Research & Development Project

Bulletproof Weekly Planner Application 3.43

Reflective Report

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Abstract

This reflection will cover the learnings and evaluation of the Bulletproof Weekly Planner application developed over a year-long research and development paper at AUT University. I will focus on the project from my own perspective and will cover the following sections: project evaluation, the link between theory and practice, personal and professional development, evaluation of the team roles, the effectiveness of the team members, and my own interaction with my team members. I was the product owner for this project as well as having a lead role in the design and development of the front-end.

Acknowledgments

I would like to acknowledge my teammates, Tristan Kells and Junha Yu. It was a long road but I am glad to have shared it with you both. We worked great as a team and I am proud of what we built.

I would also like to thank Kenneth Johnson for his wisdom and advice when we needed it. Having a knowledgeable mentor on this project helped us to make informed decisions and liaise with our clients with confidence.

And finally, I would like to thank the team at Bulletproof for providing the project for us to work on. Grant Sweeney, Geethika Guuruge, James Burton and Craig Hurley. The continued invested interest and helpful feedback kept the project alive and it would not have been as polished without your help. A special thank you to Grant for his kind words in the client feedback he provided. Although we were not able to show the finished product to James and Craig I know they would be happy with what we delivered.

Contents

Introduction

This project is the culmination of a yearlong research and development paper at Auckland University of Technology. The project was commissioned by Bulletproof, a cloud consulting agency in Auckland, and described as a cloud hosted weekly planner application. This report will discuss what I learned during the research and development process and the challenges I faced working in an Agile Scrum project management environment. My teammates on this project were Tristan Kells (Scrum Master/Team Lead) and Junha Yu (Team Member) and I was assigned the roles of Product Owner, Team Member and UX/UI Designer.

There were several learning outcomes from undertaking this project, including research into user experience design, usability testing, cloud infrastructures, front-end development languages/frameworks, database design and IT project management tools. From this project I was able to gain a better understanding of these tools and concepts, as well as a clear path of where to go next to further expand my skill set upon project completion.

During the planning phase of our project we established clear deliverables and set an initial due date for our minimum viable product. The application at its core needed to represent a physical whiteboard the Bulletproof team was using in their office to increase mobility, productivity and transparency of their consultants. While almost all of the deliverables we set were achieved, the scope of the project changed throughout the development lifecycle and we were forced to adapt to meet the demand.

The project will have a significant impact on the Bulletproof team. The ability to see consultant schedules while remaining mobile will increase productivity and streamline

their current workflow. The opportunity also exists to expand upon the initial tailored solution and create a version that caters to a multitude of organisations.

Usability testing was a tool we used early in the design phase and iteratively throughout our application development. The ability to test each feature and gain valuable insight into user experience helped us create a human-centered product that has a high chance of adoption by our client upon release. The downside to this approach was that taking all of the feedback we received from each usability study created a large amount of work to prioritise which meant that managing stakeholder expectations as a product owner was crucial.

Throughout this project I have grown significantly as a developer and designer. When I first was assigned the project I had little to no experience in front-end web development, user experience design or cloud infrastructures and deployment. By the end of development I have confidence in two of these areas, with room to grow and a solid understanding of where to go next to further expand my skill set.

As a team we worked well together, allocating work and user stories to each team members according to their area of strength. Our team had strong communication with each other, our mentor and our client throughout our entire project. We also utilised techniques such as peer programming and peer review to build strong code that we all understood. We also modified Agile Scrum artifacts such as the daily stand-up to suit our busy schedule.

Project Evaluation

The project we planned for in March had clear defined deliverables that were initially outlined in our project proposal. While almost all of our deliverables were met well before the due date, a few were re-structured or discarded after several consultations with our client. Due to the Agile nature of our development, conversations regarding these changes went smoothly and we were able to adapt to situations as they arose. Ken Schwaber (2004) said “the creative process is the heart of the Scrum’s productivity.“ This was especially true for our team, as the back and forth communication of ideas at each client meeting provided us with new user stories and adjustments to existing ones. This meant we were able to optimise and refine on the go instead of working on features that were not contributing to the product vision.

The core of the application needed to be a digital representation of a physical whiteboard the team used to plan and structure work between consultants and clients. Appendix one shows the physical whiteboard at the beginning of our project. The core features were that it had to display a list of consultants with allocation slots for the clients they were working on Monday to Friday in the AM and PM. It also needed to be accompanied by a client key below that had additional information about each client such as the full name, abbreviation and all consultants working on them.

