Optimizing the data management of an SME in the videography industry

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The goal of this bachelor thesis was to optimize the data management processes of Velhot Photography Oy, which is a company that operates in the photo and videography industry. The company operates globally working with photographers from around the world. The objective of this thesis is to optizime the case company's data management processes to deliver a more efficient workflow.

To help Velhot Photography Oy to reach its goals of optimizing the data management processes, this thesis will analyze the data management processes of the company in their current state and work towards visualizing them in the form of a Data Flow Diagram (DFD). This visualization will then be utilized to pinpoint different problems and bottlenecks within the processes.

After conducting the research, several problems in the data management processes were found and applied to their matching stages of data flow in the diagram. Some of the cloud storage services in use were disorganized and weren't being maintained efficiently. The CEO's e-mail server was constantly reaching its maximum capacity due to lack of archiving and there were also inconsistencies in the produced data found during the filming and editing processes, which were causing delays for the projects.

Suggestions to these problems were proposed in the form of audits to the cloud storage systems and removal of irrelevant or outdated data. Suggestions were made to improve the consistency of data being produced and manipulated during the filming and editing processes by compressing raw video material and providing guidelines for data management.

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1   Introduction

The rapid advancement of technology has started to show its limitations with the large amounts of data becoming more difficult to transfer and store. An original article from Åse Dragland of SINTEF in 2013 states that 90% of all data in existence was created in the past two years, which has later been reflected on by other researchers and companies such as IBM and Forbes to be true for 2019 as well. Among other industries, this also affects the videography industry with video cameras utilizing newer technologies that produce higher definition video and therefore resulting in higher file sizes. (Dragland 2013)

This Bachelor's Thesis will study the case of Velhot Photography Oy, with the goal of optimizing the company's data management processes to match modern-day standards. The research will begin by mapping out the existing data management processes in the company and look for suboptimal ways of handling the data management. This research will be conducted by performing interviews with the CEO of the company and utilizing personal previous knowledge from working for the company and participating in these processes. The paper will also investigate suitable tools and frameworks and use them to express the data management processes of the case company. After conducting research into the company's current data management processes, I will suggest alternative procedures and/or systems that could lead to a more efficient workflow and optimize the data management processes of the company.

1.1   Background of the case company

Velhot Photography Oy (Velhot) is a Finnish company that operates in the photo- and videography industry. Velhot produces high quality photos and videos all around the world by utilizing its global partners which include a network of freelancer photo- and videographers, editors and other professionals in the field. In addition to running the business side of the company, the CEO also creates the scripts and organizes all the projects remotely. Velhot was founded in 2009 by two former employees of Nokia Oyj to answer the growing demand for video- and photography material to be used for B2B-marketing and other commercial purposes in international companies. Velhot main office is located in Espoo Finland and it currently has one employee who is also the CEO of the company.

In the beginning the company was more focused on photography, but in recent years the focus has shifted more towards videography. The company has had permanent employees before, including local editors and producers but currently only works with freelancers around the world. The company's data management methods have been designed to support large amounts of data, but the rapid increase in file sizes the past ten years have started to bring out the limitations of said methods and systems. The company's IT-infrastructure and data

management processes have been created in 2010 and have not been updated much in the past ten years. There is a lack of standards and/or for data management in the company, which inspired this research.

Figure 1: Velhot Photography Oy logo

1.2   Research objectives, questions and scope

The research aims to optimize the data management of the case company by preparing an analysis of the current data management processes to find bottlenecks or suboptimal methods in the company's current procedures of operation. After performing the analysis, the research will utilize this data to begin optimizing the data management by studying more modern and optimized solutions. The goal is to improve the overall workflow of the company's CEO by providing them with easier and more efficient ways of data management.

To support the research objectives, the following questions have been generated;

1. Where is the data being transferred and stored in the company's operations?

2. What are the main challenges the company faces in their data management?

Scope of the research will focus on the needs of Velhot Photography Oy. The theoretical framework of choice will be used to perform research on the company's data management processes and later utilized to pinpoint problems in said processes. The framework of choice is more commonly used in software development and programming projects but is also viable to be used for data management process visualization and evaluation. The research methodologies will be explained more thoroughly in a later section.

2   Theoretical framework

To begin the research, the current data management processes within the company must be studied. This review will be conducted by performing an analysis on the company's internal and external data management processes. The project is technically Business Process Management (BPM), as its goal is to optimize the processes related to managing the company's business practices, but as the company's operation is almost solely based on data transfer and storage, a Data Flow Diagram (DFD) is a legitimate option to perform the review. By utilizing a DFD, we can graphically present the flow and transformation of data in the information system and deliver a end product with a logical model that will support the business operations and meet users needs (Tilley 2017). The information gathered in this analysis will be applied into a DFD to help with visualizing the data management processes. The different components of the DFD will be explained in detail first, and after that the advantages of using it for this project will be covered.

2.1   Data Flow Diagrams (DFD)

R.J Wieringa (2003) defines Data Flow Diagrams (DFDs) as "a well-known technique from structured analysis that is used to represent the decomposition of the system under development (SuD) into processes and data stores.". The purpose of using a Data flow diagram for this research is that it offers a simple way to visually present how data is managed in the case company, including both the transferring and the storing processes. As the case company works with a lot of external personnel, a Data flow diagram seemed like a valid option to perform the analysis, as the components within it matched well with the research that I want to perform on the case company's operations. If there is a need to create a visual overview of the system that can be elaborated later, a preliminary step is to create a DFD of the company's processes. (Rosing et al. 2015)

When beginning to research for options on creating a Data flow diagram, I found that there are numerous different templates and software available, but they all had similarities within their components. I found the software provided by Visual Paradigm to have the best layout and be the most efficient and easy-to-use solution for this project.

