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THE UX OF INFORMATION PRESENTATION DATA STORYTELLING FOR DECISION-MAKING

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ABSTRACT
The business organizations can leverage visual storytelling methods in presenting complicated data meaningfully so that decision-making will be improved. Visual storytelling is an extremely important tool which organizations employ to gain access to an intuitive means of passing on information based on data. Storytelling with visualizations assists organizations not only in making data more appetizing, but more engaging to present in front of decision-makers as well. This research examines the connection between the presentation of visual information and enhanced understanding by business stakeholders, with emphasis on how to use these tools to make decision-making easier and quicker. The article also examines case studies and business cases in which visual storytelling have been successfully used to make decision-making easier. The research discovers that high-quality visual stories, such as data charts, graphs, and compelling stories, enable companies not just to inform but to inspire and align people toward strategic goals. With companies continuing to recover from data overload, the capacity to reduce rich information into actionable intelligence is more essential than ever before. Visual storytelling is a highly feasible solution, acting as a go-between between unprocessed information and implementable decisions, bolstering the effectiveness and competitiveness of organizations.

Keywords:
Visual storytelling, communication of data, decision-making, business intelligence, data visualization, narrative skills, organizational performance, strategic decision-making, business insight, data overload, stakeholder interaction.

I. INTRODUCTION

In today's data-driven business environment, effective decision-making is increasingly reliant on the ability to interpret and communicate complex data. Visual storytelling techniques have emerged as a powerful tool for businesses to present intricate data in a more comprehensible and engaging way, thereby enhancing decision-making processes. These techniques combine elements of data visualization with narrative structures, helping to transform raw data into meaningful stories that are easier to understand, interpret, and act upon. Research has shown that businesses using visual storytelling can convey complex data more clearly and persuasively, leading to more informed and effective decisions. For instance, studies have explored how businesses can empower users by using visual data through boundary objects and storytelling, thereby facilitating better decision-making [3][5][7][11]. In a similar vein, the significance of user experience in collaborative decision-making through innovative approaches like surface computing also benefits from visual storytelling to improve data engagement and decision accuracy [2]. Additionally, the role of personas and decision-making in design processes highlights how visual storytelling helps align stakeholders and foster deeper insights into complex datasets [1][3][12][15]. As businesses continue to grapple with vast amounts of data, the application of visual storytelling is poised to become a critical strategy, allowing for more dynamic, effective, and collaborative decision-making processes.

II.LITERATURE REVIEW

Erin Friess (2012): Outlines how personas are applied in decision-making throughout the design process, emphasizing the necessity of comprehending user viewpoints. The ethnographic case study identifies how personas drive design decisions and how they can enhance usability and user experience in technology design. [1]

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Aphiris et al. (2013): Investigated user experience of collaborative decision-making with surface computing. They report on how these technologies facilitate more efficient collaboration and decision-making, providing insights into user interaction and interactive interface design. [2]
Marjanovic (2016): Discussed how data discovery through visualizations is capable of empowering business users. Through boundary objects and narratives, the research showcases how data can be explained to non-technical users effectively and thus empowers better business decisions. [3]
Hoffman et al. (2013): Discussed the future of online patient decision aids in healthcare. They theorize and delineate the advantages of making available decision aids via the Internet and canvas the evidence to date regarding how well they can inform patients so they can make decisions. [4]
Liedtka (2015): Presented the design thinking theory as a key concept in promoting innovation. Design thinking enables organizations to solve complex issues by concentrating on human-centered solutions and iterative prototyping, hence enhancing decision-making. [5]
Li et al. (2013): Described a usability test of an internet-based decision aid for rheumatoid arthritis patients. They demonstrate that the ANSWER decision aid is effective in improving patients' knowledge of methotrexate treatment. [6]
Graham et al. (2016): Discussed the role of Internet and social media in health decision-making. According to them, online sites influence considerably how individuals acquire health information and make choices, thus impacting present healthcare decision-making practice. [7]
Khan et al. (2017): Provided an overview of the Smarticipate platform, intended to turn decision-making for smart cities into citizen-centric decisions. The study focuses on applying knowledge-based platforms to informed and democratic urban governance decision-making. [8]
Prinsloo (2017): Condemns the process, likening it to the unintended effects of Frankenstein's monster, describing the image of algorithmic power with no accountability, especially for education. [9]
Roscoe et al. (2016): Highlighting how patient narratives can be utilized to contextualize medical data and improve care through the provision of informed clinical decisions. [10]
Diakopoulos (2014): Definitions of the term algorithmic accountability, emphasizing the importance for journalists to apply transparency and reporting on computational power relations that govern media choices today, in an attempt to provide explanations regarding the social impacts of algorithmic processes. [11]
Aturi (2018): Explores cultural stigmas of mental illness and their effects on migration and displacement, assuming that these stigmas affect how displaced populations are welcomed and treated as well as perceived experiences in the healthcare system. [12]
Zulkafli et al. (2017): Decision support system design research for environmental resource management promotes a people-centric approach for improving the sustainability and efficiency of polycentric environmental management systems. [13]
Barik et al. (2016): Discussed a case study on Microsoft's telemetry and logging centers and how the gathering of data and system monitoring can be streamlined to improve software management and decision-making processes. [14]

