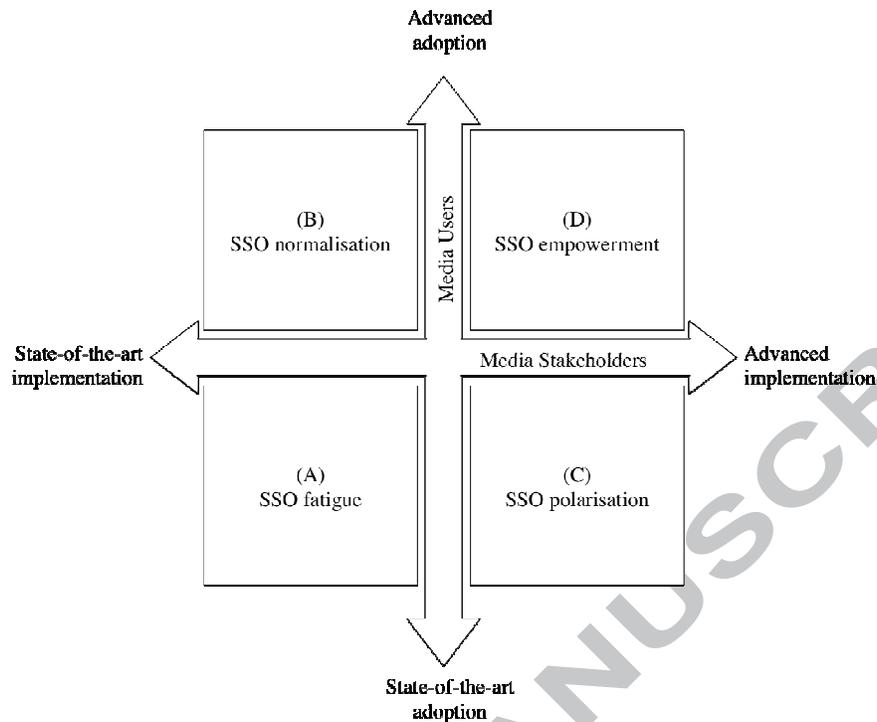


Figure 2 - The impact of a media SSO service: The four scenarios.

4.2.1. (A) SSO fatigue

The first identified scenario, and least desirable, is the SSO fatigue scenario. Along the media users' axis this means that the digital media users will partly adopt the SSO service but this is limited to a "state-of-the-art adoption". Users' interaction with the digital offerings of the media stakeholders will be habitual, functional and relatively stable. Users might be obliged to transfer from (a) local media account(s) to the SSO for different brands, but sign-on sessions are avoided. Trust in the SSO service will be low as not many people use it for more than what they did with their original accounts (e.g. handling subscriptions, receiving newsletters, participation in competitions). Because of the lack in trust in how their data will be used, many SSO users might sign up using fake contact data. This user behaviour could be observed in the focus groups, where media users elaborated on obliged logins:

"I still think that is really annoying. Well, sometimes it's just necessary." (Tom, 30, researcher) / *"Actually, I detest websites where a login is necessary."* (Jef, 36, research scientist) / *"On some websites, I'm not afraid to use a fictitious spam Gmail account to register and then all the advertisements are sent to that address."* (Daan, 38, consultant)

Along the media stakeholders' axis, the SSO fatigue scenario will result in the implementation of the SSO service by the participating media brands and over the time some additional brands will be added. However, the implementation will be limited, as the media stakeholders will not use the service to innovate. The digital activities of the media stakeholders will be in many ways an extension of today's digital media environment. The media stakeholders are reluctant to make risky progressive business decisions and add new value-added services and digital pay plans but focus on already integrated progresses. Therefore, the SSO service is solely seen as cost efficient identity manager but not as enabler. In the interviews many media stakeholders focused on simple cost-reduction and tentative approaches to the SSO service. Some even stated that they are only participating because their competitors are joining and they are hesitating:

“The safer approach for us is to include in the beginning only our three biggest brands. After evaluation we will consider at some point to include all ten brands.” / “The SSO service will reduce our costs for creating and upholding our own sign-on and payment system. We hope the SSO service will at least be a zero sum game for us.” / “The reasons for SSO: first, payment solution, second, be in the collaboration! Our goal is just to break even with the operation of the SSO system.”