In addition to the software itself, there is a thorough guide available on their website on creating diagrams with the software, along with valuable information on different data analysis diagrams and their use-cases. This combination of software and guidance documentation helped me to understand the basics of creating Data Flow Diagrams and made it easier to start mapping out the data flow of the case company.

2.1.1 DFD components

The Data flow diagram used in this project will consist of four different components:
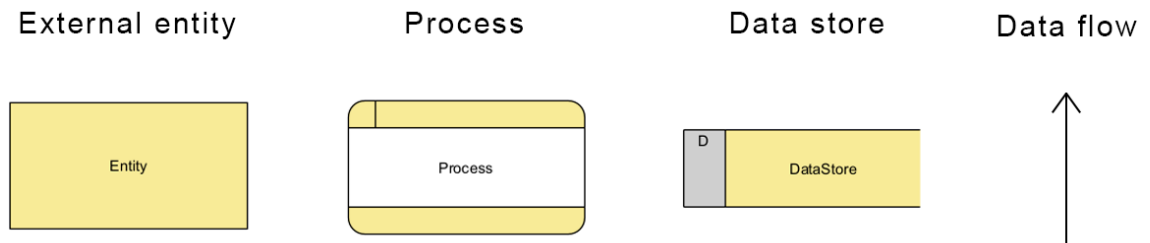

Figure 2: DFD Components

1. External Entity
   The External Entity component represents a human, system or subsystem to which data comes from and/or goes to. It is not included in the system being studied but contributes to its processes externally.

2. Process
   The process component is a data manipulation function, whenever data is transferred or manipulated in other ways, this is expressed as a process component in the diagram.

3. Data Store
   Whenever persistent data is stored within the system, this will be expressed by a Data Store component.

4. Data Flow
   The Data Flow component expresses the movement/flow of data within the diagram. The direction of the flow is expressed by an arrowhead which can also be bidirectional. (Visual Paradigm 2012)

2.1.2 Advantages of using a DFD for this project

Upon further review of the project's objectives, the goal was to find a suitable tool to firstly map out the company's data management processes and find possible problems within them, and secondly to study alternative methods to perform them more efficiently. The Data flow

diagram provided by Visual Paradigm offers a good framework to accomplish both tasks, because the diagram components are suitable with the company's data management processes. It provides a good framework to perform the initial analysis, and ultimately provides a visual representation of the company's data flow to provide optimization suggestions. When we need to understand manipulation and creation of data within individual business processes, a DFD is a legitimate choice for business process modeling. (Hathaway 2016)

3   Research Methodology

After figuring out the objectives and asking the relevant questions, the research aims to answer these questions utilizing different methods of which some are listed in this section. The theoretical framework will be utilized to perform the research based on data gathered from interviews and observations of the case company's daily business operations.

3.1   Data collection methods

The first step of performing the analysis was to acquire up-to-date information from the case company on its current data management processes. Having previously worked for the company, I had a decent understanding of the company's basic data management processes which I utilized to create a draft on a piece of paper to present. Due to the coronavirus pandemic, the interviews with the client were conducted remotely through Microsoft Teams. During the first interview, due to the lack of previous audit on data management, we agreed to follow the company's data management processes for a 2-month time period which would help us build the DFD with up-to-date information based on real-world situations.

3.2   Data analysis methods

After the collection of required data is completed, this data will then be applied to a DFD which will be reviewed together with the CEO and adjusted if necessary. Once the DFD has been completed in co-operation, the possible problems will then be numbered and pinpointed in the diagram to help visualize their locations in the data flow.

4   Conduction of Research

The first objective to begin creating the DFD is to observe the different static components and determining the correct ones for each part of the data flow within the case company. Starting from the External entity component, which in this case represents the client of the case company. The client is the external entity, because they initiate the data flow externally by creating an order and eventually receiving the final product therefore ending the

data flow. Next, we must determine the Process components, which represent the manipulation of data within the data flow diagram. We managed to determine five processes in the case company's operations: processing the order, filming the material, editing the material, performing a final review of the finished video before delivering it to the client and finally, archiving. The last static component left to determine is the Data store component. For this we identified four different data stores: cloud storage for business data, cloud storage for scripts and guidance, temporary cloud storage and a long-term storage/archive. Once the components are decided, we are ready to create a draft of the diagram components.
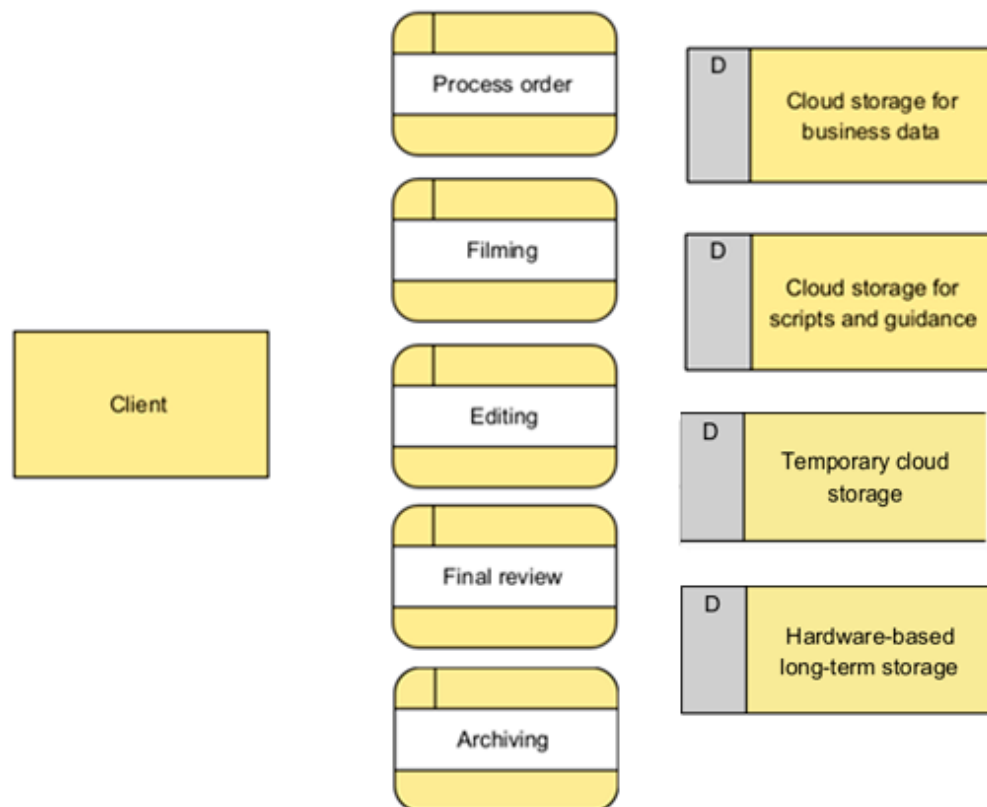

