Research Trends on Self-service Analytics: A Bibliometric Review from year 2010 -2023

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Abstract
In the era of digital economy, massive data not only becomes an important asset, but also brings many challenges to enterprises. Self-service analytics (SSA) was born to solve these problems, which refers to the centralized data control and data distribution by enterprises through IT, and the use of data by business personnel without barriers. SSA is considered as a type of business intelligence. How to release data value through self-service data analysis has become the key to enterprise digital transformation. As a result, comprehending SSA has become essential in the development of digital transformation. This research paper presents a comprehensive bibliometric analysis of the emerging field of Self-service Analytics (SSA). The authors examine 69 publications from the Scopus database over a 14-year period, revealing a growing interest in SSA with an annual growth rate of 8.82%. The majority of these publications are theoretical solution papers, indicating that SSA is still in its early stages of theory with limited practical implementation. Given the apparent constraint of obtaining data from a single database, this paper recommend that future studies should examine the research outputs of SSA using other databases such as Google Scholar, Scopus, and Web of Science.
Keywords: Self-service Analytics, Business Intelligence, Bibliometrics, Scopus

Introduction
Today, the Self-service Analytics (SSA) has gained significant attention due to its potential benefits for organizations. According to Oliveira and Bernardino (2020), self-service analytics empowers employees to make data-driven decisions promptly, leading to improved productivity and operational efficiency. Besides, self-service analytics can foster a data-driven culture within an organization, encouraging employees to explore and gain insights from data to drive innovation and competitive advantage (Thomas Publishing Company LLC, 2010). By enabling users to perform data analysis tasks on their own, self-service analytics reduces the burden on IT departments, allowing them to focus on more strategic initiatives (Vo, Q. D. et

al., 2018). This benefit is making SSA increasingly popular among organizations looking for data transformation.

However, implementing SSA can be challenging due to technical and non-technical challenges. The first mentioned challenge includes data quality, data integration, and data governance, while the second one includes lack of user adoption, resistance to change, and lack of executive support (Leka & Çomo, 2023). Organizations can establish data governance frameworks to standardize data definitions, improve data quality, and maintain consistency across self-service analytics platforms. Meanwhile, non-technical challenges in implementing SSA include lack of user adoption, resistance to change, and lack of executive support. Few studies give answers to the SSA challenges that have been mentioned in previous papers. However, an SSA implementation model or framework may be able to solve the issues. For the creation of such a model or framework, two requirements must be obtained: an awareness of the present level of research and an understanding of current difficulties in practice. The first point is addressed in this work.

We carry on as follows. Related SSA works are presented in the following section. The paper then goes over the approach used to ensure a thorough and appropriate study of SSA research. The results of the bibliometric analysis will be presented in the next section along with a discussion of the findings. The last section of the paper will finish with a discussion of the paper's limitations and future research in this field.

Literature Review

SSA has been explored in various contexts, including the oil industry Akoum & Mahjoub (2013), power internet of things (Na et al., 2021), and offshore drilling. For example, Akoum and Mahjoub (2013) proposed a unified framework for implementing business intelligence, real-time operational intelligence, and big data analytics for upstream oil industry operators. In the context of offshore drilling, Yoder (2019) discussed the role of digitalization and data democratization, touching on the use of SSA (Yoder, 2019). Various tools and techniques have been proposed for SSA. For instance, Chouder et al (2019) proposed EXODuS, a tool for exploratory OLAP over document stores. Additionally, Convertino and Echenique (2017) discussed the emerging needs, skills, and tools for self-service data preparation and analysis by business users. In conclusion, the literature on SSA presents a growing trend towards empowering users to leverage data for decision-making. Despite the challenges, SSA offers significant potential for improving business performance. The ongoing research trends focus on exploring SSA in different contexts and developing effective tools for SSA. However, existing research on the practicality of SSA in various circumstances is limited.

The implementation of SSA within organizations requires considering various factors. Firstly, Convertino & Echenique emphasize the importance of user-friendliness and ease of use of self-service analytics tools (Dinsmore, 2021). User interfaces that are intuitive and require minimal training can enhance user acceptance and engagement with self-service analytics platforms. Secondly, organizational support and leadership commitment play a crucial role in the successful implementation of self-service analytics (Orcajo & Fonseca, 2022). Managers and leaders should actively promote the use of self-service analytics, provide necessary resources and training, and establish policies that encourage data-driven decision-making. Thirdly, data governance are essential factors to consider. Organizations need to ensure data accuracy, consistency, and security to build trust in self-service analytics. Clarke et al. (2016) highlight the issue of governance in SSA, discussing the need for a balance

between user empowerment and control. These factors all play a role in the effective installation and use of SSA in organizations. However, existing research does not provide potential improvement measures.

