Why Developers Are Slacking Off: Understanding How Software Teams Use Slack

Bin Lin
Eindhoven University of Technology
Eindhoven, The Netherlands
b.lin@student.tue.nl

Alexey Zagalsky
University of Victoria
Victoria, BC, Canada
alexeyza@uvic.ca

Margaret-Anne Storey
University of Victoria
Victoria, BC, Canada
mstorey@uvic.ca

Alexander Serebrenik
Eindhoven University of Technology
Eindhoven, The Netherlands
a.serebrenik@tue.nl

Abstract
Slack is a modern communication platform for teams that is seeing wide and rapid adoption by software development teams. Slack not only facilitates team messaging and archiving, but it also supports a wide plethora of integrations to external services and bots. We have found that Slack and its integrations (i.e., bots) are playing an increasingly significant role in software development, replacing email in some cases and disrupting software development processes. To understand how Slack impacts development team dynamics, we designed an exploratory study to investigate how developers use Slack and how they benefit from it. We find that developers use Slack for personal, team-wide and community-wide purposes. Our research also reveals that developers use and create diverse integrations (called bots) to support their work. This study serves as the first step towards understanding the role of Slack in supporting software engineering.

Author Keywords
Software Development; Collaboration; Slack; Bots; Social Media

ACM Classification Keywords
H.5.3 [Group and Organization Interfaces]: Computer-supported cooperative work
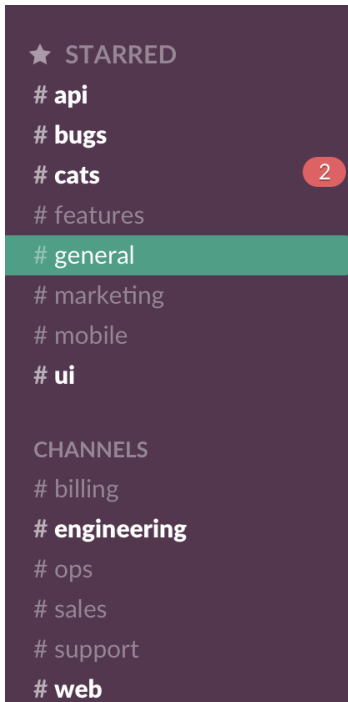
Introduction

Slack is playing an increasingly significant role in shaping the way developers collaborate and communicate. In just two years, it has gained more than 1.1 million daily users and over 900k integrations[1]. Slack not only facilitates team messaging and archiving, it also supports a wide plethora of integrations to external services and bots (e.g., GitHub, Asana, Jira, Hubot). Moreover, Slack is disrupting and shaping developers' activities and practices within the modern, social, fast-moving and sometimes overwhelming development environment [3].

Understanding **how** and **why** developers use Slack to support their work is essential to gain insights into modern software development practices, and its collaborative aspects. Other knowledge workers are also adopting Slack, findings from this study may also prove useful for other domains. In this exploratory study, we aim to understand how Slack and its integrations are used by developers. Our study is guided by the following research questions:

RQ1: What do developers use Slack for and how do they benefit?

RQ2: What bots do developers use and why do they use them?

We conducted two surveys with developers who adopted Slack and/or used bots, and received 104 combined responses. We found that developers use Slack for different purposes, which can be categorized as **personal**, **team-wide** and **community-wide** purposes. This study sheds light into the benefits Slack brings and also into the role of bots in software development teams and processes. We conclude the paper with directions for future work.

Background

Social media has disrupted the way developers work, collaborate, and communicate [3]. Benefits include more user involvement, simplified project management and coordination, and transparency of software development activities. In addition to coordinating software development, developers also use social media to enhance their programming skills and manage their personal reputations [2].

Furthermore, modern communication tools, such as instant messengers and IRC, provide integrations with bots, thus enriching these applications with a command-line interface capable of non-IM related tasks [1]. These bots are created to execute automated tasks without human intervention and assist in repetitive tasks. In the software development context, bots have been used to assist with information retrieval [4] (e.g., error logs), and tasks such as image processing for computer vision applications.

Although some examples of bots have been used for many years, the adoption of Slack bots arouses high attention due to much easier integration of services that Slack has enabled. Indeed Slack in some ways can be compared to a "marketplace for apps" as Slack users can now easily avail of the many integrations that Slack provides. There has however been very little research on the role these bots play in collaborative software development activities, and thus our study investigates which ones are used and why.

Methodology

For our exploratory study, we deployed two surveys with open-ended questions to developers who adopted Slack. For the **first survey**, we targeted software developers who use Slack. We promoted it to 30 development-related Slack teams (that are publicly open) and through Twitter. We re-

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[1] http://techcrunch.com/2015/06/24/as-slack-hits-1m-daily-users-and-900k-integration-installs-it-hires-april-underwood-as-head-of-platform/

Purposes	Times being mentioned
Personal benefits	
Discovery and news/information aggregation	11
Networking and social activities	4
Fun	6
Team-wide purposes	
Communication	75
Team collaboration	14
Customer support	4
Dev-ops	20
Community support	
Participation in communities of practice	20

Table 1: Survey results of what developers use Slack for.

ceived 53 responses to the first survey[2]. From the analysis of this survey, we realized that bots played a significant role in software development processes. Thus, for a **second iteration of the survey**, we refined some of the questions[3] and focused the distribution of it to developers that customized Slack bots—specifically we emailed 650 developers who forked or starred the "hubot-slack" project on GitHub[4]. We received 51 responses to this second survey.