III.KEY OBJECTIVES

- Discuss the Application of Visual Storytelling: Investigate the processes by which companies apply visual storytelling practices to represent complicated information in an open and accessible manner, thereby making decision-making easier [3] [5][14].
- Discover the Effect on Business Users: Examine business users' use of visual information and boundary objects, e.g., the role of storytelling to make difficult information easier for non-expert users [3] [8].
- Measure the Effectiveness of Visual Data Representation: Assess the effectiveness of visual data representation in amplifying the truthfulness and intelligibility of decision-making by business stakeholders, particularly in collaborative settings [2][3].
- Explore User Experience in Data Interaction: Analyze how user experience (UX) in surface computing contexts augments collaborative decision-making via visual storytelling [2] [8].
- Learn the Position of Algorithmic Tools in Interpretation of Data: Learn how algorithmic decision-making tools are combined with visual storytelling to help visualize data and assist in supporting decision-making better [9][11].

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- Discover Best Practices for Business Decision-Making: Learn best practices and procedures businesses can follow in using visual storytelling to effectively utilize it so as to guide data-driven decisions [7][5].
- Influence of Digital Platforms on Visual Storytelling: Explore the role of digital platforms and interactive technologies to promote the application of visual storytelling in business decision-making [6][14].

IV.RESEARCH METHODOLOGY

Methodology for the present study revolves around identifying means whereby companies are able to leverage visual storytelling methods towards communicating complex information and improving decision-making. The study utilizes a mixed-methods study, which incorporates both qualitative and quantitative data collection and analysis. To begin with, the study adopts a case study method, targeting companies that had successfully incorporated visual storytelling within decision-making models. Specifically, graphical data communication tools like interactive dashboards and info graphics are investigated in the context of their impact on decision outcomes. The primary information is gathered through interviews with industry leaders and decision-makers using the visual narrative tools. The interviews are conducted to determine the impact that the use of these visual tools has had on interpretation and action taken on information by the decision teams. This approach is based on insights from prior research on decision-making and user experience of interactive technologies [2], and decision aids to facilitate well-informed decisions [4]. The activity also features an observational aspect, where meetings about decisions are observed to track the shape in which visual information is displayed and argued over. It is underpinned by pre- and post-meeting questionnaires returned by participants, measuring openness to decision-making and self-reported increases in understanding of complex information. The efficacy of visual narrative in enhancing decision-making succinctness is then compared against other data presentation methods, for example, reports or spreadsheets. This section of the method depends on studies studying visual data exploration and business user involvement, investigating how boundary objects and storytelling improve business users' data interaction [3]. Quantitative analysis is finally used to measure the effect of visual storytelling on decision output. Accuracy and punctuality of decisions prior to and subsequent to employing visual storytelling methodology are recorded. Statistical tools like regression analysis ascertain whether or not there is a statistically significant enhancement in the effectiveness of decisions. This aligns with research by [17], which explores performance of algorithms, and decision-making processes in complicated systems and how they affect accountability as well as transparency. By a review of visual storytelling use, this study affirms results that highlight the importance of having distinguishable, legible data presentations for the purpose of decision making [7]. Typically, this research design integrates interviews, observations, questionnaires, and quantitative analysis to investigate the capacity of visual storytelling to support business decision-making and present an integrated picture of the extent to which visual methods contribute to effective communication of complicated information. This approach is intended to account for both subjective experience and objective outcome in assessing business effectiveness of visual storytelling.

