Incorporating a tag management system in an agile web development process to become more data-driven

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ABSTRACT
Web analytics are used to track and examine user behavior on websites and web applications. In order to take data driven decisions companies and organizations working with the web look to web analytics to understand their users. A piece of Javascript code that collect user behavior and information is often referred to as a tag, which can be managed through a tag management system. Tag management systems can provide structure to how a website’s users’ behaviors are being measured. This study examines how a tag management system can enable web analytics of user data to be incorporated in an agile web development process at the Swedish company Dailybitsol. With a literature study, case study and interviews with professionals on the subject, a set of recommendations to enable web analytics is presented. This study suggests that a tag management system can enable web analytics to be incorporated into an agile web development process if it is implemented in combination with changes to the agile process.

1. INTRODUCTION
1.1 Problem Definition
As important it is to have working software, there is a need for being able to measure and evaluate how successful it is. When developing websites and web applications in an agile process you prioritize the most important features/tasks and do them first. The ability to analyze a feature can get overlooked by the focus of having working software in agile development.

This study aims to investigate how web analytics tools, Google Analytics and Google Tag Manager (GTM) 1, can be incorporated in an agile web development process.

1.2 Goal
The goal is to provide the Client (Dailybitsol) with a deeper understanding of their current web development process and to propose a set of suggestions for improvements for how the Client can have a more data driven development process and workflows.

My personal goal is to practice knowledge of Software development processes in general and agile development process in particular. Furthermore, I aim to gain a deeper understanding of web analytics tools and how they relate to software development.

1.3 Research Questions
To become more data-driven one can ask how the agile web development process could be adjusted to integrate user data in a structured way? What roles, tools and processes can be added to enable a more data-driven process? This study examines the following research question;

- How can a tag management system enable web analytics of user data to be incorporated in an agile web development process?

To support the main research question, the following sub-questions are being investigated,

- What are the prerequisites for web analytics to be incorporated agile web development process?
- How can Google Tag Manager be used in an agile web development process?

1.4 Limitations
The tag management system that will be investigated in this study is GTM. There exist other tag management systems and ways to organize tags on a website, but they will not be covered in this study. The agile method that will be focused on throughout the study is Scrum, since it is the method used at the Client. Some other agile methods will be explained, but will not be taken into account when presenting the recommendations. This study will focus on how GTM can be integrated in a Scrum process.

This study will mainly focus on the processes and management related aspects of the research question. The study will not go into

1 https://www.google.com/analytics/tag-manager/
depth on the technological aspect of the implementation of tools discussed in this study.

1.5 Description of the Case Company
Dailybitsof (referred to as the Client) is a Stockholm based company started in 2014. They describe themselves as an e-learning company, that offers small courses. Users can both participate in and create courses on the website. The courses can be consumed both via daily emails or in Facebook Messenger.

The Client are looking to become more data driven when it comes to making decisions and proceeding the development of their product. The Client defines to be data-driven as the ability to base decisions, both for business, marketing and development on data instead of assumptions. Web Analytics tools are used today to measure user data on the website, but the Client feels a need for improvement to become more structured around how they collect, analyze and act on user data. Being a small company with only two full time developers, the Client feels the need for structure and tools to support the process. This project aims to provide the Client with a deeper understanding of their current processes and to give suggestions of how the Client can achieve a more data driven development process.

2. METHOD
2.1 Data collection
This study has a qualitative approach to data collection. The collected data is transient and can only be understood within the research context (Collis and Hussey, 2013).

The case study and interviews with professionals working with web analytics focused the data collection around semi-structured individual interviews. To further gain insights and perspective in the early stages of the study, a literature study of the domain was conducted in addition to the interviews.

All interviews were performed face-to-face at the current workplace of the interviewee. Opdenakker (2006) claims that face-to-face interviews have the advantage of making the interviewees more spontaneous in their answers. A disadvantage of face-to-face interviews can, according to Opdenakker, be that the interviewer must focus much of his/her concentration on what questions should be asked based on the answers given. During the semi-structured interviews of this study, a set of questions was prepared and brought as support to ensure that certain aspects and themes were mentioned during the interviews. In addition to the predefined questions, follow-up questions were asked. Asking follow-up questions can enable more depth and richness to the answers (Rubin & Rubin, 2005).

The primary data of the study consisted of interviews with both the Client as well as experts and professionals related to the research area. The secondary data came from the literature study. Collis and Hussey (2013) argues that a combination of data collection methods could decrease bias in sources of data and research methods from other studies.

2.2 Literature Study
To gain knowledge of the background and basis of the research areas a literature study was made. To aim to limit the data sources and research to data that had been peer reviewed and was of a scientific manner was very important to keep an objective approach of the study.

In order to not get too affected by the potentially biased input from the interviews, the initial literature study was conducted before the interviews. It is presented in the chapter 3.

2.3 Case Study
Studies focused around one company and/or development team can be well suited to be a case study, according to Kitchenham et al. (1995). Yin (2003) presents four scenarios when case studies can be considered:

- The focus is to answer why and how questions for a certain phenomenon;
- when the behavior of the people involved in the study cannot be manipulated by the researcher;
- when the researcher wants to include contextual aspects of a phenomenon that might add to the study;
- or when the boundaries between phenomenon and context is not clear.

This study focuses on one company and its web development process. The study aims to answer a how question. This study examines an existing process at the Client, and will not need to have control over the behavior of the people. There are some contextual aspects, such as the type of web development process, and the number of people involved that can be of interest and add to the study. As this study will investigate contemporary events of the Client, the boundaries between phenomenon and context can be unclear. As this study relates to all four scenarios, a case study was chosen as a research method.

During the first part of the case study, three interviews with team members of the Client were held combined with observations by the author. The goal of the interviews was to get each team member to individually give their view on current processes and workflows. The interviewees at the Client have experience from other companies and roles and therefore could draw comparisons and insights from more than just the current way of working.

The second set of interviews consisted of four interviews with carefully selected professionals and experts in the field of web analytics and agile software development.

A set of recommendations were presented to the interviewees at the Client and were evaluated to be adjusted to suit the Client's need and situation.

The interview questions were designed after the literature study and focused mostly on the current agile workflow and how web analytics were done. The interview questions for Client interviews presented in chapter 4.1 were also revised by a web analytics expert (Interviewee 5) and a product owner working with agile technologies (Interviewee 6) to get insights and suggestions for improvement.

All interviewees are described in short below.

Interviewee 1: CEO of the Client. Has a master in psychology and experience from several startups and ventures. Provided the study a great deal of insights in workflows from different teams and shed light on certain problematic aspects of analyzing data with
limited resources of people, time and skills. Also had general knowledge in working agile.

