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Leveraging Data Analytics to Improve User Satisfaction for Key Personas: The Impact of Feedback Loops

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Abstract

A well-known method in human-computer interaction is the use of personas. Nevertheless, robust empirical study comparing persons to alternative approaches is lacking. Agile techniques' theoretical underpinnings are based on a number of important frameworks of theory. According to complexity theory, emergent features are present in complex systems, such as digital financial ecosystems. These are difficult for conventional linear algorithms to forecast. Agile recognises this complexity and supports continuous improvement cycles and flexibility to changing requirements. Lean thinking, which is drawn from manufacturing, places a higher priority on maximising customer value and removing waste. A promising market for IT-driven products, or Smart, Connected Products (SCPs), is made possible in this day and age by the rapid growth of Information and Communication Technology (ICT) (such as wireless sensor networks and cyber-physical systems). This also modifies the way that manufacturers and users interact during the product's process of development. Big data analysis allows businesses to base judgements on facts instead of gut feeling or internal knowledge that may be disguised. Business organisations gain from better informed choices and consistent results than ever before when knowledge workers and those making decisions have access to reliable sources of information that are constantly updated and accurate, as well as the analytical tools needed to make sense of it. The manner in which knowledge workers carry out their duties and the company's overall operations may be impacted by this method of decision support. Large data sets provided insights for analytical tools. They contribute to the expansion of the context and backgrounds that are available for rational, precise, and coherent decision-making. This study illustrates how Adaptive Case Management (ACM) systems' DSS component can be expanded through Big Data analysis. The article's authors explore the idea that businesses might use big data to enhance their operations by combining analytical tools, adaptable process management, and easy access to all the necessary data into a single application.

Keywords: Human Computer Interaction, Analytic Tools, Adaptive Case Management (ACM), Leveraging, Single Application, Big Data Analysis, User-Manufacturer Interaction, Agile Embraces, Management and Access.

I. INTRODUCTION

The process of imbuing portions of a user base, audience, or client base with personal traits is called persona development. In numerous fields, such as software development, marketing, product design, and content creation, personas are used to improve knowledge of customer groups [1]. Personas are

often created using user data gathered through online surveys, in-person interviews, and focus groups [1], while algorithm methods for data-driven persona generation are gaining popularity. This research focusses specifically on data-driven personas [1, 2], since modern approaches to persona building are represented by data-driven personas, and organisation are becoming more and more interested in using massive amounts of data for user comprehension [1, 2].

Personas, or which include data-driven personas, are typically displayed as a collection of persona profiles, also known as "descriptions" or "narratives." These persona profiles typically consist of one or two pages and include personal characteristics, behavioural patterns, objectives, skills, name, age, and a photo in order to portray the persona as a real individual. The purpose of using personas is to help in decision-making by offering insights into the requirements, wants, and aspirations of a specific target group in an empathic way (i.e., as another person). Put simply, by giving user data a human face, the usage of personas is thought to be cognitively engaging for user understanding [2, 3]. Persona research is extensive, and its proponents assert a number of advantages, chief among them being the ability to better focus attention on and emphasise user communication in order to enhance the crafting, design, and improvement processes in teams and organisation. [3].

A lot of previous study has been done on personas, and many of the benefits that have been mentioned mostly centre on maintaining the focus and stressing communications about users, audience members, or clients in order to improve development and design [3, 4]. Benefits include, but are not limited to, shared comprehension of the user, steer clear of preconceptions, and targeted communication. There isn't much quantitative research to support the claims made about personas' advantages in the Human-Computer Interaction (HCI) literature, despite some qualitative studies on their application [3, 4]. If there is, are personas really any more helpful than other techniques for deriving insights about users? Such study is necessary since personas—as concepts and as instruments—have also been criticised for having little utility and not adhering to a legitimate scientific methodology, raising doubts about whether their usage can even be justified. The problem is made worse by the fact that, [4], since personas were first introduced, a plethora of substitute online analytics services, applications, and metrics have appeared (e.g., Facebook Insights, Google Analytics, IBM Analytics), which businesses can utilise to comprehend user, audience, or customer segments. [4].

