Annotated Bibliography

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Boyd, B., Townsley, A., Walter, C., Johnson, C., & Gamble, R. (2017). *Examining collaboration among student teams relying on web applications to coordinate software development.* Retrieved from: http://hdl.handle.net/10125/41233.

Training students in software engineering should attempt to mimic industry practices. Thus, student teams develop non-trivial software products, which includes interacting with collaborative tools deployed as web applications. The interaction may be mechanistic or organic, and occur for different durations. Collaboration studies tightly control these factors, relying on manual activity logging, very specific software requirements, surveys and interviews. Since these tools allow simultaneous interaction and capture revision histories, collaboration may be more objectively measured. This paper investigates social media conversations, revision histories, and commit logs from undergraduate student teams performing software development. The objective is to examine how this form of data could be translated into collaborative activities and whether the same performance relationships are achieved in a class setting. A small pilot study shows that the translation methodology did not produce the exact relationships from other studies, but it does shed light on a team's perception of collaborators.

Cross, S., Sharples, M., Healing, G., & Ellis, J. (2019). Distance Learners' Use of Handheld Technologies. *The International Review of Research in Open and Distributed Learning*, *20*(2). https://doi.org/10.19173/irrodl.v20i2.4040

This study investigates how and where distance learners use handheld devices and the impact this has on learning habits, access to learning content and quality of work. It analyses the spatial dimension of anytime-anywhere learning and, with a focus on anywhere learning, it explores students' ongoing negotiation of the flow between and across study locations. The study concludes by proposing two new concepts: the *flow of places* and *place of space*. These should help direct the framing of future studies into the places, spaces, and mobility of formal and informal seamless learning. A dataset comprising 446 responses from undergraduate students enrolled at the UK's largest distance learning university was analysed in respect to three research questions. All age groups, study levels, and disciplines were represented. Five key findings are: most students now use handheld devices for study-related learning; the distribution of study-related learning tasks was similar in all seven study places; there is a strong, statistically-significant correlation between the number of study places in which handheld devices are used and the number of study task types performed; two fifths of students using a handheld device for learning have noticed a change in study habit and benefit to learning; and multiple regression analysis shows three variables (number of study places, number of study tasks, and change in study habits) are predictors of finding it easier to access learning materials and improved quality of learners' work.

Cisco Systems (2009). Blueprint for collaborative application architecture. Retrieved from:

https://www.cisco.com/c/dam/en/us/solutions/collateral/enterprise/benefit-unified-communications/C11-503429-00-CollaArchit.pdf

Enterprises are under constant pressure to expand business capabilities, improve realtime information access, and provide richer user interactions. Globalization and new business models are breaking down traditional enterprise boundaries. Analytics and regulations are complicating information processing. And new Internet capabilities are raising customer expectations and demands on user interaction. Business must respond with a new generation of applications built for today's realities, delivering business value using the latest technologies. The next generation of applications will integrate collaboration into business processes at new and fundamental levels and will foster new models of people working together to achieve common goals within the extended enterprise. However, next-generation applications require a nextgeneration architecture. In addition to the technical capabilities, the next-generation application architecture must integrate new models of the workspace, support collaboration across end-to-end business processes, extend current practices of service-oriented architecture (SOA) and Web 2.0 to new environments, and take advantage of new technology opportunities. This paper, prepared for solutions architects, application architects, and enterprise architects, describes the application-level architecture for the next generation of collaboration applications in the context of their vocabulary and conceptual models. Beyond describing network platform capabilities as a set of core services, it also explains what kind of services they are, how they relate to SOA and

other applications, how they support collaborative applications and business processes, and where they fit into the overall, end-to-end solution architecture. We start with a review of what collaboration software is, what enterprises are trying to achieve with it, and different scenarios of its use. Then we discuss in detail the end-to-end architecture of the next-generation applications, which incorporates SOA, Rich Internet Applications (RIA), and collaboration. Next, we provide an application-level framework for integrating collaboration into business applications. Building on that, we present a sample business process, show how it could be improved with collaboration, and illustrate the application architecture for implementing it. Finally, we tie these architectural concepts to Cisco's network-as-a-platform vision, which encompasses intelligent network capabilities and the Service Oriented Network Architecture (SONA).