**Interviewee 2:** CTO of the Client. Over five years of experience in software development.

**Interviewee 3:** Software developer at the Client. Worked at several companies with agile software development.

**Interviewee 4:** Web analyst professional. Worked three years with web analytics professionally. Been working with analytics in an agile software process for one year. Have experience working with GTM.

**Interviewee 5:** Web analyst expert. Worked for several companies with web analytics. Educates companies and private persons in the use of web analytics tools such as GTM.

**Interviewee 6:** Product owner in agile process. Worked for three years as a product owner the agile process of a software service company.

**Interviewee 7:** Software developer. Worked four years as a software developer, mainly in agile processes. Referred to as in this text as.

### 2.4 Designing the proposed recommendations

The proposal aims to give suggestions for improvements and solutions for the Client’s development process and answers to how a tag management system could enable the Client to become more data driven. In order to design the proposed recommendations, an analysis has been conducted from the result of the case study and the literature study. The literature study provided a background on theory of agile methods, scrum, web analytics and GTM. With that background, the interviews to research the current workflows of the Client was designed. The interviews gave insights to what strengths and weaknesses in terms of being and becoming data driven that which was relevant for the Client. This laid the ground for the recommendations that were then iterated during interviews with professionals working with agile and web analytics. The final iteration of the proposed improvements and solutions was made during the third sub study where the solutions were presented and evaluated together with the Client.

### 2.5 Evaluating the recommendations

The proposed recommendations and solutions were evaluated by interviews with the Client. The interviewees were presented with the proposed improvements and provided feedback on how it would fit the Client’s current workflow.

### 3. THEORY

#### 3.1 Agile Software Development

The core of agile project management is formed to adjust and take into account uncertainty and change in a project. Every stakeholder in a given project knows that issues and discussion leading to a change can arise. Agile development should aim to increase the speed-to-market by delivering working software frequently.

#### 3.1.1 Overview of Agile Methods

The Agile Manifesto (presented in section 3.1.2) and the most commonly used method, called Scrum, came from several other methodologies that in some ways touched on what is considered to be agile methods. To give a background to how both the Agile Manifesto and Scrum originates, four of the previously most common methods are presented. According to Jansson (2015) these four methods are;

- Crystal Family (CF)
- Extreme programming (XP)
- Adaptive Software Development (ASD)
- Feature Driven Development (FDD)

The four methods are presented with key strategic aspects, values and principles in Table 1.

#### Table 1. Four methods of agile.

<table>
<thead>
<tr>
<th>NAME</th>
<th>KEY STRATEGIC ASPECTS</th>
<th>VALUES/PRINCIPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRISTAL FAMILY</td>
<td>- Sprints, deliverables, refactoring, pairings, &amp; planning</td>
<td>- Individual &amp; team accountability &amp; ownership</td>
</tr>
<tr>
<td>EXTREME PROGRAMMING</td>
<td>- Adaptability to change, incremental planning,</td>
<td>- Flexibility</td>
</tr>
</tbody>
</table>
| ADAPTIVE SOFTWARE DEVELOPMENT | - The most important aspect of Scrum is team-based communication. 
1. Plan, inscribe, implement, 
2. Insure that the team is working together, and 
3. Communicate | - Adaptability to real-time feedback |
| FEATURE DRIVEN DEVELOPMENT | - Identifies features in the release. 
- Information is obtained from stakeholders. 
- Labels should not take longer than two weeks to complete. 
- Provide a concrete description of the feature. 
- Feature should not be too complex. | - Balancing between external and internal goals |

#### 3.1.2 Agile Manifesto

With an ambition to give structure around a variety of methodologies of software development, the Agile Manifesto was developed in 2001 (Beck et al., 2001). From the Agile Manifesto the term agile was given a definition, that had taken into account the way that the term had been used in various other methodologies. To explain and define the term agile, 12 principles were proposed:

- “Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.”
- “Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.”
- “Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.”
- “Business people and developers must work together daily throughout the project.”
- “Build projects around motivated individuals. Give them the environment and support they need, and trust them to manage their own work.”
them to get the job done.”

- “The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.”
- “Working software is the primary measure of progress.”
- “Agile processes promote sustainable development.
- “The sponsors, developers, and users should be able to maintain a constant pace indefinitely.”
- “Continuous attention to technical excellence and good design enhances agility.”
- “Simplicity--the art of maximizing the amount of work not done--is essential.”
- “The best architectures, requirements, and designs emerge from self-organizing teams.”
- “At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.”

In addition to the twelve principles, the Agile Manifesto also contain four core values to explain what is means to be agile;

**Individuals and interactions over processes and tools**

According to the Manifesto, there is of greater importance to focus on teams and people and how they interact, rather than what process you run and what tools you have access to. Instead of letting the tools and process define the environment you work in, the team should develop a good dynamic first and later identity the needed tools. (Beck et al., 2001)

**Working software over comprehensive documentation**

The agile way of running projects promotes results in the form of running software instead of extensive reports. In agile, you aim to after each cycle, evaluate the how well the software is working rather than write a long description of it.

**Customer collaboration over contract negotiation**

When working agile, the Manifesto recommends the demands and requirements towards a customer to be met through recurring customer collaboration rather than to define it on beforehand through time consuming contract negotiations.

Extensive project plans and contracts are seldom met, many times because of unforeseen change and obstacles (Beck et al., 2001). The people running an agile project should listen and collaborate with customers to ensure that the goals are met.

**Responding to change over following a plan**

Similar to the previous value about customer collaboration, this value highlights the importance of being able to respond to change before following a predetermined plan. In agile, the more amenable you are to change, the more likely you are to have a successful result.

However, planning in agile is of great importance, but instead of doing it before the project it is spread out throughout the sprints. To be able to react to change, the planning takes place between each sprint and is set for a shorter time period (i.e. the next sprint).

### 3.2 Scrum

The most common used way or working agile is through a method called Scrum. Scrum was created by Jeff Sutherland and Ken Schwaber (2002). The process of Scrum was designed for IT and software projects. Sutherland and Schwaber (2002) saw a need of a more flexible way of running projects. As the most used agile method, Scrum will be described in greater detail in this section, presenting the roles, processes and meeting structures that is used. To further motivate the more extensive description of Scrum, it is the method used by the Client in the case study of this thesis.

#### 3.2.1 Roles

For a Scrum process you have some defined roles, such as Product Owner, Scrum Master and Scrum Team (not more than 12 people).