Research Methodology
Sources of Data
Based on the literature that is currently available and archived in reliable academic databases, bibliometric analysis is a systematic approach that educates academics on the global trends in study in a particular research subject (Khudzari et al., 2018). This method is distinct from writing a review paper. As a result, information on SSA publications used in this analysis was obtained from the Scopus database. The use of Scopus as the database ensures that the data is of a high caliber and sufficient quantity. The data were presented using an analysis tool named biblioshiny.

Search Strategy
This study conducted data search on July 2023, using the Scopus database. The search central was articles covering "self- service analysis" in the title. Synonyms of SSA were used to enhance the volume of documents retrieved. Thus, "self- service analytics", "self- service BI", "self- service business analysis" were all used as alternative search terms. Results of the first search for any document containing SSA show that the oldest publication dated 2010 and the most recent articles are published in 2023. The data collection included 71 articles in total for the purpose of identifying contributions relevant to the SSA domain. Then, we read all the papers and create a list to summarize their main idea, methodology, and findings. However, after reviewing the substance of all 71 articles, we dropped out two papers since they weren't related to the idea of self- service analysis. Take one of the papers that was deleted as an example; it studied a model called "CNN-SSA-Bi-LSTM,". The paper was included mistakenly only because it shares the same abbreviation with self-service analysis (SSA).

The method then proceeded on to the analysis stage, which sought to pinpoint the research context and research trend, after eliminating irrelevant papers. For the purpose of analyzing the contributions of SSA research, a framework for analysis was created. Figure 1 shows how the framework is organized. We read the abstract, the introduction, then quickly skim the important points of the remaining section of the paper, as well as its conclusions, to get a sense of the overall context of the research. Then we identify the paper's domain, type, and region. All papers were classified by the type of publication (Solution, Case Study, or Both), the domain of subject (Computer Science, Engineering, Business, Management and Accounting etc.), and geographic region of publication of the paper (North America, South America, Europe, Asia-Pacific, Africa). After generating an overview of the *research context*, we analysis the document information including author, year of publication, sources, institutions, keywords and topics for prospecting the *research trend*. We used bibliometric pointers like annual growth rate, average citations per doc, international co-authorships, frequent words and trend topics for ranking publication articles and discovering the research trend in these studies.

Research Context	Type	Domain	Region
Research Trend	Production	Authors	Words

Figure 1. Analysis Framework

Results and Discussions
Research Context

Figure 2 displays the breakdown of publications by type, including case study and solution articles. The majority of the publications, 55 (79.7%) of the articles, are theoretical solution papers, and only 11 (15.9%) are case study papers, as would be expected for a new type of business intelligence. Three (4.3%) articles did, however, fit the bill for both kinds of articles. The findings imply that although research on SSA solutions has begun, it is still in the early phases of theory, and few firms have implemented SSA processes. This result shows that SSA does not receive the essential practice-based support. On bridging this gap, more research can be done in terms of case study.
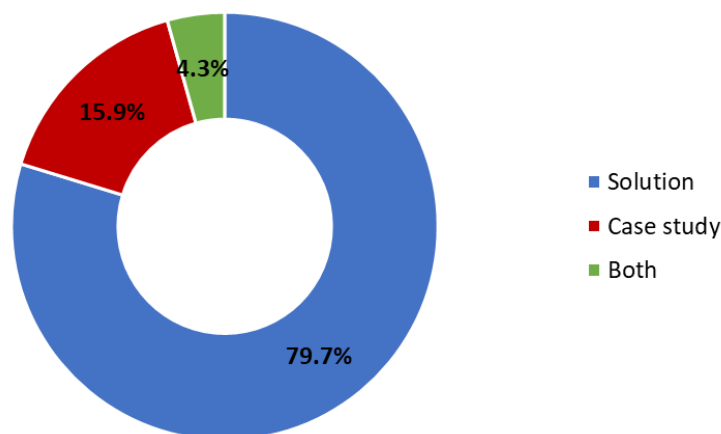