Appendix two shows our initial prototype for the application based on these requirements. This step was vital in relation to the User Experience design process. I delivered the prototype within a week of receiving the product requirements which pleased our client and helped to guide important decisions regarding usability and the user interface.

Another requirement was that the user should be able to log into the application to ensure secure access. As with many of the features we were attempting to add, security was an unknown area for myself and Tristan and it took a great deal of research to fully understand what level was needed for our project. While I took part in the research process, the majority of our backend login system was developed by Junha as he had prior experience with cryptography and was able to use salt and hash to meet the requirement. Due to the way we had allocated our work, my understanding of this area is still rather limited and I would have liked to have been more involved in this process. If I were to redo the project, I would have ensured that more peer programming was completed in the early stages of development to gain a better understanding in this aspect of the application.

A requirement that caused a few complications in our development was that the application had to be viewable from a pc, tablet or mobile device. This requirement changed dramatically throughout the entire project and had a large influence on our decision-making. When we first met with the client the idea of mobility was a key part of our design process and ensuring that this deliverable was met was crucial. After discussing platforms for the application to reside we decided on Jira, their existing project management tool. We spent several weeks researching the Jira platform and planning our development within their ecosystem and ultimately decided against it due to a need for simplicity and quick access. In this instance, I feel that we could have arrived at this decision much faster. If we had more consistent communication with our client this decision could have been made in the first few weeks and saved us at least a month of research time which would have allowed for more time in the research and design phase. Furthermore, this decision was then reversed later in the development cycle after one of our key stakeholders left and was replaced by another. The new stakeholder decided that as long as it was viewable on a mobile device and editable on a tablet, pc or laptop that would meet their requirements. Without the inconsistency in decision-making, I would have saved around two-weeks of mobile optimisation time that could have been used elsewhere in development.

Reading directly from the original project synopsis, the objectives outlined were as follows:

- Cloud-based web app
- Password protected with login and encryption
- Easy to understand UI which displays weekly details of team member work
- Able to be viewed and updated remotely
- Integration with Jira, Harvest and Asana.
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Aside from the Jira integration, which was negotiated out of the project scope early in the planning and research phase, we have completed each objective to a high standard, along with providing countless additional features that have all contributed to the usability of the application. This can be seen in figure three and four where all the features of our application have been clearly outlined. I hope that this will allow the team at Bulletproof to increase productivity and transparency around their consultant and client workflow.

Project Significance to Client

The application we built for Bulletproof not only met the initial requirements but extended usability beyond the limitations of a physical whiteboard. The following features that we implemented late in the development cycle are simply not possible with the old system:

- Navigate to a future/past week to review or plan in advance
- Copy a consultant row, or entire calendar to a new week
- Client colour code for readability
- Month overview

This meant that not only was our client satisfied, but they were also genuinely excited to use the system. This was reflected in our meetings, as every time we met they seemed to have new ideas on features to add that would make their lives easier. As the product owner of this project, it was my job to ensure that all these features did not weigh the application down as one of the initial sentiments was to make sure that the calendar was as simple and intuitive as possible. I feel that I did a good job in this regard, pushing back on ideas that might have cluttered the view or did not add enough to warrant space in the limited development time we had left.

In the short term, I am certain that this application will be used in day to day activities and make management easier for the team. Based on feedback we received from our client they seemed to be impressed with the product we delivered met their requirements.

In the long term, we have been looking into expansion and how the application could serve the same purpose but in other organisations and industries. James Burton, our initial client correspondent expressed interest in commercialising the application upon completion, as he was aware of several other companies in a multitude of industries that were in need of the same solution. We have had many discussions since then and are exploring our options when it comes to further development and paths we can take.

Link Between Theory and Practice

One of the tools we utilised during the design phase of the product was usability testing. Dumas (1999) explains that contextual inquiry is a technique that is used to explore design options in usability testing by observing the user in their natural habitat (in our case the Bulletproof offices in Auckland) to gather predesign information. This was a key step for me in understanding how the team was using their current physical whiteboard system and how we could replicate it digitally, maintaining their natural workflow. This

technique was used iteratively throughout our entire design process at each step of development to gather valuable insight into features that worked and those that didn't, which lead us to more informed decision making overall.