De Villiers, M., & Pretorius, M. (2012). *Academic group and forum on facebook: Social, serious studies or synergy?* Retrieved from: http://hdl.handle.net/10500/13203

An academic group and discussion forum were established on Facebook for a cohort of postgraduate students studying the concepts and principles of eLearning. The Forum had a constructivist, student-centric ethos, in which students initiated topics for discussion, while the course leader and administrator facilitated. Previous research has been conducted, involving content analysis of the topics and academic discourse, but the present study focuses on social aspects, investigating social- and study-related pursuits and determining whether synergy can exist between them. A literature review shows how social networking by students, initially social, began to overlap with academia, leading to the use of groups for academic purposes and

forums for subject-related discussions. In the present study, data was triangulated and two methods of data analysis were used. Qualitative analysis was done on free-text data from students' reflective essays to extract socially-related themes. Heuristic evaluation was conducted by expert evaluators, who investigated forum discourse in line with contemporary learning theory and who considered the social culture of participation. Findings of the qualitative analysis of students' perceptions and results of the heuristic evaluation of forum participation confirmed each other, indicating a warm social climate and a conducive, well-facilitated environment that supported individual participation styles. It fostered inter-personal relationships between distance learners, as well as study-related relationships due to peer teaching and insights acquired from social negotiation. The environment supported student-initiative, but was moderated by facilitators. The mixed-methods research approach of evaluating students' essays and conducting expert analysis of forum discussions showed the advent of a virtual community with a synergy between social aspects and academia. Most participants experienced a sound balance of social- and study-related benefits, but with a stronger focus on academic matters.

Dennerlein, S., Gutounig, R., Goldgruber, E., & Schweiger, S. (2016). *Web 2.0 messaging tools For knowledge management? Exploring the potentials of Slack.* Retrieved from: https://search.proquest.com/openview/3715bd60fe7aa3d54fb52867099c1c95/1?pq-origsite=gscholar&cbl=1796412

There are many web-based tools like social networks, collaborative writing, or messaging tools that connect organizations in accordance with web 2.0 principles. Slack is such a web 2.0

instant messaging tool. As per developer, it integrates the entire communication, file-sharing, real-time messaging, digital archiving and search at one place. Usage in line with these functionalities would reflect expected appropriation, while other usage would account for unexpected appropriation. We explored which factors of web 2.0 tools determine actual usage and how they affect knowledge management (KM). Therefore, we investigated the relation between the three influencing factors, proposed tool utility from developer side, intended usage of key implementers, and context of application, to the actual usage in terms of knowledge activities (generate, acquire, organize, transfer and save knowledge). We conducted episodic interviews with key implementers in five different organizational contexts to understand how messaging tools affect KM by analyzing the appropriation of features. Slack was implemented with the intention to enable exchange between project teams, connecting distributed project members, initiate a community of learners and establish a communication platform. Independent of the context, all key implementers agreed on knowledge transfer, organization and saving in accordance with Slack's proposed utility. Moreover, results revealed that a usage intention of internal management does not lead to acquisition of external knowledge, and usage intention of networking not to generation of new knowledge. These results suggest that it is not the context of application, but the intended usage that mainly affects the tool's efficacy with respect to KM: I.e. intention seems to affect tool selection, first, explaining commonalities with respect to knowledge activities (expected appropriation) and, subsequently, intention also affects unexpected appropriation beyond the developers' tool utility. A messaging tool is, hence, not only a messaging tool, but it is 'what you make of it!'

Gonidis, F., Simons, A., Paraskakis, I., & Kourtesis, D. (2013). *Cloud application portability: an initial view.* Retrieved from: https://dl.acm.org/citation.cfm?id=2490290.

Growing interest towards cloud application platforms has resulted in a large number of platform offerings to be already available on the market and new related products to be continuously launched. However, there are a number of challenges that prevent cloud application platforms from becoming widely adopted. One such challenge is application portability. This paper reports on an ongoing effort to explore the area of cloud application portability. We briefly examine the issue of heterogeneity in cloud platforms and highlight specific platform characteristics that may hinder the portability of cloud applications. We present some high level approaches and existing work that attempts to address this challenge. In order to narrow down the area of our exploration we have been carrying out an experiment in cross-platform application development and deployment with four prominent cloud platforms: OpenShift, Google App Engine, Heroku, and Amazon Elastic Beanstalk. We briefly discuss our initial conclusions from this ongoing experimentation.

Forment, M., Casany, M., Mayol, E., Piguillem, J., & Galanis, N. (2012). *Docs4Learning: Getting Google Docs to work within the LMS with IMS BLTI.* Retrieved from:

http://www.jucs.org/jucs_18_11/docs4Learning_getting_google_docs/jucs_18_11_1483_1500_forment.pdf

Google Docs is a well-known suite of online collaborative tools for document processing, spreadsheets, online presentations, drawing and even forms. The last versions of the major open source LMS Moodle, offers weak integrations with Google Docs treating it as a content repository. But these integrations are neglecting the collaborative qualities of the Google Docs suite and its potential as a learning activity within the LMS course. This paper presents an integration proposal that using the IMS Basic Learning Tools Interoperability (IMS BLTI) standard turns Google Docs into an engine that powers collaborative learning activities within the LMS Moodle.