Figure 2. Distribution of Articles by Type

Further investigation was carried out in order to determine the subject area of the papers. Figure 3 displays the findings, which showed that the application of SSA described in the papers was dominated by five domains: computer science, engineering, business, management and accounting, decision sciences, and mathematics, which accounted for 78.3% of the articles. However, just 21.7% of the publications mentioned specific industries like energy and medicine. This observation is consistent with the previous one, that there are few case studies for SSA. The practical application on SSA is currently ongoing.
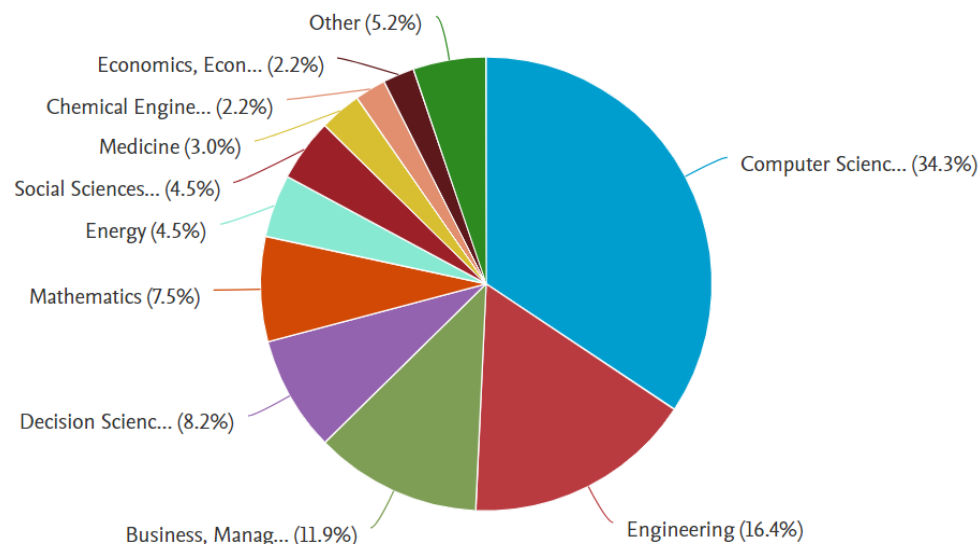
Figure 3. Articles by Domain of Applications

When examining the distribution of publications by region, we identify the country of publishing authors and then classify the countries into different regions. According to the results, the top three regions are Europe, North America, and Asia-Pacific, with 31, 21, and 15 articles, respectively. The total proportion of these three regions is 82.7%. It shows that advanced technology will first benefit the developed regions. Meanwhile, there is a need to investigate SSA in various countries, with a special focus on developing regions.
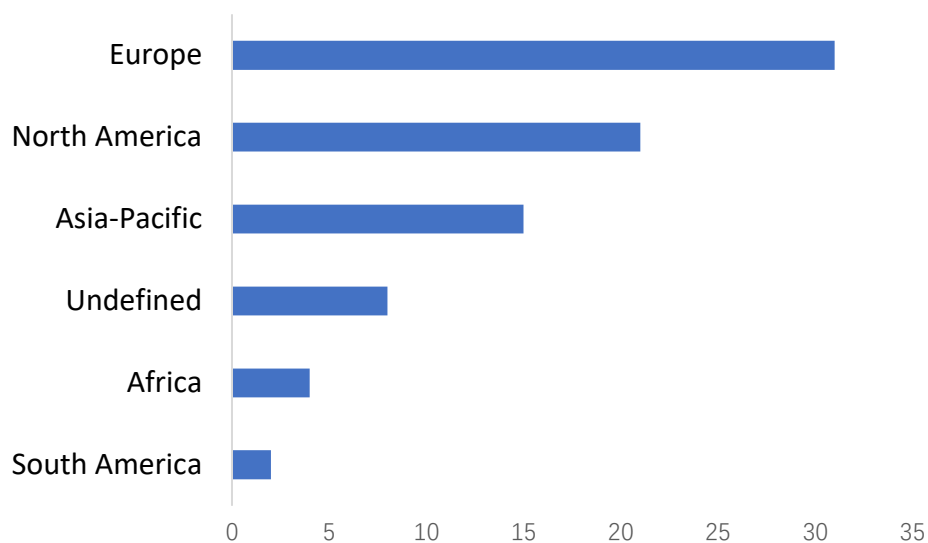