There are many benefits of creating a more usable product. Mayhew (2020) states that products that have been designed to be user-friendly offer the following benefits:

- Increased productivity
- Reduced training time
- Reduced human error
- Increased accuracy of data input/interpretation
- Reduced need for ongoing technical support

Through our research, I discovered that each time an issue was raised by our stakeholders or usability testers we were able to improve it and move closer to a more human-centred design. This slow incremental change happened over several sprints and also fit perfectly into the iterative nature of the Agile Scrum methodology we were working in.

Critique of the Development Methodology

The other side to this argument, however, is how hard it was to keep the project on track due to the constant addition of work. Because we had organised to deliver a minimum viable product (MVP) well in advance, we were able to include the changes as we went along.

Personal and Professional Development

When I first was assigned this project I was excited as it was one that I had chosen specifically for the design aspect. I thought that the idea of digitising a physical management system seemed to be an appropriate way to use the knowledge I had learned over the last two years of my degree in a practical way. Initially, I thought that we may be building a mobile application as the project stated it needed to be mobile/tablet optimised, however, we quickly realised that in order to fulfil the clients request for Jira/Asana integration we would need to build a web application. My understanding of web application development was extremely limited and I had no previous exposure to the type of development needed for the project.

If I refer to the skills analysis my team completed as a part of our project proposal, I had listed my experience in Linux, JavaScript, PHP and AWS as none. The only two areas I had any experience was simple HTML, CSS and SQL from prior courses and personal development. The project itself got off to a slow start as we were uncertain of how to even begin. We began asking questions and researching development stacks to understand the languages we had chosen, as well as researching other web application calendars to understand how we might build our custom version. For me, a turning point came from a paper I was studying at the same time as we were researching. I was taking a web development paper, which just so happened to be teaching the exact languages we were going to need for our project. Through the teachings of this paper combined with self-directed learning, I was able to build a simple prototype of our application, modelled from a design I had created for our project proposal. This was a huge milestone for me and gave me the confidence I needed to continue developing and growing. As far as development skills go, I feel that my understanding of the technology stack and languages we utilised (HTML, CSS, JavaScript, PHP, MySQL, Bootstrap) has grown tremendously and now feel confident to grow independently as a front-end developer.

Another area of growth was in the IT Project Management section of our research and development project. We chose an Agile Scrum methodology to follow as we had some prior experience with it and felt that the industry demand for a strong background in this field warranted the choice. I was assigned the role of Product Owner, which meant that I was responsible for ensuring that the product vision was maintained and that our product backlog made sense, and was pruned and optimised at all times. As a natural leader, I feel that working with Tristan was a great benefit. Our skills complement each other and we were both able to take the lead on different aspects of the project without conflicting at any stage in the development process. Our third member Junha was happy to take direction from us and worked to complete the user stories I assigned him each week, which I made sure were stories that played to his strengths.

The area I believe I grew the most, however, was one that wasn't even listed as a skill in our original project proposal or skills analysis. Design. We completely underestimated how much upskill was needed in order to make sure that the application we built followed a human-centred design and would ensure a natural transition for the team at Bulletproof from the physical whiteboard they were using to the digital replica we were building. Not only were we taking a system they had grown to depend on, but we were intending on adding several additional features to improve productivity. This meant that the application needed to be as intuitive as possible. For the first half of the project, I would hold mini usability sessions with our client at each meeting, without even knowing it was a usability session. It wasn't until later in the year that I understood what the concept of usability testing and user experience design meant. This prompted me to learn as much as possible about the subject to better apply the concepts to our project.

Identification of future learning needs

As far as front-end development goes, we have only seen the tip of the iceberg when it comes to languages and technology stacks. After the extensive research we did at the beginning of the project I feel that the languages we chose were perfect for our skill level and gave us a strong background in front-end development. For future projects, I would like to continue working on building my skills in JavaScript and SCSS (Sass) as the majority of the work I did was in HTML, CSS and PHP. SCSS is a powerful CSS preprocessor language with syntax improvements that standard CSS lacks, like the addition of variables. It is widely used in the industry and while I had a little exposure to it, I was too late in development to implement it for this project and am looking forward to exploring it more in the future.