4.2.2. (B) SSO normalisation

The second identified scenario is the SSO normalisation scenario. Along the media users' axis, this will result, in contrast to the SSO fatigue scenario, in enabled digital media users who will not only adopt the SSO service as a login system but the SSO service will also readjust their online media behaviour. The amount and duration of logged-in online sessions will increase. The easy and secure online payments across various media brands positively affect media users' willingness to pay. Existing accounts will be transferred to the SSO service and, additionally, people who never used account options before will now register. Trust in the SSO service will be high. Within the focus groups media users saw advantages and expressed an interest in exploring new cross-platform login services:

“(SSO) can be handy. You don't have to manually login every time or create a new login.” (Robin, 23, student) / “I would like to see it as the Google system. It always knows who I am and also my preferences. That would be my expectation of such a thing.” (Daan, 38, consultant) / “Although it probably is already the goal of the SSO service, it will eventually lead to more effective and easier payment methods for articles etc.” (Simon, 22, student)

Along the media stakeholders' axis, the SSO normalisation scenario will result only in the implementation of the SSO service into the planned brands and maybe some additional brands over time. Despite the steady rise of registrations and logged-in sessions, the media stakeholders are hesitating to broaden the scope of the SSO service and add additional online services and brands. Since there is a reluctance to make risky progressive business decisions, the digital activities of the media stakeholders will be a simple extension of their current digital media strategies. This stands in contrast to the expectations of the users as explained above. The media stakeholders predicted that outcome in the interviews and are hesitating:

“SSO will help to increase the number of registrations and the number of logging in but not the revenue directly.” / “A SSO service will not push media users exponentially and we need first the proof-of concept”

4.2.3. (C) SSO polarisation

The SSO polarisation is the third identified scenario. This scenario represents a future where on the axis of media users the adoption of the SSO system happens on a “state-of-the-art” level. As described in the SSO fatigue scenario, most of the media users will be transferred from former accounts to the SSO and slowly additional media users will sign up, but engagement and interaction with the media brands will be low, as well as the trust in the SSO system. Within the focus groups media users expressed their distrust in a SSO service as being just valuable for the media stakeholders but not for the users themselves. They had doubts about the additional value to be offered and expressed privacy concerns:

“I prefer not to participate in that, except for services who also have something extra to offer.” (Sarah, 27, researcher) / “I just don't see many advantages. Then there should be a whole package of advantages to convince me, or to convince the consumer.” (Simon, 22, student) / “Who will then have access to your data?” (Dana, 31, researcher) / “Then I don't think all the partners should have my address because I have a subscription to one newspaper.” (Sandra, 43, content specialist) □

The media stakeholders' axis on the other hand will tend to the advanced implementation of the SSO service, which means that additional services, media brands and new digital pay plans will be integrated into the SSO service. The media stakeholders seek value from the additional user data gathered and try to add personalized content and services. Digital pay plans in the SSO

service can have a positive effect on the long term, since it can help users to get more accustomed to new media services and the accompanying new digital media payments. This scenario can lead to a discrepancy in the costs of new content and service offerings and actual revenue of SSO service. Still, media stakeholders will try to trigger media users in using the SSO service and explore the necessary new business strategies. The change in consumption towards digital platforms is reality and media organisations have to tackle that issue. Even though media users will not follow in this scenario, results of the advanced implementation of the SSO service can be profitable on the long term. Within the media stakeholder interviews, the importance of logged-in sessions has been stressed:

“We have to trigger users through for example contests: If you want to win something you have to register.” / “The most important is to make people be logged in all the time.” / “If we do not succeed it is going to be a disaster. It is very hard to have a second chance in the digital age.” / “Cross-platform surfing is today already very important for news sites. Statistics about incoming and outgoing traffic shows that.”

4.2.4. (D) SSO empowerment

The SSO empowerment describes the fourth, and most desirable, scenario. Along the media user axis, this will result in enabled digital media users who will not only adopt the SSO service as login system, but the service will also readjust their online behaviour as continuously new value added services are linked to the service. Trust in the service is high, all existing accounts will be transferred to the SSO service and people who never used account options before will sign up with the new service. The SSO service makes the payment easier, faster and more secure, fostering online payments. This can be reflected in the statements of the media users in the focus groups:

“The added value is that you find what you are looking for at once and that you can swap very fast between the different sources.” (Hendrik, 41, project manager) / “It would be an asset for me, and I think it would be really interesting, if there would be a mega media subscription with which I can access everything with one login for a one fixed price.” (Daan, 38, consultant)