Figure 4. Articles Population by Region

Research Trend

Figure 5 displays the 69 research publications that were published in the Scopus database over a 14-year period. In 2010, one paper starts to appear in Scopus. The production amount has been rising gradually each year until 2020. However, the publication amount rises again after 2021. We assumed that it is affected by the epidemic. Since the data was extracted in the first half of 2023 and that is the reason only three papers gathered in 2023. Overall, the annual growth rate is 8.82%. This could suggest an increasing interest or development in SSA. More research being published means more work is being done, which generally indicates

that the area has substantial attention in these years. The fact that there are 69 publications from 56 sources demonstrates that the study is diversified and comes from a variety of individuals and institutions.
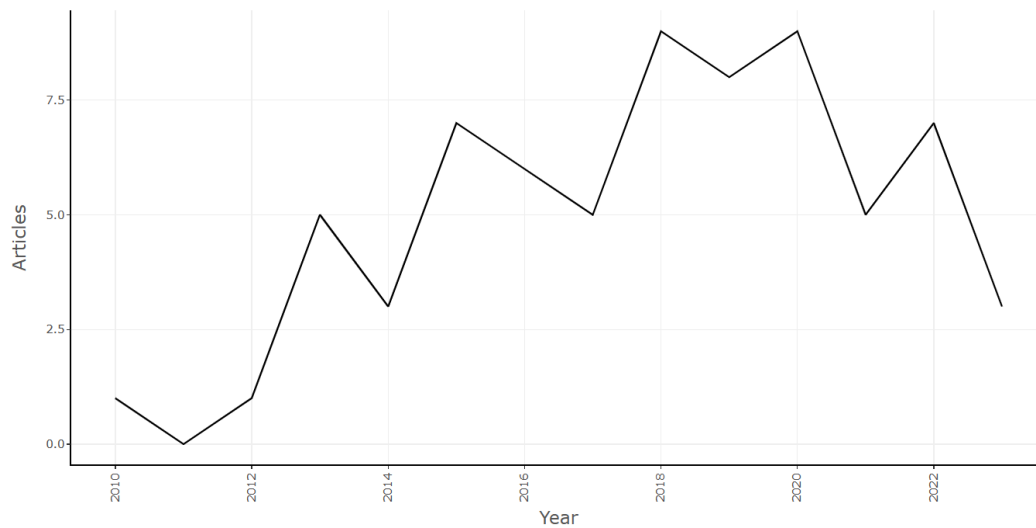

Figure 5. Distribution of Article per Year

According to Figure 6, there are 189 authors who have contributed to the body of work. This could indicate a high level of collaborative research, given the large number of authors relative to the number of documents (69). Furthermore, there are 11 authors who have single-handedly authored a SSA research. This represents a small fraction (about 15.9%) of the total number of articles, indicating that the majority of the work is produced collaboratively as well. The international co-authorship rate is 17.39%, suggesting that a significant portion of the papers involved international collaboration. This indicates a global research effort and potential diversity in perspectives and approaches. On average, each paper has approximately 3.04 authors. This indicates a high level of collaboration among authors. It aligns with the trend in many fields towards collaborative research, which allows for the pooling of resources, skills, and expertise.
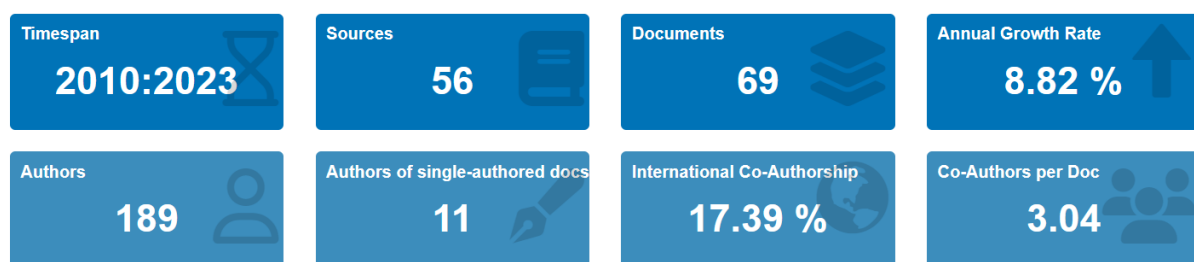