JavaScript is still such a large part of front-end development, however, with more modern JavaScript libraries such as ReactJs and Angular, I would like to spend more time understanding the newer technology stacks and how they work while improving my vanilla JavaScript skills. The same idea can be applied to other languages and their modern counterparts such as PHP vs Node.js which also includes JavaScript functionality.

While we did not utilise AWS as much as we thought we might, the little knowledge we did gain was highly valuable and interesting. Junha worked on most of our back-end and cloud deployment as he was already familiar with the technology. This is an area I would like to understand more and did not quite get enough exposure to during this research project due to my own commitments to the front-end and design.

The last area I would like to explore further and am the most excited about is User Experience and User Interface design. What I discovered during this project that surprised me the most is a passion for design and user experience. Learning how our

stakeholders were using our application and the changes we could make to improve that experience was fascinating to me. A paper I took in the second semester of this year, Human-Computer Interaction, compounded this interest and I have taken it upon myself to submerge myself in the area and learn as much as possible. This is the direction I am looking at taking upon graduation and is the most applicable to my future learning needs.

Evaluation of the Team

The roles in our team were selected early in the planning phase. We first decided on an Agile Scrum methodology and at an early team meeting had a discussion surrounding roles. We decided that Tristan would take the role of team lead (Scrum Master) and I would take the role of Product Owner, with Junha contributing as a team member. Looking back on the project I feel that this was the perfect fit for our team. As a team lead, Tristan was excellent at motivating and organising our workflow, acting as a point of contact between our stakeholders and managing our project as a whole. Junha took direction well and fit his role in delivering features and functionality via the user stories he was assigned each sprint.

My role as the product owner was at first not as clear as I thought it would be, as the small size of our team meant that we were all assisting with the responsibilities of each role and the role wasn't as clearly defined as it could have been. Rossberg (2016) states that the role of the product owner at the beginning of a project is to gather requirements and sort them into a product backlog. While I was a part of this process, I would say that I was not the sole owner of this task and it was instead shared between myself and Tristan. As the project progressed I felt the responsibilities of being a product owner kick in and was more involved in the ordering of our backlog and managing client expectations. I ensured that we were setting realistic goals for each sprint and that what we promised our client was achievable within the time frame. This ensured that at each client meeting we had an

incremental feature to deliver and following the best practice for Agile Scrum methodology. Our client was impressed with this method of delivery and was genuinley enthusiastic about each feature we added, to the point where they were suggesting several new features each meeting. This is where my role came into play the most. As the product owner, I felt it was my job to stay true to our original vision, while still maintaining the flexibility of working Agile. I wanted to keep our clients happy, but push back on some ideas or features that I felt were not as high a priority or didn't belong in the product backlog at all. The maintenance and delicate handling of this process is one part of this project I am most proud of and was reflected in our client feedback form.

As a team, we had a slow start and a few setbacks that were previously outlined in this report yet came together and produced a considerable amount of work towards the end of our third and fourth sprint. Our team communication was excellent throughout and I was happy with the level of input and clarity from each of my team members. At all times I was aware of where not only I was, but where my team members were in development and what user stories they were working on for the sprint. This allowed us to work efficiently and decide when it would make sense for us to code together or make use of peer programming. While myself and Tristan would often peer program and peer review each others code, Junha preferred to code alone and produce his code when it was complete. Unfortunately, because of this and the way we segmented our work, there weren't many opportunities for me to learn much about the AWS EC2 server we were hosting our application on, or about any of the cryptography work related to login credentials. There were a few opportunities but in the future, I will make more of an effort to organise more peer programming or group programming sessions to learn the areas that I am not as confident in.

Rossberg (2016) argues that the daily stand-up is intended to be a communication opportunity for team-members as opposed to a status update for the stakeholders. This was especially true for our team due to the small size and the absence of our key

stakeholders during each meeting. As the product owner, I aimed instead to play the part of a team member during these meetings to efficiently communicate with my team. Our daily stand-up was not in fact daily but instead weekly or bi-weekly, usually happening at the end of a sprint. This was due to our busy schedules. Instead, we opted for a less formal and more consistent communication channel using Facebook Messenger to discuss progress and updates or changes on a daily basis. Since our team only had three members this was an achievable task, however, I would not consider this solution for a larger team, as I found myself losing information and missing important updates if a conversation happened while I was not active. I could only imagine this effect compounding with a larger team and would instead encourage the use of a project management or communication tool like Slack or Jira to make announcements and the daily stand-up for requests for change.