Figure 3: DFD Draft with components

External entity is placed on the left because it represents the starting and ending point of data flow in the diagram, Processes are in the middle because these will have the most data flow within the diagram and finally the Data stores on the right. The following subsections will expand further on the procedures of transferring and storing the data in the company's data flow as it is currently being operated.

4.1 Data transfer

Once we have all the static components applied to the diagram, it is time to start following the flow of data between them. In a typical project for the case company, the data flow is initiated when the client (External entity) makes an order and sends this order information to

the CEO for processing. This flow of data is usually bidirectional, as the process includes creating offers and other business affairs resulting in the two eventually coming to an agreement. After an agreement is achieved, the CEO starts preparing a script for both the videographer and editor, this script needs to be accessible for them both during all stages of the project. At this point the videographer can start filming the material following the script, after which the produced material is reviewed by the CEO and the best clips are chosen to be sent forward to the editor. Once the editor receives the material, he begins utilizing the script to create edited versions for the CEO to review, initiating the final process called Final review. Even though the CEO does not do the actual filming or editing, she is always present in each of the processes to validate every part of the project. After the final version is completed and reviewed, the last flow of data is the delivery of the finished video to the client. Technically there is still the archiving process to complete, but this is not part of the active data flow as it is not required to complete the project, and therefore does not have a deadline.

4.1.1   Business-related data

The business-related data consists of documents, tables, receipts and contact information. This data is sensitive but rarely manipulated, as it acts as a database of clients and different business documents. The first step where business-related data is being transferred, is the initial contact from the client to the CEO in the form of an order. This order is then processed, and an offer is created based on the nature project. This transaction of business-related data is almost exclusively done through e-mail between the two participants, and in rare occasions with f2f meetings at the client's premises. We will go into further details on how this data is stored later in the Data storage section.

4.1.2   Guidance and re-usable assets

The guidance and re-usable asset data are crucial in every part of the company's operations. It is generated in every project beginning with the script that is then accessed by both the videographer and the editor to complete their work. In some rare cases, the client company provides a link to an external service with assets that are needed for the project, which is then forwarded to the editor. This data is all about accessibility, as it is required to be easily accessible for the videographer and editor to complete their work and reduce downtime. After producing the script, the CEO uploads it to the cloud and provides a link to the videographer along with detailed information on the venue and client. Upon completing the filming process which includes a review on the produced raw video material with the CEO, the link then gets passed on to the editor with updated information and editing guidance. The editor also accesses this cloud storage service to obtain any possible assets such as logos, animations or pre-composed effects.
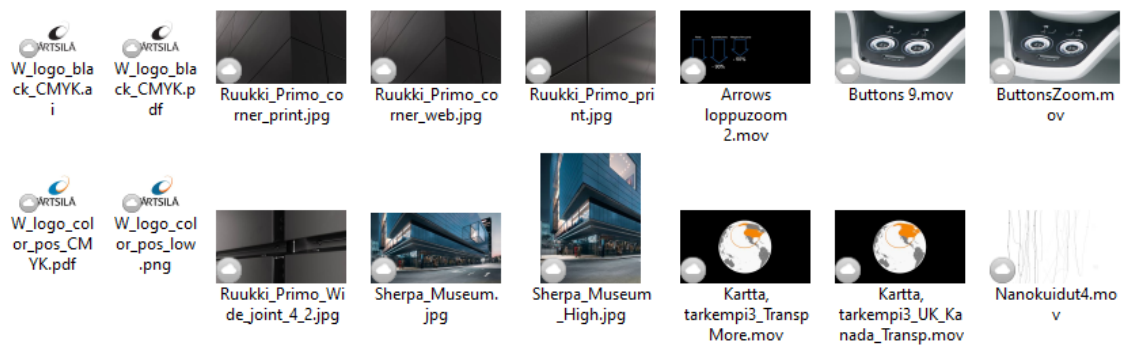
Figure 4: Example of re-usable assets in the cloud