Along the media stakeholder axis, this scenario will result in the advanced implementation of the SSO service. Innovative services will be built upon the SSO service and new revenue sources sought. The growing number of logged-in user sessions strengthens media stakeholders’

relationships with consumers, among others by customizing and filtering the content offer for each individual user. Additional media brands and services will be integrated over time, including a large number of smaller publishers and content providers. The SSO service will become the only login system for all available media websites, applications and services. In this scenario, the local media stakeholders as the trusted brands maintain a strong position against other big international players who are entering local markets (e.g. Netflix). This is in line with the expectations of many media stakeholders. They stated:

“The idea is that at some day we can have targeted advertising.” / “The next step of the SSO system is to achieve quality data and services like payment transactions.” / “We hope to make money through profiling our users. Paying readers are more important now and the relative importance of advertisers is diminishing on the internet.” / “Logging in is already the first step towards payment for us.”

5. Conclusions

5.1. Discussion and recommendations

As the process of digitization evolves and matures, it is critical for media organisations to understand the evolutions in the media business landscape. It is of vital importance to invest in digital in order to accelerate the transition and build a sustainable business model for the future. A collaborative SSO service is able to support this transition. A SSO service can enable not only the media stakeholders but also the media users, hereby creating new value for both sides of the market. Nevertheless, it is difficult to predict the real impact of a SSO service. To map and limit the many uncertainties, we used foresight scenarios to explore plausible futures for both the media users and media organisations. Four scenarios were distinguished: the SSO fatigue, the SSO normalisation, the SSO polarisation and the SSO empowerment scenario. It is important to remember that those four scenarios are developed to help exploring alternative, plausible futures. It is not about accurately predicting the future, but about identifying the opportunities and possible threats to limit the uncertainties and make better decisions. It is very unlikely that the future will entirely resemble a single scenario. Instead, the future is most likely to be an amalgamation of scenarios, evolving differently for varied sectors and user groups. Still, the

impact of a collaborative SSO system on the media industry will mainly depend on the level of adoption of it by the media users (state-of-the-art adoption versus advanced adoption) and the level of implementation of the service by the media stakeholders (state-of-the-art implementation versus advanced implementation). The media user focus groups and the media stakeholder interviews have shown, that both tendencies are represented. Some media users are seeing the value in a SSO media service and are eager to test new services, while others are sceptical because of security/privacy concerns. Some media stakeholders are very enthusiastic and are planning to implement new services and create new revenue streams, others are more reluctant and are waiting for proven success before being active. The outlook will be highly determined both by the choices users and businesses make on using the SSO service. It is not only possible to distinguish between the different behaviours of the two distinct groups as shown in the scenarios, but also draw conclusions about what the actual user and business requirements are for a successful SSO service in the Belgian media ecosystem.

Based on the user research findings, we identified five different user requirements or desires users have with regard to the SSO service: (1.1) ease of use of the service, (1.2) respect for users' privacy through transparency and user control of data, (1.3) the need for (extra) added value within the SSO service, (1.4) the possibility to pay through the SSO and (1.5) security measures. These user requirements need to be taken into account for an advanced user adoption of a SSO service. In line with the media user requirements, we also identify three different requirements for media stakeholders in order to achieve an advanced implementation on the media organisations side: (2.1) the need to create dynamic digital content within the SSO service, (2.2) the usage of personal data through the SSO service to gain deeper users insights and offer better (personalized) services and (2.3) the creation of additional digital revenue streams. The developed requirements can help media organisations in making future decisions and guide their strategies in implementing and exploring the possibilities of a SSO service. The requirements have been depicted in Table 1 in greater detail.

(1) Media User Requirements

(1.1) Ease of use	The user can easily create and use the SSO service. The SSO service facilitates a fluent online media consumption experience, whereby actions can be performed with a minimum of clicks.
(1.2) Privacy (Transparency/Control)	The user knows which personal data can be seen or collected by which party and for which purpose. The user also has control over which personal data can be seen or collected by which party.
(1.3) Added value	The user can now experience a frictionless online media experience, whereby only one login is needed for multiple media websites and services. However, additional integrated services are a big asset.
(1.4) Payments	The user can easily and quickly make online payments, using the payment method of his choice.
(1.5) Security	The user adopts a secure and trustworthy service, in which a safe online experience and the protection of personal information and payment data are guaranteed.