Summary

To summarise, I feel that our choice of an Agile Scrum methodology was the correct choice for this project and our team size. It allowed us to stay flexible and modify the application as new ideas and features came into sight. Although at its core the application was simply a copy of a physical whiteboard, I believe we delivered much more than that due to the iterative usability testing we conducted throughout, which resulted in an intuitive and functional piece of technology. This application should serve to replace the current system and provide an elegant digital solution for our client.

Personally I have grown as a developer and designer in several areas, especially in front-end development and user experience/interface design. At the beginning of the project I had little to no experience in either, and feel confident in my abilities now through the work completed in this research and development paper.

Although it was at times hard to keep the project on track, I feel that the consistent communication with our client enabled us to prune and push back when ideas ran outside of our project scope. The project we ultimately delivered met almost all of our initial requirements outlined in our project proposal, with justification and transparency for the requirements we did not. Our clients are happy with the result as outlined in our client feedback form and I look forward to hearing further feedback as they begin to use the application in their daily operation.

References

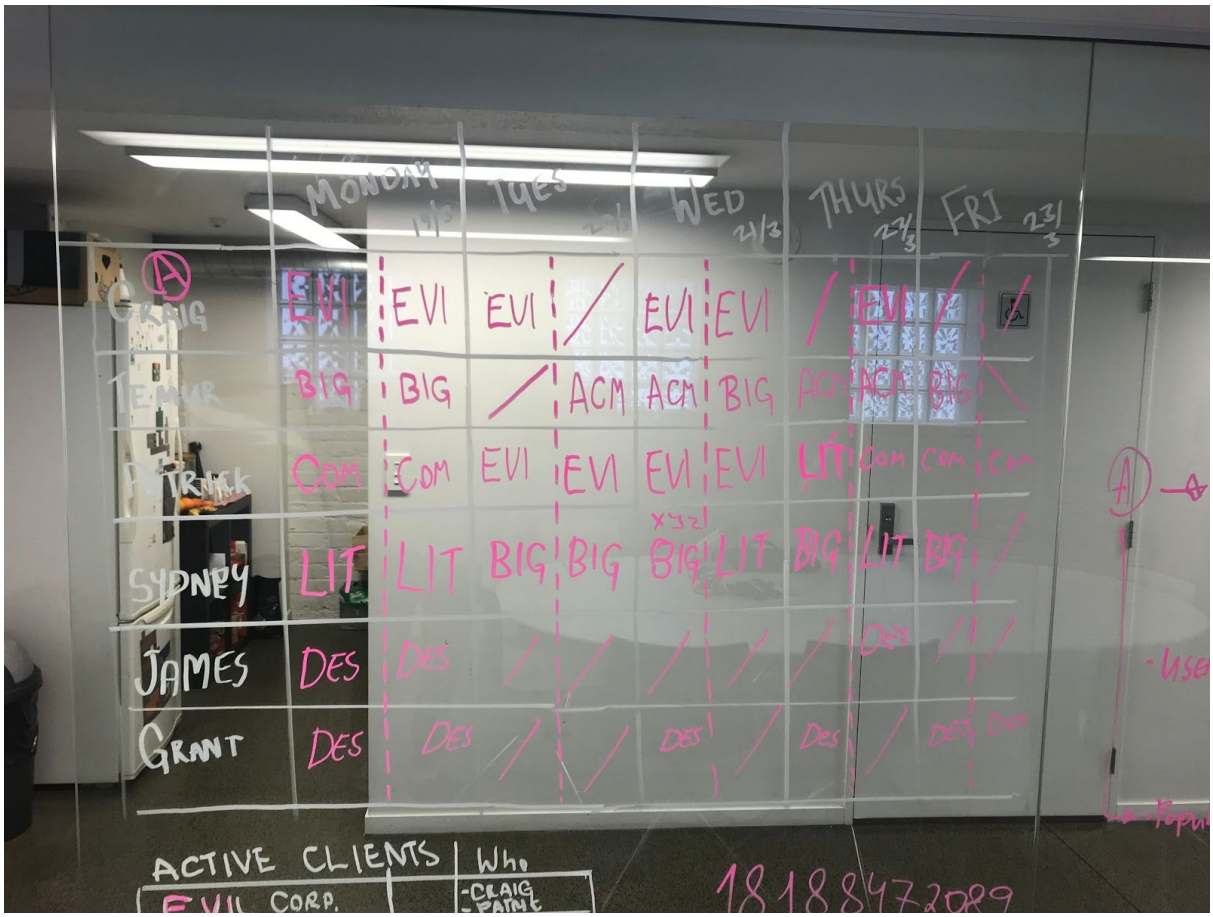
Dumas, S. J., Redish, J. (1999). A Practical Guide to Usability Testing. Intellect Books.

