Conveying Data-Driven Design Information To Users: An Exploratory Study On Transparency Between A Data-Driven Culture And The Public

BY

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TABLE OF CONTENTS

ABSTRACT

From a pragmatic perspective, this study debates disclosing data-driven design information to users of publicly accessible websites/apps, as rationale for redesign. The conclusion from surveying literature, suggests lack of significant work covering the research topic. The exploratory position of this study utilized a mixed method research strategy investigating: 1) whether practices disclosing this type of information currently exist, 2) whether any potential benefits can be identified, from the public's perspective, 3) whether a hypothesis for future research questions can be induced. An equally weighed Qual →Quan research approach was employed. A qualitative case study utilizing virtual documents collected from subjectively selected websites, was used to explore current transparency practices employed by data-driven software companies**.** A thematic analysis followed, which resulted in identifying 4 central themes. A quantitative self-completion survey was employed online to gain insights from the public user's perspective. 100 surveys responses were collected from individuals of which 90 were deemed usable. Findings from the qualitative research suggest that this level of design rationale is not currently practiced. Additionally, transparency tends to focus toward data practices and technology-driven design features such as algorithmic behaviors, ad and content placement. Potential benefits identified from quantitative analysis were: 1) companies project an honest and trustful perception, 2) increase user acceptance, and 3) mitigate users from refraining further use of the website/app. Survey results shows that 44% of users of 'free' public websites/apps hold a neutral position, and 11% lack interest towards obtaining informative material regarding data-driven design decisions. However, 64% of the individuals sampled possess very little to no understanding about data transparency and data driven design. Therefore, results suggest that public users must obtain more understanding of the core topics, before determining the necessity of such design transparency. The need for further research from a different perspective is required.

Keywords: Data-driven design, Transparency, Design Rationale, Website/App Analytics, Mixed Method Research, Descriptive Univariate Analysis, Thematic Analysis

ABSTRAKT

Fra et pragmatisk perspektiv, diskuterer denne undersøgelse datadrevet design information til brugerne af offentligt tilgængelige hjemmesider/ apps, som rationale for de beslutninger, der styrer et redesign. Gennemlæsning af litteratur tyder på en mangel på arbejde, der dækker dette forskningsemne. Den udforskende vinkel på denne undersøgelse anvendte blandede forskningsmetoder til at undersøge: 1) om der på nuværende tidspunkt findes metoder**,** der afdækker denne type information; 2) om der, fra offentlighedens opfattelse, er potentielle fordele, der kan identificeres; 3) om en hypotese for fremtidige forskningsspørgsmål kan identificeres. En Qual → Quan-forskningstilgang blev anvendt. Et kvalitativt casestudie med virtuelle dokumenter indsamlet fra nøje udvalgte hjemmesider, blev anvendt til at undersøge den nuværende gennemsigtighed, der bruges af datadrevne software-virksomheder. Herefter fulgte en tematisk analyse, som resulterede i identificeringen af 4 centrale temaer. En kvantitativ selv-administreret online spørgeskema blev anvendt for at opnå indsigt i offentlighedens viden. 100 spørgeskemasvar blev indsamlet fra individer, hvoraf 90 blev betragtet som anvendelige. Resultaterne antyder, at dette design rationale ikke for nuværende praktiseres, da gennemsigtighed har tendens til at fokusere på databehandling og teknologidrevne designelementer såsom algoritmer, annonce- og indholdsplacering. Potentielle fordele fra den kvantitative analyse blev identificeret som: 1) virksomheder kan opfattes som ærlig og tillidsfulde, 2) øget bruger accept, og 3) Forhindre at brugere afstår fra videre brug af hjemmesiden/app'en. Resultaterne fra spørgeskemaerne indikerer, at 44% af brugere af 'gratis' offentlige hjemmesider/apps forholder sig neutralt, og at 11%eller mangler interesse i at modtage informationsmateriale om datadrevne designbeslutninger. Dog har 64% meget lidt eller ingen forståelse for data gennemsigtighed og datadrevet design. Derfor antyder resultaterne, at offentlige brugere bør opnå mere forståelse for de centrale emner, inden nødvendigheden af sådan design-gennemsigtighed afgøres. Der er fortsat behov for mere omfattende forskning fra forskellige perspektiver inden for emnet.

Nøgleord: Datadrevet design, Gennemsigtighed, Design Rationale, Hjemmesider/app analyse, blandede metoder forskning strategi, Beskrivende univariat analyse, Tematisk analyse

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TERMINOLOGY

Note: terms placed within the same row indicate that they are used interchangeably in this paper.

Term	Clarification
Analytics, data analytics.	Referring to website &/or mobile app analytics on an existing solution.
Author, Researcher	Christopher Charles Sousa.
Data-Driven Design 'DDD'	Referring to data-driven practices and decision making impacting the design of website &/ mobile applications.
'Free' websites/apps, 'free' services	Users are not the customer, they are the product. By using such platforms and services, individuals are often viewed as commodities in the form of personal data, sold to advertisers and data brokers (Sadowski 2019).
Real-world	Existing real companies, drawn from actual situations and the information made openly accessible through internet sources 'websites'.
The public, public users, end users, public end users, users.	Those individuals who consume 'free' content &/or publicly available services provided through websites and/or mobile apps.
User Interface 'UI'	The graphical design elements permitting interactions between the system and the users.
Virtual documents	A collection of information that is obtainable on internet websites, forming a type of document source.

LIST OF ILLUSTRATIONS, DIAGRAMS AND TABLES

CHAPTER 1 – INTRODUCTION

Research topic: Exploring transparency practices shared between technology, data-driven companies and the users of their publicly offered websites/apps. This study considers whether to openly disclose data-driven design information to the public, as design rationale for a new redesign.

Interrelating concepts between data-driven design 'DDD', dissemination of design rationale, transparency practices, and potential repercussions encountered post-release of a redesigned website/app, can be portrayed as knowledge significant for both practical and academic perspectives. From a practical real-world perspective, this paper contributes towards exploring transparency between companies who emphasize a data-driven culture and those public individuals who occupy the user base. Intentions situate with understanding implications of an alternative strategy towards rationalizing design decision-making to users. From the academic perspective, this study aims at an audience comprising of the professors assessing the paper and fellow research scholars. Academic contributions situate with identifying a topic which appears relatively untapped and opening the door for future research studies.
Note: Motivation behind formulating the problem is based on the perspective of practical use.

1.a – PROBLEM FORMULATION AND RESEARCH QUESTIONS

To whom is it relevant: Technology, data-driven companies prioritizing the importance of communication and transparency with public users.

Where is it relevant: Technology, data-driven companies implementing a redesign of their website/mobile app and have concerns about public user acceptance. The focus is on understanding the decision-making and analytical results that influence the redesign outcome, not with how/where raw data was selected, nor what operations were performed during analysis.

Research problem aimed to address: Combining insights derived from website/app data analytics and user research together forms an enlightening outlook of usability. Therefore, should technology, data-driven companies feel persuaded to convey these results steering redesign decisions, to the actual end-users? And if so, how should such information become transparent to the public. By embarking on exploratory research, this study investigates whether: there is a need to disclose this type of information, and whether this level of design transparency can influence user acceptance, through identifying motives and perceived drawbacks.

Hypothesis: Users have typically been at the center of design for a while. The impacts of using analytical data to strategically make decisions can deter from that original focus. By conveying relevant portions of this information, in a manner suitable and understandable to public users, a company may significantly decrease the likelihood of facing user resistance to change. Specifically, undesirable repercussions of users refraining from use, users spreading their displeasure through social media or other public outlets, and a decrease in user retention.

Qualitative research questions:

- Qual-1: What types of information are companies, who offer publicly available websites/apps services, currently being openly transparent with the public about.

Quantitative research questions:

- Quan-1: According to the public's perception, is conveying data-driven design decisions an area that companies offering 'free' content consuming sites/apps should be practicing.
- Quan-2: According to the public's perception, what advantages can be argued as reasoning for why transparency of this notion should be considered by companies offering 'free' content consuming sites/apps.

Mixed methods research questions:

- Mixed-1: According to the public's perceptions, is the notion of transparency of data-driven design decisions steering redesigns, currently not openly shared between companies offering publicly accessible sites/apps and their users.
- Mixed-2: Could utilizing visualization templates be argued as an optimal approach for communicating such design rationalizations of this notion with public users.

1.b – MOTIVATION AND BACKGROUND

How did the idea of this study materialize? The research area began to idealize based on personal experiences with websites and apps, some of which I use daily. Many others I associate with and myself included, have been in a situation where we have been very pleased with the current state of certain apps; generally speaking, about design and functionality offered. Suddenly, a complete overhaul of design is released unexpectedly, e.g. ESPN's mobile app. With no prior knowledge or understanding of how or why this happened, users like myself are stranded feeling blindsided and caught staring trying to navigate to where our favorite features have relocated to. If they even exist in the same manner anymore. One cannot simply ignore the emotional response of public users, nor the impact that different classes of affordances have on user interaction, especially with daily users. Experience is powerful and users rely on it to carry out their favorite interactions with a website/app quickly and effectively. Change resets much of the experience and requires time to adjust, for which public users may reasonably resent.

I can personally relate to another experience involving Yahoo!'s Yahoo sports website, where I have been a daily user for 20+ years. Consistency and high-quality service offerings have always been trademarks that have helped maintain a loyal base of users. Although design elements have been upgraded throughout time, e.g. HTML/CSS upgrades and responsive layouts for smaller devices, the changes were never dramatic, and navigation and functionality offered have always remained relatively similar.

The interest at-hand is whether the decision-making behind a redesign is already transparent or whether it should be made so with public users. Often, the matter of promoting new changes are conveyed, but in several different ways. Another matter concerns arguing for or admitting fault when a redesign fails to gain support. But what about the matter of being transparent about the information dictating design decisions. Reflecting on personal experiences

and my background leads to theorizing that the main factor steering such design changes most likely is influenced by DDD activities.

Background: establishing the context of the study

Data is at the forefront of technology, medicine, advertising, design and business strategies, etc. "Data is valuable and value-creating" and referred to by some as the most valuable resource in society today (Sadowski 2019). However, it appears that transparency has generally not been a focal point for companies with a data-driven culture, until in recent years due to personal data leakage, privacy concerns, and government regulations. Discussions involving data within this paper primarily refer to the insights derived from data-driven design activities. These insights steer decision making and design improvements by delivering an informative view of user preferences, user behavior, user likes and dislikes, pain-points, etc., often in the form of quantitative data.

In referring to public users, this study recognizes those individuals who have a preexisting perspective of a given website/app before to a redesign release. Not referring to new users with zero prior experience, whereas a redesign had a relatively nonbearing effect on them. In using the term websites/apps, this study mainly refers to publicly available services for modern browsers and mobile devices, e.g. 'free' content consumption newsfeed/sports/social media outlets, and B2C services; not B2B or internal business solutions. A redesign that aims at improving business aspects e.g. sales, ROI, faster checkout process, etc. does not fall within the focus of this study. Companies initiating these types of improvements presumably will not realize the relevance of openly conveying this sort of rationale, and rightfully so. Their focus is on increasing revenue and quicker user action. Whereas, the target audience likely could realize its relevance, given they should want to keep users engaged and utilizing the services for a longer duration. Therefore, from a research and practical perspective, it should be made apparent to what extent companies under the context exhaust efforts towards rationalizing new usable design and transparency practices.

To understand why redesigning a website/app becomes justified, this study recognizes the following reasons, in no specific ordering: 1) DDD practices are newly adopted within a company; 2) usability issues have been undoubtedly identified and data analytics performed on e.g. a website may have identified the presence of a wide range of issues; 3) improve customer satisfaction and/or loyalty programs; 4) gain new customers; 5) improve business outcomes e.g.

increase sales and transactions; 6) dictated by the competition, as to provide a new advantage or to match competitors' offerings; 7) dictated by new innovations, e.g. new devices or introduction of new/updated frameworks.

Subjective reasons established from the onset for why companies could be persuaded to being more transparent about a redesign include, in no specific ordering: 1) taking a proactive approach to communication versus a reactive approach; 2) creates a sense of trust, honesty, and understanding, thus likely results in a loyal and informed user base; 3) provides users with a feeling of self-worth and appreciation, thus naturally enticing them to be more accepting; 4) may help ease psychological impacts caused by the sudden change. It is fair to assume that people are reluctant to change. The same applies to users of a website or mobile app. Having to adapt to something new can bring forth challenges, uncomfortable feelings, and early frustrations until one has grown accustomed to the new environment. Provoking distrust and blindsiding users prompt them to become emotional, impatient and unforgiving.

1.c – LITERATURE INCLUSION/EXCLUSION CRITERIA

Inclusion/Exclusion criteria	Note
Excluded if published in a language other than English.	
Excluded if currently not listed on the dynamic BFI lists as of series 2018.	Two lists: the BFI list of publishers and the BFI list of series found at (https://ufm.dk/en/research-and-innovation/statistics-and-analyses/bibliometric-research-indicator/bfi-lists?set_language=en&cl=en)
Excluded are unpublished academic thesis papers.	
Existing quantitative and/or qualitative case studies are accepted for inclusion.	Studies related to user research, usability, app/web design, data-driven design, design rationale, transparency practices, and data visualizations are accepted for inclusion.
Journal papers, book chapters, papers and abstracts from conference proceedings, and literature reviews are accepted for inclusion.	Primarily, the published literature cited is to fall within the boundaries of computer science or social research.
Preferred max-limit of 5 articles published before the year 2000 for inclusion in the thesis paper.	Well established groundbreaking articles of relevant content are still accepted.
Seek other referenced publications primarily between the years 2007-2019.	The purpose behind focusing searches between these years is associated with the rise of social media, smartphone apps and the sudden need to consume content gained popularity within this time frame.

Both supporting and contradictory theories, concepts, methods, and argumentative points are accepted for inclusion.	The use of cited literature is not only to provide similar thoughts supporting the hypothesis but also contradictory viewpoints, if found.

Figure 1.c.1 – Table displaying the criterion for selected published literature pieces comprising of the bibliography and not those defined under *web references.

Sources used for the literature search

Databases and Search engines – Springer Link, Elsevier Science Direct, ACM Digital Library, Dblp Computer science bibliography, REX online Library at RUC, and Google Scholar. The terms ‘transparency practices’ + ‘rationale’ + ‘design’ + ‘case study’ were the most widely used across database searches by using a variety of search term expressions. Moreover, many of the articles comprising of the bibliography and unpublished website references were discovered by crawling the references of articles produced from search results.

Additional terms used across the search include:

- "Transparency between a data-driven culture and the public", "Rationalizing design decisions to users", "Data Driven Design", “Transparency by design”, “user acceptance + app design + rationale” "Transparency + the good and the bad", "Telling Stories with Data", "Web Analytics || app analytics & Data discovery", “app redesign case studies”, "What's the most effective way to justify design decisions to users?”.

Extensive search occurred through the following journals and conference proceedings:

- The Interdisciplinary Journal of Design research
    - Advance search on science direct for the journal titled Design Studies: term “transparency design rationale” and filter ‘discipline computer science’ rendered 12 results; term “design transparency” and filter ‘discipline computer science’ rendered 60 results; term “data-driven design” and filter ‘discipline computer science’ rendered 292 results.
- Cooperative Design, Visualization, and Engineering international conference proceedings
    - Advance search on science direct for the conference papers: term “Design Transparency” and filter ‘discipline computer science’ rendered 19 results; term “Design rationale + transparency” and filter ‘discipline computer science’ rendered 30 results.

- Human-Computer Interaction international conference proceedings
    - A SpringerLink search on the term “transparency design rationale” and filter ‘discipline of computer science’ rendered 44 results.
- Design, User-Experience, and Usability international conference proceedings
    - Term “design rationale and users” and filter ‘discipline computer science’ rendered 63 results.
- Proceedings from International Conference on Intelligent User Interfaces
- Proceedings from International Conference on Engineering Design
- Proceedings from International Conference on Theory and Practices on Electronic

**Note*: please do not be discouraged by the use of web references from sources considered unpublished literature. This use reflects the qualitative research approach employed. The abundance of information available online combined with the inability to discover preexisting studies, made this a viable and purposeful choice.

CHAPTER 2 – THEORETICAL BACKGROUND

Written in an explanatory manner, this chapter provides a descriptive narrative about core concepts from the literature search. The purpose is to provide the reader with a brief explanation and introduce relevance to the problem area. As (Bryman 2012) states “discussion to the existing literature is an important and useful way of demonstrating the credibility and contribution of your research”. Through an extensive literature search, this study utilizes these sources for capturing understanding and theorizing the overall research theme, identifying theoretical and empirical case studies relating to this area of transparency, and building rationalizations and arguments for discussion. Most of these references classify as published literature, apart from four website articles that add real-world context.

Usability

This study relates usability to the research topic by recognizing the improvement of usability issues as a determining factor for performing data-driven design activities. Identifying the presence of usability problems insists the need to implement a redesign.

Usability is a critical quality characteristic of interactive software systems. "The ISO/IEC 25010 standard defines usability as the degree to which a product or system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". Effectiveness defined as "degree to which users correctly and completely achieve specified goals". Efficiency defined as "[the] resources expended by users to correctly and completely achieve specified goals". Satisfaction as "degree to which user needs are satisfied by using a product or system in a specified context of use". (Ferreira et al. 2020)

Issues concerning usability are generally thought of as qualitative and based on behavior aspects when interacting with a product. When identified, such problems can be described by expressing the context, underlying cause, and severity among other characteristics (Hvannberg, Law, and Lárusdóttir 2007; Tullis and Albert 2013b). Ideally, usability problems are actionable. "If they don't point directly to a part of the interface that was causing a problem, they should at least give you some hint of where to begin looking" (Tullis and Albert 2013b). The goal of identifying and reducing such issues lay with improving the overall user experience.

Three modes of identifying usability problems are commonly performed. Those which do not require users (Hvannberg et al. 2007), e.g. expert reviews/inspections or heuristic evaluation. Those which do incorporate real users, e.g. usability testing, surveys or observations. And those that utilize analytics software to record behavioral and usage data of users.

Usability problems can be discovered using numerous sets of existing heuristic evaluations. Nielsen's heuristics are one set of design guidelines, 10, which concentrate on the system's UI. Few heuristics refer to the understanding of user cognition or situation awareness. The cognitive principles of Gerhardt-Powals is one set consisting of guidelines based on cognitive principles and situation awareness theory. (Hvannberg et al. 2007)

To potentially obtain user experience insights with users, some easily missed during a usability test, tools can be employed for measuring user behaviors and emotions. This includes collecting verbal expressions focusing on the ration of positive-to-negative comments metric, facial expressions, eye movement tracking by employing e.g. infrared technology, skin conductance which measures e.g. the level of arousal, measuring heart rate variance which can indicate stress, and electroencephalography 'EEG' which measures brain wave activity. Worth noting about evaluating usability with user is the notion that some participants may be hesitant or fearful of admitting their true feelings and thoughts to a stranger. (Tullis and Albert 2013d)

Backing design with data. Mining and analysis of activity data assist the search for patterns and metrics, which can indicate the presence of usability problems. E.g. analyzing performance metrics based on user behavior in relation to task success, time on task, errors, efficiency, and learnability (Tullis and Albert 2013a). The resources required to collect, analyze, interpret and visualize the resulting usability problem data is a main consideration (Pyla et al. 2006).

Associating relevance between website/app redesign and usability may also delve into the argument of 'why invest resources towards usability testing, analytical software or hiring of experts; just let designers be creative designers?'. Throughout the last 20+ years, literature has weighed arguments with reference to 'What is beautiful is usable' or 'What is usable is beautiful'. Previous studies have focused on the users' perceptions of beauty and usability regarding a computerized system, before and after use. (Tractinsky, Katz, and Ikar 2000) suggests with their experiment that "the degree of system's aesthetics affected the post-use perceptions of both aesthetics and usability, whereas the degree of actual usability had no such effect". Meaning "users perceive aesthetically appealing interfaces as indicative of usable systems". (Al-Qeisi et al. 2014) leans towards this stance, via their research survey, by adding that improvements to a website's design appearance impacts usage behavior and should enhance the overall evaluation of a site, thus leading to greater usage intentions.

Contrary to the previous point, generally in the field of HCI, the prominence of usability has had a pervasive claim over aesthetics. (Tuch et al. 2012; Hamborg, Hülsmann, and Kaspar 2014) both contribute on the interplay between usability and aesthetics by employing laboratory studies. Their results suggest reversing the notion of 'what is beautiful is usable', as "usability has an effect on post-use perceived aesthetics", under certain conditions.

Data-Driven Design

This study recognizes data-driven design as the approach, under research, for effectively solving app/website redesign challenges by using insights derived from user activity data and preferences. Data steering these design decisions is the subject of how rationalizing a redesign using this information could impact user acceptance.