The Internet of Things (IoT), cloud computing, Cyber-Physical Systems (CPS), and other ICT innovations have created a potential market for information-dense products, or Smart, Connected Products (SCPs). These innovations have been made possible by the rapid growth and convergence of ICT in this period. In order to meet various social standards and generate value-added revenues, industrial businesses are working to develop what are known as Sensing, Smart, and Sustainable (S3) goods. In the meanwhile, it modifies the way that manufacturers and users communicate during the product development procedure. As an IT-driven product, SCP [3] can interact in a distributed setting with consumers (product-to-user communication) along with other SCPs [3, 4] (product-to-product communication) inside the ecosystem. Additionally, it is capable of gathering, processing, producing, and even learning on its own [4].

Agile emphasises candid dialogue and teamwork. Clients can be updated on planned features, advancements in development, and possible obstacles [4]. The bank and its clients benefit from a sense of partnerships and trust that is fostered by this transparency. The emergence of digital banking necessitates ongoing innovation to satisfy clients' constantly changing demands [4, 5]. Agile approaches offer a framework for producing solutions that are focused on the needs of the customer through quick development cycles, feedback responsive design, and an emphasis on the user experience [5]. Banks can establish a digital banking system that promotes customers happiness, loyalty, and ultimately a competitive advantage in the constantly changing financial landscape by adopting agile practices [5].

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1.1 Theoretical Foundations of Agile Approaches

The world of digital banking is a constantly shifting battlefield. The ever-changing expectations of customers necessitate constant adaptation and creativity [5]. Conventional development approaches fail to keep up since they are frequently inflexible and slow [5, 6]. Offer a strong substitute instead, which emphasises a customer-focused strategy that places an emphasis on adaptability, teamwork, and quick iteration. The Agile Manifesto serves as a successful basis. It describes the twelve guiding principles and four fundamental ideals of agile development. [6], Agile emphases people and relationships above procedures and tools, promoting collaboration as well as interaction between developers in particular, stakeholders, and—above all—clientele [7].

ACM enables complete visibility and control over every individual case, regardless of whether it is managed via an ad hoc, specified, or hybrid procedure [7, 8]. Knowledge workers such as operators and managers can exhibit creativity and innovation in their work within a constantly changing management environment [8], thereby facilitating managerial behaviour and generation of organisational knowledge. Under ACM, the function of a process operator has been renamed as a knowledge worker in order to differentiate it from that of a temporary process participant [8, 9]. Prof. Van der Aalst, also illustrates the distinctions between the two with the metaphor of the "blind surgeon." A participant in a traditional process has limited knowledge of the entire process, typically confined to the stage where the participant is expected to decide on a business choice. On the other hand, the knowledge worker [9] has a thorough understanding of all the details related to the case or procedure. Knowledge workers are a new class of specialised employees whose primary responsibility is to effectively use and share knowledge. Their primary responsibility is to search, exchange, combine, and utilise knowledge both inside and outside the organisation in order to generate and implement new ideas that help organisations align their approach with the increasingly rapidly shifting circumstances occurring in the business environment [9, 10]. An organisation operating according to the ACM idea shall be able to integrate its core competencies with the capacity to create and validate innovations on a daily basis [10].

The ability of large companies to restore the agility and responsiveness necessary to function and compete in a market that is changing quickly is the biggest advantage of implementing dynamic ACM-based business procedure management [10, 11]. ACM enables major businesses to manage the information they have on a daily basis by allowing them to assign tasks and duties to process operator without running the danger of losing control over the processes that are currently in place [12]:

- Proactive, creative experimentation based on regular, although little, modifications brought about by several process operators, which progressively builds up and disseminates knowledge; [13],
- Verification of current knowledge and removal of material that is out of date & no longer fulfils consumer needs or competitive difficulties [13, 14].

Organisation must, as a prerequisite, be able and prepared to make daily adjustments to their operating procedures and policies as well as to stay up to date on the real and most likely needs of their clientele [14]. A further development of traditional process-based management, adaptable management of business cases aims to integrate it with the idea of a learning organisational [15].