**The Scrum Master**

The main responsibility of a Scrum Master is to manage and coach the team to work effectively during the project. The Scrum Master ensures that the team knows the Scrum process and sticks to the rules and principles of Scrum and Agile. The Scrum master interacts with both the Product owner and the development team to enable a good workflow and communication between the two. It should be noted that a Scrum master should aim to enable the team to perform well, not control them.

**The Scrum Team**

There are two important factors when designing a successful Scrum Team. First, it should be cross functional. This means that the team should have the ability to complete the whole project, with skills in all areas necessary. Gustavsson (2013) argues that due to change in projects being inevitable, the need of different expertise is important. Having cross functional teams is also necessary to boost learning within the team, which is sought after in an agile process. Even though the team usually consists of developers, they should aim to be cross functional in relation to the scope of the project.

The second factor is that the Scrum Team should be self-organizing. For this to happen, it is recommended to not have a set leader role in the team, and instead let that change depending on the need of each sprint. In that sense, the organization can differ throughout the project depending on the sprint.

**The Product Owner**

The product owner has the responsibility of delivering the product and the performance by the team working with it. He or she knows what needs to be built and sets the workflow. As a product owner, one should make sure that the customer’s and team’s voice is in everything that is produced. The product owner has the important task of owning the product backlog and to prioritize the items/tasks that in the best way help the product and team reach its goal. When managing the product backlog, the product owner should make sure that the other participants in the agile process clearly understands it and what needs to be done next in the process.

Gustavsson (2011) highlights that availability is the most important aspect of the product owner. He or she should be present throughout the process and devote time to do so. Gustavsson (2011), elaborates on that topic by stating that many agile projects fail due to lack of devotion of time of the product owner.
3.2.2 Process
The Scrum process can be divided into different events: The sprint, the planning of sprints, the daily scrum meeting, the sprint evaluation and the backlog refinement. Apart from the events, the product backlog and the sprint backlog are two central artefacts in the process of Scrum. The events and the two backlogs are presented below. The Scrum process is visualized in Figure 1.

Product Backlog
The product backlog is a list of prioritized requirements designed by the product owner. A product backlog should take the business objectives of the project/customer into account. The product backlog is owned and managed by the Product Owner, and created in collaboration with the Scrum Master.

The product backlog lists all features, functions, requirements, enhancements, and fixes that constitute the changes to be made to the product in future releases. Those are called backlog items. Each item or input in the product backlog is either a user story or linked to one. Typical attributes for a product backlog are, according to Schwaber and Sutherland (2011), description, order, estimate and value.

Each user story in the list of the product backlog is estimated by giving it a size category. From the size category, the item is assigned story points. The story points are meant to give a measurement of how complex a feature/user story is in relation to others in the backlog. The story points are an estimate of how many work hours it will take to complete the item.

The Sprint
A sprint is defined as a limited time period, usually between one to four weeks. The team works with the user stories selected for a particular sprint. Each sprint has its own goal, often to produce working software that is ready for release/deployment.

Planning of Sprints
The goal and content of the sprint is decided during the sprint planning. In this phase the user stories that are to be transferred from product backlog to sprint backlog is decided and the goal of the entire sprint is discussed and agreed upon.

The planning of the sprint should take the following questions into account:
- What can be delivered in this sprint?
- How will the team work to achieve this?

Sprint Backlog
From the list of prioritized and estimated requirements of the product backlog, a sprint backlog is designed before each sprint. The sprint backlog should contain the considered most important user stories of the product backlog that has enough size/story points to have a realistic workflow in the sprint. The estimated amount of hours accumulated by all sprint items should be equal to the amount of hours the team can produce for the coming sprint.

The Daily Scrum Meeting
In each sprint of the Scrum Process a daily meeting with all team members should take place. The goal of the meeting is to ensure communication and to get a common understanding of the coming 24 hours. Ideally, the meeting should be in the same place and same time every day. The sprint meeting should answer the following questions:
- What have you done since the last (yesterday’s) meeting?
- What are you going to do until the next (tomorrow’s) meeting?
- Are there any obstacles for you or the team to meet the sprint goal?

The daily scrum meeting should not be too long, ideally no more than 15 minutes. The daily sprint meeting is not:
- A session for problem solving
- designed to collect information about who or what is not performing well.

The Sprint Evaluation
After each sprint, the product owner invites the team, scrum master and other stakeholders to evaluate the work that has been done in the sprint. This stage can also be referred to as a sprint review or sprint demo. The Scrum team show their completed work (in a software project, it could be a working feature) and discuss obstacles and issues that might have gotten in the way during the sprint.

During this meeting the following questions should be asked and answered:
- What did you do?
- What went well?
- What do you wish not to take with you to the next sprint?

When discussing these questions, the answers should be linked to people, relationships, tools and the process. During the evaluation, you should not be discussing the plan for next sprint, this is instead to be handled during the sprint planning.

Backlog Refinement
The backlog refinement is a process that should be done continuously throughout the Scrum Process. Based on feedback during the sprint evaluation or sprint planning the backlog should be adjusted and refined. It’s important that the backlog gets updated to avoid repeating mistakes and misunderstandings. The refinements should not be done during a sprint.
3.3 Agile Analytics
In the book “Agile Analytics: A Value-Driven Approach to Business Intelligence and Data Warehousing”, Ken Collier gives a definition to what constitutes agile analytics. With inspiration of the Agile Manifesto, of which Collier is a member, the author presents the following four principles of agile analytics.
- Individuals and interactions over processes and tools
- Working Data Warehousing (DW)/Business Intelligence (BI) systems over comprehensive documentation
- End-user and stakeholder collaboration over contract negotiation
- Responding to change over following a plan

The main difference from the original agile principles (See section 3.1), is that agile analytics focuses on working business intelligence system rather than comprehensive documentation. According to Collier, it is more important to make sure that the system to measure for analytics works and the correct data gets measured rather than to spend time documenting it outside of the system.

3.4 Web Analytics
Web analytics is an approach that involves collecting, measuring, monitoring, analyzing, and reporting web usage data to understand visitors’ experiences. Analytics can help to optimize websites in order to accomplish business goals and/or to improve customer satisfaction and loyalty (Plaza, 2011). Web analytics offers opportunity to collect data of the users that can be analyzed (Plaza, 2011). Users can be recorded when visiting a certain section of a Website, but the data will not explicitly tell the researcher why they are visiting and instead tell developers and designers’ what the users are doing. There exists a wide range of tools to perform web analytics. One of the most well-used providers of web analytics tools is Google, that offer several open source, free tools to use for web analytics management.

3.4.1 Web Analytics with Google Analytics
Google Analytics is an open source web analytics tool that helps tracking user behavior on websites and mobile applications.

