Approaching Instant Messaging (IM) by Connecting Usage Scenario and User Interaction for More Meaningful Notification

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Abstract. Communication is becoming more open than ever before. Just as the world is faced with a pandemic and people are working more from home, so has our need for instant communication increased exponentially. While instant messaging is actively being researched in a range of domains notification system is a vital element of an effective Human-Computer Interaction (HCI) not just for informing a design and implementation of the interface but also for improved and advanced interfaces. For example, for instant messaging (IM) where a tremendous number of messages through e-mail and mobile instant messaging (MIM) are received often lead to disturbing notifications scenarios to users. The primary goal of this paper is to introduce relevant research questions related to the notification domain and to suggest a new instant messaging (IM) framework to reduce this disturbance, enabling both senders and recipients to be more meaningful. The paper studies notifications from two different perspectives: (i) Usage Scenario: identifying how notification alerts are designed, managed and dealing with effects on people, (ii) User Interaction: discussing meaningfulness of the notification, the value notifications can add to users, and long-term benefits users can get from being notified. The discussion will lead to opportunities for researchers to acquire relevant knowledge, assess the mechanisms of notification and evaluate the current design frameworks.

Keywords: Information technology · Messaging · Notifications

1 Introduction

Communication can be in one-to-one or one-to-many configurations, meaning that the messaging can be between two individuals or within a group where everyone in the group can see what everyone else is sending. There is no need to maintain any type of floor control since messages are posted to the individual (or group) in the order they are received, and can be read as needed [1]. As stated by Polla et al. [2], in today's office, instant messaging apps are no longer a nice-to-have solution, but a necessity. However, the high number of notifications we get is often leading to disturbing notifications scenarios [3]. Sergio et al. [4] argues that notification scenarios must be adaptable in terms of control, prioritization, triggers, silent time, and negative effects on people. The considerations involved in designing an effective and meaningful IM UX is based on how the messages and notifications are constructed [5]. Here, users play the key role in

T. Ahram et al. (Eds.): IHIET 2020, AISC 1253, pp. 272–277, 2021.
https://doi.org/10.1007/978-3-030-55307-4_41

determining specific functions within a system. The rules must go beyond the persuasive technologies and include context-awareness using discursive analytical tools to give a unique insight into the world of notifications and the rise of computer mediated communication (CMC) [6].

This article addresses the challenges of notification scenarios by determining key factors that help development of notification systems (usage scenario), novel approaches to user notifications and effective assessment techniques (user interaction).

2 Background and Related Work

In 2016, the average mobile phone user received 56 notifications per day according to a study from Telefonica Research in Spain [7]. Notification alerts is a way for an app to notify you or send you a message that you can read without having to open the app [8]. Notifications are distractions by nature; they often bring a user's attention to a (potentially) significant event they aren't aware of or might want to be reminded of. As such, they can be very helpful and relevant, aiding, and bringing structure and order to the daily routine [9] as like to connect with users who have abandoned apps and promote engagement [10]. However, they can also prevent users from performing tasks efficiently, leaving them frustrated [11] or by demanding and seizing attention unconditionally, no matter what the user is currently doing [12].

In general, notifications can be either informational (calendar reminders, delay notifications, election night results) or encourage action (approve payment, install an update, confirm a friend request) [13]. They can stream from various sources, and can have various impacts through the use of in-browser, in-app, OS notifications and email, SMS and social messaging apps [14–18].

Previous research [19] has shown that messaging in the workplace has a number of uses and benefits, including opportunistic interactions, broadcasting of information or questions, and negotiation of availability for interaction. An instant message is regarded as a less intrusive way of interrupting than a phone call or a visit. As noted by Nardi et al. [20], it also offers users "plausible deniability", (that is, the ability to deny presence or receipt of a message, even after having read it). Cui [21] argues that rather than having notifications sent one by one as events occur, users could choose a "summary mode," with all notifications grouped into a single standalone message delivered at a time each day or every week. In a study by In-geon et al. [22] the most common issue was, by far, their high frequency, even if the messages were relevant or actionable.

In an article by Alexandra et al. [23] emphasize the importance of timely notifications. For example, by sending an important notification when it's no longer relevant, so if they are tracking an important event or announcement, you'll have to decide if the event is critical enough to disturb them at an uncomfortable time [24]. Bin, Yang and Dan [25] coined the idea to track the change of time zones and local time and adjust the delivery of notifications accordingly.