4.1.3   Video material

The video material produced is the largest amounts of data that flow through the diagram, and it is also the most difficult to maintain efficiently. Between the filming and editing processes the raw video footage needs to be transferred as soon as possible. It is difficult to set a standard for this procedure, as the case company works with hundreds of videographers from around the world with each having their own ways of producing and compressing video material. Some videographers do not compress their footage at all, resulting in massive file sizes that have extremely long transfer times. This is not only user-centered, but also due to the differences in equipment, which varies depending on the venue and ways of filming. In most cases, these transfers are completed using Dropbox which makes it easier for the CEO to review the material during the filming process and pick the relevant clips to be forwarded to the editor. In some countries the internet bandwidth is much smaller than in Finland for example, which makes uploading large files very tedious and time-consuming. Therefore, in some rare cases the material consists of so much data that the videographer has proposed hardware solutions and shipped hard drives through airmail as Dropbox has not been an option. Dropbox is almost always the preferred choice, as shipping hard drives can cause delays and other liabilities such as customs clearance time and costs.
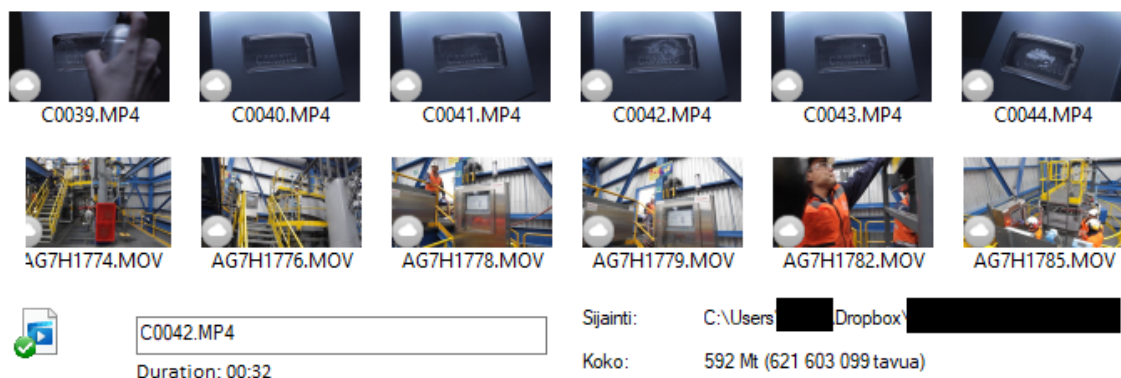

Figure 5: Video material transfer in Dropbox

4.1.4   Applying data transfers into the DFD

When studying the different data transfers taking place in the company's operations, we can create a simple draft of the active data flow during a typical project in the case company.
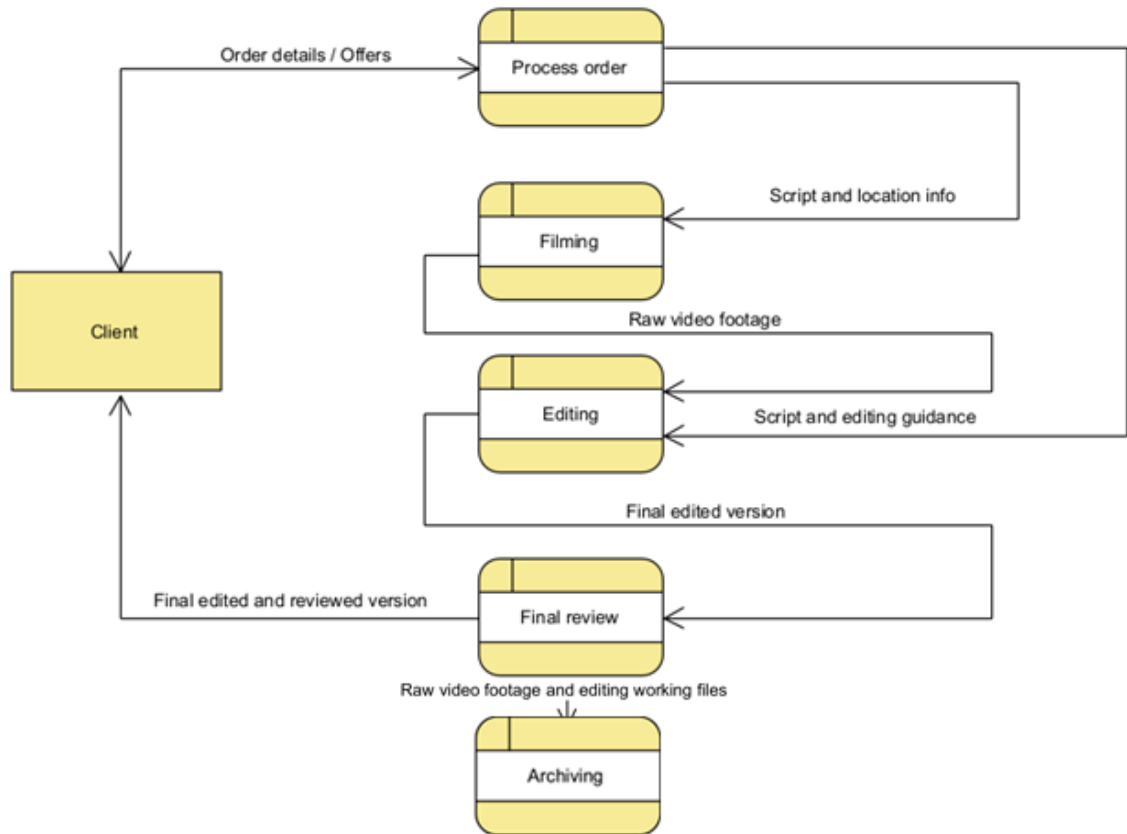

Figure 6: DFD Draft with data transfers

4.2   Data storage

Now that we have mapped the data flow within the case company and applied it to the diagram, we can start looking at the persistent data and how and where it is stored. Storing the data works in correlation with transferring it, as all the data that is being transferred is also stored somewhere. There are three different cloud-based storage services in use in the case company currently: OneDrive for Business, Dropbox Professional and Google Drive. Google Drive is being used exclusively for data such as brand guidelines or project specific guidance, re-usable assets and scripts while Dropbox is the service used to transfer large files such as raw- and edited video material and occasionally used for re-usable assets. OneDrive for Business is exclusively used to store business-related data and is only accessible by the company's CEO. Two of these services need to be accessed by all the included internal entities that are working on a project, which is why they need to have data flowing through them in the diagram. During a typical project for the case company, the first occurrence of persistent data being generated in the diagram is when the contract between the client and the CEO has

been agreed upon and signed. This contract along with other information related to the order such as client company information will then be uploaded into OneDrive (Cloud storage for business data). After the contract with the client has been signed, the CEO will start working on a script and the required guidance for both the videographer and editor to complete their jobs. These script and guidance documents will then be uploaded into Google Drive (Cloud storage for scripts and guidance), where the assigned videographer and editor will be given access. This will initiate the Filming process, which upon completion will have the videographer upload the raw video material into a separate folder in Dropbox (Temporary cloud-based storage) which will act as a temporary storage folder. Upon the completion of the editing work, the editor uploads the final edited version and all the working project files he has used to edit into the same temporary folder. Once the project is determined complete, all this data will be archived in the Archiving process and moved into a local Network-attached storage (NAS) (Hardware based long-term-storage) and removed from the temporary folder.