With Google Analytics, you can get data on a number of different aspects of a website/application, here are a few of them:
- The number of visitors
- Bounce rate
- The geographical spread of the visitors
- What pages visitors visit and interact with
- What goal conversions that took place
- Which pages are end pages, i.e. which page is the last before leaving

Users of Google Analytics can access the data via the application interface visualized in dashboards presenting the data. This allows the Google Analytics users to gain insights on how to change website/application to better meet the needs and behavior of the end-users (Plaza, 2009).

Google Analytics is implemented by simply inserting a small fragment of code on to the pages of a website/application that should be tracked. This fragment of code is an activation of a tracking to the website and sends data to a Google Analytics Account.

In Google Analytics the user can set up dashboards. The dashboards show different reports of the data sent to an account. The reports in the dashboard contains metrics and dimensions. Metrics are numeric measurements like bounce rate or page views. Dimensions is the naming to describe different aspects on which the user can define and filter different users, sessions, pages and events. Dimensions could be users from a certain city or pages viewed on only Android phones. The user can choose what performance metrics of the website to be shown in the dashboards. The user can also view multiple metrics at the same time and thus compare several at the same time. When the user creates their own dashboard report, it is called Custom Reports.

3.4.2 Web Analytics with Google Tag Manager
As a content management system manages the way you produce and publish content to your website, a tag management system manages tags of the website. A tag can be bits of code, typically JavaScript, such as the tracking code of Google Analytics. GTM is a tag management system that offers a web-based interface where the user can choose, edit and manage the tags that are included on a website. It was released in 2012, by Google, and is a free tool to use. There are several existing tag management systems on the market.

Jonathan Weber wrote the book Practical Google Analytics and GTM for Developers (2015) where it is stated that there are two advantages to manage the web analytics through a tag management system;
- You don’t need to make changes to the source code of the website when updating or adding tags to track and measure users on your website
- You can keep an organization of tags to avoid duplicates and other mistakes

For GTM more specifically, Alhlou et. al. (2016), highlights three core features;
- Built in debugging, testing and preview tools are included
- Version-control to keep track of changes and return if mistaken
- Multiple levels of permissions for different kinds of users to view, edit and publish tags.

To be able to use GTM you can use JavaScript for some commands and Weber (2015) recommends that the users should have at least some familiarity with the basic web technologies such as HTML, CSS and JavaScript. However, Alhlou et. al. as well as Weber that users of GTM does not have to be professional developers to be able to use it fully.

Alhlou et. al. (2016) further argues that GTM gives marketers, analysts and non-developers more control and can help avoid bottlenecks that hinders general website deployment and releases.

3.4.3 Workflow with Google Tag Manager
Alhlou et. al. (2016) notes that, in theory, since you rarely need to
change any source code to update what gets measured and tracked, the analyst/marketers/non-developers do not need to communicate with developers before making any changes. However, regular communication is recommended as best practice (Alhlou et. al., 2016). Two potential workflows are suggested;
- BI/Analysts add tags to GTM and let IT/developers be in charge of the publishing.
- BI/Analysts communicate tag requirements to IT/developers, who then both add and publish the tags.
Alhlou and colleagues (2016) state that it is essential that only one or a very small number of people have publishing rights in GTM. They suggest that there should be at least one person with the responsibility for analytics in a team. Those individuals should understand the functions and current status of every element that needs tagging.

3.4.4 Dashboards
Data in web analytics are often displayed in dashboards. Data dashboards displays the most important information related to the achievement of a specific goal (Smith 2013).

According to Smith (2013), an effective dashboard serves as a monitoring tool that should be understood by a quick glance. Dashboards are useful since they can serve as communication tools to give understanding to large amounts of data (Smith 2013).

4. CASE STUDY AND INTERVIEWS
4.1 Client Interviews summary
To understand the daily workflow of the Client, interviews and observations were made. Three people from the Client's team were interviewed individually; Interviewee 1, Interviewee 2 and Interviewee 3. The interview questions were divided into two themes;
1. The agile workflow.
2. The web analytics workflow.

Each theme is summarized below.

4.1.1 Theme - The agile workflow
All interviewees were asked to describe the daily workflow at the company. They all gave a unanimous description that the process is divided into three main stages with the following naming and description;
- Planning. One week where the team members check a product backlog to decide what user stories to include in the backlog for the working phase.
- Working. The team then sets out to complete the decided user stories for 2-3 weeks. They have a daily “check in”, where all team members describe what they are doing and any obstacles they are facing.
- Evaluation. The team has one week of evaluating what went good in the sprints, what went bad and what results and progress they made.

The roles at the company for the software development was that Interviewee 1 mostly is part of the planning and the evaluation. Interviewee 1 also is part of the daily check in meetings.

Interviewee 2 leads the development as well as working as a developer together with another software developer. Interviewee 2 also has responsibility for most of the design work on the website.

All interviewees said that the workflow worked well. They all felt that they deliver on time and that the workload is manageable.

Both Interviewee 1 and Interviewee 2 stated that there should be a bit more structure around how they change direction during the working phase since sometime ideas and issues can be brought up during that phase which takes away focus from the previously set goal.

All interviewees stated that during the Planning there is a need for a more structured and data-driven discussion and decision making. The interviewees felt that the planning and evaluation often ended up in discussion based on gut feeling and/or short terms trend in the data. This issue was mostly stressed by Interviewee 1 and Interviewee 2.

For the evaluation phase, all interviewees saw advantages in having a whole working week to get time to reflect and think about the process, team and progress. Interviewee 1 saw a problem in working with so many different aspects of the business that it was hard to give a focused evaluation on all parts.

Interviewee 1 saw this diversity of many different cards to be a problem for the other team members as well, but it was not brought up during the interviews.

The complete development process of the Client is visualized in Figure 2.

A comparison between the scrum naming and the names of corresponding phase for the Client is presented in Table 2.

![Figure 2. The Development Process of the Client](image)

<table>
<thead>
<tr>
<th>SCRUM NAME</th>
<th>CLIENT NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT BACKLOG</td>
<td>PRODUCT BACKLOG</td>
</tr>
<tr>
<td>SPRINT BACKLOG</td>
<td>SPRINT BACKLOG</td>
</tr>
<tr>
<td>SPRINT PLANNING</td>
<td>PLANNING WEEK</td>
</tr>
<tr>
<td>SPRINTS</td>
<td>WORKING WEEKS</td>
</tr>
<tr>
<td>DAILY SCRUM</td>
<td>DAILY CHECK-IN/MEETING</td>
</tr>
<tr>
<td>SPRINT EVALUATION</td>
<td>EVALUATION WEEK</td>
</tr>
<tr>
<td>BACKLOG REFINEMENT</td>
<td>BACKLOG REFINEMENT</td>
</tr>
</tbody>
</table>

Table 2. Comparison of naming conventions of Scrum and the Client
4.1.2 Theme - The Web Analytics Workflow

The second of the interviews was based around the Web Analytics Workflow of the Client.