DDD is defined in (Liikkanen 2017) as "tools that assist in design research by automating data collection and analysis; and may also offer new ideas or help us make data-informed decisions with regard to one's design and business".

Data-Informed Design, Data-Aware Design, Data-centric Design, Data-driven design thinking, evidence-based design, and so forth, are interrelated terms used when discussing practices for making design decisions based on data; predominantly quantitative. Though, despite an emphasis on quantitative data, quantitative data is complementary, as both provide different types of evidence (Liikkanen 2017). Website/app analytics and user research, based on both qualitative and quantitative findings, can strongly support one another. The order of performing these activities is interchangeable. One commonly helps to understand what issues are present, whereas the other helps understand how and why they are present.

A visual representation of the decision-making process correlating to DDD can refer to the conceptual framework presented by (Mandinach et al. 2006). This approach forms a continuum describing how "decision making begins with data, transforms those data into information, and then ultimately into actionable knowledge". To note, this study does not recognize the outer hierarchy structure representing 'Classroom, Building, and District'; just the duplication of the process itself.

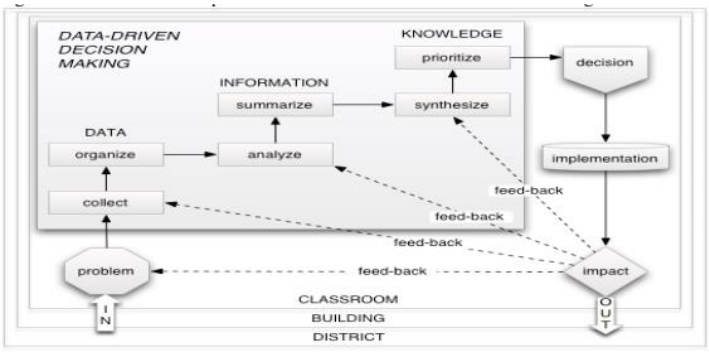


Figure 2.a - Theoretical/Conceptual Framework for Data-Driven Decision Making (Mandinach et al. 2006)

Data scientist and designers are forming multidisciplinary teams, aiming to produce design by partnering learning algorithms with user experience design techniques. They aim to "create features that arise from the current availability of data, rather than a specific user need". The ability to capture and feed user behavioral data into machine learning algorithms is propelling "designers to consider how users begin, evolve, and end their interactions". (Girardin and Lathia 2017)

"Big data's power resides in the fact that it reflects how humans behave rather than what they believe" (MIT Technology Review 2016). Integrating a new algorithm-driven recommendation feature, e.g. think of your favorite show/music streaming service, is driven by

data produced and consumed by the users themselves. These are known as intelligent systems, which make decisions based on user data and complex computations (Eiband et al. 2018). This process is "[characterized by] an iterative mechanism that typically offers ways to personalize, optimize, or automate such services" (Girardin and Lathia 2017).

Measuring user experience data 'usability' can occur from outside a lab by monitoring details of user interaction with e.g. web applications (Atterer, Wnuk, and Schmidt 2006; Tullis and Albert 2013e). Such a passive 'non-intrusive' tracking tool is defined as "any kind of [automated] under-the-surface recording of user activity" (Liikkanen 2017). "Analytics services collect data about user interactions with a web service, aka the click-stream data, along with all contextual data related to the visit, and aggregate it for reporting" (Liikkanen 2017). This valuable information typically derives from (Atterer, Wnuk, and Schmidt 2006; Tullis and Albert 2013a; 2013e; Liikkanen 2017):

- Visitor behavior data e.g. page and tab navigation, quick bounce rates, 'clickstream' actions on a page e.g. mouse movements, keystrokes, scrolling, eye movement tracking, etc.
- Site traffic, drop-off rates, average visit duration, average time on page, time-to-complete tasks, performance metrics e.g. page load time, etc.
- Visits by devices, operating systems, browsers and screen resolution; browser window size, country of origin for the request, etc.

Deriving these insights help to identify whether customer pain points exist, user journeys and heat maps, low viewer engagement signals like e.g. number of demo requests, cart abandonment rate, click-through rate, conversion rate; and so forth. In particular, the intuitive interpretation of heatmap data reveals whether there is "[an] absence of clicks in elements expected to be clicked [and] the presence of clicks in elements not expected to be clicked". Scroll depth provides evidence of why targets lack action (Liikkanen 2017).

A vast amount of open-source and powerful enterprise software tools are available for discovering, analyzing, and reporting usability problems. Behavioral analytics produced from quantitative analytics tools such as Google Analytics, Omniture, Optimizely, KISSMetrics, Adobe Analytics, IBM Tealeaf, and so on, drive modern DDD solutions. Google Analytics dominates this market. It offers the ability to view how one's website/app is performing compared to benchmarks of a given industry. "Estimated that nearly 70 percent of Fortune 500 companies use market leader Google Analytics to track online behavior". (Liikkanen 2017)

Understanding the presence of usability problems boils down to validating quantitative findings and identifying the root cause through user research. The most obvious way to learn about this is to ask participants directly about their experiences (Tullis and Albert 2013c). Techniques for requesting user input, 'active data collection', are "inherently more ethical than passive recording [techniques]" (Liikkanen 2017). This self-reported by the user data offers important insights into the users' perception and about how they feel, or reactions about the system (Tullis and Albert 2013c).

Two widely used user research experiments are A/B testing, "pits two design variations against each other", or multivariate testing, which includes more than two variations (Liikkanen 2017). "A/B tests are a special type of live-site study in which you manipulate elements of the pages; whereas, some visitors see the 'A' version and others see the 'B' version" (Tullis and Albert 2013d). Splitting visitors between A/B versions at truly random and statistical testing for significance are of vital importance (Tullis and Albert 2013d). User testing typically occurs in a remote/lab environment or within the real environment. Other user research experiments include split URL testing, multipage testing, 5-sec eye test, questionnaire surveys, focus groups, individual interviews, heuristic analysis, observational research e.g. screen recordings, and BI/market/consumer research.

Data to action: big data brings forth complicated challenges. Organizations must collect, process, securely store, integrate, analyze, interpret and present insights, and act on a vastly growing volume of data. Obviously, this requires enough resources, "amount of money, time and manpower available for tests [may be] limited" (Atterer, Wnuk, and Schmidt 2006). Ultimately, the end goal of "speed to insight", meaning efficiently transitioning from processing data to deriving action in a timely manner, is crucial (MIT Technology Review 2016).

One concern with website/app analytics is associated with potential inaccuracy in one's site statistics, due to automated programs called search bots, or spiders, implemented by major search engines. However, the bots can be filtered out, if they identify themselves (Tullis and Albert 2013e). Ethical considerations, e.g. between privacy and passive tracking, are another problematic concern that is often scrutinized. Especially, with passive data collection on the web. "The biggest ethical question of DDD is what you tell the user about your data acquisition" (Liikkanen 2017). Ensuring meaningful data is derived from asking participants questions is an upmost concern of user research. Formatting questions in the correct way can be strenuous, as

questions can possess many forms, e.g. rating scales, lists, open-ended, and so forth (Tullis and Albert 2013c). The term social desirability bias acknowledges a concern with participants' unprovoked urge to report positive feedback when collecting self-reported data directly in-person or via phone conversation (Tullis and Albert 2013c).

Modern-day organizations are leaning on analytics to reap a competitive advantage and not just with design but rather driving financial and operational objectives. "Companies in the top third of their industry in the use of data-driven decision making were, on average, 5 percent more productive and 6 percent more profitable than their competitors". People create a data-trail daily, "whether it is from mobile phone location records, online browsing and purchasing, or credit-card purchases". This trail is used to improve e.g. customer experiences without human intervention. (MIT Technology Review 2016)

In a professional environment, every seemingly minor detail should have a purpose. Take Google's test of 41 different shades of blues for their toolbar on Google pages. These 41 blue gradations were tested to determine users' preferences. Though this may seem trivial to many, the aesthetic design detail leads to more action, or clicks, which is key for Google's revenue stream. This trend continues with a recent A/B experiment testing link colors using a lower contrast of blue. (Holson 2009)

Using quantifiable web/app-based analytics also becomes an important focus post-release of a redesign, e.g. in the case of Yahoo!'s revamping of the homepage and finance websites. The company experienced immediate key improvements to consumer engagement metrics. This includes increases in scrolling activity, sessions per day, homepage viewing duration, and an "increase in interactions such as comments, shares, follows and favorite topics". (Tay 2017)

Design Rationale

This study relates design rationale to the research topic by recognizing that users are typically hesitant to change. To encourage user acceptance, one may provide insight into decision-making. Defining a solid rationale to defend one's design goes from the standpoint of advocating for the user to advocating to the user. This study considers disclosing DDD results and decisions behind a redesign to public users, as the rationale for the necessary design changes.

Design rationale is concerned with documenting the relationship between a given design artifact, the underlying goals, the design proposal, and any constraints or alternatives. Simply

put, promoting transparency of the decision-making process. This is then used as justification, for the IT design artifact and enables the design researcher to rationalize the decisions throughout the entire design process. (Schermann et al. 2009; Shipman Iii and Mccall 1997)

One common concern across the literature search was the notion of design rationale management using systems. Though limitations were stressed, these systems can assist with capturing reasoning, structuring into argumentation, and retrieval of such information. This information includes what design decisions were made, who made them and when, and why they were made. The rationale captured should be as transparent as possible, for reuse in future communication. Most often, this communication is among project team members and provides a cumulative base of design knowledge. Additionally, the rationale can mitigate conflict among the team. (Shipman Iii and Mccall 1997; Horner and Atwood 2006; Regli et al. 2000)

Reusability as a motivator for capturing design rationale enables descriptions from past cases to be reused for new design concerns. Another motivator is to communicate with individuals outside the project group, thus enabling them to understanding reasoning (Shipman Iii and Mccall 1997; Regli et al. 2000). The concept of design rationale in relation to architectural design of an IT system emphasizes traceability, detection, and reasoning as motivators for use. In this field, a rationale-based architecture model can fundamentally lead to consistent and non-violating design. "[Rationale allows] software architects to better understand and reason about an architectural design" (Tang, Jin, and Han 2006).

Transparency Practices

This study recognizes design transparency practices as the centerpiece for research. Exploring modern-day transparency practices, regarding website/app design, uncovers a sizable portion of information/data needed to answer the research questions. The concept of transparency is viewed as "a matter of providing openness, insight, and clarity…through the timely and public disclosure of information" (Flyverbom 2016). (Douglas and Meijer 2016) defines transparency as "the availability of information about an organization or actor allowing external actors to monitor the internal workings or value of that organization". The concept of 'transparency-by-design' "refers to both the design process and the outcomes of the design process" and is defined as "taking into account transparency in every phase of the design process

resulting into the automatic opening of relevant data for the public in such a way that it is easy to understand and interpret" (Janssen et al. 2017).

Transparency and data privacy have become a primary topic over recent years. European Union's General Data Protection Regulation, policy committees, and governments have placed immense pressure on companies. Data policies must be adhered to and new demands call for opening transparency of one's data processing procedures. "This includes a 'right to explanation' of algorithmic decisions" (Eiband et al. 2018). When designing for transparency, one must assess whether to offer complete transparency, or whether to select specific information deemed most useful for users to understand and keep the rest out of sight. (Eiband et al. 2018; Flyverbom 2016). Though Flyverbom states that full transparency is impossible, as it "would undermine many organizational processes and often be detrimental to innovation, profit generation, and competition".

(Eiband et al. 2018) acknowledges a lack of transparency and comprehensibility about computations generated by intelligent systems, from the user's perspective. How decisions and predictions are generated are often hidden from users. "[This] has been shown to negatively impact user acceptance of system reasoning, and satisfaction with recommendations. Moreover, trust in the system and its predictions is diminished". Considering this point, Eiband et al. add that "making an intelligent system and its underlying design decisions transparent, i.e. explaining how the system works, has been shown to improve users' mental models of that system". However, complex explanations might cause decreased acceptance among users.

"Most organizations striving for transparency focus on how to share information and document what they do most effectively" (Flyverbom 2016). One must understandably weigh the condition of creating public value, e.g. build trust and accountability, versus potentially undermining trust or inadvertently increase outside meddling or other inadvertent risks (Douglas and Meijer 2016). Results from Douglas and Meijer show that "more transparent public organizations achieved higher public value scores, especially if they disclosed information about the design and dynamics of their authorizing environment [and decision-making processes]".

Discussing 'embedding' transparency into website/app design within this study refers to "how and where transparency [can] be integrated into the UI of the system" (Eiband et al. 2018). A sound real-world example of this is described from a Mexico City design Jam covering data transparency, notification, and consent ("Turning Consent into an Experience | TTC Labs"

2019). As TTC Labs state, there is a problem and opportunity in understanding that "People know that they are giving out information but don't really know how it is being used". Attention is needed to "allow people to take an active part in shaping recommendation algorithms and how the service will use their data". In a modern data-driven culture, this is achievable by matching a user's behavioral data with manually inputted information, or their 'preferences'. However, (Eiband et al. 2018) calls attention to one difficulty stating, "Integrating all information in a high degree of detail would require a tremendous amount of screen space and likely overwhelm or annoy users who prefer a simple UI".

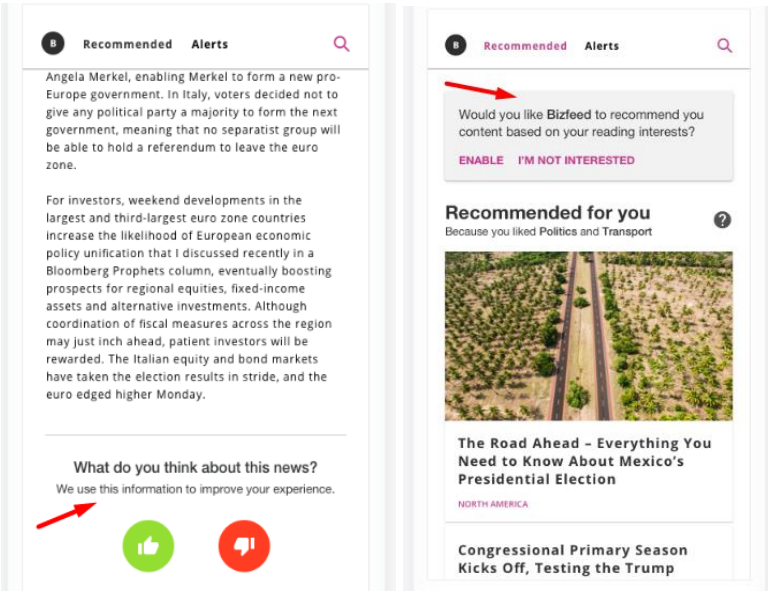


Image 2.b – Snapshot images of an attempt to offer a transparent and personalized app experience ("Turning Consent into an Experience | TTC Labs" 2019).

The use of transparency in a real-world context has impacted government sectors. In San Francisco, the power of data visualization and mapping assisted the city with illustrating why innovative financing options to fund sea wall upgrades and proceeding maintenance costs are an immediate necessity (Dangermond 2016). The visualizations and maps help tell stories which provide "a way for citizens and taxpayers to better understand how spending or other decisions are being made". Moreover, the concept of transparency-by-design strives to advance governments in more open, transparent and accountable way (Janssen et al. 2017). An 'open government' can utilize data-driven dashboards to support decision-making and to offer visual interaction and communication with the public (Matheus, Janssen, and Maheshwari 2018).

Transparency through dashboards allows "the public to scrutinize government actions, to engage in the decision-making processes and to improve decision-making". Although, obvious improvements in accountability and transparency can be obtained, a multitude of challenges can result in user misconceptions and decreased trust (Matheus, Janssen, and Maheshwari 2018).

Data Visualizations

This study relates data visualizations to the research topic by recognizing its use as a potentially ideal approach, for which the information under context can be conveyed in a user-friendly manner. This stance is based on the researcher's assumption perceived prior to commencing research. Moreover, in relations to DDD, visualizations deliver informative, actionable insights which influence decision-making.

"Data visualizations allow people to readily explore, analyze and communicate knowledge drawn from data" (Szafir 2018). Communicating data insights to decision makers rely on visual imagery in the form of typography, designs, illustrations, animations, infographics, and so forth. When accompanied by text, "[visual communication] has a greater power to inform, educate, or persuade [others]" (Ryan 2016b). This strategy could result in 65% memory retention, even after 3 days; compared to 10% retention when reading text only (Ryan 2016d).

"We are visual creatures by nature" (Ryan 2016d). "Data visualization offers a tremendous opportunity to reach insights from data by leveraging our intrinsic hard-wiring to understand complex information visually" (Ryan 2016a). Absorbing information via visual presentations is often suggested in research as the learning preference of individuals; 33% define as visual learners versus 26% auditory, 14% kinesthetic, and 27% prefer a combination of 2-3 learning styles (Buşan 2014). Understanding the preferred learning styles of one's user base, may guide reasoning, problem solving, and information transfer strategies (Mayiwar and Håkansson 2004). Mayiwar and Håkansson suggest using visualizations and simulation for supporting knowledge transfer between experts and end users. Though, this may be ideal for individuals with visual-spatial intelligence, as they learn best by looking at shapes, maps, images, and so forth.

A meaningful, well-designed visual can deliver aesthetically intriguing insights and can assist communicating new discoveries by telling a data-driven story (Ryan 2016a). The discussion of visualization storytelling in this study refers to using aesthetically explanatory visualizations, not exploratory visualizations, which are often interactive and aim at producing

insights (Murray 2015). A cardinal importance of telling a meaningful data story is fixated on "[engaging] audiences in learning complex information in a way that is visual, memorable, and fun" (Ryan 2016c). According to Ryan, a great data story triggers an "ah-ha!" moment, by swaying an audience from passively listening, to thoughtfully assembling the insights.

To capably understand data, there is an imperative need to build diverse data literacy skills. Expanding one's visual data literacy skills can contribute to finding meaning in complex data sets, garner understanding of potential risks and common mistakes committed, and lead to designing persuasive visuals for supporting recommendations (Ryan 2016b; Whitney 2013; Bresciani and Eppler 2015). Delivering an incorrect or inadequate visualization, and/or a poorly told story, can distort the meaningful representation of the data or lose the attention of the audience altogether. The ladder can potentially create a business risk of squandering an opportunity or influence taking the wrong action (Ryan 2016a). "Can information graphics ['infographics'] and visualizations lie?" (Cairo 2015). Literature also acknowledges the use of visuals to purposefully misinform and deceive audiences. Biases, ambiguity, shortcomings in one's knowledge, and distorting data inaccurately misleads a visual graphic (Cairo 2015; Szafir 2018). "Visualizations must be crafted with care, as we are easily tricked into seeing patterns in data that are not actually present" (Szafir 2018).

CHAPTER 3 - RESEARCH DESIGN

A systematic literature search showed limited information available in this area. Therefore, an approach to gain further knowledge in this field was needed. Exploratory research is defined by (Davies 2006) as "a methodological approach that is primarily concerned with discovery and with generating or building theory". Collection and analysis of primary data for this study contributed to answering the research questions and supported formulating a hypothesis for future research. (Guest, Macqueen, and Namey 2014b) contribute by stating "exploratory analyses are commonly used to generate hypotheses for further study". Performing research in a broad, and flexible form, for which aligns with the researcher's pragmatic views, helped lead to a process of continuous discovery (Davies 2006).

The exploratory focus of this study influenced the decision to implement a strategy defined as mixed methods research. Mixed method involves philosophical assumptions and the use of mixing both qualitative and quantitative approaches in a study. More insight can be gained from a mixed approach compared to either qualitative or quantitative research by itself. (Creswell 2009). As with this study, insight is a necessity when the research questions focus on the need to explore and understand. The pragmatic view of mixed methods research opened the door to different combinations of data collection and data analysis (Creswell 2009). The mixed methods research design for this study comprises of an equally weighted priority on both qualitative and quantitative research. Emphasis is given to exploring and discovering qualitative information first, followed by gathering quantitative data.

The focus on qualitative research first, clarified whether this research area is currently being exhibited by companies fitting the context of this study, from a practical perspective. This is followed by the quantitative form of research, which seeks answers from public users' perception. In terms of priority and sequence order, this mixed research process is classified by the notation Qual → Quan (Bryman 2012; Creswell 2009). This study identifies Completeness as the stance for combining research, which "refers to the notion that the researcher can bring together a more comprehensive account of the area of enquiry in which he or she is interested" (Bryman 2012).

(Parraguez and Maier 2017) state that design research relies on quantitative and qualitative data to describe design-related phenomena and to prescribe improvements for design practices. Therefore, collecting data using methodologies defined as both quantitative and qualitative, provides purposeful means to describe information about the phenomena in a broader way and from different perspectives. Understanding the perspectives of the public users utilizing an online questionnaire survey, and exploring central themes from real-world company cases, each provided meaningful viewpoints. (Stebbins 2001) contributes to the importance of employing both sets of methods, in relation to exploration-description of one's study and inductive reasoning covering a little-known phenomenon. Lastly, the mixed method approaches by (Główka 2011; Schoonenboom 2018) were also influential in designing this research study. Similarly, both papers brought focus to the design approach by discussing and describing the mixing and merging of methodologies.