Mayhew, J. D. (1999). The Usability Engineering Lifecycle: A Practitioner's Handbook for User Interface Design. Burlington, Massachusetts, United States: Morgan Kaufmann.

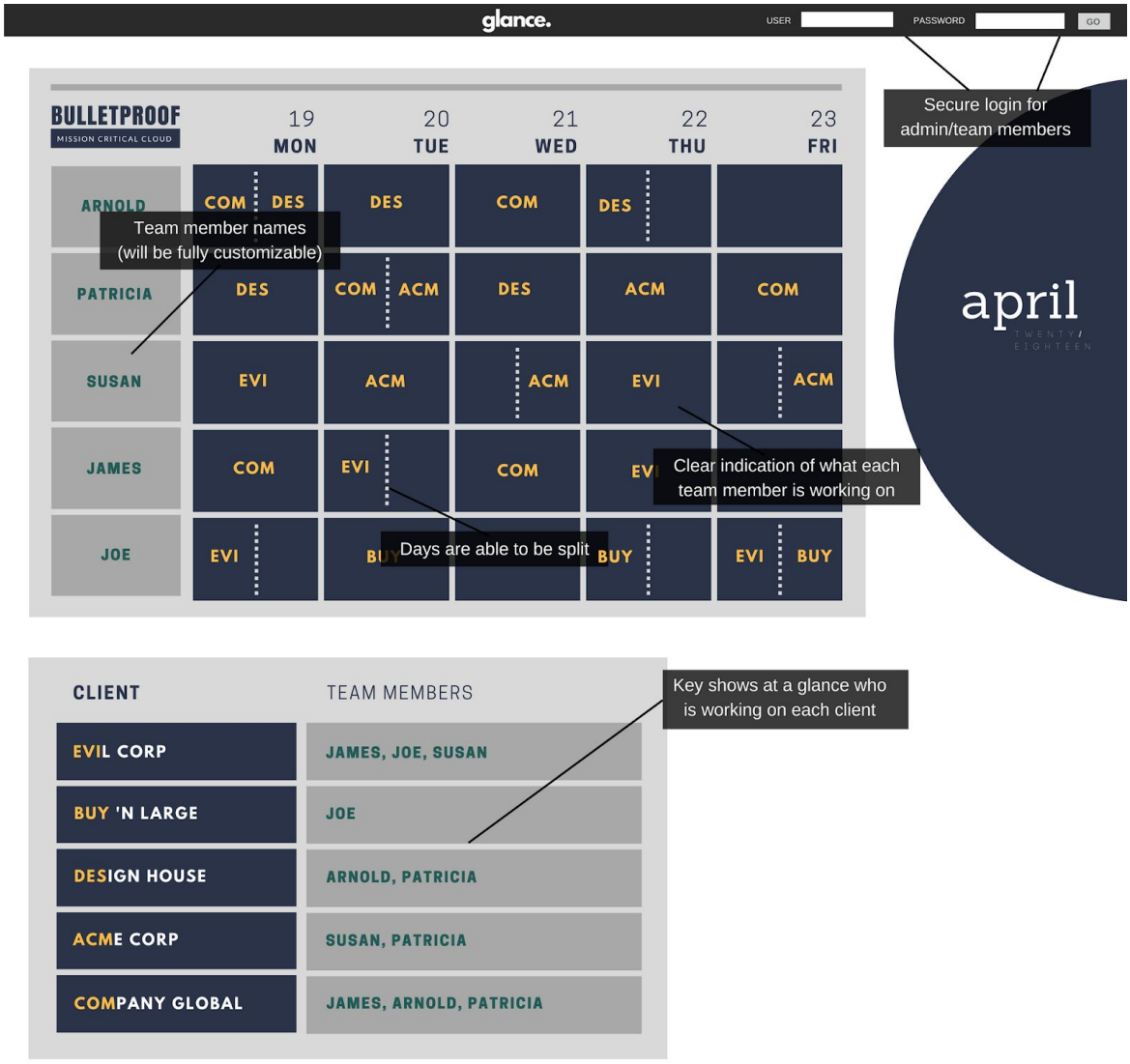
Rossberg J. (2016) Introduction to Scrum and Agile Concepts. In: Agile Project Management using Team Foundation Server 2015. Apress, Berkeley, CA

Schwaber, K. (2004). Agile Project Management with Scrum. Microsoft Press.