Interviewee 2 and Interviewee 3 presented the tools and techniques used for measuring and analyzing data as presented in Table 3:

<table>
<thead>
<tr>
<th>NAME</th>
<th>MEASURES</th>
<th>ADVANTAGE</th>
<th>DISADVANTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Analytics</td>
<td>- activity on different pages on the website</td>
<td>- Easy to use</td>
<td>- Not measuring events at the moment</td>
</tr>
<tr>
<td></td>
<td>- demographic of visitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixpanel</td>
<td>- track events</td>
<td>- Allow to send newsletters to segmentation users</td>
<td>- Not clear dashboard for demographics</td>
</tr>
<tr>
<td></td>
<td>- track opened pages</td>
<td>- track events and most-used pages</td>
<td>- Limited insights compared to Mixpanel</td>
</tr>
<tr>
<td></td>
<td>- track new visitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotjar</td>
<td>- track interaction like, scrolling, hovering, and click</td>
<td>- Insults cost with next major</td>
<td>- Limited insights compared to GA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facebook Developer</td>
<td>- events, interactions, and user information about the Messenger bot</td>
<td>- Facebook provides insights about the team</td>
<td>- No clear drawbacks has been seen</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Github</td>
<td>- track number of commits of code from different team members</td>
<td>- Give insights about the team instead of the users</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. The tools used for Web Analytics at the Client.

During the so called Planning Stage Interviewee 1 presented insights and data from different analytics tools, mainly GA and Mixpanel. Interviewee 3 and Interviewee 2 stated that the discussions during the planning phase was not always based around the data from analytics. Instead, Interviewee 2 claimed that it can lead to an argumentation based on “gut feeling”, when to decide if to implement a certain feature for example.

For the implementation of measuring of new aspects, Interviewee 1 had to ask the developers to implement it, since Interviewee 1 was not working with the source code. This could lead to bottlenecks according to all interviewee since it would take some time away from the developers and the analytics could then get down prioritized.

During the working phase, the analytics workflow was mostly handled by Interviewee 1, by checking on metrics to see how both content and new features were performing. Occasionally, the insights from the metrics were presented to the team during the working phase, but all interviewees said that they were aware of this fact and tried to not let it steer away focus from the current sprint.

In the evaluation phase, there was no structured control that the analytics was actually being measured. According to Interviewee 2, they usually check this as the project proceeds during the working phase, but also said that it can sometimes be overlooked. Interviewee 1 also said that during the Evaluation, they sometimes realize that they miss the ability to measure and hence evaluate certain progress from the software development process. The problem is usually fixable, but all interviewees saw a risk of data being missed from not measuring and time wasted of having to redo work again.

4.2 Summary of interviews with web analytics professionals

After the Client interviews, interviews with professionals on agile and web analytics were held to complement insights from the literature study and aid in evaluating the workflows of the Client. The interviewees participating in this part of the study were Interviewee 4, Interviewee 5, Interviewee 6 and Interviewee 7.

The interviews were divided in two parts. The first part was a general discussion on the research topic, discussing agile methods, scrum process and web analytics workflows. The second part focused on the findings for the Client agile scrum process and web analytics workflow which was presented and discussed together with the interviewees.

4.2.1 Theme - Agile software development and Web Analytics

The interviewees were asked if web analytics should be incorporated in an agile development process. Interviewee 4, Interviewee 5 and Interviewee 6 all had previous experience where web analytics had been practiced with agile methodologies. Interviewee 5 stated that agile methods were not designed with analytics or web analytics in mind but instead for software development and that it therefore might be some clashes in processes, terminology and artefacts. Interviewee 6 said that agile teams that want to take data-driven decisions should be flexible to adjust to the needs to do web analytics. In Interviewee 6’s experience, if treated as “ordinary development”, analytics user stories, tasks and features of web development could be integrated in the agile process. Interviewee 4 said that data from web analytics can provide better discussions and improve the product backlog and planning of sprints. Interviewee 7 said that data from web analytics can be something that is used as reference when evaluating a software or web development project, but that the structure to collect, measure and analyze data sometimes gets overlooked for other aspects of the development process, mainly getting the software to work.

All interviewees said that the majority of web development is made with agile methods today and that web analytics is an important aspect of understanding the users and developing better solutions. The interviewees suggested that a company/team should find a way to find structure and incorporate web analytics tasks in the agile process.

The interviewees were asked how the product backlog can be adjusted to enable a development process to be more data driven. Interviewee 5 said that there should be some aspect of each user story that relates to analysis. This could, according to Interviewee 5, provide a structure that can ensure that analysis and web analytics is taken into account for the rest of the development process. Interviewee 5 suggested that user stories should have some measurable goal linked to it. According to Interviewee 5 a measurable goal can force the people working with implementing the user stories to think about analytics. Interviewee 4 said that every user story has to be measurable, otherwise it is very complicated to define its success later on.
Interviewee 6 and Interviewee 4 had experience that adding the user type “Analyst” could be useful. Interviewee 6 claimed that without a specific user type for analysis, the responsibility for and understanding of the tasks can be unclear. Interviewee 4, Interviewee 5 and Interviewee 7 all suggested that the person responsible for writing the user stories and defining the tasks should aim for at least one web analytics related task to be connected to each user story. This would, according to the interviewees, enable the agile process to become more data driven. Interviewee 6 emphasized that the product owner should force him/herself to prioritize analytics user stories in the product backlog in order to ensure that the process can be data driven. Interviewee 6 saw the structure of being able to measure user data as a prerequisite of being data driven when making decisions.

When asked about how the sprint planning could be adjusted to enable a more data driven process, the interviewees all stated that it is important that you discuss who and how the analytics user stories/task should be made by. Interviewee 5 stated that this is something that easily can get overlooked if you don’t have a person solely devoted to analytics.

When asked how a sprint backlog could be adjusted to enable a more data driven process, 3 out of 4 interviewees had no specific comments for improvements, other than the user stories should follow the same template as in the product backlog. Interviewee 5 suggested it is important to ensure that analytics user stories and tasks is valued at this stage in the process as well.