Herrick, D. (2009). *Google this!: using Google apps for collaboration and productivity.* Retrieved from: https://dl.acm.org/citation.cfm?id=1629513

In 2009, Colorado State University migrated to Google Apps for Education as an e-mail hosting solution for its students from an internal on-premise e-mail system. The additional capabilities of Google Apps, originally seen as a nonessential add-on to the e-mail solution, have boosted the collaboration and communication among CSU's students beyond our expectations. Once the faculty and staff saw the potential for collaboration the requests to opt-in increased. This allowed collaboration between faculty and students on a scale not previously witnessed at CSU. Faculty who have made the switch to Google Apps are satisfied and enthusiastic with the

service. The Google Apps for Education suite comprises Google Mail, Calendar, Talk, Docs, Sites and Video. In this paper I will provide an overview of each App as well as specific techniques on using each App. We will discuss the potential of teamwork and idea exchanges made possible by Google Apps and how they can be implemented in the academic environment. We will discuss and demonstrate interoperability between Google Apps and external applications, IT team collaboration, student employee management integration, migration techniques and more.

Kambona, K., Boix, E., & Wolfgang, D. (2013). *An evaluation of reactive programming and promises for structuring collaborative web applications.* Retrieved from: https://dl.acm.org/citation.cfm?id=2489802

JavaScript programs are highly event-driven, resulting in 'asynchronous spaghetti' code that is difficult to maintain as the magnitude programs written in the language grows. To reduce the effects of this *callback hell*, various concepts have been employed by a number of JavaScript libraries and frameworks. In this paper we investigate the expressiveness of two such techniques, namely *reactive extensions* and *promises*. We have done this by means of a case study consisting of an online collaborative drawing editor. The editor supports advanced drawing features which we try to model using the aforementioned techniques. We then present a discussion on our overall experience in implementing the application using the two concepts. From this, we

propose a roadmap of how to improve support of programming event-driven web applications in JavaScript.

Lebeuf, C., Storey, M., & Zagalsky, A. (2017). *How software developers mitigate collaboration friction with chatbots.* Retrieved from: https://arxiv.org/abs/1702.07011

Modern software developers rely on an extensive set of social media tools and communication channels. The adoption of team communication platforms has led to the emergence of conversation-based tools and integrations, many of which are chatbots. Understanding how software developers manage their complex constellation of collaborators in conjunction with the practices and tools they use can bring valuable insights into socio-technical collaborative work in software development and other knowledge work domains.

In this paper, we explore how chatbots can help reduce the friction points software developers face when working collaboratively. Using a socio-technical model for collaborative work, we identify three main areas for conflict: friction stemming from team interactions with each other, an individual's interactions with technology, and team interactions with technology. Finally, we provide a set of open questions for discussion within the research community.

Lin, B., Zagalsky, A., Storey, M., & Serebrenki, A. (2016). *Why developers are slacking off: Understanding how software teams use slack.* Retrieved from: https://dl.acm.org/citation.cfm?id=2869117

Slack is a modern communication platform for teams that is seeing wide and rapid adoption by software develop-ment teams. Slack not only facilitates team messaging and

archiving, but it also supports a wide plethora of inte-grations to external services and bots. We have found that Slack and its integrations (i.e., bots) are playing an increas-ingly 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 inves-tigate 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 sup-porting software engineering.

Middleton, N., & Schneeman, R. (2013). *Heroku: Up and Running: Effortless Application Deployment and Scaling.* Retrieved from: https://books.google.com/books?hl=en&lr=&id=IS4KAgAAQBAJ&oi=fnd&pg=PR2&dq=heroku&ots=eEM-S6VeyG&sig=0hFg8Zzi-_SnYAxT9JXzDJb5rSU#v=onepage&q=heroku&f=false

Take full advantage of Heroku's cloud-based hosting services. This guide takes you through the inner workings of this PaaS platform and delivers practical advice for architecting your application to work as efficiently as possible. You'll learn best practices for improving speed and throughput, solving latency issues, locating and fixing problems if your application goes down, and ensuring your deployments go smoothly.

Moroney, L. (2017). *Using Firebase hosting. In: The definitive guide to Firebase.* Retrieved from: https://link.springer.com/chapter/10.1007/978-1-4842-2943-9_5

Firebase Hosting is designed to provide fast, globally cached and secure hosting for your web app. It's used for web sites that host static files – such as HTML, JavaScript, CSS, and more. This gives you the ability to build and host a progressive web app with the likes of Angular.

Moroney, L. (2017). *Firebase cloud messaging.* Retrieved from: https://link.springer.com/chapter/10.1007/978-1-4842-2943-9_9

Firebase Cloud Messaging is designed to provide connection to your devices via messages and notifications. It's intended to be reliable, with 98% of messages delivered to connected devices in 500ms or less, as well as massively scalable, with an infrastructure that delivers over a trillion messages each week. Being able to deliver messages is one thing, but being able to effectively target them at the right users to avoid unwanted notification 'spam' is another, and Firebase Cloud Messaging offers you a variety of methods to give you fine-grained control.