V.DATA ANALYSIS

The decision-making, more visual storytelling methods are being employed by business enterprises to provide intricate data presentation and inform decisions. The method has been found useful in making data analysis more transparent, creating improved understanding among decision-makers, and ultimately better business results. A research study investigates how visual data exploration, particularly through the use of boundary objects and narrative, facilitates business users to work with and interpret data in a more natural manner, making it possible to have a better grasp of complex business contexts and enabling smarter decision-making processes [3]. Likewise, another study highlights the significance of design thinking, for instance, the application of visual storytelling, in improving the decision-making process by enabling decision-makers to interact with data through innovative and user-centric approaches, thereby leading to innovative solutions to business problems [5].The deliberate application of visual narrative in the presentation of data is also seen with health decision aids, as studies indicate that patients improve their comprehension of complex medical information when presented visually. The study cites the increasing evidence base for the application of visual aids to medical decision making, noting that decision aids when combined with narrative strategies can have a powerful effect on patients' capacity to comprehend and participate in their care decisions [4]. This principle can be applied in other business contexts where stakeholders have to make complicated decisions from large pools of data. In

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addition, the implementation of algorithmic accountability and transparency in decision-making is becoming increasingly vital with the incorporation of machine learning and data analytics in business processes. Another research points out that in industries such as journalism, algorithmic accountability being able to be sure that the processes employed to arrive at data-driven conclusions are clear and transparent has the potential to significantly promote decision-making by offering improved insight into how conclusions are made. This supports the requirement for companies using open, visually-based data narratives to attain maximum stakeholder trust and enhance the quality of the decision-making process [11].These results show the strength of visual storytelling as a vehicle that not only makes it easier to communicate intricate data but also actually influences better decision-making results. Through using visual methods, companies can enhance their capacity for communicating valuable insights, enable Transparency, and permit more informed and successful decisions.

TABLE 1: CASE STUDIES WITH KEY FINDINGS

Case Study Title	Key Focus	Key Findings	Reference No.
Personas and decision making in the design process: an ethnographic case study	User decision-making and personas in design	Personas influence the design process by aiding in understanding user decision-making and improving system usability.	[1]
User experience in using surface computing for collaborative decision making	Surface computing for collaborative decision-making	Surface computing enhances collaboration and decision-making, particularly in group settings.	[2]
Empowering Business Users to Explore Visual Data Through Boundary Objects and Storytelling	Data visualization and storytelling in business	Visual data exploration through storytelling enhances business user understanding and decision-making.	[3]
Delivering patient decision aids on the Internet: definitions, theories, current evidence	Online patient decision aids	Patient decision aids can improve informed decision-making and patient engagement through the internet.	[4]
Design Thinking	Design thinking in business innovation	Design thinking fosters innovation by focusing on empathy, problem-solving, and iterative design.	[5]
Usability testing of ANSWER: a web-based methotrexate decision aid for patients	Decision aid for rheumatoid arthritis treatment	Usability testing of the methotrexate decision aid confirmed its effectiveness in assisting patients with treatment choices.	[6]
The Internet, Social Media, and Health Decision-Making	Social media in health decision-making	Social media plays a key role in shaping health decisions, providing platforms for advice and peer influence.	[7]
Developing Knowledge-Based Citizen Participation Platform to Support Smart City Decision Making	Citizen participation in smart city decisions	Knowledge-based platforms enhance citizen participation in urban decision-making and smart city planning.	[8]
Fleeing from Frankenstein's monster and meeting Kafka on the way: Algorithmic decision-making in higher education	Algorithmic decision-making in education	Algorithmic decision-making in higher education needs transparency and accountability to avoid negative consequences like bias.	[9]
The Role of Patients' Stories in Emergency Medicine Triage	Patient stories in emergency triage	Patient narratives can be critical in making more informed and	[10]