Figure 3.1 is displayed for the purpose of providing an overview model of the research design used in this study. The similar approach taken by (Główka 2011) aligned with the intentions of the author of this paper and therefore inspired the outlook. The forthcoming subsections within the chapter will continue by describing further the strategy behind the chosen methodologies for sampling, data collection, data analysis.

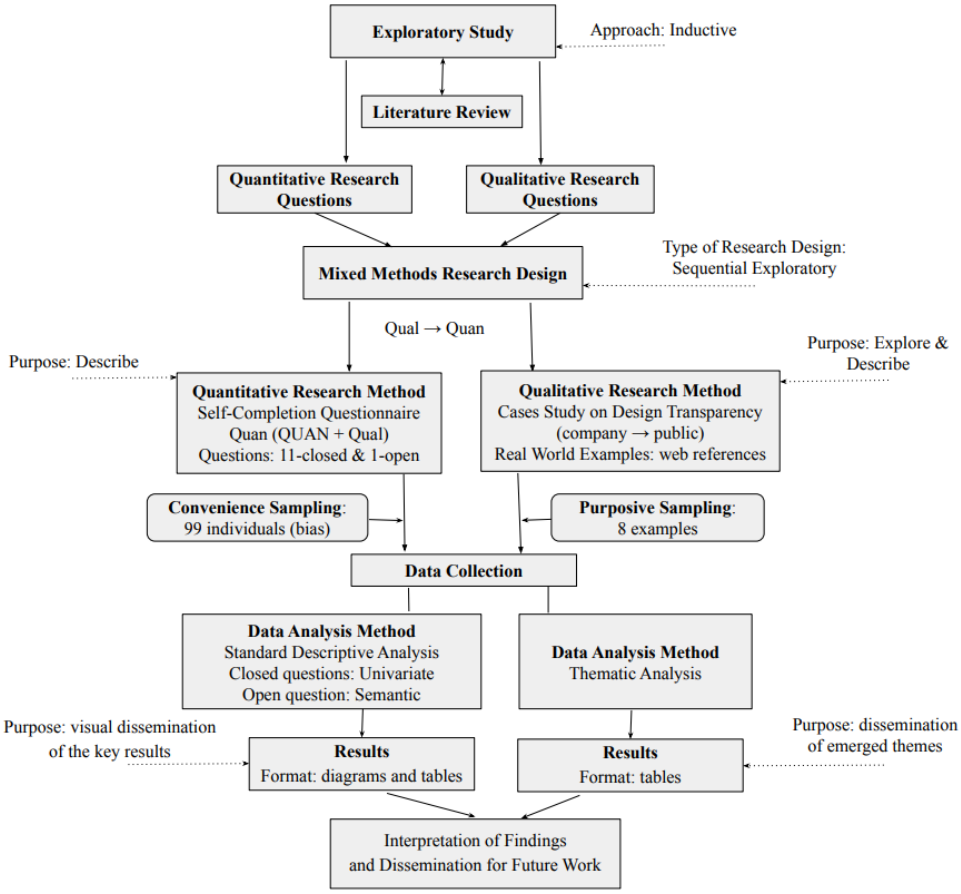


Figure 3.1 – Research Design Overview Model

3.a - RESEARCH METHODOLOGIES

Qualitative Research: Case Study

The case study approach is an investigation into "a contemporary problem within its real-life context" (Scholz and Tietje 2002). The real-life context refers to a technology-driven company's data-driven culture and the communication openly shared with the public. The contemporary problem refers to debating whether to disclose DDD information to public users, as rationale for implementing a new redesign. Understanding the current state of transparency

contributes to qualifying answers towards the research questions and towards future research.

The qualitative research design incorporates web-based textual and visual material 'documents', which relate to real-world examples openly provided by the companies themselves. This purposely emphasizes a pragmatic approach towards exploration, understanding, and describing the practices discovered. According to (Scholz and Tietje 2002), if no best solution can be identified, following a moderately unstructured format can discover preferred practices or whether theory exist. Virtual documents, those that appear on internet websites, under certain circumstances can be considered as a research data source. The vastness of the internet and growing accessibility makes it a potent source for the qualitative research (Bryman 2012).

Lastly, the population of the case examples comprises of both 'free' content consumption website/app outlets and paid website/app services. Attention to both types was deemed beneficial, as it would draw contrast and comparative arguments used within the Chapter 6 Discussion. As (Guest, Macqueen, and Namey 2014a) states, comparison is an important cornerstone, whether one is attempting to detect similarities and differences, comparisons are fundamental to the data analysis process and can deepen understanding and explanation of a particular phenomenon.

Sampling and Data Collection: Case Study on Design Transparency

Population – Technology, data-driven companies promoting websites/apps which offer services that are either 'free' or paid software services.

Sampling unit – A website document 'article' comprising of information in the form of text and/or illustrations.

Sampling frame – Snapchat, Instagram, Facebook, LibreOffice, Uber, Everlane, Airbnb, Yahoo

Sample size – 8

Recruitment strategy: Crawling the web, via search, for openly shared material and articles.

Instrument used: A Chrome web browser for the PC, and search engines: Google, Google Scholar, Roskilde University Library System.

Data collected – Primary information produced within the decade 2010-2019.

Information sources: Business Insider, The Verge, CNBC, Vanity Fair, TechCrunch, Global News CA, elite daily, The New York Times, Facebook, TTC Labs, The Verge, Medium, Instagram, libreoffice.org, Uber, Forbes, everlane.com, Airbnb, Yahoo, YouTube, marketing-interactive.com

A population is often considered but not limited only to people as the unit involved. As (Etikan, Musa, and Alkassim 2016) reiterate, a population "can also refer to total quantity of the things or cases which are the subject of our research". The purposive sampling approach employed was decided by two factors: 1) "It is typically used in qualitative research to identify and select the information-rich cases for the most proper utilization of available resources" (Etikan et al. 2016). This study recognizes 'available resources' as information immediately available on internet websites.; and 2) the researcher's dependence on exploring specific forms of design related transparency. Knowledge and exploration are the key attributes of this factor. According to (Etikan et al. 2016) description of purposive sampling methods, the nature of the sampling approach employed with this qualitative research, relates those defined as Homogeneous sampling and Expert sampling. In other words, this form of sampling comprises of a mix of two points of focus: 1) web-based case examples which share similar characteristics related to transparency and design rationale; and 2) the subjects from within the population provide well-established expert website/app services that are, subjectively, very known in the public eye. (Etikan et al. 2016) argues for purposive sampling as a tool often employed when there appears to be a lack of observational evidence currently existing, and where a desire to garner whether investigations via further study(s) warrant the effort. Overall, the qualitative material was collected purposely in a way as to explore a variety of counterparts.

Adhering to a the less structured and flexible collection process, data was collected through examining numerous 'documents', or website page articles. The information gathered can essentially be classified as unstructured or nonnumeric and less structured data, compared to those generated by its counterpart a quantitatively oriented inquiry (Guest et al. 2014b).
The use of alternative instruments such as questionnaires, observational techniques, or interviewing participants were not employed. This approach to data collection of qualitative web-based information is rationalized by four points: 1) Time, regarding the sheer speed for which information can be discovered, consumed, and summarized within the timeframe allocated for the study; 2) Volume, regarding the abundance of results produce from a simple search term. These results relay textual and illustrations produced and accessible through websites; 3) Goals, the documentation gathered aligns with the knowledge and type of information sought out for this study; and 4) Possible inability to discover sufficient case studies, secondary data, during the literature review search. Additional arguments for employing the use of virtual documentation,

or ‘documents’, as the qualitative data collection type are describe by (Creswell 2009) as: 1) ability to obtain language and words used by the source participant; 2) Convenient and unobtrusive, the information is accessible anywhere and anytime; and 3) Thoughtful information is presented given that the source warranted enough attention to compiling it. Including this type of qualitative information was deemed the optimal option, to help understand the proposed research problem area.

Contrary to these supportive statements, disadvantages to the collection of such documents as the qualitative data source may be present. This concerns the possibility of web-based information being biased, inaccurate and thus potentially not an authentic source of information (Creswell 2009). Attempts to verify the information as truthful was made, by exploring the reputations of the 3rd party website sources and the verified domains associated with the companies referenced. The process of verifying assisted in determining whether the 3rd party sources were reporting on factual topics, and whether additional documentation related to the study area is currently openly shared.

(Creswell 2009) discusses the use of lens by qualitative researchers to view one’s study from a particular perspective. Direct communication with companies falling under this context, whether verbally in person or via phone call or app, was never established. Nor did any conversations held via phone/app messaging or email take place. The author discusses, at other points in this paper, the significance of investigating the perception of the company from their perspective, though proposed with future studies. It was not feasible to view from both the public’s perception and internally through the lens of said companies promoting a data-driven culture. Utilizing the data sources provided over the internet, this study views companies of a large size, well-established, and with distribution of easily accessible documents promoting transparency of design and decision related information.

Lastly, the qualitative information collected for the study will be presented, in Chapter 4, using snapshot images taken. Chapter 4 describes and summarizes the information and examples discovered, to provide centralized insights into the explored area. This overview should help readers formulate their own understanding and subjective ideas.

Data Analysis: Thematic Analysis

(Creswell 2009) identifies the emergence of themes or abstractions as it relates to inductive data analysis from a qualitative research. Creswell states that "researcher's build categories, patterns, and themes from the bottom-up". Building from the bottom-up implies that with thematic analysis, there is ultimately reliance on the researcher's subjective judgement. Thus, influencing the obvious requirement for increased involvement and interpretation from the researcher (Guest et al. 2014b).

The analysis of material collected during the qualitative case study was conducted from examining web-based documentation, expressed by textual words and illustrations. The textual/visual analysis behind the methodological approach employed is a Thematic Analysis, which (Bryman 2012) defines as a diffuse approach to the extraction of core themes in one's qualitative data. Themes are defined as a "category identified by the analyst through his/her data, which builds on codes identified in e.g. transcripts and/or field notes, and of which provides the researcher with the basis for a theoretical understanding" (Bryman 2012). Moreover, this study places focus on the semantics or explicit context of the information, not a latent approach. Another focus relates to viewing abstractions created by the website sources to demonstrate design related transparency practices.

The process for conducting the inductive analysis of qualitative information aligns with a multi-step approach inspired by (Bryman 2012; Guest et al. 2014b; Caulfield 2019; Creswell 2009). Steps were followed as ordered: 1) Thoroughly examine and familiarize with each information source; 2) Coding or labeling to describe the information in categorical segments. This typically represents the emerging themes by linking to the raw information uncovered, as summary markers for analysis (Guest et al. 2014b). (Bryman 2012) agrees and states that this activity goes beyond any one code, as it transcends by building up out of groups of codes; 3) Generate themes by going "beyond counting words or phrases and focus on identifying and describing both implicit and explicit ideas within the data" (Guest et al. 2014b); 4) Define the emerged themes, referring to describing the meaning for each; and 5) Present the findings from the analysis in Chapter 5 and interpret in Chapter 6.

During the search and generation of themes, the areas concerning the exploration were based on recommendations from (Bryman 2012) in no particular order: 1) Missing information, referring to reflecting on missing components sought out by this study;

2) Similarities and differences, referring to exploring the 'what, why, and how' sources convey design and transparency related information in different and/or similar fashions; 3) Repetition, referring to the presence of reoccurring topics. Indicated by (Guest et al. 2014b), codes and categories were not predetermined, and all were derived after the purposively sampled data collection process.

An alternative method considered, but not employed, was content analysis. (Bryman 2012) recognizes Berelson and Holsti meanings of content analysis as a technique for objectively and systematically identifying specified characteristics and quantitatively describing the manifest content. Such a centralized focus towards objectivity, being quite systematic in one's process, and uncovering latent content (Bryman 2012) does not necessarily support the intentions of the study as much, compared to the undertaken approach. Another alternative method considered was discourse analysis. (Bryman 2012) defines this type of analysis simply as "an approach to the examination of language and its use that can be applied to a variety of different materials." Although, considered an acceptable approach for analyzing documents, focusing on the contextual meaning of the words does not align best with the ideas and goals for this study.

Quantitative Research: Questionnaire Survey

"The analysis of quantitative data from social surveys is often more exploratory than is generally appreciated and consequently offers opportunities for the generation of theories and concepts." (Bryman 2012). This position holds true for this study, as the quantitative methodology was purposely included based on the research purpose of answering questions, which can potentially lead to theorizing future work. (Schoonenboom 2018) agrees by stating that a researcher purposefully chooses research methodologies based on his or her research purpose, both for immediate and remote/larger further-reaching purposes. The research method incorporated utilizes a self-completion questionnaire survey. This strategy was employed to answer the appropriate research questions defined in Chapter 1 section 1.c. Two types of methods considered for conducting the survey are classified as either self-administered or interviewer administered, though the latter choice was not employed. Designing and conducting the research survey is inspired by a model providing recommended steps for conducting a social survey (Bryman 2012, figure 8.1). The mode of administration for the questionnaire utilizes the

Internet, as opposed to Postal mail or Supervised in-person, and via the Web, as opposed to Embedded or Attached Email (Bryman, 2012: figure 8.2).

Resources of time, cost, workforce, and the outward reach of the target population primarily impacted this decision. As (McRobert et al. 2018) discuss, internet-mediated and social media is one way to approach a recruitment strategy for a questionnaire survey. McRobert et al. also state that "traditional recruitment methods remain relevant but issues such as narrow geographical reach, high cost and time intensity limit what can be achieved". Although, an alternative traditional strategy allows for flexible administering such as e.g. over a phone, via an app Skype, or in person, it does not suffice to the researcher's capabilities.

Sampling and Data Collection Method: Self-Completion Questionnaire

Population – Adults, no gender exclusion, between the ages of 18-64 residing within the United States of America or between the ages of 15-64 residing within Denmark.
Population size – 205,233,614.
Sampling unit – An individual.
Sampling frame – 3,820 individuals potentially reached via network/friend connections using social networking sites LinkedIn (LinkedIn, Co., California, USA) and Facebook (Facebook, Inc., California, USA).
Sample size – 100 respondents; 90 defined as usable.
Recruitment strategy: Social media/internet (McRobert et al. 2018)
Administration of questionnaire: The instrument used to create/manage the survey, and collect responses was the web-based tool Google Form (Google, Inc., California, USA). Admin permissions for the form is assigned only to the researcher's private Google account.
Accessibility of questionnaire: Accessible using the internet via the web URL address https://forms.gle/NAgQVAhKpYnsk6qC6
Duration of questionnaire: October 20th, 2019 – November 15th, 2019
Data collected from the survey: Primary data via 11 closed-ended questions and 1 open-ended.

"[Convenience sampling] can also be usefully employed in relation to exploratory work from which new theoretical ideas might be generated" (Bryman 2012). A convenience sample of 100 participants was obtained via recruitment using social networking sites LinkedIn and Facebook. These participants became accessible through a shared post created by the author of

this paper. Posts created have predefined settings allowing it to be viewable only to direct network/friend connections associated with the individual who shares it. Additionally, the post was reshared by 6 network/friend connections via Facebook and 1 via LinkedIn. As of November 15th, the number of views for the post via LinkedIn was 190. The minimum number of individuals which potentially could have viewed the post via Facebook is 3,630**. The sum of these totals, 3,820, equates to the sampling frame.

****Note*:** the presence of mutual network/friend connections was accounted for and eliminated from inclusion of this total number.

The Population size for this study is calculated using the total number of residents from the USA and Denmark, who occupy the delimiter of the population. This total reflects adding the number of Americans occupying within the delimiter 201,535,140* with the total number of Danes 3,698,474** also occupying within.

***Note*: 201,535,140 persons occupying within the delimiter equates by subtracting the total number occupying outside "125,632,294" from the total population of the country "327,167,434" ("U.S. Census Bureau QuickFacts: United States" 2018). Occupying persons outside the population delimiter equates by adding the percentage of persons under 18 years "22.4" with the percentage of persons 65 years and over "16.0", then multiplying the total by 0.01%, and lastly multiplying that total by the total population of the country.

- (22.4 + 16.0) * 0.01 * 327,167,434

****Note*:** 3,698,474 persons occupying within the delimiter equates by subtracting the total number occupying outside the population "2,107,607" ("Denmark Population (2019) - Worldometers" 2019) from the total population of the country "5,806,081" ("Population in Denmark - Statistics Denmark" 2019). Occupying persons outside the population delimiter equates by adding the percentage of persons under the working age limit of 15 years "16.2" with the percentage of persons 65 years and over "20.1", then multiplying the total by 0.01%, and lastly multiplying that total by the total population of the country.

- (16.2 + 20.1) * 0.01 * 5,806,081

Note: all decimal points are rounded down to the nearest decimal.

The sample is defined as a Nonrandom or non-probability sampling, given its form does not adhere to probability methods (Davidson 2006b). This non-probability form of sampling was purposely selected as to recruit a higher volume of surveyors, while using minimal resources of

time and cost. Although biased, the sampling reflects the attitudes of the population at the industry standard of "95%" probability ("Sample Size Calculator" 2019). Though, at a "10%" margin of error that the population's responses may deviate from the sample's ("Sample Size Calculator" 2019). According to this source's calculation, a sample size of 385 is warranted, if this study were to reach a margin of error at the industry standard of 5%. Figure 3.2 provided from this source, is used to calculate the sample size.

$$Sample\ size = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1+(\frac{z^2 \times p\,(1-p)}{e^2 N})}$$ Figure 3.2

N = population; size e = Margin of error (%); z = z-score (the number of standard deviations a given proportion is away from the mean)*

**Note*: for a desired confidence level at 95%, the z-score equates to 1.96

Response rate: "the percentage of a sample that does, in fact, agree to participate" (Bryman 2012). Bryman clarifies that the calculation is not as simple as the definition implies. Submissions with multiple questions left unanswered or submissions which clearly indicate a lack of seriousness had to be accounted for. Another factor considered, is whether the participant resides within the population boundary. This is due to the known diverse reach of nationalities through the social network/friend connections. All these factors determine whether to deem a given questionnaire submission as usable. After reviewing the submitted questionnaires, 90 of them were classified as usable. Bryman suggest only employing the number of such usable questionnaires as the numerator when calculating the response rate using the formula displayed in Figure 3.3. Unfortunately, as (McRobert et al. 2018; Brickman Bhutta 2016) confirm with their similar use, it is not possible to specify a true response rate. Primarily, due to the employed recruitment strategy using professional social networking platforms. One cannot identify with certainty those who were uncontactable/did not view the shared posts.

Figure 3.3 $$\frac{\text{number of usable questionnaires}}{\text{total sample} - \text{unsuitable or uncontactable members of the sample}} \times 100$$

Non-responses follow-up: (Bryman 2012) suggests non-response, or refusal to participate, is of significance given that response rates in social surveys are declining in many countries. Therefore, non-respondents should be contacted at least once. The strategy employed for doing so utilized contacting individuals from my friends/network connection via personal message using the social media platforms. As opposed to the initial approach to recruiting,

specific individuals not appearing within the current active participant list on November 8th, 2019, were requested for a second time to participate. This strategy resulted in an additional 19 participants within the first 24 hours, which equates to a 19% increase. At the established deadline date of November 15th, 28 additional participates were included overall.

Data Analysis Method: Descriptive Univariate Analysis

Before interpretation of the findings, the involvement of managing and preparing raw data and analysis of the data occurred. The data gathered was checked to establish whether any obvious flaws were present, e.g. missing data, meaning questions any given respondent failed to answer (Bryman, 2012). Cleaning and transformation of the data is another management concern. E.g. the format of the question requesting the participant to 'Please provide your country of residence' entails free-text input. This entailed transforming all Danish residence entries 'Danmark, DK' and misspellings to a common form of Denmark. By extracting the data to a CSV file using Google Forms, checking for missing data and cleaning data, as mentioned, was performed within Microsoft Excel. Analysis of the data involved the use of data visualizations provided by Google Forms service.

Univariant analysis can be defined as a method for analyzing a single variable at a time (Bryman, 2012). This method was employed to provide a descriptive outlook of the results, by analyzing the primary data collected from the research survey. In doing so, attention is focused towards: 1) measuring the frequency by "[providing] the number of people and the percentage belonging to each of the categories for the variable in question" (Bryman 2012); and 2) measuring the central tendency of values associated with the arithmetic mean, median, and range distribution (Creswell 2009; Bryman 2012).

The descriptive analysis places attention on independent variables as represented by each individual question. Discussed by (Bryman 2012), corresponding variables with questions can be categorized four ways. This study recognizes three of these four types, defined as: Ordinal variables or rank ordered categories, Nominal/Categorical variables or non-rank ordered categories, and Dichotomous variables or data containing only two categories.