To **analyze** the open-ended responses, we followed a qualitative analysis method: we manually coded the responses, categorized each response, and iteratively formed emergent themes. Some **limitations** exist in this study. Firstly, we specifically targeted unique populations of developers (those that use Slack for the first survey and those that furthermore customized bots in the second survey). Furthermore, we targeted specific teams that are publicly using Slack or customizing bots, and the respondents that willingly answered the survey may have introduced an additional bias. The questions to our survey may also have been leading and we may have been biased in our analysis. However, we discussed our findings with teams that use Slack and our findings resonated with these developers.

Findings
To illustrate different aspects of each theme, we provide selected participant quotes using anonymized identifiers (SA# and SB# for participants from the two surveys).

What do developers use Slack for and how do they benefit? Our analysis reveals that developers use Slack for *personal*, *team-wide* and *community-wide* reasons. Table 1 shows a summary of the coded survey responses.

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[2]Survey used in the first phase: http://goo.gl/forms/mnGhSZCNtY
[3]Survey for the second phase: http://goo.gl/forms/lZpGXPE6kH
[4]https://github.com/slackhq/hubot-slack

Personal benefits: Developers use Slack as a gateway to **discover and aggregate news and information.** SB15 mentions: "[I use slack for] RSS reader/bookmarking site for reliably interesting/relevant blogs (e.g. Signal vs. Noise, Rocky Mountain Institute, etc.)" They also use the instant messaging features to support **networking and social activities** with developers who share similar interests (e.g., Android developers) or have similar jobs. Surprisingly, they also use it for **fun**, as SB02 and SB07 told us they use it respectively for "sharing gifs and memes" (through Giphy, one of the most popular bots used) and for "gaming".

Team-wide purposes: Slack's messaging feature is used widely for **communication** as SB11 shares: "[I use Slack for] communication with teammates (almost exclusively, we're a remote team)." But, the way it is used varies. For some, it is used for remote meetings and note taking, for communication with other stakeholders (such as customers through live-chats) and for non-work topics. It further supports **team collaboration** through team management, file and code sharing, development operation notifications and software deployments (i.e., **Dev-Ops**) and team Q&A.

Community support: Slack provides much support for **participation in communities of practice**, or special interest groups, as SB18 told us: "[I use Slack for] keeping up with specific frameworks/communities". SA02 meanwhile mentions using it for "bouncing ideas off of other people in the community" while SA12 uses it for "learning about new tools and frameworks for developing applications."

What kinds of bots in Slack do developers use and why? Developers use bots to support their **development and deployment support** through code hosting (e.g., BitBucket), monitoring of application build and deployment status (e.g., Jenkins CI), version control (e.g., Subversion) and issue tracking (e.g., Jira). They also write their own bots for sim-

Use	Non-cust.	Cust.
Development and deployment support	55	22
Team and task management	30	11
File sharing	8	0
Social media	8	2
Other communication channels	9	1
Customer support	7	3
Information acquisition	7	2
Service in daily lives	3	6
Fun	20	16

Table 2: Survey results of how many times different types of non-customized and customized bots/integrations are mentioned by developers.

"If Slack is taken out, it's just like turning our lights off. We're blind."
- an anonymous developer

ilar purposes (e.g., SA35 designed a bot to monitor their internal systems). Developers use bots such as Zendesk or create customized bots (e.g., SA46) for **customer support** by capturing customer feedback and to provide answers.

Developers use bots such as Wunderlist for **team and task management** by coordinating work, distributing tasks and setting reminders. SA31 created his/her own bot to "alleviate some of the difficulty with onboarding new users" by greeting new users automatically. Developers also use bots such as Dropbox and Google drive for **file sharing**.

Developers use **social media** bots to retrieve or post messages (e.g., the Twitter bot reposts tweets to Slack). While SB27 built a bot to search through integrated information from other bots. Developers use bots to integrate other **communication channels** such as audio, video, screen sharing (e.g., Screenhero) and email. Bots are also used for **information acquisition** through news aggregators.

Some developers customize bots to provide **services to support their daily lives**. SB20 created one to "determine where to go to lunch" and SB36 wrote one to "keep [their] groceries list". Developers also used bots for **fun**, or for relaxation. For example, Giphy, allows users to search and post GIF animated pictures. SA29 described creating a bot to search for images and to then add moustaches to them.

Discussion and Future Work
Our study reveals how Slack enables a new way for developers to work and collaborate with others and poses the question how computer-supported tools can impact the software development process. In the future, we need to not just understand the benefits, but also study which challenges developers face while using Slack and bots. Currently, teams that do not use Slack may wonder if and how they should adopt Slack as there are downsides to using it

as well[5]. Conducting surveys certainly brings some initial insights, but we need a richer understanding on the impact of its adoption. We are interviewing software teams that use Slack and find that these teams are replacing email with Slack, and now rely on bots for many aspects of their development process, including how they manage software deployments and how they communicate with their customers.

As mentioned earlier, Slack is not just being used by developers, but also by knowledge workers from other domains (e.g., education). We anticipate that some of our findings may bring implications for these other domains.

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[5]See this blog post for a discussion of reasons not to use Slack: https://drewdevault.com/2015/11/01/Please-stop-using-slack.html