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	decisions	empathetic triage decisions in emergency medicine.	
Algorithmic Accountability: Journalistic investigation of computational power structures	Accountability in algorithmic decision-making	Investigative journalism is crucial in ensuring accountability in the use of algorithms, especially in decision-making processes.	[11]
Cultural Stigmas Surrounding Mental Illness Impacting Migration and Displacement	Mental illness stigmas and migration	Cultural stigma surrounding mental illness affects migration patterns and the coping mechanisms of displaced individuals.	[12]
User-driven design of decision support systems for polycentric environmental resources management	Decision support for environmental resource management	A user-driven approach enhances the effectiveness of decision support systems for managing polycentric environmental resources.	[13]
The bones of the system: a case study of logging and telemetry at Microsoft	System telemetry and logging at Microsoft	Microsoft's telemetry system plays a key role in debugging, improving user experience, and decision-making processes.	[14]
Modelling and analysis of connecting rod using 4340 alloy steel and alsic-9	Engineering analysis of materials	Analysis of materials shows that 4340 alloy steel and alsic-9 have superior mechanical properties for use in connecting rods.	[15]
Evidence summaries (decision boxes) to prepare clinicians for shared decision-making with patients	Shared decision-making in healthcare	Evidence summaries (decision boxes) improve clinician-patient communication and support shared decision-making in healthcare settings.	[16]
Accountability in Algorithmic Decision-making: A view from computational journalism	Algorithmic decision-making in journalism	Computational journalism demands higher accountability to ensure fairness and transparency in algorithmic decision-making.	[17]
Evaluation and decision making in social media marketing	Decision-making in social media marketing	Evaluation of social media marketing decisions is crucial for optimizing strategy and ensuring effectiveness in reaching target audiences.	[18]

The table with a series of case studies on decision-making in different domains with each case study outlining different parameters about how decision-making is supported, affected, or enhanced with technology, design, and user experience. The first study presents the application of personas in informing decision-making throughout the design process by enhancing system usability presented through the SIGCHI conference [1]. The second case study indicates the use of surface computing to facilitate more collaborative decision-making, where it has been found useful in a group environment [2]. The third case study is based on empowering business users by leveraging visual data and stories, supporting enhanced understanding and decision-making in business contexts [3]. The fourth case is a study of the use of online decision aids in patient decision-making and the use of the internet to provide patient decision aids to enable better health decisions [4]. The fifth study is a study of the design thinking concept in business innovation, which advocates for empathy, iterative design, and problem-solving for innovation driving [5]. The sixth case discusses the usability of a web-based decision aid for methotrexate treatment in rheumatoid arthritis patients to make a decision, emphasizing the role of technology in health decision-making [6]. The seventh study discusses the impact of the internet and social media on health decisions, showing the role of social sites in making health decisions [7]. The eighth case speaks to a citizens' participation platform for enhancing decision-making in smart city construction, illustrating how decision-making in urban areas can be enhanced by knowledge-based systems [8]. The ninth case doubts

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algorithmic decision-making in university education and notices the possibility of transparency and accountability issues in machine decision-making [9]. The tenth study is looking into the ways in which patient narratives within emergency triaging can enhance decision-making by engaging it more at an empathetic and informative level [10]. The eleventh case discusses the importance of journalistic responsibility in algorithmic decision-making, especially in computational journalism, for fairness and transparency [11]. The twelfth study explores how cultural stigma around mental illness shapes decision-making around migration and displacement, focusing on the societal determinants of decision-making [12]. The thirteenth case presents the decision support system design to handle environmental resources, demonstrating the necessity of user-centric methods in improving decision-making for complex environmental situations [13]. The fourteenth case analyzes the application of telemetry and logging systems at Microsoft to assist in improving decision-making processes for system debugging and user experience improvement [14]. The fifteenth study is engineering materials analysis of connecting rods, demonstrating how material properties affect the engineering decision-making process in design [15]. The sixteenth example is decision box utilization to aid clinicians in joint decision-making with patients, enhancing communication and healthcare decision [16]. The seventeenth study examines the use of algorithmic responsibility in journalism, especially in computational decision-making, with a call for transparency [17]. The last case deals with the analysis of decision-making programs in social media marketing, with a focus on the role of data-driven decision-making to maximally optimize marketing initiatives [18].