(2) Media Stakeholder Requirements

(2.1) Dynamic digital content	The media stakeholders offer through SSO content and services that are mobile-optimized, customized and customizable. This means that besides the high quality media content also additional services and additional utilities are provided on the digital platforms.
(2.2) Getting to know the user	The media stakeholders collect insights into consumers' media practices, preferences and needs. Insight into these analytics can be used to create the right content, for the right group, on the right platform and at the right time.
(2.3) Digital revenue streams	The media stakeholders foster through the collaborative SSO online payments by providing a secure and user-friendly payment system across media brands, and also introduce new payment plans (e.g. micro payments for newspaper articles).

Table 1 - Requirements and recommendations for a successful SSO service**5.2. Future research**

The Media ID service as collaborative SSO service for the Belgian media industry has been launched in the end of February 2015. However, this was a *soft launch* with a limited number of partners and limited integration of extra services to explore possible flaws in the service and to create the opportunity to eliminate problems. In the near future, when the service is fully launched and the course of the SSO service will be observable, it will be possible to further refine the scenarios and assess their validity.

6. References

- Anderson, P., Tushman, M., O'Reilly, C., 1997. Technology Cycles, Innovation Streams and Ambidextrous Organizations, in: Tushman, M., Anderson, P. (Eds.), *Managing Strategic Innovation and Change*. Oxford University Press, New York.
- Bleyen, V., Lindmark, S., Ranaivoson, H., Ballon, P., 2014. A typology of media innovations: Insights from an exploratory study. *J. Media Innov.* 1. doi:10.5617/jmi.v1i1.800
- Dhamija, R., Dussault, L., 2008. The Seven Flaws of Identity Management: Usability and Security Challenges. *IEEE Secur. Priv.* 6, 24–29. doi:10.1109/MSP.2008.49
- Doyle, G., 2002. *Understanding Media Economics*. SAGE Publications.
- Gaw, S., Felten, E.W., 2006. Password Management Strategies for Online Accounts, in: *Proceedings of the Second Symposium on Usable Privacy and Security, SOUPS '06*. ACM, New York, NY, USA, pp. 44–55. doi:10.1145/1143120.1143127
- Glaser, B.G., Strauss, A.L., 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Transaction Publishers.
- Greeuw, S.C.H., Van Asselt, M.B.A., Grosskurth, J., Storms, C.A.M.H., Rijkens-Klomp, N., Rothman, D.S., 2000. Cloudy crystal balls. An assessment of recent European and global scenario studies and models., *Environmental issues series*. European Environment Agency, Copenhagen, Denmark.
- Hanssens, D.M., Parsons, L.J., Schultz, R.L., 2003. *Market Response Models. Econometric and Times Series Analysis* (2nd ed.). Springer, Massachusetts.
- Hursti, J., 1997. Single Sign-On, in: *Proceedings of the Seminar on Network Security*. Helsinki University of Technology.
- Johannessen, J., Olsen, B., Lumpkin, G.T., 2001. Innovation as newness: what is new, how new, and new to whom? *Eur. J. Innov. Manag.* 4, 20–31. doi:10.1108/14601060110365547
- Jøsang, A., Zomai, M.A., Suriadi, S., 2007. Usability and privacy in identity management architectures, in: *Proceedings of the Fifth Australasian Symposium on ACSW Frontiers-Volume 68*. Australian Computer Society, Inc., pp. 143–152.

- Kahn, H., Wiener, A.J., 1968. Year Two Thousand. A Framework for Speculation on the Next Thirty - Three Years. Collier Macmillan Ltd.
- Kakihara, M., 2010. Dynamic revenue model design in online services business: two cases in Japan, in: Nelson, M.L., Shaw, M.J., Strader, T.J. (Eds.), Sustainable E-Business Management. Springer-Verlag, Berlin Heidelberg, pp. 1–12.
- Leifer, R., 2000. Radical Innovation: How Mature Companies Can Outsmart Upstarts. Harvard Business Press.
- Maler, E., Reed, D., 2008. The Venn of Identity: Options and Issues in Federated Identity Management. IEEE Secur. Priv. 6, 16–23. doi:10.1109/MSP.2008.50
- McDowall, W., Eames, M., 2006. Forecasts, scenarios, visions, backcasts and roadmaps to the hydrogen economy: A review of the hydrogen futures literature. Energy Policy, Hydrogen 34, 1236–1250. doi:10.1016/j.enpol.2005.12.006
- Meade, N., Islam, T., 2006. Modelling and forecasting the diffusion of innovation – A 25-year review. Int. J. Forecast., Twenty five years of forecasting 22, 519–545. doi:10.1016/j.ijforecast.2006.01.005
- Media ID [WWW Document], n.d. . Media ID. URL <http://www.media-id.be/en> (accessed 10.9.15).
- Miculan, M., Urban, C., 2011. Formal analysis of Facebook Connect single sign-on authentication protocol, in: SOFSEM. Citeseer, pp. 22–28.
- Mortelmans, D., 2007. Handboek kwalitatieve onderzoeksmethoden. Acco, Leuven.
- Overdorf, M., Barragree, A., 2001. The impending disruption of the publishing industry. Publ. Res. Q. 17, 3–18. doi:10.1007/s12109-001-0027-y
- Pashalidis, A., Mitchell, C.J., 2003. A taxonomy of single sign-on systems, in: Information Security and Privacy. Springer, pp. 249–264.
- Piano 12: Project Piano [WWW Document], n.d. URL <http://www.pianomedia.eu/>
- Preuveneers, D., Joosen, W., 2015. SmartAuth: dynamic context fingerprinting for continuous user authentication. Presented at the Proceedings of the 30th Annual ACM Symposium on Applied Computing 2015, ACM, pp. 2185–2191. doi:10.1145/2695664.2695908