Olson, G., Malone, T., & Smith, J. (2013). *Coordination theory and collaboration technology.*

Retrieved from: https://www.taylorfrancis.com/books/9781410605863

The National Science Foundation funded the first Coordination Theory and Collaboration Technology initiative to look at systems that support collaborations in business and elsewhere. This book explores the global revolution in human interconnectedness. It will discuss the various collaborative workgroups and their use in technology. The initiative focuses on processes of coordination and cooperation among autonomous units in human systems, in computer and communication systems, and in hybrid organizations of both systems. This initiative is motivated by three scientific issues which have been the focus of separate research efforts, but which may benefit from collaborative research. The first is the effort to discover the principles underlying how people collaborate and coordinate work efficiently and productively in environments characterized by a high degree of decentralized computation and decision making. The second is to gain a better fundamental understanding of the structure and outputs of organizations, industries, and markets which incorporate sophisticated, decentralized information and communications technology as an important component of their operations. The third is to understand problems of coordination in decentralized or open computer systems.

Rourke, L., & Anderson, T. (2002). Using Web-Based, Group Communication Systems to Support Case Study Learning at a Distance. *The International Review of Research in Open and Distributed Learning*, *3*(2). https://doi.org/10.19173/irrodl.v3i2.107

This study explored the capacity of Web-based, group communication systems to support case-based teaching and learning. Eleven graduate students studying at a distance were divided into three groups to collaborate on a case study using either a synchronous voice, an asynchronous voice, or a synchronous text communication system. Participants kept a detailed log of the time they spent on various activities, wrote a 1,500-word reflection on their experience, and participated in a group interview. Analysis of these data reveals that each group supplemented the system that had been assigned to them with additional communication systems in order to complete the project. Each of these systems were used strategically: email was used to share files and arrange meetings, and synchronous voice systems were used to brainstorm and make decisions. Learning achievement was high across groups and students enjoyed collaborating with others on a concrete task. Keywords: Distance Education, Case-based Learning, Collaboration Software, Online Learning.

The evidence in favour of case-based teaching and learning continues to mount (cf. Lundeberg, Levin, and Harrington, 1999). One interesting facet of this research suggests that group discussions are the active ingredient of case study learning. For on-campus students this is simple to arrange, but where does it leave students who are studying at a distance? Case studies are often used in distance education, but traditionally they have been implemented in an independent mode, with students reading a problem-centred or exemplary narrative in order to contemplate its central issues. This type of case-based teaching omits what may be the most important part of case-based pedagogy.

Fortunately, a wide array of Web-based communication software exists that supports various types of communication at a distance, including text or voice, person-to-person or multi-person, and synchronous or asynchronous interaction. The relative effectiveness of these systems to support collaboration among students is an important issue to distance educators.

Sabah, N., Kadhim, J., & Dhannoon, B. (2017). *Developing an end-to-end secure chat application.* Retrieved from: https://www.researchgate.net/profile/Dr_Dhannoon/publication/322509087_Developing_an_End-to-End_Secure_Chat_Application/links/5a5d1134458515c03ede7ead/Developing-an-End-to-End-Secure-Chat-Application.pdf

Chat applications have become one of the most important and popular applications on smartphones. It has the capability of exchange text messages, images and files which it cost free for the users to communicate with each other. All messages must be protected. The aim of the paper is to propose chat application that provides End-to-End security that let safely exchange private information with each other without worrying about data. In addition to the protection of storage. A list of requirements to make secure chat application is presented in this paper and based on these requirements, the application was designed. The proposed chat application was compared with other popular applications based on those requirements as well as it has been tested as a proof for providing End-to-End security.

Schroeder, A., Minocha, S., & Scheider, C. (2010). *The strengths, weaknesses, opportunities and threats of using social software in higher and further education teaching and learning.*

Retrieved from: https://onlinelibrary.wiley.com/doi/abs/10.1111/

j.1365-2729.2010.00347.x

Social software is increasingly being used in higher and further education to support teaching and learning processes. These applications provide students with social and cognitive stimulation and also add to the interaction between students and educators. However, in addition to the benefits the introduction of social software into a course environment can also have adverse implications on students, educators and the education institution as a whole, a phenomenon which has received much less attention in the literature. In this study we explore the various implications of introducing social software into a course environment in order to identify the associated benefits, but also the potential drawbacks. We draw on data from 20 social software initiatives in UK‐based higher and further education institutions to identify the diverse experiences and concerns of students and educators. The findings are presented in form of a SWOT analysis, which allows us to better understand the otherwise ambiguous implications of social software in terms of its strengths, weaknesses, opportunities and threats. From the analysis we have derived concrete recommendations for the use of social software as a teaching and learning tool.