The univariant analysis performed provides the ability to visually present and interpret the results utilizing Frequency tables, Bar and Pie charts. The significance of the data analysis process will

assist in determining whether there're conclusions that can derive from the results, in relation to the inferential research questions.

3.b - QUESTIONNAIRE SURVEY DESIGN

The data gathered from the survey varies by the question. The questions presented in the self-completion questionnaire comprise of a couple formats, depending on the type of information sought out in this study (Bryman, 2012). Bryman acknowledges that some questions provide answers in terms of numerical values, yield either/or and yes/no answers, or the form of categories with the capability of being rank ordered or not. Out of these three terms listed, numerical values are not a term of answer produced from this survey. The questions comprising of the self-completion questionnaire contain the following formats:

- 2 multiple-choice questions utilizing a checkbox selection format, which allows for multiple answers to be recorded.
- 8 multiple-choice questions utilizing a radio button selection format, which allows for a single answer to be recorded.
- 7 scale questions, which allows for a single answer to be recorded.
- 1 open-ended question allowing the participant to respond freely in their own words.

The rationale behind selecting the types of questions asked in the survey includes: 1) questions formatted as closed-ended ensured efficiency; 2) minimizes the space for user error; 3) removes biased interpretation; and 4) visually promoted a more attractive form for which should increase the response rate.

The purpose of the self-completion questionnaire described to participants was stated as two parts: 1) gain insight about the most satisfying and dissatisfying user experiences when one of your favorite or most frequently used websites/mobile apps released a new design; and 2) determine whether certain information is being openly shared with public users of free websites/apps'. Insights gathered through the lens of an everyday non-technical or technically knowledgeable public user, focuses on aligning the research questions with the appropriate types of questions asked. Figure 3.4 'a, b, and c' is inspired by a technique presented by (Creswell 2009). The tables inform which questions from the questionnaire relate to research questions explored in this study.

Note: survey questions related to variables var00002, var00003, var00004, var00005, var00006, and var00007 displayed in Figure 3.4.a had been preceded by the question '1) What level of knowledge do you have about each of the following topics? (select 1 option for each row)'.
Note: survey questions pertaining to variables var00008, var00009, var00010, var00011, var00012, var00013, and var00014 displayed in Figure 3.4.b had been preceded by the question '2) Please select one option for each of the following questions'.

Note: to limit repetitiveness, the 'Research Question(s)' column refers to this legend:

- **Quan-1**: According to the public's perception, is conveying data-driven design decisions an area that companies offering 'free' content consuming sites/apps should be practicing.
- **Quan-2**: According to the public's perception, what advantages can be argued as reasoning for why transparency of this notion should be considered by companies offering 'free' content consuming sites/apps.
- **Mixed -1**: According to the public's perception, is the notion of transparency of data-driven design decisions steering redesigns, currently not openly shared between companies who offer 'free' content consuming sites/apps and their users.
- **Mixed-2**: Could utilizing visualization templates be argued as an optimal approach for communicating such design rationalizations of this notion with public users.
- **N/A**: 'Not Applicable' does not directly relate to any research question, but rather is intended to provide the basis for a discussion argument.

Survey Question	Variable Categorization	Research Question(s)	Provides Answers in Terms of:
How do you absorb information and learn best?	**Type**: nominal **Name**: var00001	Mixed-2	Not rank ordered categorization
1.1) Website and Mobile App Development	**Type**: ordinal **Name**: var00002	N/A	Rank ordered categorization
1.2) Data-Driven Design	**Type**: ordinal **Name**: var00003	N/A	Rank ordered categorization
1.3) Data Analytics	**Type**: ordinal **Name**:var00004	N/A	Rank ordered categorization
1.4) User Activity Monitoring	**Type**: ordinal **Name**:var00005	N/A	Rank ordered categorization

1.5) Data Visualizations	**Type**: ordinal **Name**:var00006	N/A	Rank ordered categorization
1.6) Data Transparency	**Type**: ordinal **Name**:var00007	N/A	Rank ordered categorization

Figure 3.4.a – Table relating survey questions to research questions

- The 7 scale questions refer to variables: var00002, var00003, var00004, var00005, var00006, var00007, var00017.
- The 1 open-ended question refers to variable: var00018.
- The 2 multiple-choice questions utilizing a checkbox format refer to variables: var00015, and var00016.
- The 8 multiple-choice questions utilizing a radio button format refer to variables: var00001, var00008, var00009, var000010, var000011, var00012, var00013, and var00014.

Survey Question	Variable Categorization	Research Question(s)	Provides Answers in Terms of:
2.1) Are you typically not welcoming to change of a website's/app's design and have the mindset of "if it's not broken, don't fix it"?	**Type**: dichotomous **Name**: var00008	Quan-2	Yes or No
2.2) Have you ever been notified beforehand that a new redesign of a website/mobile app was coming?	**Type**: dichotomous **Name**: var00009	N/A	Yes or No
2.3) Have you ever become dissatisfied immediately after a website/mobile app released a new design?	**Type**: dichotomous **Name**: var00010	Quan-2	Yes or No
2.4) Are [Have] you ever been notified about why a website/ mobile app needed design changes?	**Type**: dichotomous **Name**:var00011	Mixed-1	Yes or No
2.5) Should a website/mobile app feel obligated to explain the reasons why their design needed change?	**Type**: dichotomous **Name**:var00012	Quan-1	Yes or No

2.6) Have you ever refrain from using a website/mobile app because of a change in design?	**Type**: dichotomous **Name**:var00013	Quan-2	Yes or No
2.7) Have you ever expressed your displeasure to others (fx. online) after a website/mobile app released a new design?	**Type**: dichotomous **Name**:var00014	Quan-2	Yes or No

Figure 3.4.b – Table relating survey questions to research questions

Survey Question	Variable Categorization	Research Question(s)	Provides Answers in Terms of:
3) Which of the following areas do you feel is important for a company to be openly transparent with the public about	**Type**: nominal **Name**: var00015	Quan-1 Quan-2	Not rank ordered categorization
4) If a website/mobile app company was more transparent with you, the user, and shared design decisions that were driven by data, it would	**Type**: nominal **Name**: var00016	Quan-1 Quan-2	Not rank ordered categorization
5) I Would like to read an explanation about the decisions and view a variety of data visualizations, which steered the new design of a website/mobile app? (how much do you agree with this statement)	**Type**: ordinal **Name**: var00017	Quan-1 Mixed-2	Rank ordered categorization
6) Can you provide any specific reasons for why the redesign of any website/mobile app would create a dissatisfying experience for you?	**Type**: open-ended **Name**: var00018	N/A	Free-text

Figure 3.4.c - Table relating survey questions to research questions

Note: The true total number of questions 18 does not reflect the total shared in Figure 3.1 due to questions one and two, which comprise of multiple sub questions. These real totals are 6 for question one and 7 for question two respectfully.

The significance of excluding a neutral/maybe/undecided option with the multiple-choice questions associated with var00008 through var00014, was an attempt to seek only decisive responses. The significance of purposively including a 'None of the above' option to the questions associated with var00015 and var00016 was to ensure that the participants read the

options provided. Furthermore, the 'other' option can be a reasonable indicator for additional considerations from the public's perception, for which have not been defined. The purpose of including a wide variety of transparency topics with var00015 was to explore how much the sample valued gathering knowledge.

The significance of purposively including a 'neutral' option to the question associated with var00017 was to employ a 5-point Likert scale format (Creswell 2009; Bryman 2012). Including the open-ended question associated with var00018, provided participates with the opportunity to express themselves freely, using words that have not already been expressed. Moreover, arguments derived from var00018 can bring attention to additional factors, which may not have been considered. Analysis of this question takes a semantic approach and allows for presenting results in a word cloud format or describe by themes.

Note: the survey documents discussed within this section can be viewed in the Appendix, titled 'Presenting the Format of the Surveys'.

CHAPTER 4 – CASE STUDY EXPLORY REAL-WORLD EXAMPLES

The qualitative study entails a detailed exploration of specific cases (Bryman 2012). This chapter introduces recent real-world examples of technology-driven companies, who have realized a need for transparency with the public. Transparency of information in these cases pertain mostly to processing algorithms, data privacy protection, and transparency embedded in the user interface. The openly accessible information is presented together to provide the reader with a complete picture of relevant examples captured during the collection of qualitative data. In doing so, readers may capture a broader understanding of the current use of design-related transparency and articulate deeper thoughts, before proceeding through results and discussions.

By demonstrating how transparency is communicated to the public, the study attempts to pinpoint examples of: 1) where and how transparency is currently being embedded into relevant design practices; 2) which information, sensitive or not, is currently viewable; and 3) why it may be necessary to openly convey such information to public users. The presentation of these cases is divided into two sections. Section 4.a presents examples of two 'free' apps, which faced

heavy criticism immediately after releasing a new redesign. Section 4.b describes examples of how companies, under the sample, approach being transparent.

4.a – EXPLORING PREVIOUS REDESIGN 'MISSTEPS'

The collected examples were examined from website articles and/or tech reports defined as unpublished perspective/opinion/commentary literature pieces. The examples from section 4.a point a biased lens towards negative consequences faced when redesigning an app without properly communicating design outcomes to users. Included are two of the biggest names in social media, Snapchat and Instagram. Understanding instances where public outcry had a critical effect on a 'free' website/app can assist in answering the research questions and deriving argumentative points for discussion.

Snapchat

Background: "In a move aimed at simplifying Snapchat's historically confusing design, [Snapchat's biggest-ever redesign] is now divided into three main windows and separates all communication with friends from professionally produced content". "[Snap Inc. redesign] to kick-start growth and make its app more appealing to a wider user base" (Heath 2017).

Controversial Redesign: "In February [2018], Snapchat released a controversial app redesign that triggered backlash from users - including celebrity users like Kylie Jenner and Chrissy Teigen" (Fagan 2018). "Snapchat launched an overhaul which earned the wrath of dedicated users who hated the new layout" (Ong 2018). As a consequence, "nearly 1.2 million signed an online petition pleading with Snapchat developers to undo the update" (Fagan 2018; Ong 2018). "Users are complaining on other social media. A fake tweet purporting to be from Snap said it would change back if it got 50,000 retweets - it now has over 1.3 million [Feb. 12th, 2018]" (Angulo 2018). "It was cataclysmic [in terms of engagement]: can snap chap survive its redesign…. [worst part] was we saw the new-subscriber numbers absolutely plummet. So not only were fewer people viewing the content, no one was signing up" (Kosoff 2018). "Snapchat's redesign was a disaster. Its cratered ad views and revenue led Snapchat's user count to shrink in March…. essentially, Snapchat has taken its redesign philosophy too far…. and Spiegel says he expects users metrics to stabilize as people get used to the redesign." (Constine 2018).

Aftermath: faced a declining reoccurring user base, said to be in the millions, and harsh public criticism from reporters, bloggers, and celebrity/public users alike. The app was forced to update the redesign with a reversal of some features, less than 2 months after release. "Even the complaints we're seeing reinforce the philosophy. The frustrations we're seeing really validate those changes, said [CEO Evan Spiegel]" (Fagan 2018). A simple Google search for the term "snapchat redesign fail" garnered 1,290,000 hits.

Instagram

Background: In late December 2018, Instagram released to many users a "drastically different layout" and users "weren't too happy about it". Primary change under public scrutiny centered around the scroll-viewing of the feed, which had similarities to how stories appeared on the app. Written instructions regarding the change was provided by the company (Abedi 2018).

Controversial Redesign: "It seems like our favorite social media platforms are fixed on constantly giving us updates and changes that no one needs or asked for." For years users scrolled one way 'vertically' but suddenly it is the opposite and this caused "immediate backlash from users on Twitter" (Bondar 2018). Users promptly complained online through social media posts, e.g. "on Twitter, #instagramupdate was the No. 1 trending hashtag in the U.S", and many even inquired about reverting the app back a version (Abedi 2018; Feiner 2018).

Aftermath: "But just after a slew of complaints appeared online, the automatic update was reversed", citing due to a bug, the release accidently went to a broad user base, not the intended small test (Abedi 2018). Though the design change was short lived, the internet noticed and public criticism expressed online lives on (Bondar 2018). A simple Google search for the term "Instagram accidental redesign" garnered 1,650,000 hits.

4.b – EXPLORING TRANSPARENCY AND OPEN DESIGN PRACTICES

The forthcoming examples were examined and collected from website documentation and website articles/tech reports. These sources are defined as unpublished perspective/opinion/-commentary literature pieces. These real-world examples point the lens towards broadly exploring transparency practices made visible to the public.

Facebook, FACEBOOK, Inc.

Over the last couple of years, the 'free' social network website/app Facebook has faced scrutiny over its management of user data, e.g. the British analytics firm scandal, data breach of nearly 50 million user accounts, etc. (Issac and Frenkel 2018). Expectedly, more oversight towards data security and data privacy transparency practices have been emphasized. Other examples of transparency practices discovered are: page content, ads and other page related content shown in Figure 4.b.1, allowed content and use of third-party fact-checkers for reporting false information shown in Figure 4.b.2, and community standards and enforcement reports, etc. Efforts towards providing insights into design and the decisions made are shared at (facebook.design). Though, no specific mention of DDD practices was discovered, some design related posts utilize pictures, text and video to communicate with the public; e.g. "a look into the decisions we made to design our company brand" (Stubenvoll et al. 2019).

Facebook for developers allows the public to explore how interactions and visualizations come together. Exploring the Design Jam Toolkit at (developers.facebook.com) and TTC Labs, collaborative design innovation focuses on Trust, Transparency and Control because "to give people a true sense of trust, transparency, and control, you must start with design" (facebook for developers 2018). Developers, engineers and researcher can gather even more insights by viewing articles posted at (engineering.fb.com). More efforts to be transparent lead Facebook CEO Mark Zuckerberg to initiate Townhall Q&As. Found at (facebook.com/qawithmark/), public users can submit questions, which he may respond to live on Facebook (Flyverbom 2016).

An overhaul of Facebook's mobile app took place in April of 2019. Through a blog post, the company discussed the redesign which places more attention and easier accessibility of two popular features: events and groups. The primary reason influencing that decision was stated as "there are tens of millions of active groups on Facebook. When people find the right one, it often becomes the most meaningful part of how they use Facebook" said the company (Statt 2019).

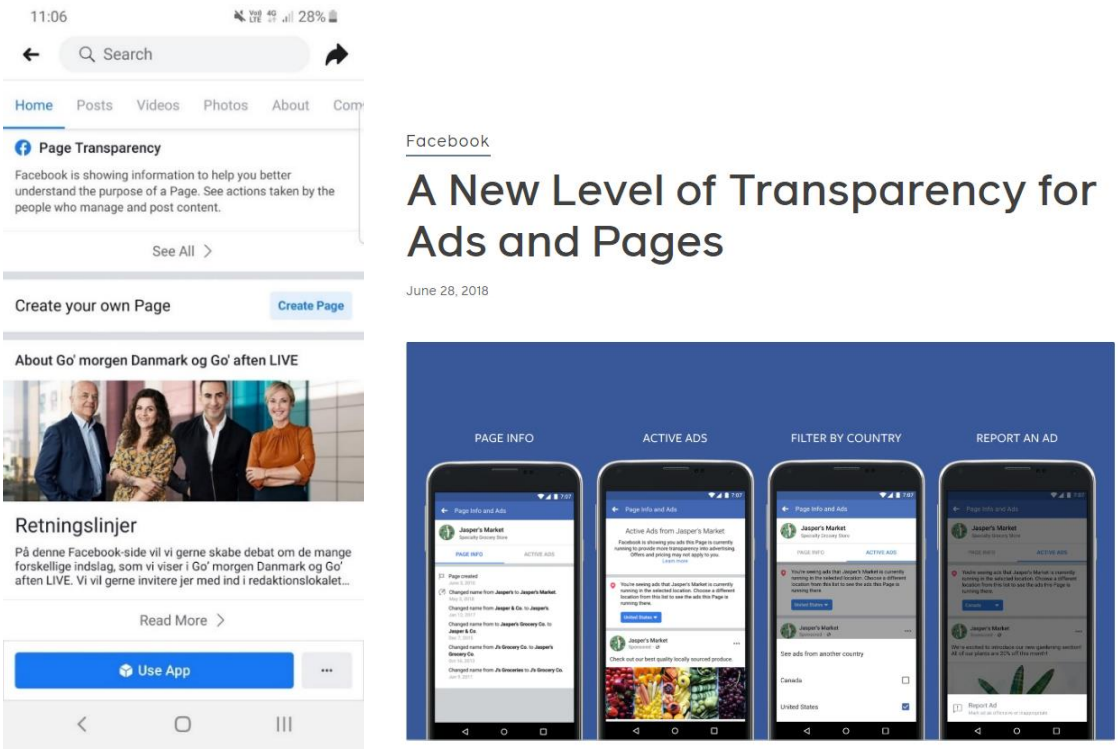


Figure 4.b.1 – To the left, a snapshot image of transparency embedded into UI page content (facebook.com) and to the right, a snapshot image of UI embedded transparency for ads and pages (about.fb.com)

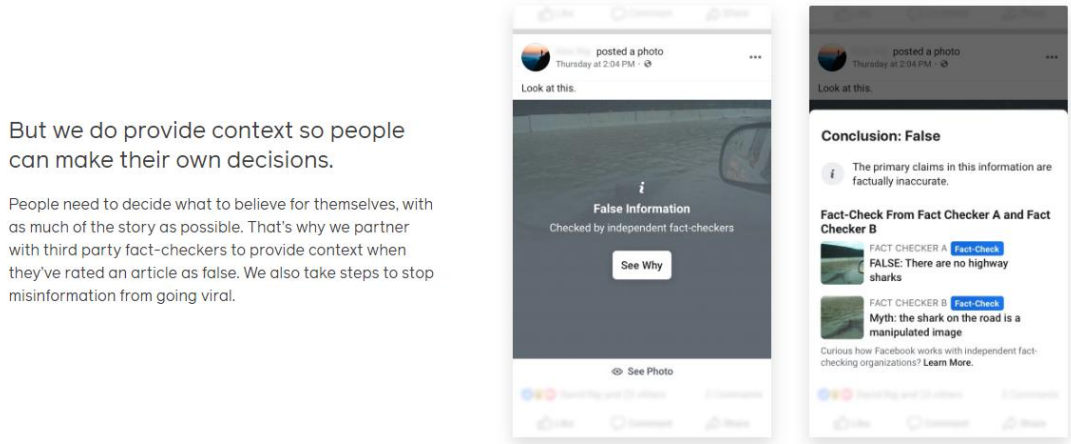


Figure 4.b.2 – Snapshot displaying transparency of false information checking (about.fb.com)

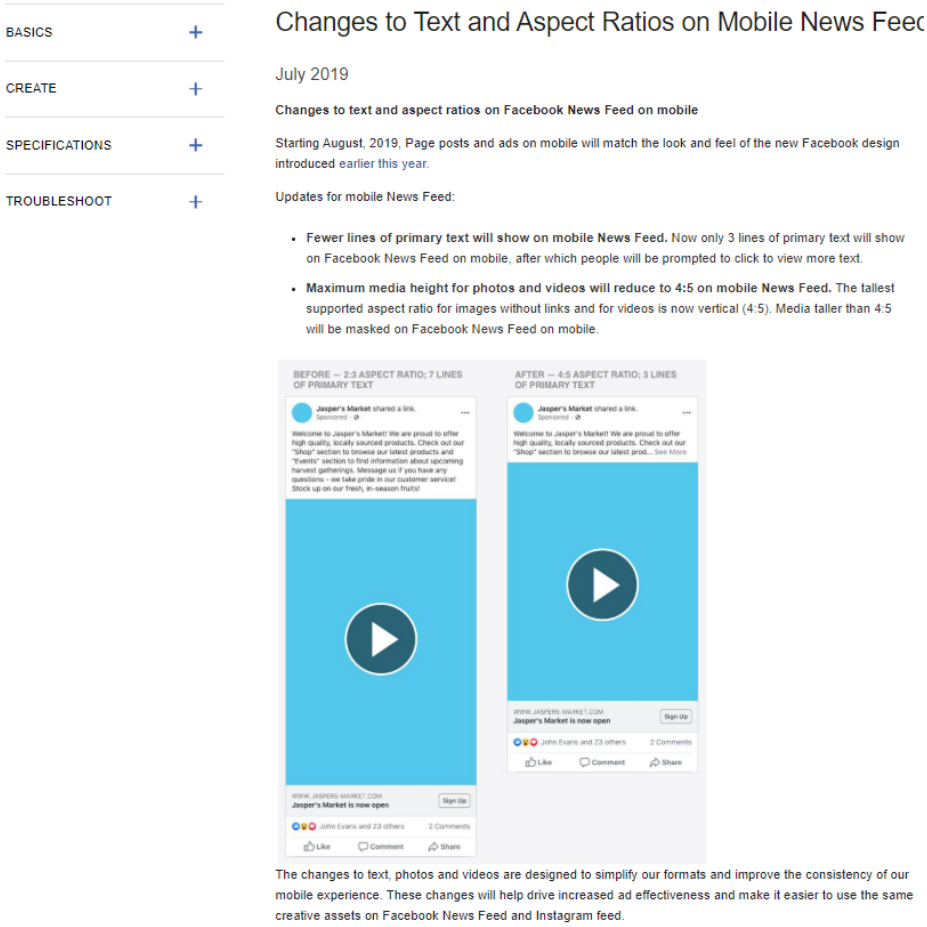


Figure 4.b.3 – Snapshot demonstrating how a design change was conveyed for business users (facebook.com/business)

Instagram, FACEBOOK, Inc.