4.2.1 Persistent business-related data

Once an agreement between the two participants is reached, the official order details are then uploaded into a cloud-based storage service. For client-based information such as offers, order details and company contact information, OneDrive for Business is being used as the primary service. It is the only cloud-based storage that needs to be accessed solely by the management of the company, which in this case consists of the CEO only. The accessibility and security of OneDrive for Business make it the best choice for this type of sensitive data, and according to the CEO she is most comfortable using this service. According to Microsoft, they do not share your data with their advertiser-supported services, nor do they mine it for marketing or advertising. If you leave the service, they take the necessary steps to ensure the continued ownership of your data. (Microsoft 2021)

4.2.2 Cloud storage for assets, scripts and guidance

The data store with the most activity in the diagram is the Cloud storage for scripts, guidance and assets data store, which utilizes both Google Drive and Dropbox, to deliver all the scripts, guidance and assets to the videographer and editor. Once the client accepts the offer and signs a contract, the project is initiated, and the CEO creates a script with guidance for both the videographer and the editor which are crucial for them to complete their work. Scripts and guidance documents are exclusive to Google Drive, which is also the preferred option for re-usable assets. The script and guidance documents are accessed and edited in real-time from Google Drive, which makes it easier to add changes or comments to the documents in real-time if there are changes.

4.2.3   Hardware-based long-term storage

After the project is determined complete and the final version is delivered to the client, the Archiving process begins. The Archiving process is often undervalued by the videographer and editor, but it is very important for both security and reliability reasons. Even though archiving the produced video material is not officially categorized in the case company as a service that is offered for the client, it works to benefit both parties if the client decides to make another order in the future. Re-using material in the videography-industry is very common, and in fact largely offered as a paid service in the form of stock footage markets. Properly archiving the produced video footage can create savings in the future by having the option to re-use the footage for future projects. In addition to this, it is important to keep the editors working files archived as if there ever is the need to modify the produced video in the future, it is much easier and cost-effective to do so with the editing project files available. This process consists of moving the files from the temporary Dropbox folder into a Network-attached storage (NAS) unit in the case company's main office. NAS is a physical storage device that is connected to a network, and it allows data storage and retrieval from a central location for users and clients with the required authorization. NAS devices are flexible and scalable, making the addition of more storage into the existing system simple. NAS is considered like a private cloud that is located within your office (Seagate 2020). This NAS is particularly configured to be both an easily accessible and reliable solution to allow long-term storage that is possible to access from external networks if she needs to work from abroad.

4.2.4   Applying data stores into the DFD

Observing the DFD draft with data transfers more closely, we were able to determine four different data stores that should be included in the final version of the diagram.
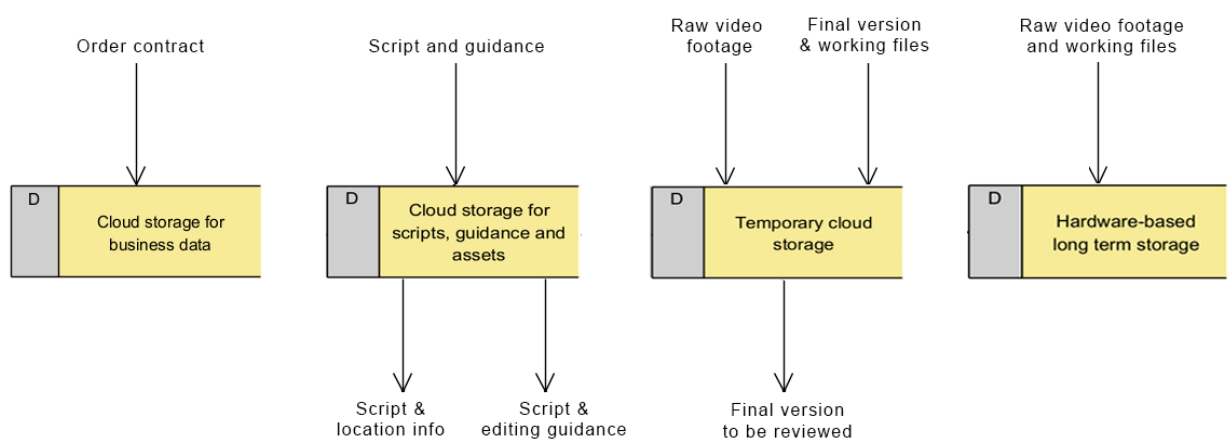