Timespan	Sources	Documents	Annual Growth Rate
2010:2023	56	69	8.82 %

Authors	Authors of single-authored docs	International Co-Authorship	Co-Authors per Doc
189	11	17.39 %	3.04

Figure 6. Authors' Main Information

According to Figure 7, the terms "information analysis" and "information management" have the highest frequency, with 13 and 11 occurrences respectively. This suggests a significant focus on the collection, organization, and analysis of information in the SSA research. The terms "big data" and "decision making" both appeared 10 times. This could indicate a SSA research trend focusing on how big data can be utilized to inform and improve decision-making processes. The terms "competitive intelligence" and "information systems" each appeared 9 times, suggesting a trend towards understanding how to leverage

information and data systems for competitive advantage. In conclusion, the research trend among the 69 papers linked to SSA from 2010 to 2023 indicates a high emphasis on data and information management, enabling better decision-making, gaining a competitive edge, and improving corporate operations. The need of employing self-service analytics platforms that not only store and organize data but also produce functional insights for strategic decisions that contribute to corporate performance is an emerging subject.
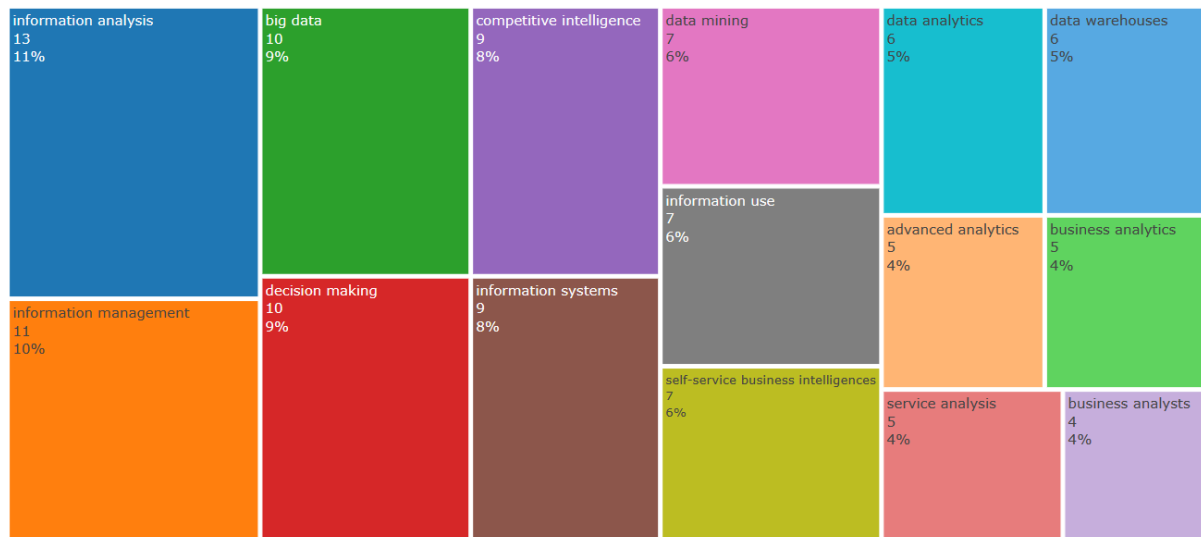

Figure 7. Top 15 Keywords

Conclusions

As an integral facet of business intelligence, SSA plays a vital role in enterprise digital transformation by unlocking data-driven insights. This research paper undertook a comprehensive bibliometric analysis of SSA, shedding light on its evolving landscape and trends.

The findings underscore a growing interest in SSA, evident through a consistent annual growth rate of 8.82% in research publications. While SSA's theoretical foundations are well-established, practical implementation remains relatively limited, with a predominant focus on theoretical solution papers. The analysis highlights the necessity of expanding research efforts to encompass practical case studies to bridge the gap between theory and application. The exploration of SSA's subject domains and region also reveals this gap between theory and practice.

Collaboration is a feature of SSA research, with a high proportion of articles featuring international co-authorship. This collaborative effort adds varied viewpoints and broadens the study's insights. The bibliometric study reveals those phrases such as "information analysis," "information management," "big data," "decision making," "competitive intelligence," and "information systems" predominate in SSA research. As research expands, emphasis on the practical consequences of SSA in real-world circumstances will be critical in increasing its application.