This American-based social networking app provides a 'free' service for photo and video sharing. Instagram implemented a DDD strategy as it experienced huge growth and integrated into Facebook, Inc. DDD often becomes a necessity when a website/app has gained a worldwide user base. Kevin Systrom, a co-founder of Instagram, explained in a 2013 interview, the company went from a hunch-driven design strategy to a data-driven because "it's really easy when you have a hundred users to go talk to and ask them what they want. It's really difficult when you have 150 million people in many different languages". (Roberts 2013)

Multiple reads existing online discuss user paranoia over ad placement and whether apps like Facebook and Instagram, among others, listen to conversations using the phone's microphone. This suspicion lingers due to a lack of understanding about what one view in their social feed and why (Cababa 2018). Likely, only business users understand how this reflects

tracking user movement across a multitude of apps and the web, e.g. via The Facebook pixel. Instagram incorporates ad transparency by providing a barely visible UI feature, shown in Figure 4.b.4, where users can read explanations about ad placement algorithm and more. Seeking understanding pertaining to a user's Instagram Feed is provided using simple textually formatted statements accessible via (help.instagram.com), shown in Figure 4.b.5. As of 2019, Instagram is included in Facebook's transparency report, though not concerning of design.

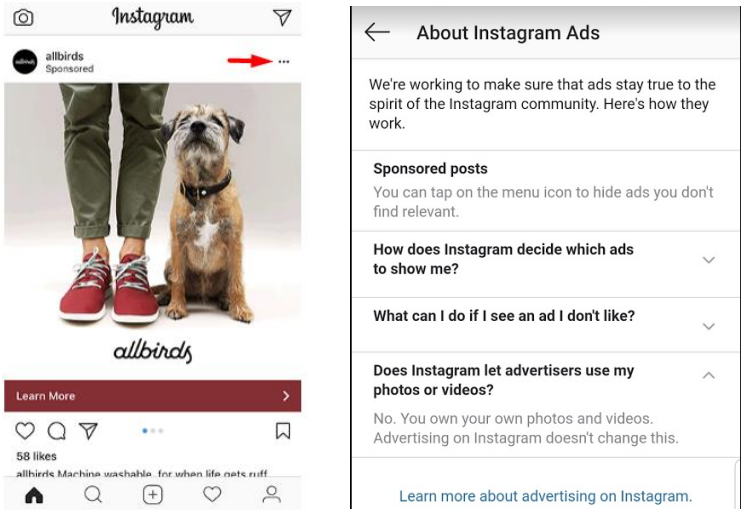


Figure 4.b.4 – The left snapshot image (Cababa 2018) shows the UI feature enabling a user to view ad placement information, as shown in the right snapshot (Instagram app).

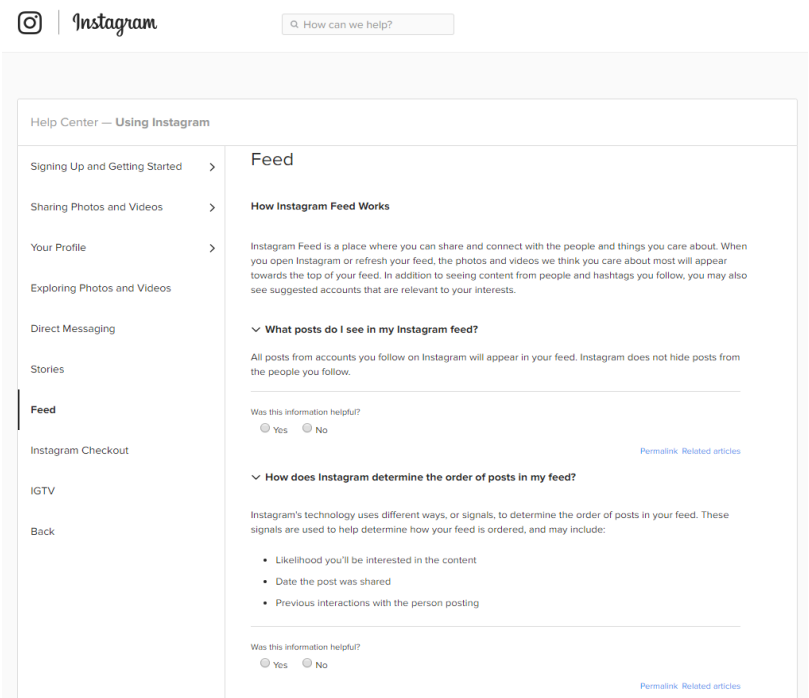
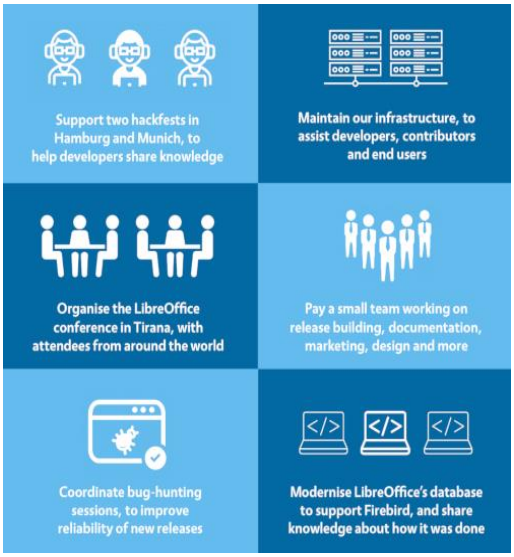


Figure 4.b.5 – A snapshot image showing how Instagram informs users of the content displayed in the Instagram Feed.

LibreOffice, The Document Foundation.

LibreOffice is an open-source office suite. Data was collected via the LibreOffice donate tab, where information concerning supporting the "volunteer-driven non-profit organization" is viewable. Figure 4.b.6 is an illustration provided by the organization and titled as "see how donations helped us in 2018". Additionally, the organization's core values, and financial records are promoted, as they state "our values are openness, transparency and meritocracy. By using these as our guiding principles, we have made our financials and budgets public". The Annual Report produced by The Document Foundation also shares: 1) an explanation of the principle of meritocracy using text and a diagram; 2) list of new features, along with a video demonstrating many of them; 3) details about the end-user-facing features and developer-related changes; 4) an explanation of the decisions behind their website design layout (libreoffice.org 2018).



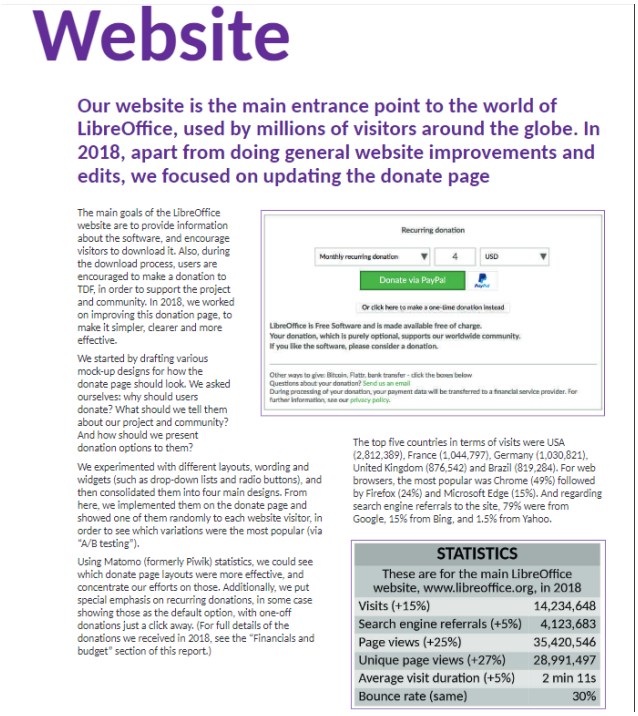


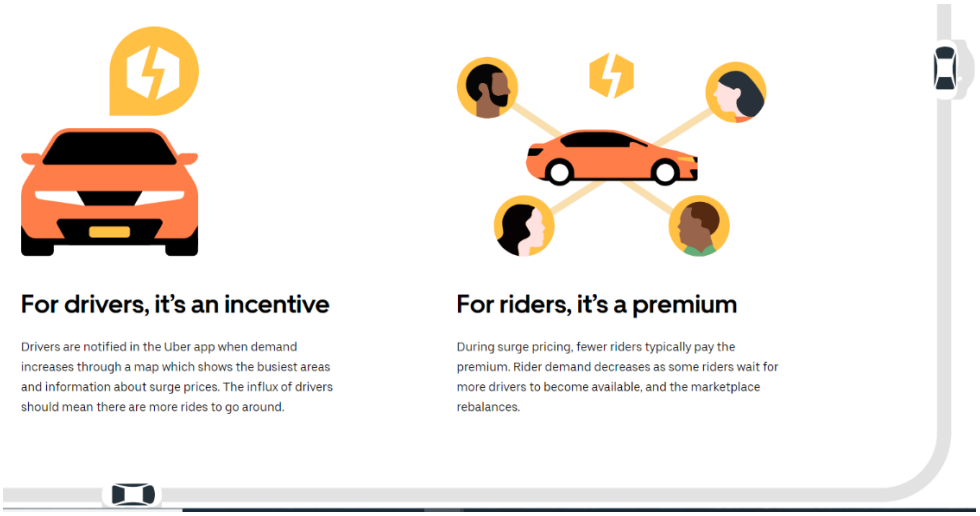
Figure 4.b.6 – To the left, an infographic displaying how donations helped LibreOffice in 2018 (libreoffice.org 2018), and to the right, a snapshot image from The Document Foundation 2018 annual report, expressing language of decision-making process and DDD (Foundation 2018)

Uber, Uber Technologies Inc.

Uber, an American-based ridesharing company, is widely known to utilize and produce big data, e.g. with pricing as "Uber tracks the data in such detail that it knows people will pay surge pricing if their phone battery is running low" (Cababa 2018). Even a simple Google search on the term 'data-driven design + Uber' produced 23,300,000 hits. In 2018, Uber launched a new site dedicated to providing users, drivers and riders, with insight into how principles shape the technology that serves them (marketplace.uber.com 2018). This recent focus towards openness, e.g. shown in Figure 4.b.7, educates users by expanding access to information regarding pricing algorithms, design needs, etc. "Being upfront" is listed as a key principle, as they "believe everyone should be equipped with the right information… we [Uber] strive to be clear about pricing, matching, and how our technology affects riders and drivers" (marketplace.uber.com 2018). Uber is also open about how they collaborate with different cities on studies to e.g. develop innovative transportation strategies in Cincinnati USA. "Uber commissioned a study with Fehr & Peers Transportation Consultants that analyzed a combination of rideshare pick-up and drop-off activity data, traffic count data, video documentation, and in-person observations" (Wylie 2019).

Uber Engineering documentation, found at (eng.uber.com), is full of information which describes how Uber "takes data-driven to the next level with the complexity of its systems and breadth of data" (Li, Onuk, and Tindal 2018). These authors describe extensively how Uber turns big data into knowledge with metadata. "From driver and rider locations and destinations, to restaurant orders and payment transactions, every interaction on Uber's transportation platform is driven by data" (Li, Onuk, and Tindal 2018). This source illustrates the architecture comprising of their Databook platform, shown in Figure 4.b.8.

A further search through Uber Engineering reveals in detail how the company realized the need for a Uber Lite, "a rider app designed for use on older Android devices and in areas [e.g. Latin America, India, and the Middle East] where network infrastructure may not reliably serve LTE data connectivity" (Bangar et al. 2019). The document describes their motivation behind the app, the importance towards understanding user behavior data, design considerations, architectural design decisions, data usage and network transferring, and so forth.



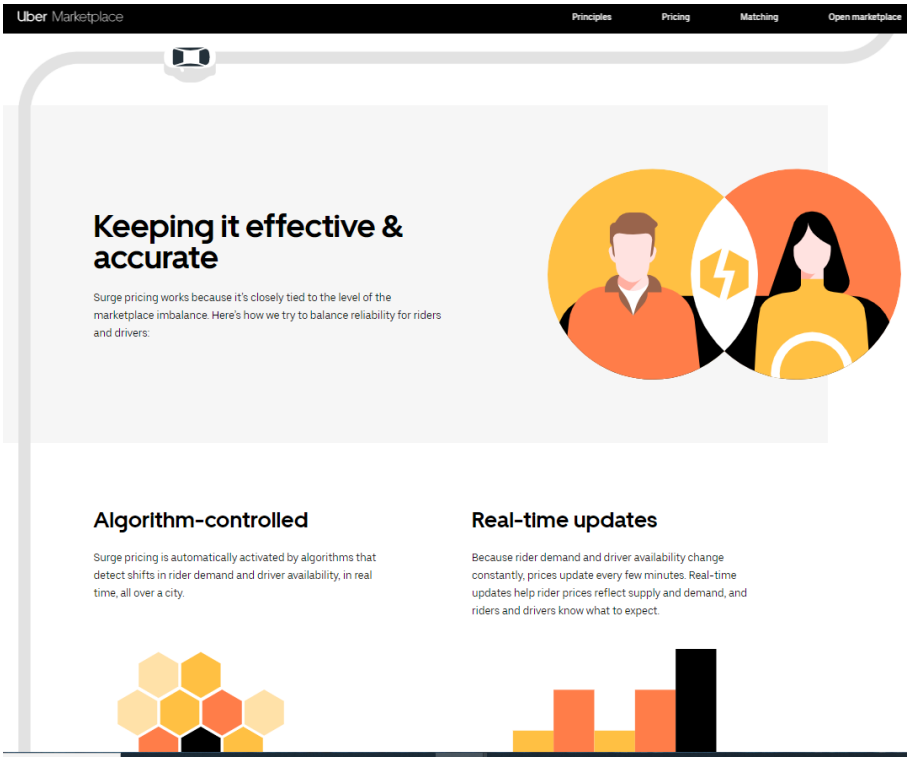


Figure 4.b.7 – Snapshot images describing the principles of Uber's surge pricing algorithm are explained using a video link and infographic styled template (marketplace.uber.com 2018)

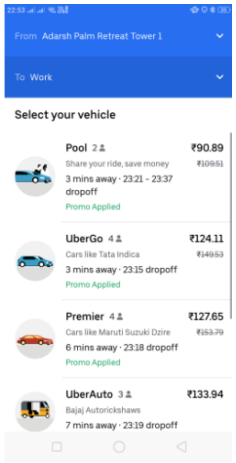


Figure 3: Uber Lite preloads data, such as available product types, so as not to burden the app with excessive network calls.

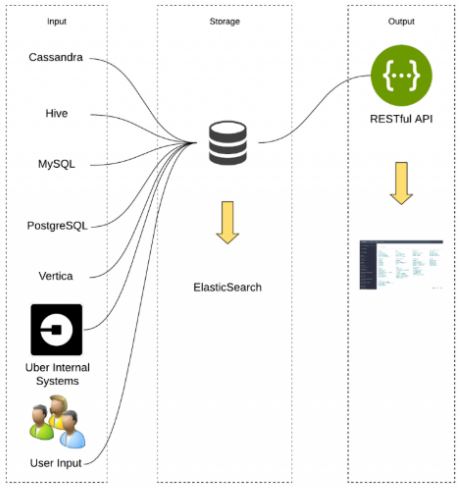


Figure 2. The Databook architecture takes in metadata from Vertica, Hive, and other storage systems, stores it in its back-end databases, and outputs the data using RESTful APIs.

Figure 4.b.8 – The left snapshot image describing the Uber Lite information flow utilizing preloaded data and the right image depicts the architecture behind how Uber's Databook platform collects, stores, and visualizes metadata from data sources (Bangar et al. 2019)

Everlane, California, USA

An online American clothing retailer, Everlane is a company thriving within a crowded eCommerce industry. One strong reason driving the success of their website/app-based service is being transparent. In a simple way, they have managed to illustrate to their customers how money is made from their products using a transparent pricing structure, e.g. Figure 4.b.9 (Cababa 2018). Bringing visibility to its products, transparency as a trend is such a priority of the company's philosophy and was a founding principle. The slogan on the main website reads "Exceptional quality. Ethical factories. Radical Transparency" (O'Toole 2016).

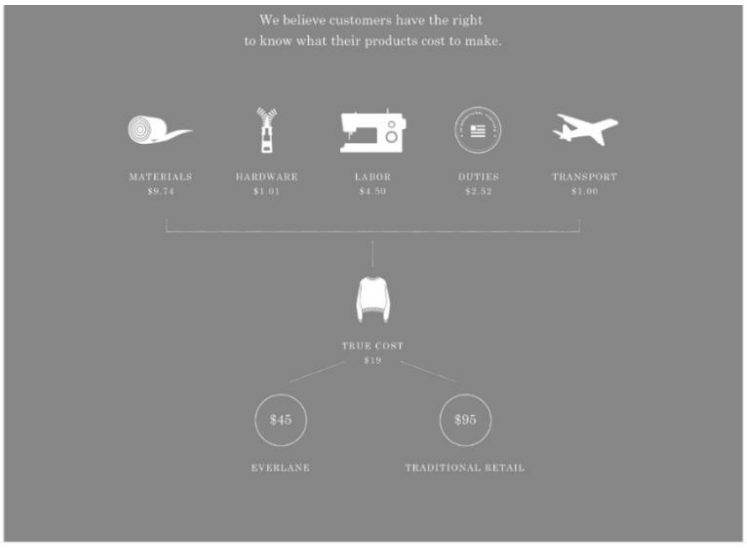


Figure 4.b.9 – Snapshot image of a transparent pricing structure used at Everlane (everlane.com)

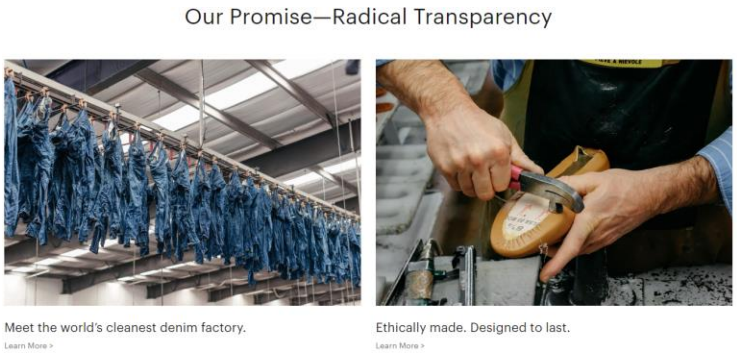


Figure 4.b.10 – Snapshot image taken from the homepage at Everlane's website (everlane.com)

Airbnb, Inc.

Through the Airbnb website/app, a large amount of data is generated and observed from what people are searching for. In 2016, Airbnb introduced insights on the host calendar page. Behind this data, the company promotes useful insights to help host users better manage their listings. These insights are personalized, targeted and actionable (Gupta and Kwon 2016). Their Smart pricing feature, a personalized daily pricing recommendation, is one example of a service driven by data. Gupta and Kwon explain further about how this feature operates based on a mathematical model that learns how likely a guest is to book a listing using several other variables of information. The result projected to the user in the UI is shown in Figure 4.b.11**.**

Conveying of backend design related choices made for the Airbnb website/app also appears as illustrations with textual description, in a technical manner. This shares how insights to host derive using an internally built, real-time backend service called Narad; seen in Figure 4.b.12. The representation of the stored data ingested is used for UI presentation seen in Figure 4.b.13. The company sometimes shares limited textual information about design changes, e.g. "Building a More Transparent Platform" (Airbnb 2019). Other articles exploring community features, case studies, opinion pieces, etc. are shared at (airbnb.design) using text, images and video. Furthermore, (airbnb.io) shares articles pertaining to engineering and data science practices at Airbnb, using sometimes very technically detailed explanations; e.g. discussing a machine learning-powered search ranking of Airbnb experiences (Grbovic 2019). However, such articles are more focused on describing the design process or how the technical aspects operate, not on specific design related rationale.