Figure 7: Data stores to be added to the DFD

4.3   Completed Data Flow Diagram

After we have determined the static components of the DFD and applied the data flow and data stores into it, it is time to construct the completed diagram. This diagram was constructed based on the initial interviews with the CEO of the case company and reviewed in co-operation to make it as close to real word scenarios as possible. According to the CEO, it is the first time these data management processes have been mapped and visualized in any format. The initial layout remained persistent and according to her, it produced a clean diagram that is relatively easy to read. The analysis was linear and followed the initial plan, but it required a lot of co-operation with the case company in the form of peer-reviewing the diagram.
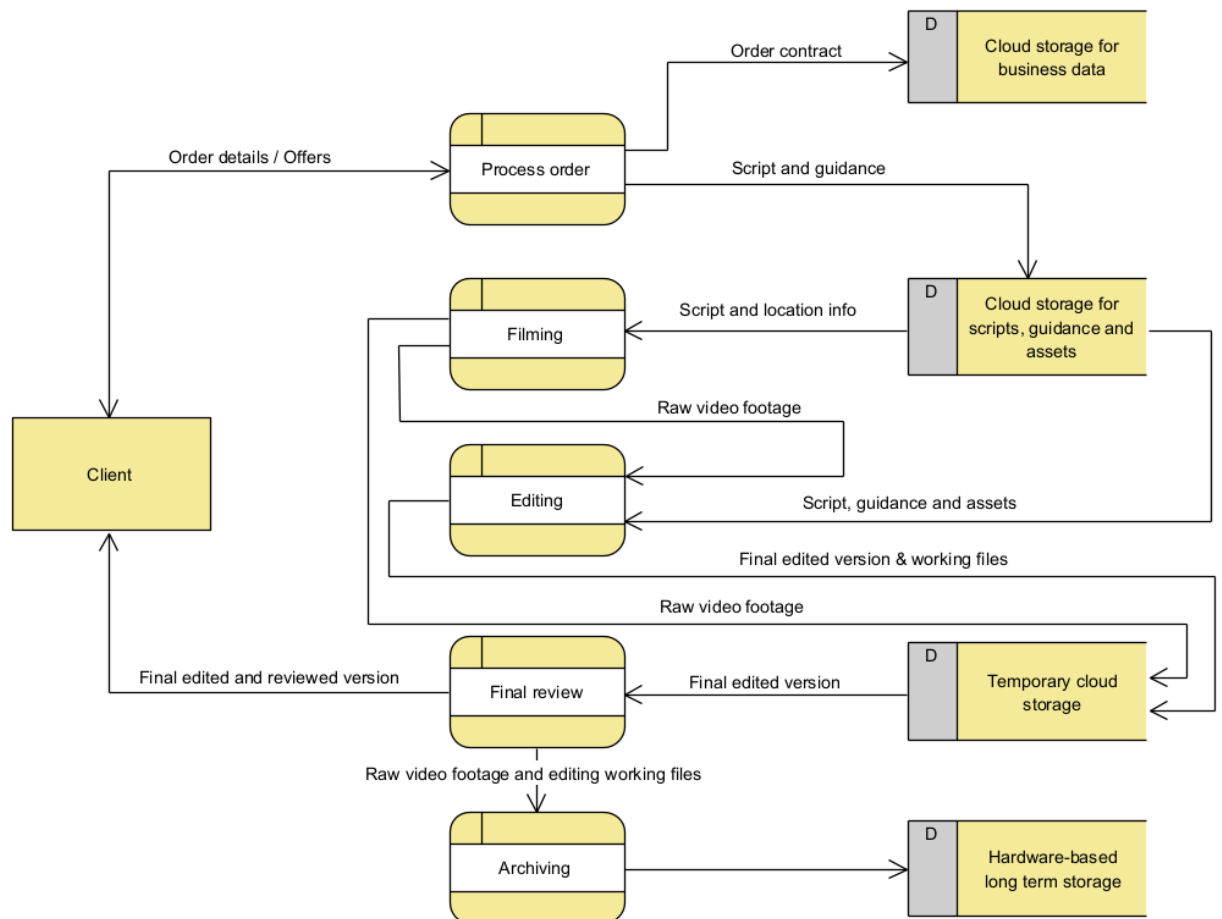
Figure 8: Completed Data Flow Diagram

This analysis has provided us with a good visualized overview of the company's data management procedures in the form of a complete Data flow diagram, which helps us pinpoint possible bottlenecks and propose optimization suggestions.

4.4   Results

After completing the Data flow diagram, we can start to more closely examine the different stages and find where could be room for improvement. "A DFD serves multiple purposes. You might create one to be able to analyze the current situation with the goal of identifying road-blocks and improving efficiency. You might also create one to present and discuss the process with others." (Hathaway 2016). Visualizing the data flow makes it easier for the case company to understand how and where the data is moving during a typical project. This ultimately not only helps us identify the problems in the data management processes, but pinpoint where and when these problems are occurring.

4.4.1   Identifying the problems

The first observed problem in the data management is during the first Process order-process. The e-mail correspondence between the clients and the CEO dates to as early as 2009 when the company was founded. This correspondence has generated large amounts of e-mail data that has reached the maximum capacity of the e-mail server numerous times. This issue has been combatted by either deleting old e-mails permanently or increasing the maximum capacity of the e-mail server. This has both slowed down the CEOs workflow when the maximum capacity has been reached and created more avoidable costs due to purchasing more capacity. There are three different cloud services being used for transferring and storing data, which all have slight differences in their functionalities. According to the CEO, some of the cloud-based storage systems have room for optimization in the form of better folder hierarchies, accessibility and reliability. Google Drive and Dropbox are being used as the cloud-storage service for all the client specific persistent assets that are used for video editing and animation, but there is no consistency in what type of data is stored and where. This typically leads to both the editor and the CEO searching for the required assets and therefore delaying the start of the project. There are also some problems with the data consistency, as the data generated by different videographers comes in different formats, which is an issue in both the Editing and Archiving processes. Uncompressed raw video material can have huge variations in file sizes, where the difference between an uncompressed and a lossless compressed video file can differ as much as 50 gigabytes for a 5-minute video, without any visible differences in quality. This data consistency is also an issue for the editors working files, where different editors can use different software or methods to complete the same tasks, causing difficulties when revisiting old projects that were worked on by someone else. In the later parts of the data flow, the assumption is made that the Archiving process is designed well but lacks proper execution. This is most likely due to the videographers and editors not having proper guidelines and therefore not valuing the Archiving process enough to upload the necessary data consistently.