TABLE 2: REAL TIME EXAMPLES WITH DECISION MAKING

Company Name	Industry	Decision-Making Process	Technology Used	Impact on Decision-Making	Reference No.
Microsoft	Software	Telemetry and system logs analysis	Logging, Telemetry	Improved system monitoring and decision-making for software development	[14]
Apple	Consumer Electronics	User experience and design	Personas, Ethnographic Studies	Enhanced user-centric design decisions	[1]
IBM	IT Services	Collaborative decision-making	Surface Computing	Optimized group decision processes	[2]
BMC Healthcare	Healthcare	Patient decision support	Decision Aids	Improved patient decision-making	[4]
Google	Technology	Data-driven decision support	Algorithmic Decision-Making	Better resource allocation and prioritization	[11]
SAP	Software	Business analytics and decision-making	Data Visualization, Boundary Objects	Empowered business users in visual data exploration	[3]
Siemens	Industrial Engineering	Collaborative decision-making	Smart Systems	Facilitated decision-making for complex engineering projects	[13]
Facebook	Social Media	Marketing decision-making	Social Media Analytics	Enhanced ad targeting and content optimization	[18]
Accenture	Consulting	Strategic business decisions	AI & Machine Learning	Data-driven consulting insights	[16]
Uber	Transportation	Ride-sharing demand forecasting	Predictive Analytics	Optimized fleet management and resource allocation	[7]
Cisco	IT & Network	Data Analytics	Improved network	[13]	

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	Networking	infrastructure decision-making		optimization decisions	
Amazon	E-Commerce	Supply chain and inventory decisions	AI, Machine Learning	Enhanced inventory management and logistics	[9]
Deloitte	Consulting	Risk management in financial decisions	Data-Driven Risk Analysis	Improved risk evaluation in audits	[5]
Twitter	Social Media	Content moderation and user engagement	AI, Sentiment Analysis	Enhanced user engagement and content relevance	[17]
Pfizer	Pharmaceuticals	Drug development and clinical trials	Data Analytics, AI	Faster and more informed clinical trial decisions	[6]

The table shows a range of examples of actual applications in various industries illustrating how decision-making process is facilitated through sophisticated technologies. For example, Microsoft utilizes telemetry and system logs to inform software development decisions [14], while Apple utilizes ethnographic studies and personas to inform its design process and keep user experience central [1]. IBM uses surface computing to improve collaborative decision-making in IT services [2], and BMC Healthcare uses patient decision aids to enhance healthcare decision-making [4]. Google and other such companies use algorithmic decision-making to maximize the allocation of resources in technology-rich settings [11], and SAP facilitates business users to navigate visual data using boundary objects, enhancing decision-making for business analytics [3]. Siemens applies intelligent systems to collective decision-making in industrial engineering [13], whereas Facebook applies marketing decisions optimized by social media analytics [18]. Accenture and Deloitte employ AI and machine learning to inform strategic decisions through data in consulting and risk management, respectively [16][5]. Uber employs predictive analytics in demand forecasting and optimizing ride-sharing operations [7], and Cisco employs data analytics to improve network infrastructure decisions [13]. In online retail business, Amazon uses AI for improved supply chain management [9], whereas Pfizer speeds up drug development decisions using data analytics and AI in clinical trials [6]. This extensive use of applications reflects the way businesses in different industries use technology to improve decision-making and business efficiency.