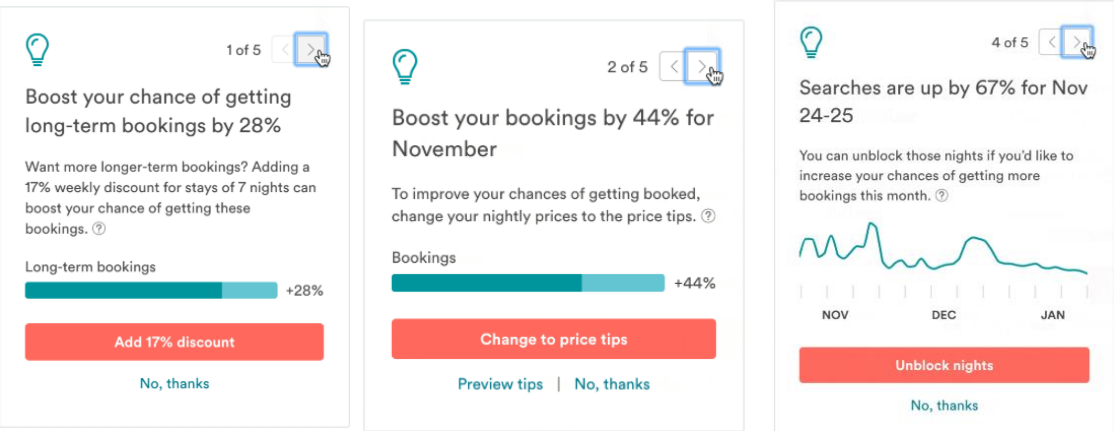


Figure 4.b.11 – Snapshot images of how Airbnb shares recommendations derived from big data insights to host users (Gupta and Kwon 2016)

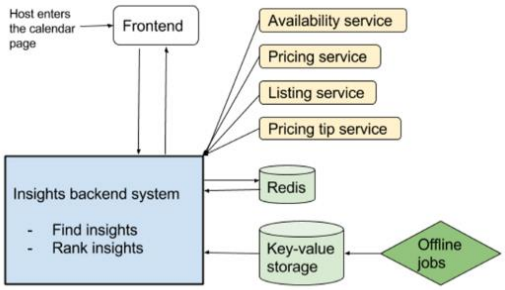
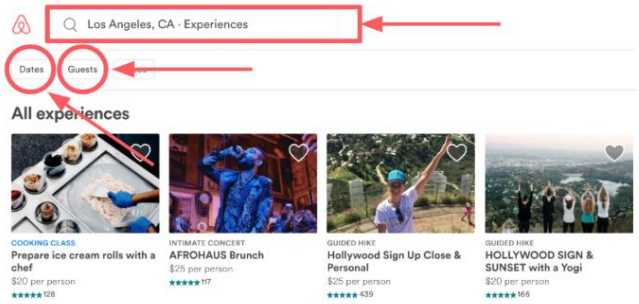


Figure 4.b.12 – Snapshot image of how the Narad service at Airbnb ingests data from offline and online data sources (Gupta and Kwon 2016)

Figure 4.b.13 – Snapshot image example of how the backend representation of an insight (on the right) can be translated into a personalized insight shown to the host (Gupta and Kwon 2016)

Moving to *Online Scoring* also unlocks a whole new set of features that can be used: *Query Features* (highlighted in image below).



This means that we would be able to use the entered *location*, *number of guests*, and *dates* to engineer more features.

Figure 4.b.14 – Snapshot image showing how moving to an ML online scoring infrastructure improved targeting more booking gains and the development of new UI features (Grbovic 2019)

Yahoo!, Inc.

Branded as a web service provider, this company provides more than just a search engine and news site. Yahoo! is recognized to employ a data-driven culture. In fact, in 2011 they invested $270 million into data-driven advertising with the purchase of interclick (Rao 2011) and even their own Director of Data Insights published a book title 'Yahoo! Web Analytics: Tracking, Reporting, and Analyzing for Data-Driven Insights'.

A common practice, nowadays, of providing textual information explaining the use of ad placement is discoverable via (research.yahoo.com/about-us) or as a feature embedded within the UI, as shown in Figure 4.b.15. Though, the information is very limited. Recent design changes include an overhaul of the Yahoo! Mail service. In a short video found at (Yahoo 2016), Yahoo Design Labs explains the changes made with the new layout by placing attention to simplicity in the design and describing how animations are used to make the app feel alive. The creative director speaking refers to these animations as "moments of wonder".

The company also revamped the design of its Homepage and Finance websites. "According to Yahoo [Rico Chan, Yahoo! vice president and head of India, Southeast Asia and Hong Kong], the new experience promises that ads will be seen during moments when consumers are most engaged". By increasing user engagement, enriched data is generated to help advertisers reach the right audience. A change to the homepage feed design is stated to

"deliver a continuous stream of articles tailored to each user, [through scrolling compared to opening different tabs], and aim to deliver a more consistent experience on Yahoo properties across devices". This consistency is assumed to be associated with the feature permitting a user to reduce content from certain media outlets, as shown in Figure 4.b.16. (Tay 2017).

Figure 4.b.15 – Snapshot image showing the UI feature enabling a user to view ad placement information (yahoo.com)

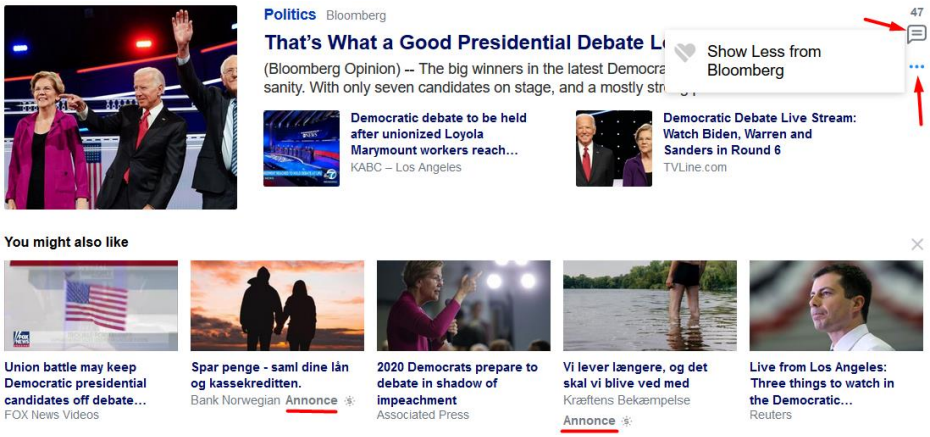


Figure 4.b.16 – Snapshot image showing the UI features permitting a user to reduce content from certain media outlets, engage in conversations with other public users, and transparency of labeling specific stories from advertisers as 'Announce' (yahoo.com)

Validating the sources and information

Attempts were made by the researcher towards reviewing documentation provided online termed as e.g. Journalistic Standards, Principles and Practices, Full Disclosure and Ethics Statements, etc. The status of the sources used were also critically judged by reviewing several online review forums and attempts were made towards finding duplications of the examples and statements quoted, thus indicating truthful information.

CHAPTER 5 – DATA ANALYSIS RESULTS

This chapter presents the researcher's findings, which resulted from the mixed-method data analysis. As mentioned in Chapter 2, a portion of the data gathered, designated as N/A, was purposely intended to provide argumentative points for the discussion chapter. Results presented only reflect findings that directly relate to the research questions. Divided into two sections, presented first are results of the analysis of qualitative research 'case study', followed by results of the quantitative research survey 'self-completion questionnaire'.

5.a – QUALITATIVE FINDINGS

By describing negative viewpoints shared through the web, section 3.a contributed to the notion that potential repercussions centered around a redesign can be damaging to website/app service. Within an unspecified timeframe, some companies may or may not be able to fully revive their image. The circumstances faced with Snapchat and Instagram resulted in extreme public backlash, user resentment, declining user base totals, and unknow financial cost. The short term and long-term longevity of these repercussions were not identified.

The derivation of categorical labels and themes was a result of an inductive thematic analysis approach. Figure 5.a.1 displays the existence or nonexistence of these identified labels in relation to the companies under the sample. The labels reflect transparency practices regarding what information is shared, how, who is the audience, and why is it shared.

Facebook (**FB**), Instagram (**Insta**), Snapchat (**Snap**), LibreOffice (**LibreO**), Uber (**Uber**), Everlane (**EL**), Airbnb (**Airbnb**), Yahoo! (**Yahoo**)

Categorical Labels	FB	Insta	Snap	LibreO	Uber	EL	Airbnb	Yahoo
attention to aesthetics	✔							✔
data protection policies and privacy-driven	✔	✔						✔
ad targeting-driven	✔	✔	✔					✔
focused on keyword dropping	✔		✔					✔
user activity and data-driven	✔		✔	✔	✔		✔	✔
user research-driven				✔	✔			
feature-driven	✔	✔	✔	✔	✔	✔	✔	✔

intuition-driven			✓					✓
aimed at developers and engineers	✓			✓	✓		✓	
competition-driven			✓			✓		
page content transparency	✓	✓					✓	✓
combat inaccurate information spreading	✓	✓	✓					
received criticism	✓	✓	✓		✓		✓	✓
transparency of design/development practices	✓			✓	✓	✓	✓	
communication via textual explanation	✓	✓		✓	✓	✓	✓	✓
communication via illustrations &/or video explanation	✓		✓	✓	✓	✓	✓	✓
communication via press		✓	✓		✓			✓
highly technical communication	✓			✓	✓		✓	

Figure 5.a.1 – Matrix table representing the categorical labels ‘codes’ that emerged from the qualitative data analysis.

Describing the emerged categorical labels

Attention to aesthetics: the mentioning of design beauty, animations and effects drive the communication or talk of letting designers just be creative.

- E.g. Yahoo Design Labs affords most attention to the animations, colorful effects and UI, when discussing the mobile Yahoo mail client.

Data protection policies and privacy-driven: releasing annual transparency reports and making appropriate updates to afford users knowledge of and access to the data collected about them.

- Distribution of policy driven reports and communication utilizes terminology like safer, transparent practices, better security, etc.

Ad targeting-driven: driven by business growth through ad targeting and/or explaining ad placement to users.

- E.g. Yahoo, Facebook, and Instagram label sponsored ads. UI features are embedded to mitigate content and garner knowledge. Inclusion of algorithms steer the design.

Focused on keyword dropping: communication is focused on describing the why factor behind the design utilizing terminology like better user experience, easier, sleek design, faster, convenient, consistency, tailored, simplify and improve.

- E.g. Snapchat communicated in terms like personalizing, UI simplification highlighting the most relevant content so that it is easier to consume, lean back and watch.

User activity and data-driven: communication, design and/or features are steered using user activity tracking and data.

- E.g. Uber engineering documentation discusses cases where the company tracks every interaction and everything on the platform is driven by data. The Document Foundation shares a table chart used to display the crucial statistics produced from web analytics, which steer design changes for their main LibreOffice website.

User research-driven: qualitative and quantitative forms of user research, e.g. A/B testing or administered interviews or participating in research studies which influence design changes.

- E.g. Uber openly collaborates with different cities on studies and distribute their details.

Feature-driven: updates to popular features or new releases are highlighted or utilizing machine learning algorithms for content recommendations.

- E.g. Instagram's controversial redesign of scroll-viewing of one's feed.

Intuition-driven: design decisions appear to be based on managements' and/or designers' personal preferences and background.

- E.g. according to sources mentioned, Snapchat tends to lean on intuition over data.

Aimed at developers/engineers: algorithmic details or heavy use of technology specific words/illustrations, for which only persons with a high technical understanding can comprehend.

- E.g. Facebook designates this level of knowledge sharing via their internally managed design, developer and engineering websites.

Competition-driven: competing or replicating advancements made by direct competitors.

- E.g. this quote: "Snapchat hopes to conquer Instagram and revive its own growth with a big redesign". "Rather than sorting content by how popular it is with everyone else like Facebook or by reverse chronological order like Snapchat used to, Snap will mold itself to what each person watches most, like Netflix" (Constine 2017).

Page content transparency: embedded elements of UI design which convey the what, who, how, and why certain content is shown.

- E.g. Facebook and Instagram are clear examples of this practice. Noticeably missing is Everlane, though radical transparency is branded across their website. Reasoning being, there is no indication provided to how they derive at the 'Traditional Retail' price.

Combat inaccurate information spreading: proving context and information checkers to identify content as inaccurate or fake news.

- E.g. Facebook's use of 3rd party fact-checker tools and utilizing user feedback.

Received criticism: faced heavy public backlash and spread of negative press, primarily due to a redesign or mishandling of user information.

- E.g. Snapchat and Instagram new layout designs caught their users completely off-guard and immediately frustrated them, causing them to publicly voice negativity.

Transparency of design/development practices: openly convey information pertaining to the design of one's products.

- E.g. The Document Foundation is detailed in describing their process and the decisions behind all their changes to LibreOffice.

Communication via textual explanation: company conveys information in a plain-text format.

- E.g. Instagram does so but hides knowledge sharing behind barely visible UI features and very dull and minimal textual description. Whereas Facebook uses concise but informative and easily navigable transparency practices.

Communication via illustrations and/or video explanation: the company conveys information using illustrations, charts or video presentations, in addition to plain text.

- E.g. on the LibreOffice website, an infographic is promoted for conveying how donations helped LibreOffice in 2018. Many companies also utilize YouTube as an outlet for demonstrating new design features via a video presentation.

Communication via the press: the company shared explanation and insights by discussing primarily with external press.

- E.g. with Instagram, source quotes, explanation pieces and insights were discovered via online website publishing outlets.

Defining the emerged themes

The results of the qualitative data analysis are represented by 4 classification themes. Figure 5.a.2 characterizes the themes corresponding to the labels exemplifying them.

Categorical Labels	Theme	Description
→ user activity and data-driven → feature-driven → page content transparency	Personalized design practices	Affords attention to insights and control methods behind content presentation. Demonstrates how the dynamic factors influencing design features operate.
→ focused on keyword dropping → received criticism → communication via textual explanation → communication via illustrations and/or video explanation → communication via press	Open communication efforts	Conveys design and decision related knowledge behind a redesign and/or features. Occurring before or simultaneously with the redesign, or only after facing heavy criticism.
→ data protection policies and privacy-driven → focused on keyword dropping → page content transparency → transparency of design/development practices	Building trust	Promotes a trustful perception and adheres to regulations. Provides clear and open dialogue regarding content. Keyword branding with the direct use of terms trust, transparency, safe, honest and being-upfront.
→ ad targeting-driven → user activity and data-driven → aimed at developers and engineers → combat inaccurate information spreading	Technology-driven practices	Incorporate a strong modern data-driven culture. Embellish the use of advance technical features and dialogue aimed at IT industry members.

Figure 5.a.2 – table displaying the emerged themes from the thematic analysis.

5.b – QUANTITATIVE FINDINGS

The key quantitative findings derive from a standard descriptive analysis performed on the primary data collected by the researcher. Illustrations in the form of tables and charts are grouped in a logical order according to the research question they relate to. The results reflect the number of usable submissions, n=90, not the total sample collected, 100.

Note: decimal points are rounded up towards the nearest tenth percent.

Quantitative research question:

Quan-1: According to the public's perception, is conveying data-driven design decisions an area that companies offering 'free' content consuming sites/apps should be practicing.

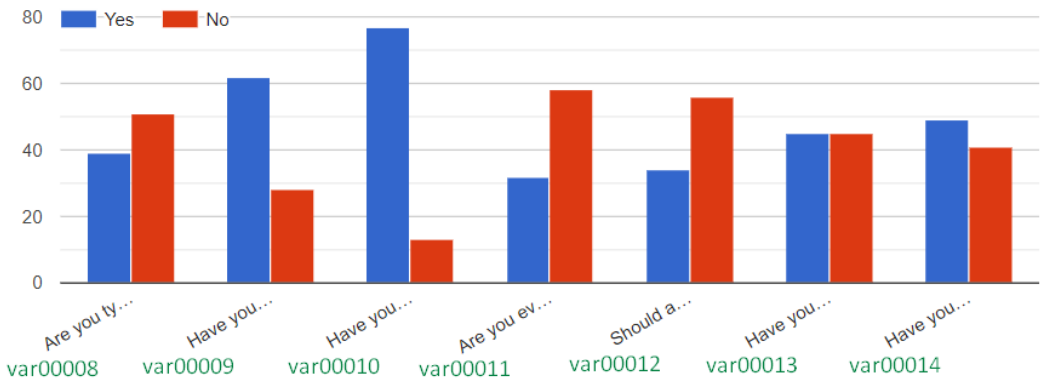


Figure 5.b.1 - Bar chart sharing insight into public users' previous experiences with a redesign.

The dichotomous variable, var00012, is associated with the survey question: 'Should a website/mobile app feel obligated to explain the reasons why their design needed change?'. Figure 5.b.1 displays the number of answers represented by totals n=34 for yes and n=56 for no. The findings suggest that 62.2% of individuals do not believe that a redesign must be rationalized. Even though, 85.6% of them reported, two questions prior in the survey 'var00010', that they've experienced immediate dissatisfaction after a new redesigned website/app was released.

Frequency table displaying important areas a company should be openly transparent with the public about

Options	n	%
Changes to products and services	69	76.7
Terms & Conditions and Policy changes	76	84.4
Distribution of Data	72	80
Describing the design and development process behind their product	10	11.1
Company values and employment practices	34	37.8
Pricing decisions	23	25.6
Explaining how the provider of the "free" website/app generates money	31	34.4
Ad Marketing practices	31	34.4
None of the above	1	1.1
Other: If they have, CSR policies	1	1.1
Other: Green policy	1	1.1

Figure 5.b.2

The nominal variable, var00015, is associated with the survey question: 'Which of the following areas do you feel is important for a company to be openly transparent with the public about?'. Figure 5.b.2 displays the number of individuals and the percentage of each non ranked ordered category for the variable. At only 11.1%, the result from option 'Describing the design and development process behind their product' especially stands out in comparison to 'Changes to products and services' at 76.7%. These totals suggest that participants want companies to communicate when a product will/has changed and want to view why the change(s) occurred, but companies are not obligated to explain how the change(s) come to fruition. Results also show that the sample values three areas of knowledge sharing, at a relatively high mean of 80.4%. Unsurprisingly, 'Distribution of Data' and 'Terms & Conditions and Policy Changes' were included, given the excess publicity surrounding data leaks, privacy, unethical practices of companies, etc. Excluding the 1.1% outliers present in the last three options, the collective results from the other five options result in a quite low mean of 28.7%.

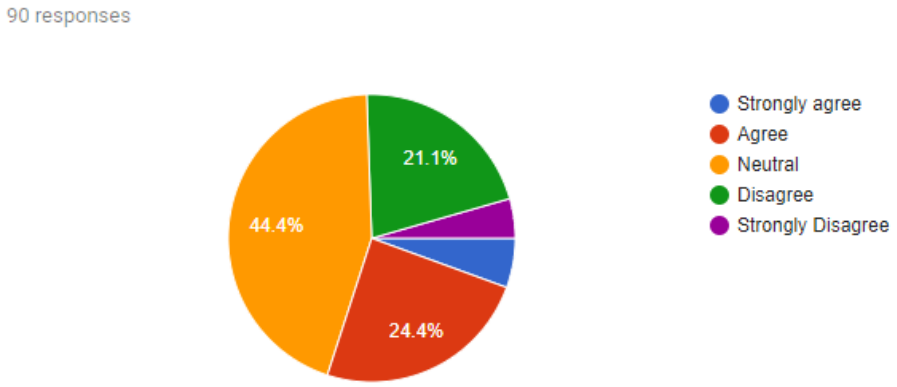


Figure 5.b.3 - Chart displaying whether the public have an interest in obtaining design rationale

The ordinal variable, var00017, is associated with the survey question: 'I Would like to read an explanation about the decisions and view a variety of data visualizations, which steered the new design of a website/mobile app? (how much do you agree with this statement)'. Results show that majority of the sample take a neutral position. This could suggest that they are unsure of what to expect or are unfamiliar with this type of information or simply do not understand the question. Furthermore, a neutral position could be interpreted as indicating room for persuasion, as this percentage of individuals are not opposed to viewing the information mentioned in the

statement. The mean score, based on a Likert scale coding of 5-1, for variable var00017, represented by results from Figure 5.b.3, equates to 3.1.