3 Approach

The primary approach of this paper is to introduce relevant research questions and future research directions related to the notification system domain. To this end, we review notifications from different angles such as by connecting usage scenarios and user interaction. These elements chosen to overlap the above mention topics being applicable to all facets (see Fig. 1).

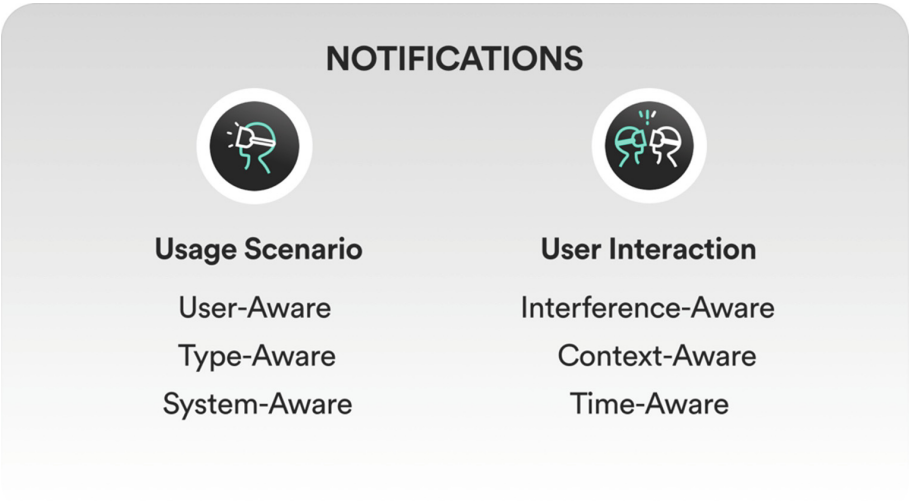

Fig. 1. Queries on notifications.

3.1 Usage Scenario

The central question that this article asks, then, is: How are notification alerts designed, managed and dealing with effects on people in different scenarios? (i.e. how are notifications initiated, controlled, communicated and experienced?). Therefore, we need to think about identifying key issues that aid in building a pluralistic notification system. Thus, we pose these following queries:

- User-Aware: Does this vary depending on who the message is between? (i.e. a colleague, friend, acquaintance, a stranger or a love interest).
- Type-Aware: Does this vary depending on the type of notifications? (i.e. User-generated, triggered, in-browser, in-app, modals, chatbot).
- System-Aware: Does the nature of notifications vary depending on the system? Is it reusable? (i.e. a status, a like, a location, a comment, a private message).

3.2 User Interaction

HCI considers user interaction as to how the user acts on the system and how the systems act on the user. In spite of the common perspective, here we look at notifications from a more holistic consideration of notification systems, where it emphasizes the meaningfulness of the notification, values that notification can add to users, and the longer-term benefits that users can get from being notified.

- Interference-Aware: A notification is a meaningful alert. However, it can distract the user. Hence, the main characteristic of a notification is that it should be non-interfering [26].
- Time-Aware: A good notification should be as timely as possible but effective at the same time [27].
- Context-Aware: A location-based push notification is context-aware [28, 29]. They can alert you in case you are in the vicinity of the particular event or place.

4 Summary and Discussion

The biggest problem with many application notifications is that the benefit doesn't outweigh the cost—the information they offer isn't worth pulling your attention at that moment [30]. Notifications should provide a valuable service to the users, and only in that case the user will perceive them as something deserving their attention [31].

- People seem to care more about new messages from close friends and relatives, notifications from selected colleagues during working hours, bank transactions and important alerts, calendar notifications, scheduled events, alarms, and any actionable and awaited confirmations or releases.
- People seem to care less about news updates, social feed updates, announcements, new features, crash reports, web notifications, informational and automated messages in general [32].

5 Conclusion

This paper has presented a new perspective on notification design considerations that provides a grounding for the interpretation and measurement of the need of meaningful and distracting-free notification experience. Aside from the suggested notification queries, we would like to evaluate whether and how IM UX changes the behavior of IM users, in particular large group messaging and media switching. By individuating strategies for notification design for more meaningful user experiences, we aim towards identifying opportunities for implementing the concept within modern IM systems in HCI settings.

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