Understanding user differences in open-source workflow management system usage intentions

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A B S T R A C T

Open-source software systems have become a viable alternative to proprietary systems. We collected data on the usage of an open-source workflow management system developed by a university research group, and examined this data with a focus on how three different user cohorts – students, academics and industry professionals – develop behavioral intentions to use the system. Building upon a framework of motivational components, we examined the group differences in extrinsic versus intrinsic motivations on continued usage intentions. Our study provides a detailed understanding of the use of open-source workflow management systems in different user communities. Moreover, it discusses implications for the provision of workflow management systems, the user-specific management of open-source systems and the development of services in the wider user community.

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1. Introduction

Over the last decade, the open source software (OSS) phenomenon has revolutionized the way in which organizations and individuals create, distribute, acquire and use information systems and services, making it an increasingly important topic for information systems researchers. Many aspects have been investigated in this vein of research, including participation in open-source development [29], business models [10], community ideology [34], motivation [6] and governance [33]. In this paper, we aim to contribute to this current and relevant body of knowledge by studying the behavioral factors that lead to individuals' acceptance of an open-source workflow management system. To the best of our knowledge, this is the first time that the acceptance of an open-source workflow management system is analyzed. Also, our study is the first that explicitly examines differences in acceptance behaviors across three different user cohorts.

Specifically, we consider the YAWL system [39] as an example of open-source workflow management system. Two reasons underpin this choice. First, the YAWL system represents a state-of-the-art open-source workflow management system that is developed based on a solid grounding in research. Also, not only has it enjoyed uptake in industry practice, but it has also generated a significant impact in academia [36]. Second, the system is supported by a wide and diversified user community that includes three distinct user cohorts: student users, academic users and professional users. This is because the YAWL system is an OSS system that aims to address three different purposes:

(i) to serve as a platform upon which researchers can prototype cutting-edge workflow technology;
(ii) to educate students on business process modeling and automation; and
(iii) to generate industry uptake.

In this respect, the YAWL system shares some commonalities with the open-source operating system GNU/Linux (whose distributions are used both in educational

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institutions to teach software and operating systems as well as in commercial environments), but differs from the majority of other OSS products (e.g. Mozilla Firefox) that target general users and do not necessarily have an educational purpose.

In this paper, we seek to examine differences in the behavioral motivations to accept the YAWL system across its three different user cohorts. Knowing how different user cohorts perceive OSS software and how these perceptions affect their individual usage decisions is important because it helps managers in charge of software acquisitions to design more effective implementation strategies and offers guidance for personalized management interventions. This knowledge is also important for providers of OSS software solutions and related services for developing effective personalized marketing strategies. Further, the open-source workflow management system YAWL that we are examining is different from traditional information systems in that it explicitly caters to different user cohorts instead of being purpose-built for a particular cohort like many other systems (e.g., DSS for decision makers, EIS for executives, TPS for operational staff). Systems that are built for a variety of users face important challenges in acceptance and usage behaviors because different stakeholders typically have multiple and often conflicting objectives and priorities and rarely agree on a set of common aims [31,51]. Correspondingly, in our paper we set out to answer the following two research questions:

(1) Which factors contribute to explaining individuals' acceptance of an open-source workflow management system?
(2) How do these factors differ across three user cohorts of an open-source workflow management system, viz., student, academic and professional users?

We proceed as follows. First, we review the literature on determinants of the behavioral intentions to use open-source systems and introduce the specific research context of our study by providing relevant background to the YAWL initiative. Then, we describe our research model and develop a set of hypotheses about the expected differences across the three user cohorts considered. Next, we describe design and conduct of our empirical study to test the model and the hypotheses. We discuss the results and identify important implications for theory and practice before concluding the paper with a review of contributions and limitations.

2. Prior research

2.1. Determinants of the behavioral intentions to use open-source systems

Much research has examined different motivating factors that lead to an individual's intentions to use an information system. Venkatesh et al. [43,45] summarize these studies. Importantly, research has shown that both intrinsic motivators such as hedonistic motives (e.g., [17]) or enjoyment [41] as well as extrinsic motivators such as outcome value expectancies (e.g., [50]), perceptions of

usefulness [12] or social motives [46] are important motivations for the behavioral intentions to use an information system. The strength of these intentions, furthermore, is also known to be dependent on people's perceived control over using the system [42], which is influenced by the technological and resource support facilities available to assist with the use of an information system.

Much of the knowledge on technology acceptance and use holds for both proprietary software and open-source software systems. Still, with the emergence of OSS as an alternative paradigm to propriety software, there are several key attributes that differentiate open-source software from proprietary systems:

- Many OSS software development efforts are provided non-for profit [4].
- Many OSS software products are provided at the expense of limited end user support, uncertain bug fixing and upgrades, and negative network externality effects that typically favor the diffusion of proprietary solutions [7].
- The quality of service provided by an OSS software product can vary greatly [14].
- OSS usage can be strongly influenced by one's socio-cognitive perception of the related open-source user community [3].
- OSS software products are often associated with greater affordances of flexibility than proprietary solutions [16], mostly due to the unconstrained access to source code, free modifications, and the potential to reuse the code in other software [9].

Still, the usage of OSS is dependent on behavioral factors not dissimilar to those of other systems, such as proprietary utilitarian or hedonic technologies. For instance, we also know that in the open-source context evaluations of usefulness and ease of use are key to understanding usage behavior [43]. The prominent theories of reasoned action and behavioral control specifically show that motivational as well as control beliefs add to our understanding of how and why users accept and continuously use technology systems. Still, there are certain peculiarities about OSS usage. For instance, some researchers have found that OSS users are motivated by specific extrinsic factors relating to future rewards such as career opportunities, knowledge gains, reputation and status [20,22], and that these factors can sometimes dominate utilitarian beliefs such as usefulness, expected performance gains or ease of use. Other studies have also shown that intrinsic motivations such as self-determination, hedonic interest or even fun add to our understanding of OSS use [18,20,52]. Other studies have shown how social factors pertaining to the OSS community [3] or ideology [34] affect people's usage behaviors.

Before the background of these findings, our interest in this study is to advance an integrative model explaining the intentions to use an open-source workflow management system that is based on an amalgamation of existing theories, and to examine this model across different user cohorts relevant to the particular system in focus. To that end, we will now detail the background of the open-source workflow management system under consideration, YAWL.