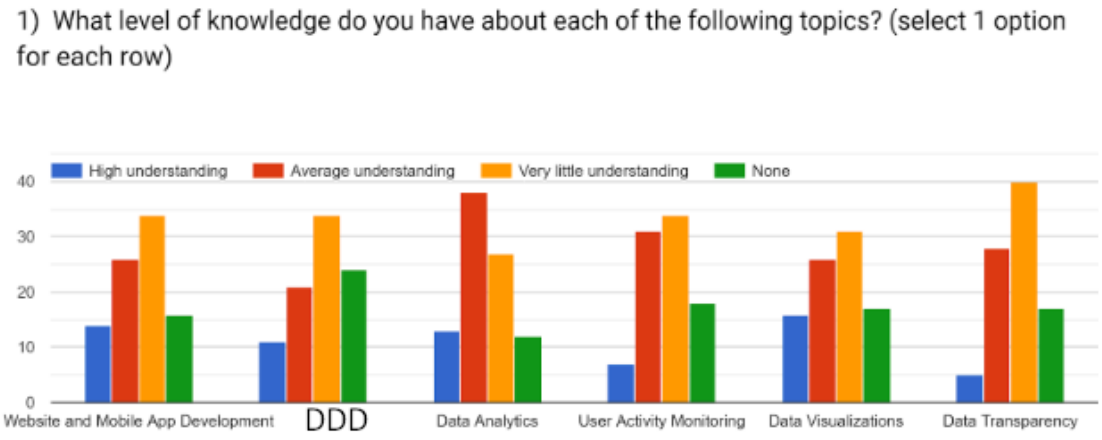


Figure 5.b.4 - Chart displaying the public's level of knowledge pertaining to core technical topics

Previously, in Figure 5.b.3, 30% of the sample cumulatively agree with the statement presented in the survey question, while cumulatively 25.5% disagree. One consideration for the 44.4% indecisiveness shown, relates to the results represented in Figure 5.b.4. Indecisiveness potentially being a result of low understanding and/or exposure to the topics. The results from these variables, var00002 through var00007, show a fair number of individuals lack enough knowledge across the topics. E.g. Data-Driven Design 'DDD' and Data Transparency identified that individuals possess very little to no understanding about these topics, at 64.4% and 63.3% respectfully. However, 56.7% of the sample have an average-high level of understanding about Data Analytics and 42.2% are aware of User Activity Monitoring behavior with at least an average understanding.

Quantitative research question:

Quan-2: According to the public's perception, what advantages can be argued as reasoning for why transparency of this notion should be considered by companies offering 'free' content consuming sites/apps.

The dichotomous variable, var00008, is associated with the survey question: 'Are you typically not welcoming to change of a website's/app's design and have the mindset of if it's not broken, don't fix it'. Figure 5.b.1, presented earlier, displays the number of answers represented by totals of n=39 for yes and n=51 for no. A total of 43.3% of participants typically object the notion of redesigning a website/app, if in their eyes, it already provides a satisfactory solution.

The dichotomous variable, var00010, is associated with the survey question: 'Have you ever become dissatisfied immediately after a website/mobile app released a new design?'. Figure 5.b.1 displays the number of answers represented by totals of n=77 for yes and n=13 for no, which equates to 85.6%. The use of the word 'immediately' within the question indicates communication as a necessity, whether distributed prior or simultaneously with a redesign.

The dichotomous variable, var00013, is associated with the survey question: 'Have you ever refrain from using a website/mobile app because of a change in design?'. Figure 5.b.1 displays the number of answers represented by an even split of n=45 for each option. This result suggests that a company may risk, at a flip-of-the-coin and for an undetermined longevity, losing a fair share of its user base due to withholding information.

The dichotomous variable, var00014, is associated with the survey question: 'Have you ever expressed your displeasure to others (fx. online) after a website/mobile app released a new design?'. Results displayed in Figure 5.b.1 are represented by totals of n=49 for yes and n=41 for no. Meaning, 54.4% of participants have previously expressed some form of backlash, either publicly or privately. This result indicate a need for better practices, in order to mitigate potential public backlash.

Frequency table displaying important reasons to share design decisions driven by data, according to the public

Options	n	%
Create a sense of trust and honesty	58	68.4%
Break your trust	2	2.2%
Provides a feeling of self-worth and appreciation	6	6.7%
Make you more understanding and open to change	65	72.2%
Annoy you and make you less willing to welcome the change	1	1.1%
Keep you as a loyal user	24	26.7%
Prevent you from further use of the product	1	1.1%
Encourage you to share positive comments with others	20	22.2%
Encourage you to share negative comments with others	3	3.3%
Have no effect. I personally do not care to view this information, as long as the design is beautiful.	10	11.1%
None of the above	4	4.4%

Figure 5.b.5

The nominal variable, var00016, is associated with the survey question: 'If a website/mobile app company was more transparent with you, the user, and shared design decisions that were driven by data, it would'. A relative balance of 1 neutral, 5 positive, and 4 negative structured options represent reasons, which help identify whether to openly convey certain aspects of website/app design to public users. Results show advantages pertaining to projecting an honest and trustful perception and willingness to accept change rate well collectively at a mean of 70.3%. Moreover, nearly 25% of the sample collectively identify user retainment and willingness to publicly support the new design, as other potential advantages that can derive from this activity. No disadvantages were identified, due to the relatively low occurrence, range of 1.1% and 3.3%, for which the negative options 2/5/7/9 were chosen.

Mixed method research question:

Mixed-1: According to the public's perception, is the notion of transparency of data-driven design decisions steering redesigns, currently not openly shared between companies offering publicly accessible websites/apps and their users.

The dichotomous variable, var00011, is associated with the survey question: 'Are [Have] you ever been notified about why a website/ mobile app needed design changes?'. Figure 5.b.1, presented earlier, displays the number of answers represented by totals of n=32 for yes and n=58 for no. The findings suggest that 64.4% of individuals are in the complete dark and are not afforded the opportunity to understand design rationale. It also implies that at least 64.4% of individuals from the sample have identified the notion, described in the research question, results in a confirmative answer.

Mixed method research question:

Mixed-2: Could utilizing visualization templates be argued as an optimal approach for communicating such design rationalizations of this notion with public users.

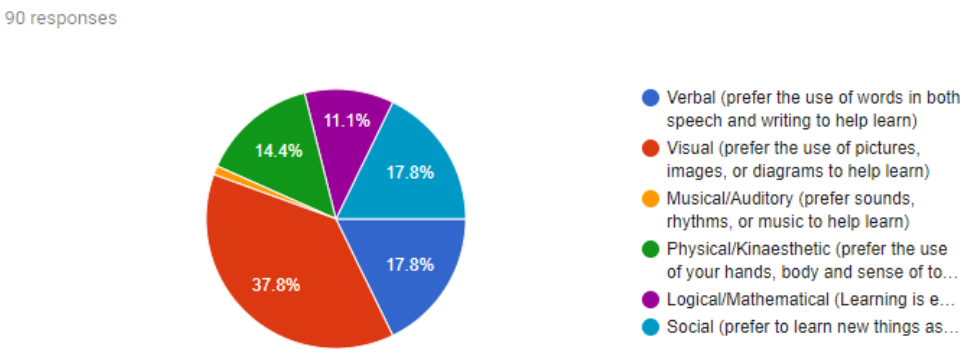


Figure 5.b.6 - Chart displaying the public's preferred way of absorbing new information

The nominal variable, var00001, is associated with the survey question: 'How do you absorb information and learn best?'. Figure 5.b.6 displays the percentage of answers represented in terms of not rank ordered categorization. The findings show that individuals prefer the use of visual material, more than twice as much compared to the second, verbal, and third, social, most selected options combine at 37.8% > 35.6%. This comparison contributes to the notion of data visualizations and informatics as a potential optimal approach for communication between a data-driven company and their public users.

The ordinal variable, var00017, has previously been described with Figure 5.b.3. This variable also relates to research question Mixed-2, by suggesting whether the sample has interest in viewing a variety of data visualizations. Only 30% of individuals indicated to have interest, compared to 25.5% who have no interest. These results aren't wide enough to draw immediate conclusions, but it is fair to consider reformulating the statement in alternative ways. This could then e.g. suggest: 1) whether there are other means of conveying design rationalization, besides utilizing visualizations and data, which can be concluded as an optimal approach.

CHAPTER 6 – DISCUSSION

Discussion of research question Qual-1:

Companies discussed in the qualitative research study appear to be openly transparent about many areas of design and development. Though, most companies under the study did not refer to data as the reason for driving a redesign of a website/app. Although there were many cases where conveying design rationale in textual format was uncovered, it is something that must be actively sought out. Design rationale and factors contributing to the redesign decisions did not appear to be promoted directly with the public through the actual websites/apps.

As anticipated, the emerged labels and themes from the qualitative case study suggests a linkage between the companies and modern data-driven culture. Whereas, strategy and decisions are dictated by data and shared internally. Outside of LibreOffice, the practice of conveying design decisions and data as the rationale was often not the focus of conversations. The two most common centerpieces of transparency noticed were data/account security and algorithmically placed page content and ads. From the researcher's perception, several

approaches shown in chapter 4 make attempts at being transparent but convey design related information in a poor, non 'user-friendly' manner, sometimes with too high technical details.

Data is a critical entity impacting decision-making, automotive features, and provides designers with insights that are influential in creating highly usable designs. However, the qualitative case study revealed an ineffectiveness of knowledge transferring for most cases. To a certain extent, companies are limited with how transparent they can be over their use of machine learning/deep learning algorithms (Eiband et al. 2018). Therefore, "companies might want to meet the regulations on transparency without unveiling the details of the underlying algorithm, and thus their intellectual property" (Eiband et al. 2018). TTC Labs, initiated and supported by Facebook, helps concludes this point by acknowledging "until now, the tools we've relied on to inform people about their data and choices have not kept pace with technology. They are neither intuitive nor user-friendly" ("About TTC Labs" n.d.).

Boasting a new feature or page design was commonly demonstrated using a demo video on the company's domains, press reporting websites, and/or social channels, e.g. YouTube. Snapchat is a company that releases snaps to all their users, which demonstrate how new features function. This effective approach puts the information directly in the user's hands, though decision-making design aspects are not discussed. Whereas, a video demonstration of a new feature shared via their YouTube channel, titled "Introducing Cameos", amassed only 31,899 views between the upload date December 18th, 2019 and January 8th, 2020. This is considered extremely low for YouTube standards, especially for a company with 100s of millions of users. Identifying the most effective communication channel becomes critically important to the success of transferring design knowledge to users.

Transparency is also being directly built into the UI content of websites/apps. Although, there are mixed opinions on how well this is accomplished. (Eiband et al. 2018) acknowledges the absence of work supporting integrating transparency into existing UIs. The researcher acknowledges that including transparency into UI content is quite a difficult task, primarily due to the restriction of bloating a page with content. This would complicate simple features and potentially cause a user to misunderstand or become uninterested. Eiband et al. state that making underlying design decisions transparent has been shown to improve a user's view of a system. Although, "users might want to understand the system's reasoning, but do not want to be overwhelmed by information". Complex explanations might negatively impact user

acceptance. The researcher views this topic as a risk versus reward debate. Without rationalized communication supporting said decisions, how would the public understand that these actions are truly intended to provide the best user experience feasible.

Uber's level of commitment towards openly conveying information and rationale behind their technology and design choices is top-notch. They exhibit many qualities discussed within this study. Although, the researcher assumes that a high percentage of their userbase are unaware of this content. In fact, after a simple discussion with 5 peers of mine, all of whom are repeated monthly users of Uber, they confirm that this information shared by Uber was completely unknown to them.

Airbnb demonstrates an eagerness to transfer design and technical knowledge with the public. This appears driven by the business case, because hosts provide the physical property 'home', while Airbnb provides the service to connect users 'guests' to the home. Essentially, they are the broker. The researcher assumes a reliance on the host sector of their user base to drive business revenue. As a result, they would be an ideal fit to investigate future studies with.

Referenced sources covering the 2018 redesign of Snapchat, suggest rationale for the new design layout and features were explained only after users were able to vent their frustration and cause an immediate public backlash. This attempt was futile, damage to their public image and decreased market value was swift. Even if design rationale is shared, the window appears extremely narrow as it pertains to sharing redesign choices with the public.

"There has been a steady drumbeat of stories that reveal the hidden cost of 'free' platforms" (Cababa 2018). In a data-driven culture, the true price of using 'free' websites/apps is one's data and companies ought to promote better transparency. If the argument of being ethically correct is not enough, certain advantages interpreted with this study should influence tech-savvy companies and researchers to explore the research topic further from a practical perspective.

Discussion of research question Quan-1:

The interpretation of findings associated with research question Quan-1 do not conclusively support answering yes or no, to whether this is a practice deemed necessary. To an extent, results from the survey variable var00012 disagrees with the notion that conveying the information described in research question Quan-1 is something that should exist.
Results from the variable var00015 option 'Describing the design and development process

behind their product', support answering no to Quan-1, as only 11.1% reported it as important. This result stands out because the researcher had a prior assumption that everyday users of public websites/apps would be more interested in knowing more about how such solutions are created. Moreover, the collective results from this option and four others associated with survey variable var00015 result in a quite low mean of 28.7%. This suggests the sample lacks interest regarding obtaining knowledge and informative material about the 'free' websites/apps they use.

However, findings supporting the yes stance reside in retrospect to examples, presented in section 4.a, of negative consequences from redesigning an app without pre-notifying or communicating rationale to public users; combined with 85.6% of survey participants reporting that they have experienced the feeling of immediate dissatisfaction after a redesigned website/app was released. Survey variable var00017, presented in Figure 5.b.3, concluded in a relatively low result of 25.5% of participants who identified a disagreeing position to whether they 'would like to read an explanation about the decisions and view a variety of data visualizations, which steered the new design of a website/mobile app'.

44.4% of participants from variable var00017 responded with a neutral stance, which may likely indicate indecisiveness or confusion. As reported from comparing results associated with Figure 5.b.3 and Figure 5.b.4, indecisiveness could be related to a general low understanding and/or exposure to the core topics. If the research were able to identify which participants from the neutral position were simply confused by the question itself, further clarity could be provided which in turn could sway answers towards a definitive stance. But as literature stated, one downside to employing an online questionnaire is that you cannot clarify questions or pry for a deeper explanation. Interpreting these results collectively suggests that to justify a transparency practice of this notion mentioned in Quan-1, the public users must obtain more understanding of the core topics before concluding on its necessity. This would require companies to invest resources in teaching unknowledgeable users.

The survey employed for quantitative data collection incorporated a question requesting the participants to 'Please provide your age group (select 1 option)'. Distinguishing the age group served two purposes: 1) verify whether a participant exists within the population boundary; 2) assemble an argumentative point for practical use in a real-world context. The results from this survey question do signify bias towards the sampling method employed. Given the researcher's age, 33, it is not surprising that 71% of participants occupy the age group

of 26-39 years old. Most significant is that results from the survey primarily reflect a generation who has spent much of their adulthood surrounded by the internet and vast growth of app technology. From a practical viewpoint, the data from their responses can provide interesting perspectives for companies with a dense user base occupying this group.

Discussion of research question Quan-2:

The interpretation of findings associated with research question Quan-2 suggest building/maintaining a trustful relationship and an increase in user acceptance as primary advantages for why transparency of this notion should be considered by companies under the context. The open-ended survey question designated as variable var00018 provides qualitative support demonstrating a correlation between potential repercussions, due to what a participant describes as a dissatisfying redesign experience, and potential benefits reaped from practicing this notion of design transparency. Of the 90 participants, 53 responses, or 58.9%, submitted a response. In one response, a participant stated "When things change drastically enough to contradict the intuitive nature of operating the app that I grew to love and know, it becomes a bit irritating. If I feel I have to learn it all over again, what's stopping me from finding a whole new app. I do feel a brief explanation of what changes happen and why, would help ease the transition, as they are telling me how these changes will help me, and I feel informed". This response indicates repercussions associated with displeasure, a decrease in user retention, and loss of loyalty. Benefits indicated with said response include providing a sense of understanding and appreciation, thus influencing user acceptance as a user is kept well-informed.

Building trust with the public is another achievable advantage for companies, who expend efforts to be more transparent about design. Openly disclosing information publicly demonstrates accountability and generates trust was a repeated declaration of transparency across the literature search. In the quantitative research survey, one participant reported with variable var00018 "Just show me the why and the benefits and I'm GOOD. Build trust and customer experience". Another reported "(increase trust, user[s] appreciate transparency". These statements highlight a desire to be informed, which would then result in loyalty and ongoing trust between the two parties. Projecting a trustful perception is also highlighted by results from survey variable var00016, where 64.4% of participants reported that transparency of DDD decisions would create a sense of trust and honesty; while only 2 participants claimed it would

cause the opposite effect. Projecting a trustful perception is an endless concern. As the old saying states, 'trust takes years to build, seconds to break, and forever to repair'. However, revealing results based on user behavior and user research data introduces data privacy risks. "If data is not properly anonymized, private data can be displayed erroneously" (Matheus, Janssen, and Maheshwari 2018). Contrary to its desired purpose, this could then result in instantaneous loss of trust.

Improving user acceptance and reducing the potential for public backlash is also deemed plausible. Results from variable var00016 showed that 20 participants, or 22.2%, acknowledge that transparency at this level would encourage them to share positive comments publicly; while 54.4% of participants claimed in survey variable var00014 to have previously expressed their displeasure to others. Weighing this against the undesirable circumstances faced by social media giants Snapchat and Instagram, as reported in section 5.a - qualitative finding indicate users' willingness to express opinions publicly. These individuals appear more enticed on voicing their frustration more often compared to voicing joyful experiences. 72.2% of participants reported that transparency of DDD decisions would make them more understanding and open to change, while 1 outlier claimed the opposite. This tally is significant as it rated highest among all possible options. The collective results suggest practicing this notion of design transparency can likely garner the advantages of improving public opinion and increasing user acceptance.

Discussion of research question Mixed-1:

The interpretation of all findings associated with research question Mixed-1 suggest answering true, as this is allegedly a non-existent notion of design transparency, both from a research and practical perspective. There has been virtually no information uncovered within this study, outside a single unpublished website article which mentioned applying design rationale as justification to end-users. Most viewpoints from online sources and literature only discuss justifying one's design decisions to those internal to the company, e.g. stakeholders. The idea surrounding the research topic weighs the importance of allocating resources towards 'keeping users in the loop'. Onboarding stakeholders, meaning bringing different members and areas of the business/team on board, is a widely common amongst literature covering design rationale and DDD techniques. So, the researcher wonders why onboarding users is not just as concerning. Take the internal perspective of Instagram as an example ("How This Head of

Engineering Boosted Transparency at Instagram | First Round Review" n.d.). If shedding light on the decision-making process by identifying who was making decisions, how those decisions were made and why they were being made, was stated to a sizable component towards leadership at the company being more transparent, then why is it not valuable to practice the same with the public. Rationalizing design decisions appears to be a missing component in a publicly available website/app's redesign process.

Discussion of research question Mixed-2:

The interpretation of findings associated with research question Mixed-2 suggests the use of visual templates, e.g. graphs or infographics, as the optimal means of absorbing information for the sampling frame. Acknowledging a yes answer to this research question derives from both research methods employed. The case study discovered the predominant use of combining visual and textual descriptions, while the survey variable var00001 resulted in a combined 55.6% of participants identifying themselves as either visual or verbal learners. This study acknowledges that "not all users will have the same preferred learning styles, this makes the learning process complex" (Mayiwar and Håkansson 2004), so accommodating several different styles of learning is a difficult task. Though, most literature sources identified within chapter 2 do support utilizing a combination of visualization and textual content for communicating design-related information and rationale.

The literature search included many perspectives detailing the pitfalls of using data visualizations. Gathering knowledge of pitfalls was purposeful due to the researcher's biased assumption that using visual material is the optimal method for conveying information. (Bresciani and Eppler 2015) supports this view stating "the rise of visualization's use on the web, in social media, in education, and in management calls for a systematic understanding of the limitations of graphic representations and of potential mistakes that are committed when designing or viewing visualizations".

Answering this research with a yes does not signal a highly definitive answer. It is naive to ignore the cost of resources needed to successfully utilize visualization templates. Without efficient data and effective data analysis systems, analysts cannot derive insights. Without skillful analysts, meaningful insights are missed and worse, the ones derived are inaccurate. Without insights, decision-making cannot be optimally influenced.

Without clear decisions and informative data visualizations, telling a data-driven story becomes seemingly impossible. Each aspect mentioned requires careful considerations, much practice, patience, and willingness to transfer knowledge across multiple entities.

Storytelling is a skill that requires considerable practice, as difficulty resides behind digesting vast amounts of data and analytic results (Ryan 2016c). Literature discussion of data visualizations and storytelling often mentions the effective use of infographics. The visual design of information increases perceptibility, ensures comprehensible presentation, and guides educative discussion in a persuasive way (Dur 2014). Infographics specifically can provide an easy-to-understand visual projection, which seemingly tells the story without a narrator, while incorporating minimal text. Uses cases include: marketers building brand awareness and boosting user engagement, educators to make content more memorable for students, nonprofit organizations to promote their events and raise awareness for a cause, and as discussed in chapter 2 governments sharing statistics and census data. "To date, there is no consensus as to when to use text-based explanations or visualizations, and in which form." (Eiband et al. 2018). Buljan et al. 2018 healthcare study state although infographics are perceived as more user-friendly and enjoyable for reading, there is no significant difference in knowledge transfer compared to a traditional text-based approach.