- Rogers, E.M., 1995. Diffusion of innovations. Free press, New York.
- Rosenthal, R., Rosnow, R., 1991. Essentials of Behavioral Research: Methods and Data Analysis, 2nd edition. ed. McGraw-Hill, New York.
- Sandelowski, M., 1995. Focus on qualitative methods: sample size in qualitative research revisited. Res. Nurs. Health 179–183.
- Schumpeter, J.A., 1934. The Theory of Economic Development: An Inquiry Into Profits, Capital, Credit, Interest, and the Business Cycle. Transaction Publishers.
- Shirey, R.W., 2007. Internet Security Glossary, Version 2 [WWW Document]. URL <https://tools.ietf.org/html/rfc4949#page-9> (accessed 10.9.15).
- Stobert, E., Biddle, R., 2014. The Password Life Cycle: User Behaviour in Managing Passwords. Presented at the Symposium On Usable Privacy and Security (SOUPS 2014).
- Sun, S., Pospisil, E., Muslukhov, I., Dindar, N., Hawkey, K., Beznosov, K., 2011. What Makes Users Refuse Web Single Sign-on?: An Empirical Investigation of OpenID, in: Proceedings of the Seventh Symposium on Usable Privacy and Security, SOUPS '11. ACM, New York, NY, USA, pp. 4:1–4:20. doi:10.1145/2078827.2078833

VITAE

Marlen Komorowski is currently doctoral candidate at Vrije Universiteit Brussels (VUB). She holds two Bachelor degrees (Bachelor of Honours in International Management, Bachelor of Science in Economics and Law) and completed her Master's degree in International Communication Studies at VUB in 2013 summa cum laude. Her expertise lies in quantitative research methods as well as statistics and advanced research methodologies while focusing on media economics. Within SMIT she is involved in media related projects and is especially interested in market innovation and sector transition from a business modelling perspective.



Paulien Coppens holds a master's degree in communication sciences (2011, Ghent University) and a postgraduate degree in digital marketing and communication (2012, Ehsal Management School). Paulien joined iMinds-SMIT in September 2012, working in the user research department. She works and has worked on projects related to personalized media services and the related quality of experience, location based services and privacy.



Prof. dr. Wendy Van den Broeck joined SMIT in 2003. She is head of the user research unit at SMIT and also leads the media research team within the user research unit. Her research expertise is user experience and quality of experience of audio-visual services (i.e. interactive digital television, 2nd screen, online video consumption) and the domestication of new media technologies in a home context. She is also a professor at the communications studies department of the Vrije Universiteit Brussel.



Olivier Braet is senior researcher and project leader within iMinds-SMIT, a research institute affiliated with the Vrije Universiteit Brussel. Within national and international research projects he focuses on the economical and industrial dimensions of new information- and communication technologies. He focuses on business modelling, strategic ICT-alignment, and the management of intangible assets such as intellectual and social capital. He has served on advisory boards in ICT-appropriation decisions, did consultancy on ERP and eBusiness implementations, and conducted research on entrepreneurship.

HIGHLIGHTS

- Registration forms a barrier to visit media websites and adopt cross-platform usage.
- The Belgian collaborative single sign-on (SSO) system Media ID lowers this barrier.
- It is uncertain what influence a SSO system has on media companies and users.
- This paper provides four scenarios with potential outcomes of a SSO innovation.
- Certain requirements of a successful SSO system have been identified.

ACCEPTED MANUSCRIPT