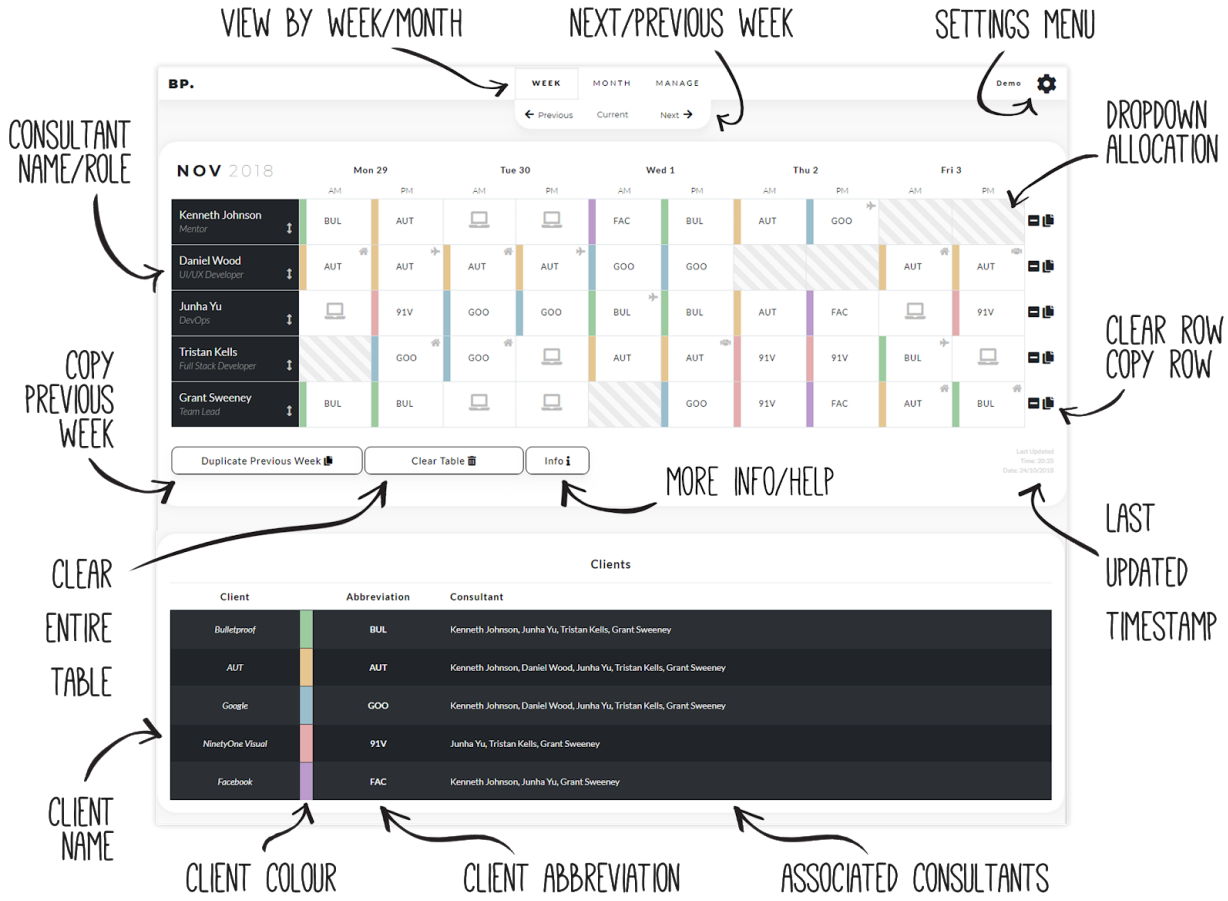
Appendices



Appendix 1: Bulletproof Whiteboard Calendar



Appendix 2: First Prototype Main Calendar



Appendix 3: Bulletproof Weekly Planner - Main week view