The problems that were identified from interviews with the CEO in conjunction with creating the DFD, were the following;

1) CEO's e-mail server reaching its maximum capacity
2) Cloud-based storage folders are unorganized and difficult to navigate
3) Consistency of data in video- and editing material
4) Lack of data management guidelines

To help with understanding where and when each of the problems occur on the company's data flow, we can add each numbered problem to the diagram. (Hathaway 2016)
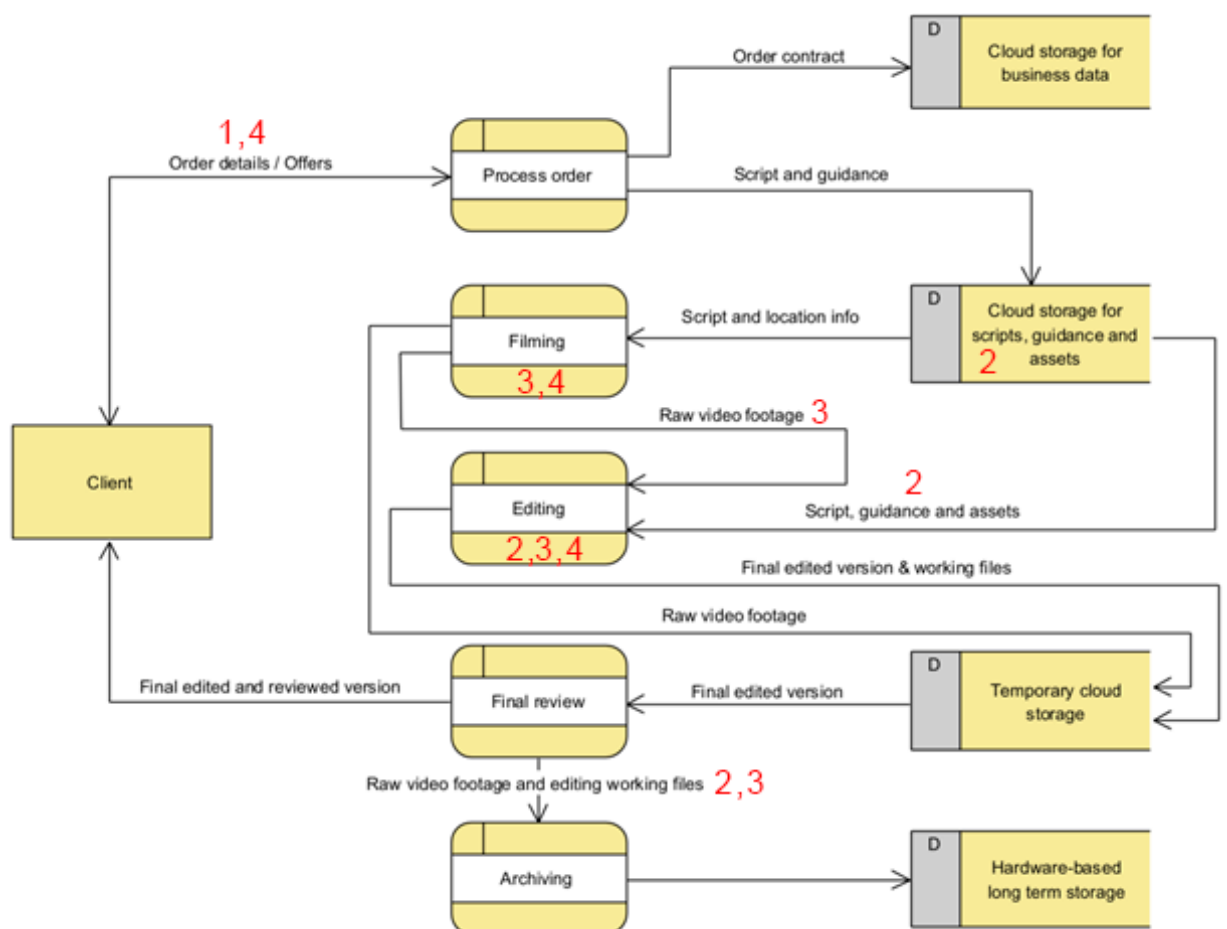

Figure 9: Data Flow Diagram with numbered problems inserted

5   Suggestions

After the analysis we found problems in the company's data management processes and provided them with a framework to help finding the main causes of them. There are still some optimization suggestions that I can provide to the case company, by proposing some quality-

of-life solutions that hopefully help their daily workflow when it comes to data management. This section will shortly go through the optimizations for three different segments. We will look at how we could improve the efficiency of the cloud-based storage systems, data consistency for all the participants in the processes and provide some ideas on how to build data management guidelines that suit the case company the best. The problem of the CEO's e-mail server reaching it maximum capacity will also be addressed, and better solutions are going to be suggested to combat this problem.

5.1   Cloud-based storage systems

There are three different cloud-based storage systems in use within the case company, with each having an assigned role to serve a specific purpose. However, when researching said systems we came across a few problems in them. The location of files is sometimes not clear enough, which makes finding the required files difficult. This is effectively made worse by the fact that there are different systems being used for this purpose. This easily leads to an organizational nightmare where it becomes difficult to track where and in which cloud services storage the needed files are (Senad 2013). This could be improved upon by performing an audit on all the cloud storage services and cleaning up old data that is no longer needed and is defined irrelevant to the company. The company could also find success by standardizing the different services for specific purposes. Currently they are structured in an unorganized way and the different locations for certain type of files is not clear enough, making the issue worse over time as files are being saved to different locations without clear guidance.