Interviewee 5 said that during the sprints, the scrum master/others responsible in an agile sprint should be aware of that change could and should happen during the process. It is important to welcome change, but also try to ensure that web analytics follows the change in prioritization, workflows etc., according to Interviewee 5. Interviewee 4 said that he had experienced sprints in projects where a change led to all analytics related tasks being discharged in order to get other parts of the software working first. Interviewee 4 said that even though working software is at the core of agile development, discharging the web analytics tasks will complicate the later evaluation of the software and a data driven process. Interviewee 6 said that, except for working with analytics tasks, not many adjustments to the sprints were necessary.

For the daily scrum meeting, the interviewees had no other suggestions for changes/improvements rather than that Interviewee 5 wanted to stress that web analytics user stories and tasks should be discussed as detailed as other user stories and tasks.

When discussing about how the sprint evaluation can be adjusted for a more data driven structure, Interviewee 5 and Interviewee 6 stressed that it is during the sprint evaluation that communication about data should be limited to.

Interviewee 4 said that for the backlog refinement to enable an agile process to be more data driven, that is is important at this stage to make sure that the web analytics implementations and what is being measured follows other aspects of the agile process. Interviewee 6 and Interviewee 7 said that there were no specific changes to the way the backlog is being refined that enables a better incorporation of web analytics.

Interviewee 5 wanted to add that it is important with visualization of data every time you discuss it. It was not related to any specific part of the agile process but a general guidance for a data driven process.

A summary of the the interviewees suggestions for enablers to incorporate web analytics in an agile process is presented in Table 4.

<table>
<thead>
<tr>
<th>PART OF PROCESS</th>
<th>ENABLERS TO INCORPORATE WEB ANALYTICS</th>
</tr>
</thead>
</table>
| **PRODUCT BACKLOG** | - Add a measurable part to each user story.  
- Add the user type “Analyst” as a role.  
- Add web analytics focused tasks to each user story.  
- Product owner should prioritize Analytics user stories/tasks highly. |
| **SPRINT PLANNING** | - Discuss how and by whom analytics will be incorporated in the planning. |
| **SPRINT BACKLOG** | - Analytics user stories/tasks should be considered and valued for each sprint. |
| **SPRINTS** | - Aim to for analytics user stories/tasks not to be discarded due to change during sprints. |
| **DAILY SCRUM** | - Discusses analytics user stories/tasks in the same way as other user stories/task. |
| **SPRINT EVALUATION** | - Base discussions on features and success of user stories on visualized data and how they relate to agreed goals.  
- Limit discussions around user data and measurements to the sprint evaluation phase. |
| **BACKLOG REFINEMENT** | - Ensure to adjust analytics user stories/tasks for changes in other user stories/tasks and vice versa. |

Table 4. Summary of findings of enablers to incorporate web analytics in an agile software development process.

### 4.2.2 Tag Management System and Google Tag Manager

For the questions regarding tag management systems in general and GTM in specific, only Interviewee 4 and Interviewee 5 had experience working with either of them. Therefore, they were the only ones asked about this aspect.

Both interviewees were asked about how a tag management system relates to web analytics. Interviewee 5 stated that a Tag management system handles what data gets tracked and how. Therefore a tag management system can be seen as a prerequisite to be able to get an overview and structure around measurements for a development process. Interviewee 5 suggests that every user story/task should at least be examined if and how it could be measured, and preferably write the user stories in a format that forces this to happen. By using a tag management system, it is easier for the people in the agile process to keep track on what and how the analytics is implemented. Interviewee 4 said that tag management system ensures a structure to how certain aspects of a website are measured. This structure enables a more data driven process in general, according to Interviewee 4.

A problem with a tag management system can, according to both Interviewee 4 and Interviewee 5, arise when the tagging handles page customization. Interviewee 5 described it as “When doing page customizations, the tags often extracts data from the Document Object Model (DOM) or the URL. If the developers don’t know what changes you’ve made, they might override the measurements by accident. If you as an analyst or responsible for the analytics do not communicate and be observant on changes to
the DOM for example, you can get into trouble”. Both interviewees said that as long as analysts are a part of the agile development team, this can be avoided.

The Tag Management system GTM has been used by both Interviewee 4 and Interviewee 5. Both interviewees highlighted that there is an advantage in that it is free, easy to implement and does not require the user to be a professional programmer. GTM further has the advantage of collecting several tracking tools (not only Google solutions) in one place, giving the user an easy overview and control over what and how it is being measured on their website, according to both interviewees.

Interviewee 4 said that GTM has the advantage of not requiring as much changes in the source code to track session, events or features. According to Interviewee 4, this would avoid the common bottlenecks during the sprint work when developers have to stop to implement tracking code. Interviewee 5 stated that GTM also gives the opportunity for non-coders to implement tracking.

4.3 The proposed recommendations

Here recommendations for how the Client can incorporate web analytics in their agile web development process are presented.

4.3.1 Product backlog

The Client writes user stories to describe what they are going to build and implement on their website and service. Both Interviewee 4 and Interviewee 6 suggested to add a measurable part to the user story. Collier (2011) suggest to focus on getting the analytics to work rather than to document it and a measurable goal could force the development process to implement web analytics and get the analytics to work in order to reach the goal. During the Client interviews, all interviewees stated that they realized first when a feature or improvement is implemented that they need to implement analytics tags to track the user's behavior. This master thesis recommends the Client to:

1. Add a measurable part to each user story in the product backlog. Proposed format: “As a [User type] I want to be able to [action/feature] so that I can [reason]. This is successful when [measurable goal] happens.

Interviewee 4 and Interviewee 6 stated that a clear role for Analysts could help for a web development process to become more data driven. Alhlou et. al. (2016) suggest that there should be at least one person responsible for handling the web analytics workflow. At the Client, they have a shared responsibility for web analytics, but stated during the interviews that it was some not clear regarding who was in charge of implementing and analyzing data. The Client had the roles of users, developer and product owner to describe a user story, but not analyst. This master thesis recommends the Client to;

2. Add the user type “Analyst” as a role in the product backlog

Interviewee 4, Interviewee 5 and Interviewee 7 all suggest that a web analytics related task should be added to each user story. As for Recommendation 1, the Client had a need to ensure that web analytics do not get overlooked or forgotten. This master thesis recommends the Client to;

3. Add web analytics themed task(s) to each user story. The goal of the item should be to make sure the user story is measurable

4.3.2 Sprint backlog

According to Interviewee 6, it is the person responsible for prioritizing the user stories, should force himself/herself to value analytics highly in order for it to not get overlooked. As the sprint backlog should contain the most important user stories, analytics user stories needs to be considered as highly valued in order to be included in the sprint backlog. This master thesis recommends;