Common among the literature search was the mentioning of key quality attributes which define a good visualization. This included highlight indicators on critical data results, clear and concise language, high aesthetics and vibrant contrasting color palettes with text hierarchy guiding the users' attention. Designing and presenting a visualizations are not the only critically important concerns of utilizing data visualizations. (Ryan 2016b; Whitney 2013; Bresciani and Eppler 2015) also mention the imperative need to build data literacy skills, as this enables one to assemble meaning within the complexity of data and visuals. Regarding the general concept of data visualizations, 53.3% of participants reported with survey variable var00006 to have either very little understanding or none. Moreover, more than half of participants also reported either very little or no understanding pertaining to var00003 'Data-Driven Design' at 64.4%, var00005 'User Activity Monitoring' at 57.8%, and var00007 'Data Transparency' at 63.3%.

In conjunction with the discussion of Quan-1, literature, and other arguments mentioned here, the researcher concludes that companies must expend resources to help properly educate public users, to maximize the potential impact visualizations can have on supporting knowledge

transfer. Data Visualization templates can provide very valuable insight, but to only those who can interpret them correctly. One must strive for user comprehension and transparency when selecting from the dense data. Such an approach requiring extensive resources is fair to assume as argued against by many smaller companies.

Hypothesis

'People are reluctant when it comes to change'. 'Having to adapt to something new can bring forth challenges, uncomfortable feelings, and early frustrations until one has grown accustomed to the new environment. '[Being more transparent] may help ease the psychological impacts caused by sudden change'. These statements from section 1.3 were subjective reasons for why companies could be persuaded to become more transparent about a redesign. These arguments are also referenced when declaring undesirable repercussions from users, within the hypothesis stated in Chapter 1. Results from this study tentatively support such argumentative positions, with change being the common component.

Survey variable var00010 reported that 85.6% of participants have experienced becoming immediately dissatisfied after a website/app released a new redesign. As variable var00013 shows, 50% of participants have even refrained from using a website/app due to changing its design. 39.6% of the responses gathered from open-ended survey variable var00018 expressed 'having to relearn', via direct use of the term or by paraphrasing, as the reason why a redesign would cause dissatisfaction and likely prompt user resistance. 11.3% of the responses for variable var00010 also indicated an impact on user retention. Results produced by the survey variable var00008 showed 43.3% of participants typically object to the notion of design change. This 'if it is not broken, do not fix it' mindset signified user resistance.

Interpreting these results collectively indicates that companies should be worrisome, as users generally strongly oppose the idea of changing a website/app's design. Rationalizing one's redesign using decisions backed by data has the potential for avoiding blindsiding and upsetting public users and may decrease the number of users who potentially refrain from use; at least temporarily. Therefore, communicating design centered on definitive reasoning should positively impact retaining users and boost one's public image. This study suggests that currently designated communication channels are not promoted effectively and understanding the material may prove difficult for many individuals.

Lastly, to discuss whether an aesthetically beautiful website/app design triumph expensive efforts and resources required for achieving high usability. The debate between what is usable is beautiful or vice versa influences whether the research topic leans towards disclosing the aforementioned information or not. If research or a given company recognizes the standpoint of 'what is beautiful is usable', then that focus on aesthetics outweighs the need to practice the notion of transparency introduced in this study. Even though findings on the relationship between usability and aesthetics have been inconsistent throughout the past two decades, it appears to be trending importance in favor of usability.

6.a – LIMITATIONS

Convenience Sampling: employing social platforms as an instrument for recruiting respondents limits the ability to definitively know how many individuals truly were reached. The minimum number of individuals who potentially could have viewed the recruitment posts is truly uncertain. There is an inability to definitively declare that each network/friend connections logged in, viewed, and read the post regarding the survey. The subjective nature of the selected sample is not a generalized representation of the population, although the approach did prove useful as randomization was difficult due to the very large population size (Creswell 2009; Etikan, Musa, and Alkassim 2016).

Survey: allowing anonymous participants was purposeful, to elicit as many responses as possible. Openly distributing a link associated with the questionnaire form risks receiving duplicated responses. Google Forms provides no effective means of ensuring that each submission originated from a unique person. The inability to prompt or probe a participant (Bryman 2012) when he/she has trouble understanding a question. This could be crucial, given that many participants reported having a low level of knowledge about the core concepts.

Is this level of design transparency something currently being practice? The results could not definitively answer. Although an ethnographic research approach could be considered, it was not feasible within the time frame of this study. However, gathering empirical data through observation or experimentation in the natural setting (Creswell, 2009), e.g. via surveying or interviews companies, is necessary to further the research. This approach would assess the outside perspective interpreted from survey responses and results of the qualitative study, against

definitive answers from the company perspective. According to Creswell, this would then reduce the number of subjective judgments interpreted.

6.b – FUTURE WORK

Induction of research questions and/or a hypothesis for use in future research work.

- Increased user retention and mitigating public backlash are directly influenced by the open transparency of the data-driven design decisions behind one's website/app redesign.
- Data visualizations and infographics are an effective means of communicating argumentation-based rationale to public users, as justification for a redesign.
    - *Note*: Statistical, Timeline, and Informational infographics do not appear as ideal templates for drawing inspiration.
- Can a written data-driven story utilizing user-friendly visualizations positively impact users refraining further use and public backlash, by openly sharing analytics steering the redesign decisions of a website/mobile app?
    - *Note*: this does not just refer to dashboards and analytical diagrams, e.g. scatterplots, bar charts, etc., but rather a means of rationalizing data and design decisions via a cross-style incorporating design rationale, storyboards, and diagrams.

Potential titles for research articles

- Data Transparency through Visualization Stories: decisions for *your* design.
- Transparency of Data-Driven Design Through Infographics and Data Visualizations.

CHAPTER 7 – CONCLUSION

A seemingly valuable need to bridge the gap between what is known and what is portrayed is present. Brief and comprehensive are two attributes of communication which are extremely difficult to master. Presenting information in a meaningful and very concise manner is vitally important. Especially given the domain of websites/apps which bear disparities between device screen sizes. Rationalizing decision-making behind a redesign is often aimed at advocating for the user and rarely concerned with advocating to the user. Users are often reactionary and generally quite brash when lacking understanding. A change in design philosophy could increase user acceptance and mitigate negative public criticism. Let public users obtain an insightful view into the critical information driving a redesign. Modern data-driven culture is thriving, and companies should not be fearful of opening new communication.

An 'open-book' policy, regarding design transparency, may lead to beneficial outcomes, though several challenges reside with accomplishing this level of design knowledge transfer. Potential repercussions are realistic if a user misinterprets the purpose of conveying such information. Conveying important aspects of one's data-driven design process, especially by using visualizations, requires correct interpretation and contextual knowledge. Some public users may understandably be skeptical and cast doubts over the legitimacy of such information, while others may be able to conceptualize its purpose and accept the need for a redesign. Companies may understandably be wary of being too openly transparent about their data-driven strategies. Disclosing this information exposes potential data privacy risks and could prevent them from possessing a competitive advantage. Hence why open transparency is a classic risk versus reward scenario. Therefore, this study proclaims the need for further research; especially those employing real-world case trials.

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APPENDIX

Additional statements regarding the methodological choices

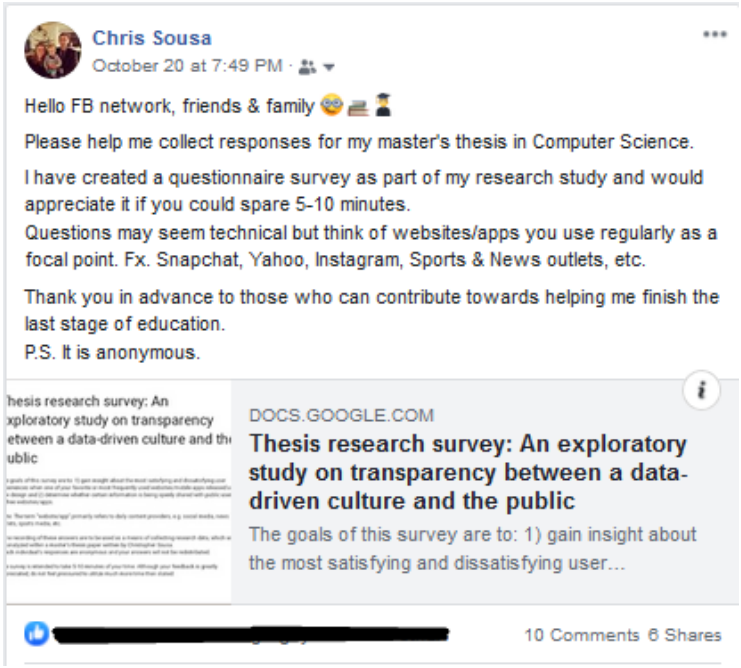
The significance behind the population for the quantitative research defined as the USA is a result of where the companies reside geographically. That being companies fitting the boundaries of the study described in Chapter 1 and demonstrated within the case study research in Chapter 4. An assumption of this study assumes there is strong familiarity between the public and the well-established websites/apps occupying the case study. Studying cases of this nature, ensured at a very high likelihood the results interpreted from the qualitative analysis could reflect the perception of the public after the quantitative analysis is interpreted.

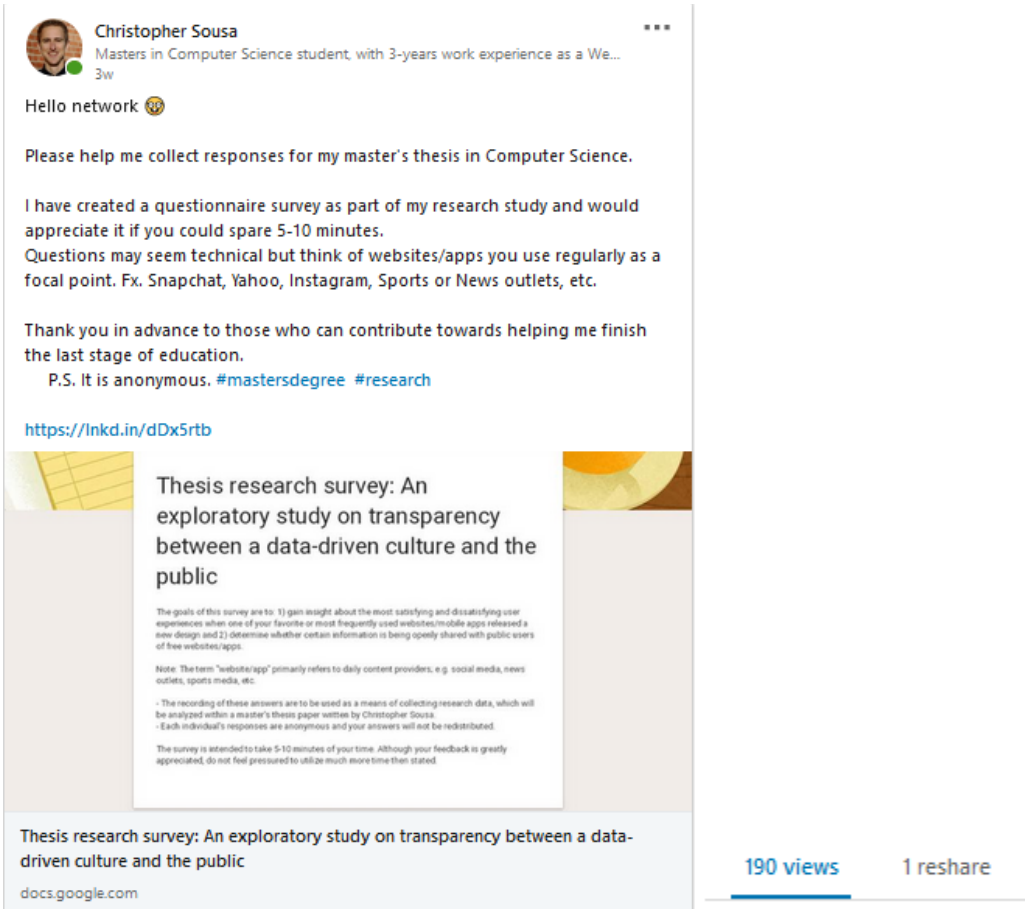
Some opportunities present themselves in the current space and some are simply unobtainable or unmanageable at a given moment. For this study, insufficient resources influenced the type of sampling method used with the quantitative research survey. However, an opportunity for a sampling approach known as convenience sampling was present and used. “[Convenience samples] approach is often used when the researcher must make use of available

respondents or where no sampling frame exists" (Davidson 2006a). (Etikan, Musa, and Alkassim 2016) adds that a non-probability sampling technique is useful when the researcher has limited resources at his/her disposal. (Brickman Bhutta 2016) adds that the use of social networking sites and an online questionnaire undoubtedly makes fast and cheap research possible, without requiring much or any assistance. (Brickman Bhutta 2016) also argues that Facebook specifically being a social networking site well suited for research of this nature. Mainly given its popularity and sheer size of enrolled people with 845 million+ users worldwide. Ultimately, respondents were immediately reachable with the non-probabilistic form of sampling via social network platforms.

Another approach to non-probability sampling considered was Snowball sampling. Whereby, an iterative process of identifying a specific individual, within my networks, as an appropriate respondent. This individual would've been requested to identify another participant(s) and the process would be repeated until sufficient data is collected. (Oliver 2006). The decision ultimately was driven by respondents and the rate at which they agreed. Due to the number of responses received quickly, 12 hours = 38 respondents or 38%, 36 hours = 56 respondents or 56%, and so forth.

Convenience Sampling: recruiting participants via a post using social networking sites LinkedIn and Facebook.





Presenting the Format of the User Survey

Thesis research survey: An exploratory study on transparency between a data-driven culture and the public

The goals of this survey are to: 1) gain insight about the most satisfying and dissatisfying user experiences when one of your favorite or most frequently used websites/mobile apps released a new design and 2) determine whether certain information is being openly shared with public users of free websites/apps.

Note: The term "website/app" primarily refers to daily content providers; e.g. social media, news outlets, sports media, etc.

- The recording of these answers are to be used as a means of collecting research data, which will be analyzed within a master's thesis paper written by Christopher Sousa.
- Each individual's responses are anonymous and your answers will not be redistributed.

The survey is intended to take 5-10 minutes of your time. Although your feedback is greatly appreciated, do not feel pressured to utilize much more time then stated.

* Required

Surveyors Information

1. **Name (optional)**

2. **Please provide your age group (select 1 option)** *
   Mark only one oval.
   - ◯ 18-25 years old
   - ◯ 26-39 years old
   - ◯ 40-59 years old
   - ◯ 60+ years old
   - ◯ Prefer not to say

3. **Please provide your country of residence?** *

4. **How do you absorb information and learn best?** *
   Mark only one oval.
   - ◯ Verbal (prefer the use of words in both speech and writing to help learn)
   - ◯ Visual (prefer the use of pictures, images, or diagrams to help learn)
   - ◯ Musical/Auditory (prefer sounds, rhythms, or music to help learn)
   - ◯ Physical/Kinaesthetic (prefer the use of your hands, body and sense of touch to help learn)
   - ◯ Logical/Mathematical (Learning is easiest if you use logic, reasoning, or mathematical operations)
   - ◯ Social (prefer to learn new things as part of a group and explaining my understanding to others)

Survey Questions

5. **1) What level of knowledge do you have about each of the following topics? (select 1 option for each row)** *

Mark only one oval per row.

	High understanding	Average understanding	Very little understanding	None
Website and Mobile App Development	◯	◯	◯	◯
Data-Driven Design	◯	◯	◯	◯
Data Analytics	◯	◯	◯	◯
User Activity Monitoring	◯	◯	◯	◯
Data Visualizations	◯	◯	◯	◯
Data Transparency	◯	◯	◯	◯

6. **2) Please select one option for each of the following questions:** *

Mark only one oval per row.

	Yes	No
Are you typically not welcoming to change of a website's/app's design and have the mindset of "if it's not broken, don't fix it"?	◯	◯
Have you ever been notified beforehand that a new redesign of a website/mobile app was coming?	◯	◯
Have you ever become dissatisfied immediately after a website/mobile app released a new design?	◯	◯
Are you ever been notified about why a website/mobile app needed design changes?	◯	◯
Should a website/mobile app feel obligated to explain the reasons why their design needed change?	◯	◯
Have you ever refrain from using a website/mobile app because of a change in design?	◯	◯
Have you ever expressed your displeasure to others (fx. online) after a website/mobile app released a new design?	◯	◯

7. **3) Which of the following areas do you feel is important for a company to be openly transparent with the public about : (you may select 0-many answers)** *

Check all that apply.

- ☐ Changes to products and service
- ☐ Terms & Conditions and Policy changes
- ☐ Distribution of Data
- ☐ Describing the design and development process behind their product
- ☐ Company values and employment practices
- ☐ Pricing decisions
- ☐ Explaining how the provider of the "free" website/app generates money
- ☐ Ad Marketing practices
- ☐ None of the above
- ☐ Other: _____

8. **4) If a website/mobile app company was more transparent with you, the user, and shared design decisions that were driven by data, it would: (select each box which applies to you)** *

Check all that apply.

- [ ] Create a sense of trust and honesty
- [ ] Break your trust
- [ ] Provides a feeling of self-worth and appreciation
- [ ] Make you more understanding and open to change
- [ ] Annoy you and make you less willing to welcome the change
- [ ] Keep you as a loyal user
- [ ] Prevent you from further use of the product
- [ ] Encourage you to share positive comments with others
- [ ] Encourage you to share negative comments with others
- [ ] Have no effect. I personally do not care to view this information, as long as the design is beautiful.
- [ ] None of the above

9. **5) I Would like to read an explanation about the decisions and view a variety of data visualizations, which steered the new design of a website/mobile app? (how much do you agree with this statement)** *

Mark only one oval.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

10. **6) Can you provide any specific reasons for why the redesign of any website/mobile app would create a dissatisfying experience for you?**

_____

_____

_____

_____

_____

Presenting the Format of the Company Survey

Note: due to a lack in resources, this survey was never distributed.

Thesis research survey: an exploratory study on transparency between a data-driven culture and the public

The goal of this survey is to gain insight about the experiences your company had after you released a new design of a website &/ or mobile app and whether certain considerations has ever been discussed.

- The recording of these answers are to be used as a means of collecting research data for a master's thesis paper written by Christopher Sousa.
- The answers and results provided WILL NOT be distributed/sold to anyone else.
- The only person to analyze and conclude on the responses will be the survey creator Christopher Sousa.

The survey questions are intended to take 5-10 minutes of your time. Although your feedback is greatly appreciated, do not feel obligated to utilize much more time then stated.

* Required

Skip to question 1.

Company information

1. **Please provide your country of residence?** *

2. **Please provide the name of your company:** *

3. **If you allow permission to possibly reference your company name within my thesis paper, please check below. Otherwise, your answers and name will be anonymous within the paper.**
   Check all that apply.
   - [ ] Allow use of the company name

Survey Questions

4. **Does your company consider themselves to be a data-driven company? Meaning do you lean considerably on data when making decisions, especially referring to decisions about design and user experience.** *
   Mark only one oval.
   - ◯ Yes
   - ◯ No

5. **Please select one option for each question. Each individual question refers to the redesigned of a website/mobile app available to public users.** *

Mark only one oval per row.

	Yes	No	Prefer not to say
Has your company ever released a redesign of any website/mobile app?	◯	◯	◯
Has your company ever experienced what you would consider an unsuccessful release?	◯	◯	◯
Has you company ever received &/or noticed negative backlash from public users immediately after a release of a new design?	◯	◯	◯
Has your company ever had issues retaining users after the release of a new design?	◯	◯	◯
Has your company ever noticed (backed by data) users refraining from normal use immediately after the release of a new design?	◯	◯	◯
Does your company use website/app data to help drive design strategy and improve user experience?	◯	◯	◯

6. **Which of the following activities does your perform &/or incorporate:** *

Check all that apply.

- [ ] User Activity Tracking
- [ ] 3rd party web/app analytic tools (fx. Google Analytics, Clicky, or similar)
- [ ] User Research/Testing (quantitative &/or qualitative)
- [ ] Customer Satisfaction Surveys
- [ ] Data Visualizations and Storytelling
- [ ] Prefer not to say
- [ ] Other: _____

7. **Would the idea of being more transparent with your public users about the analysis of data steering your strategic design decisions, be of interest?** *

Mark only one oval.

- ◯ Yes
- ◯ Neutral
- ◯ No

8. Please briefly share pros and cons, if your company has ever made an effort to be more transparent about the data collected, analyzed and used to drive strategic business and design decisions.

9. If the previous question does not apply to your company, please briefly share what you envision the advantages and disadvantages could be, if you were to do so?

10. Can you briefly describe how your company manages user retention, user refraining from use, and/or mitigation of public backlash, in the case of an unsuccessful release of a redesign website/mobile app?