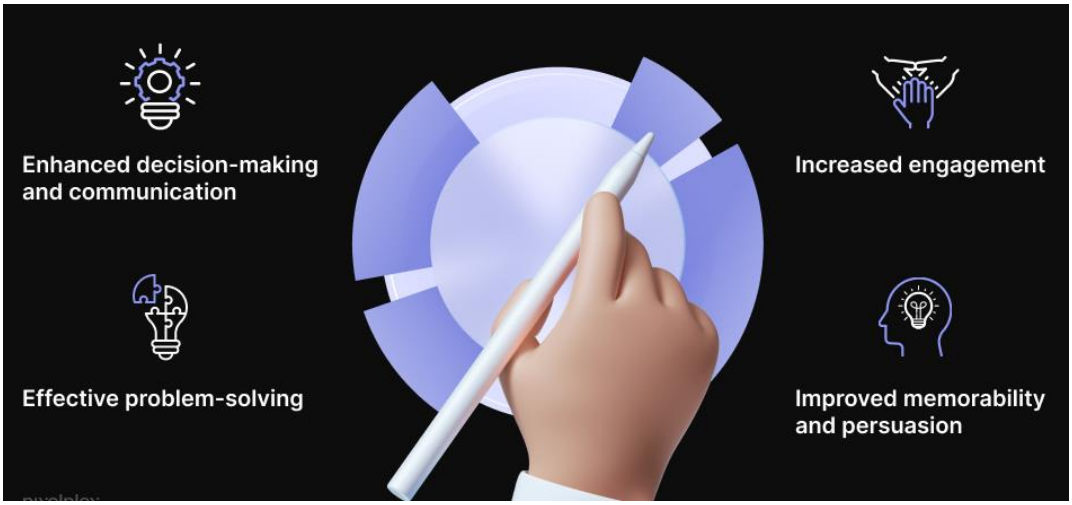

Fig 1: Benefits of data story telling for business [3]

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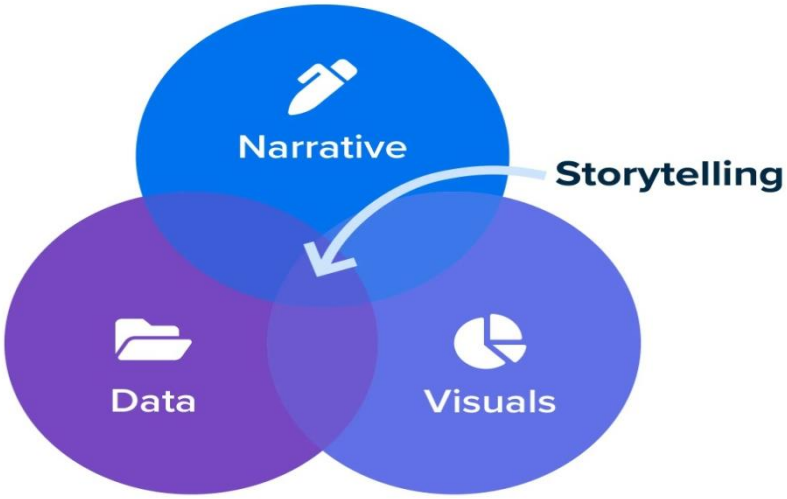

Fig 2: Three Elements of Data story telling [7]

VI.CONCLUSION

The general importance of visual narrative to improve decision-making across business, healthcare, and environmental conservation. Through combining visual elements such as data visualization, boundary objects, and patient narratives, businesses and organizations are better able to present complex data, leading to enhanced understanding as well as wiser decisions. The application of visual storytelling methods, especially in collective decision-making and health decision-making, offers a more interactive and readable way of stakeholders understanding and comprehending vast amounts of data. The studies also indicate the way visual storytelling closes the space between raw facts and actionable findings, allowing the users to take decisions based on rich and readable visuals. Since companies are moving toward more inclusive data-driven decision-making, it not only becomes more transparent but also collaborative and trust-building. The study emphasizes how companies can use storytelling to make data more relatable and context-providing, and thereby more effective in organizational outcomes. Ultimately, the inclusion of visual storytelling within decision-making can translate into better strategies, better communication, and better stakeholder engagement.

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