4. Analytics user stories and tasks should be considered and valued for each sprint when forming the sprint backlog

4.3.3 Sprint Planning

All interviewees working with web analytics and agile processes stated that it is important to discuss analytics during the sprint planning. The Client interviews showed that there was a need to be able to base discussion more on data. According to Smith (2013), dashboards showing information can be useful as communication tools to give understanding to large amount of data. Google Analytics is a web analytics tool that offers dashboards that present user behaviors. The Client use Google Analytics today, and thus have a tool for data visualization in place. This master thesis recommends the Client to;

5. Use visualized data as arguments in discussions on priority of user stories in the sprint planning.

4.3.4 Sprints

As the Beck et. al. (2001) states that an agile process should welcome change, change can naturally happen to analytics user stories and tasks during a project or sprint. Both Interviewee 4 and Interviewee 5 stated that it is a risk that analytics user stories get forgotten during times of change, for the focus of getting the software to work. This master thesis recommends the Client to;

6. Make sure that analytics user stories and tasks are not discharged when change occur during sprints.

4.3.5 Daily Meeting

During the daily meeting, or the daily scrum meeting, the Client discusses what everyone have been doing, and what is stopping them from doing it tomorrow. Interviewee 5 suggest that it is important not to forget about analytics during this phase of the agile process as well. This master thesis recommends the Client to;

7. Make sure that analytics task is treated with same importance as other tasks during the daily meeting

4.3.6 Sprint Evaluation

As the sprint evaluation is the time for the developers (and analysts) to showcase what they have performed during the sprint, the sprint evaluation should be the time to confirm that the analytics aspects are working. Thus, this master thesis recommends the Client to;

8. Confirm that every new feature is measurable during the
sprint evaluation. Interviewee 5 and Interviewee 6 highlighted that it is during the sprint evaluation only that the stakeholders in an agile process should communicate about data. For the Client, it is during the sprint evaluation that they most often look at data points. This master thesis recommends that:

9. The analyst(s) checks how close user stories are to reach the measurable goal during the sprint evaluation.

4.3.7 Backlog Refinement
As stated in chapter 3.2.2 it is important that the backlog gets updated to avoid repeating mistakes and misunderstandings. Interviewee 4 highlighted that it is important that analytics user stories and tasks are changed and updated if other user stories get changed in the backlog. This master thesis recommends the Client to:

10. Ensure to adjust analytics user stories/task for changes in other user stories and tasks and vice versa

4.3.8 The Web Analytics Tools
The Client had a problem with the person most often responsible for analytics unable to implement it due to not being a programmer. According to Ahlhou et. al (2016) the tag management system GTM does not require deep knowledge in code. By using GTM, there is changes does not need to be made in the source code in order to measure and track users' interactions with e.g. a new feature on website. Ahlhou et. al, (2016) suggested that either an analyst or a developer has the final responsibility for the deployment of new tag. Interviewee 4 and Interviewee 5 further highlighted that GTM is free to use and has the advantage of making it possible to manage tags from not only Google solutions but a lot of different tracking solutions. As shown in Table 3, the Client has a several tools and services for tracking that can be handled from one tag management system. As the Client has a small development team, it was stated that there could be a bottleneck in the web development process when only the developers are the ones able to implement tracking code. Interviewee 4 and Interviewee 5 noted that there could arise issues when using a tag management system, so that customizations to a page makes analytics tags overridden. Both interviewees said that this issues can be handled with communication between analysts and developers, which most of the previous recommendations stress. This master thesis recommends the Client to:

11. GTM is suggested as an addition to the current web analytics tool stack of the Client.

4.4 Evaluation of the Recommendations
The recommendations were presented and discussed under interviews with Interviewee 1, Interviewee 2 and Interviewee 3 of the Client. The feedback from the interviews is presented in Appendix 1. The general feedback was that the recommendations would enable web analytics. The evaluation led to three adjustments on three of the recommendations. The changes are presented in chapter 4.4.1. The final list of recommendations from this thesis is presented in 4.4.2.

4.4.1 Changes to the recommendations
Based on the feedback from the interviews the recommendations were adjusted to be able to better suit the Client. The changes are presented below in Table 5.

<table>
<thead>
<tr>
<th>No</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Add a set date to the format</td>
</tr>
<tr>
<td>2</td>
<td>none</td>
</tr>
<tr>
<td>3</td>
<td>none</td>
</tr>
<tr>
<td>4</td>
<td>none</td>
</tr>
<tr>
<td>5</td>
<td>none</td>
</tr>
<tr>
<td>6</td>
<td>Should aim not force for the recommendation to occur</td>
</tr>
<tr>
<td>7</td>
<td>The Scrum master should be responsible</td>
</tr>
<tr>
<td>8</td>
<td>none</td>
</tr>
<tr>
<td>9</td>
<td>none</td>
</tr>
<tr>
<td>10</td>
<td>none</td>
</tr>
<tr>
<td>11</td>
<td>none</td>
</tr>
</tbody>
</table>

Table 5. Changes to the proposed recommendations

4.4.2 The evaluated recommendations
The recommendation that were adjusted after the evaluation are marked with *.

1. Add a measurable part to each user story in the product backlog. Proposed format: “As a [User type] I want to be able to [action/feature] so that I can [reason]. This is successful when [measurable goal] happens which is measured on a [set date] *.
2. Add the user type “Analyst” as a role in the product backlog
3. Add web analytics themed task(s) to each user story. The goal of the item should be to make sure the user story is measurable
4. Analytics user stories and tasks should be considered and valued for each sprint when forming the sprint backlog
5. Use visualized data as arguments in discussions on priority of user stories in the sprint planning.
6. Aim* for analytics user stories and tasks to not be discharged when changes occur during sprints.
7. Scrum master* responsibility of making sure that analytics task is treated with same importance as other tasks during the daily meeting.
8. Confirm that every new feature is measurable during the sprint evaluation.
9. The analyst(s) checks how close user stories are to reach the measurable goal during the sprint evaluation.
10. Ensure to adjust analytics user stories/task for changes in other user stories and tasks and vice versa.
11. GTM is suggested as an addition to the current web analytics tool stack of the Client.

5. DISCUSSION

5.1 The Recommendations and the research questions

The main research question “How can a tag management system enable web analytics of user data to be incorporated in an agile web development process?” is answered by the recommendations. The recommendations suggest that a tag management system such as GTM, combined with additional process improvements can enable the company to become more data driven. The recommendations cover how the agile web development can be more data-driven. As the number of recommendations indicate, this study suggests that a tag management system alone is not enough to enable web analytics of user data. The first sub-question, “What prerequisites for web analytics to be incorporated agile web development process?” relates to the recommendations are some of the prerequisites for web analytics to be incorporated. During this study it has also been clear that people really are prerequisite for web analytics to be work. People need to focus on incorporating web analytics and have endurance to be able to be structured with their web analytics. Time, tools and structure has been recurring factors, both by the interviewed professionals and the interviewees at the Client.