5.2   Data consistency

When it comes to data consistency, there are two different types of data affected. The video material produced by videographers, and the project/working files generated while editing. The lack of lossless compression for some videographers creates issues when the project advances, as the large file sizes are slower to transfer and take more capacity to store. This lossless compression process could be added to the offer for the videographer as a paid service, where incase it requires more attention from them, it will be noted in the price. Even though this would make the service generate more initial cost for the case company, it could improve the later stages of the project by such a margin that it would make it worth it and even eventually end up reducing the total cost by easing the work of the editor. There are different editors that work on projects for the case company, each with their own working environments, methods and in some cases different software. When hiring third-party editors, it would be a good idea to find out which software they use and provide them with a template that provides consistency into the working environment within the software. This makes it easier for other editors if they ever need to go back to the project files to make changes or re-edit the produced video.

5.3 E-mail server capacity

The e-mail server capacity is creating bottlenecks by becoming full and therefore not allowing the CEO to send or receive e-mails. This problem has been previously combatted by increasing the e-mail server capacity from the service provider. This is however not the optimal way of handling this because it creates more monthly costs for the company and does not provide a permanent solution, as the server will get full again. Instead of increasing the server capacity, the CEO should start archiving old e-mails that she does not require frequent access to. There are many ways of archiving e-mails either online or offline, but the proposed and quite possibly the easiest solution would be to utilize the provided tool for archiving within Microsoft Outlook which is the software being used within the company.

5.4 Data Management guidelines

Establishing data management guidelines for the case company would be a good way to reduce inconsistency, improve the workflow of all the participants and support the continuous improvement for the company. These could simply be a set of instructions for all the participants of the project, where the manipulation and storage of data is standardized, simplifying the data management processes for everyone included in the project.

5.4.1 Data Management Framework

A Data Management Framework such as the Data Excellence Model by the Competence Center Corporate Data Quality (CC CDQ) could be utilized to prepare guidelines for the company's data management. This framework is designed to support and give guidance to companies implementing data management guidelines by defining the major design areas and supporting the transition into a data-driven and digital company. This framework model splits the design areas of data management into three different categories:

1) Goals
   Figure out the overall aim of data management by specifying the necessary capabilities in both business and data management.

2) Enablers
   Specify six different design areas: people, roles and responsibilities; performance management, processes and methods, data architecture, data lifecycle and data applications.

3) Results
   Metric the results on to what extent the goals are achieved in terms of two aspects: data excellence and business value.
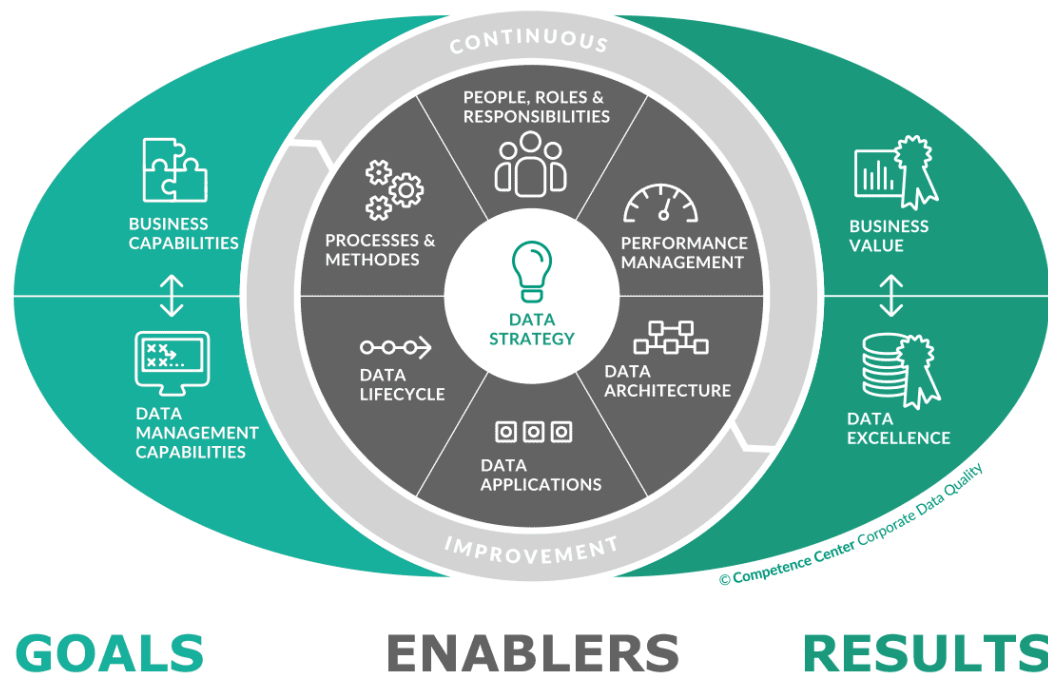
Figure 10: Data Excellence Model by CC CDQ (CC CDQ n.d.)

6   Conclusion

Data management processes are crucial to a company operating in the photo- and videography industry, and they need constant monitoring to match modern day standards. Data is becoming larger and therefore more difficult to manipulate and store, which makes the importance of said processes even more important. This thesis had the goal of visualizing the current data management processes of the case company to help in optimizing them by pinpointing problems and/or inefficiencies within them.

A Data Flow Diagram (DFD) was created with co-operation from the CEO, which ended up working as intended in helping us pinpoint the different problems in the processes. The thesis however was not intended to deliver a one-time fix for any of the problems, but instead offer a continuous improvement model for the company to help optimizing their data management in the future.

The problems found when conducting the research were the inconsistency of data generated in the filming and editing processes, disorganized cloud storage services, e-mail server capacity being capped and the lack of guidelines for data management. To these problems the following solutions were suggested: Performing an audit on the cloud storage services and

removing old and/or irrelevant data, encourage consistency for filming and editing by requesting different lossless compression methods and consistency for editing project files and archiving older e-mails that do not require frequent access. A framework for creating data management guidelines was also suggested.

This thesis brought clarity to the company's CEO about how the data management processes in their company are being handled currently, and they look to monitor, develop and improve said processes in the future.

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Figures