While this analysis provides useful insights into SSA research trends, its shortcomings require further investigation. Although Scopus is one of the largest databases of indexed journals, there are still some high-quality publications with SSA articles that have not been indexed. As a result, SSA articles published in these journals are missing from the Scopus

database. Thus, this paper proposes that future studies compare the published outputs from various databases. For example, compare SSA publications in Scopus, Web of Science, and Google Scholar. Using various databases in Bibliometric analysis would provide a more thorough and helpful study for future academics. Despite the limitation, this study is one of the first to examine the detailed bibliometric indicators of the SSA literature.

Acknowledgments

References

Akoum, M., & Mahjoub, A. (2013, October). A unified framework for implementing business intelligence, real-time operational intelligence and big data analytics for upstream oil industry operators. In *SPE Middle East Intelligent Energy Conference and Exhibition*. OnePetro.

Bhat, H. J. (2020). Investigate the Implication of "Self-service Business Intelligence (SSBI)"—A Big Data Trend in Today's Business World. *Curr. Trends Inf. Technol*, 10, 17-22.

Chouder, M. L., Rizzi, S., & Chalal, R. (2019). EXODuS: Exploratory OLAP over document stores. *Information Systems*, *79*, 44-57.

Chouder, P., Tyrrell, G., & Nagle, T. (2016). Governing self service analytics. *Journal of Decision systems*, *25*(1), 145-159.

Convertino, G., & Echenique, A. (2017, May). Self-service data preparation and analysis by business users: New needs, skills, and tools. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 1075-1083).

Daradkeh, M. (2019). Determinants of self-service analytics adoption intention: the effect of task-technology fit, compatibility, and user empowerment. *Journal of Organizational and End User Computing (JOEUC)*, *31*(4), 19-45.

Dinsmore, T. W. (2021). *Disruptive Analytics: Charting your strategy for next-generation business analytics*. Apress.

Khudzari, J. M., Kurian, J., Tartakovsky, B., & Raghavan, G. V. (2018). Bibliometric analysis of global research trends on microbial fuel cells using Scopus database," *Biochemical Engineering Journal*, *136*, 51-60.

Leka, B., & Çomo, A. (2023). Self-Service business intelligence.

Na, Q., Su, D., Yang, Y., Lou, J., Wu, J., & Zeng, J. (2021, April). Research on face recognition algorithms in the context of power internet of things. In *The Proceedings of the 9th Frontier Academic Forum of Electrical Engineering: Volume II* (pp. 295-306). Singapore: Springer Singapore.

Oliveira, A., & Bernardino, J. (2020). Evaluating self-service BI and analytics tools for SMEs. In *ICETE, 3*, 89-97).

Hernández, O. J., & Casas, F. I. P. (2022). Business intelligence's self-service tools evaluation. *Technologies, 10*(4), 92.

Riggins, F. J., & Klamm, B. K. (2017). Data governance case at KrauseMcMahon LLP in an era of

self-service BI and Big Data. *Journal of Accounting Education*, *38*, 23-36.

Schlesinger, P. A., & Rahman, N. (2016). Self-service business intelligence resulting in disruptive technology. *Journal of Computer Information Systems*, *56*(1), 11-21.

Schuff, D., Corral, K., St. Louis, R. D., & Schymik, G. (2018). Enabling self-service BI: A methodology and a case study for a model management warehouse. *Information Systems Frontiers*, *20*, 275-288.

Thomas Publishing Company LLC. (2010). Deep dive: Business intelligence user resources. *Managing Automation*, *25*(10).

Vo, Q. D., Thomas, J., Cho, S., De, P., & Choi, B. J. (2018). Next generation business intelligence and analytics. In *Proceedings of the 2nd International Conference on Business and Information Management* (pp. 163-168).

Willett, D. L., Kannan, V., Chu, L., Buchanan, J. R., Velasco, F. T., Clark, J. D., ... & Basit, M. A. (2018). SNOMED CT concept hierarchies for sharing definitions of clinical conditions using electronic health record data. *Applied clinical informatics*, *9*(03), 667-682.

Yoder, R. T. (2019). Digitalization and data democratization in offshore drilling. In *Offshore Technology Conference*. OnePetro.