5.2 The principles of the Agile Manifesto

In order to view the recommendations as suitable for agile web development a discussion on how they relate to the four principles in the Agile Manifesto is presented.

Individuals and interactions over processes and tools

In order to not interfere with the principle by proposing a process, the recommendations to the general aspects and artefacts of the agile development process of the Client was suggested. The recommendations were evaluated together with the individuals of the agile process. GTM is suggested as a tool to support the agile web development process to become more data driven. However, it is a tool that I believe would strengthen the individuals and their interactions by providing structure and control over the what and how the website is being measured.

Working software over comprehensive documentation

GTM does not require comprehensive documentation but can be considered to be self-documenting in the sense that it has automatic version control. In the version control changes are logged and reversible. To include web analytics in a more structured way the Client can have the opportunity to follow up on how well the software is working for the users. I would say that with better analysis of the web development more data driven decisions can be made to achieve even better working software in the future.

Customer collaboration over contract negotiation

As the Client was not working with customer relationships, but instead in-house development of their “own” product, the recommendations did not really relate to how the Client collaborates and negotiates with the customers.

Responding to change over following a plan

Web analytics would provide the persons involved in the agile process with data to analyze, potentially act on and then provide a change. The ability to respond would not be threatened by having data available. It can be viewed as how certain requirements for when software is tested has to be met to be approved, the software must also be measurable.

5.3 The recommendations for other cases

As the recommendations are presented based on the Client’s current web development and web analytics process and the small group of interviewees these recommendations cannot be considered to suit other cases than the Client in this study.

5.4 Method critic

5.4.1 Interviews

As the Client did not have more than three people directly involved in their development process, no more people could have been interviewed. However, for the interview with professionals working in the area of the research topic were held with a small number of people. Their opinions were collected qualitatively, but could have been extended with more people with relevant experience to gain further insights to the study. There could have been changes in questions and focus between the interviews due to the answers from previous interviews providing new insights and questions.

5.4.2 Designing the proposed recommendations

The proposed recommendations were developed and designed based on the literature study and the findings from the interviews with professionals. From that, data has been collected and analyzed by the researcher to design the recommendations. It is hard to not get biased as an individual researcher combining data from several sources.

5.4.3 Evaluating the proposed recommendations

The evaluation of the proposed recommendations was made together with the interviewees of the Client. It might have added more insights if the recommendations would have been evaluated by a non-related team or organization. The recommendations are therefore to be seen as evaluated for the purposes and needs of the Client, but not necessary for other, even similar teams and organizations.

6. CONCLUSION

To conclude and answer the research question, a tag management system can enable web analytics in an agile web development process if combined with additional improvements to the process and workflows. A tag management system would be a prerequisite for a more data driven process as it would allow non-developers to handle the web analytics aspects of the development as well as offering structure. A tag management system can help an agile
web development process to avoid a bottleneck of having to wait for developers to change the source code to add tracking. This study recommends a combination of adjustments to the agile process of the Client in combination with a tag management system.

The aim of the study was met as the Client got insights in how their web development process can incorporate user data from web analytics.

6.1 Future works

To build on the suggestions of improvements, the implementation of the changes in the organization should be examined.

This study touches mainly on the process and workflows around web analytics and tag management systems. For future work, a more technical evaluation of the usability of tag management systems like GTM in relation to an agile web development process is welcomed.

7. REFERENCES


8. APPENDIX

8.1 Appendix 1. Feedback from the evaluation of recommendations

<table>
<thead>
<tr>
<th>No</th>
<th>Interviewee 1</th>
<th>Interviewee 2</th>
<th>Interviewee 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Liked the new format, but wanted some way to know when the goal should be met.</td>
<td>Liked the format. Said it would force them to focus more on analytics in a way that was welcomed</td>
<td>Liked the format. Said that it would bring more structure</td>
</tr>
<tr>
<td>2</td>
<td>This would be beneficial in the process</td>
<td>Said that it could help in the process, but still felt that someone needs to be responsible since</td>
<td>Said that it could improve the structure and help us know what that should be done for</td>
</tr>
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<td></td>
<td></td>
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<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>Would force us to focus on analytics. Worried that it could be forgotten, but said that it would help if followed</td>
<td>It was needed to get continuity in the analytics workflow. Afraid that it might take a lot of time, but was also willing to put the extra time in for it.</td>
<td>It will be important that someone is responsible for this to happen, as the developers might overlook it otherwise.</td>
</tr>
<tr>
<td>4</td>
<td>Agreed that it would be valuable</td>
<td>Agreed that it would be valuable</td>
<td>Agreed that it would be valuable</td>
</tr>
<tr>
<td>5</td>
<td>Stressed that it is needed for the data to be visualized in order to base discussions on it</td>
<td>This would be very beneficial for the development process and company in general. The data has to be visualized.</td>
<td>Is not so involved in general discussions on decisions for the company, but welcomed a more data driven discussion for the development process.</td>
</tr>
<tr>
<td>6</td>
<td>It would be good, but wanted to be able to remain flexible to change.</td>
<td>From previous experience, change can happen during the sprints, so it would be best to aim for this to happen</td>
<td>It would be hard to live up to since smaller changes often happen during the sprints. Perhaps have this as a goal.</td>
</tr>
<tr>
<td>7</td>
<td>Would improve the process</td>
<td>It should be added that it is the scrum master responsibility that this happens</td>
<td>Was a good idea and easy to implement.</td>
</tr>
<tr>
<td>8</td>
<td>Liked it but afraid that it would take a lot of time.</td>
<td>It would benefit the process to get structure in this way. Requested some sort of testing environment for the analytics</td>
<td>Would be good, but could be time consuming.</td>
</tr>
<tr>
<td>9</td>
<td>Would help in discussions</td>
<td>Would be good for the process and help during discussions</td>
<td>This would help during this stage.</td>
</tr>
<tr>
<td>10</td>
<td>Would be helpful</td>
<td>Sound reasonable</td>
<td>Liked the idea and thought it was manageable</td>
</tr>
<tr>
<td>11</td>
<td>Liked that it is free and that you don’t need to be a developer to implement tracking. Liked that it was free.</td>
<td>Thought it would be good to get support for analytics. Liked the list of functionalities.</td>
<td>Liked the list of functionalities but was not sure how it would work technically with their website.</td>
</tr>
</tbody>
</table>

*Table 4. The feedback on the proposed recommendations*