1.2 Fundamental Approach

The decision and process contexts will fluctuate during the decision-making process, much like the process of making choices itself, as cases are resolved [15]. From a commercial standpoint, DSS is frequently considered a component of ACM [15, 16]. Define the following essential DSS features:

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- creating socio-technical environments that assist users and let them participate in the system process of development both during the design and use phases; [17],
- fostering social creativity by offering the social and technical frameworks necessary for the sharing of ideas during the process of brainstorming co-creation sessions, discussions, debates, and other lively forms of cooperation [16];
- integrating design and art with self-realization process;
- Applying a meta-analysis to prior research to compare, combine, synthesise, summarise the information, specify, and generalise findings.

According to a common definition, ACM is,

> *'An cooperative process of planning, facilitating, advocating, and assessing alternatives and services to fulfil a person's comprehensive requirements via communication and the resources at hand in order to provide high-quality, reasonably priced results [16].*

According to this description, an ACM platform includes a decision support system (see Figure 1).
One of the pioneers of the DSS idea, Clyde Holsapple, observed that,

> *'…The architecture of DSS serves as an ontology that provides a common vocabulary for the creation, debate, and assessment of DSS, not defining what DSS is.*

These realisations lead us to the concept of DSS architecture that follows:

> *'A DSS architecture is a broad framework that delineates the fundamental components of a DSS and their interconnectedness.*

Many commercial firms utilising ACM systems requested the authors do comprehensive research, which reveals that most of these systems have similar business goals for decision support and are connected to the component arrangement in Figure 2:

- Helping an informed employee make the best decision possible in each circumstance,
- To settle cases with more accuracy and speed, [18],
- To apply decision help with more agility by following business conventions.

The process of control in current systems that support decisions is carried out by Meta knowledge systems (such as ontologies, norms, and axioms). [17, 18].

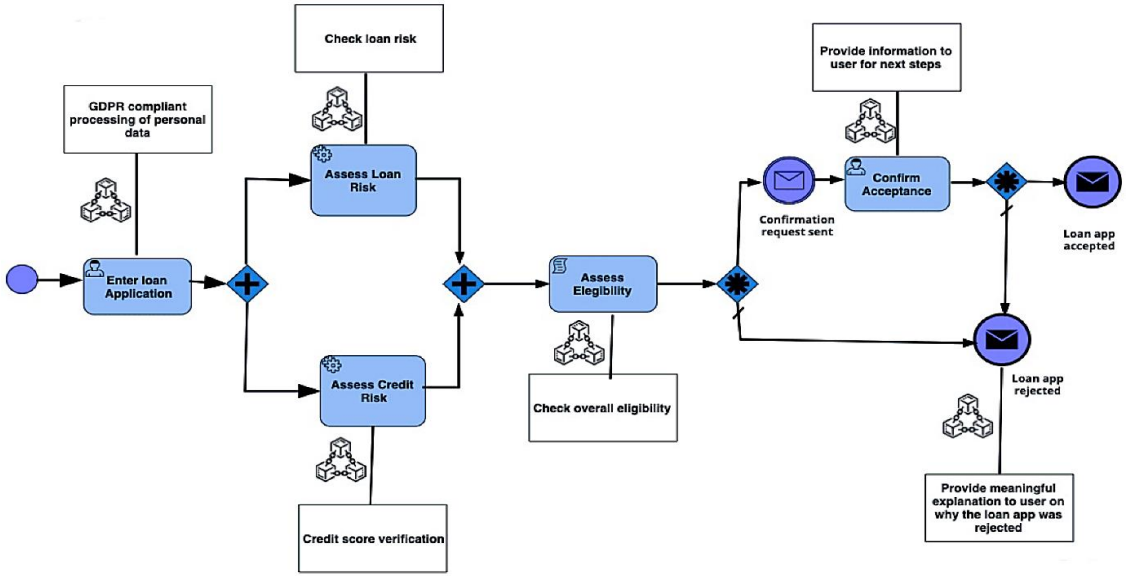

Fig. 1 Comparing the conventional BPM approach with modern ACM. [18]

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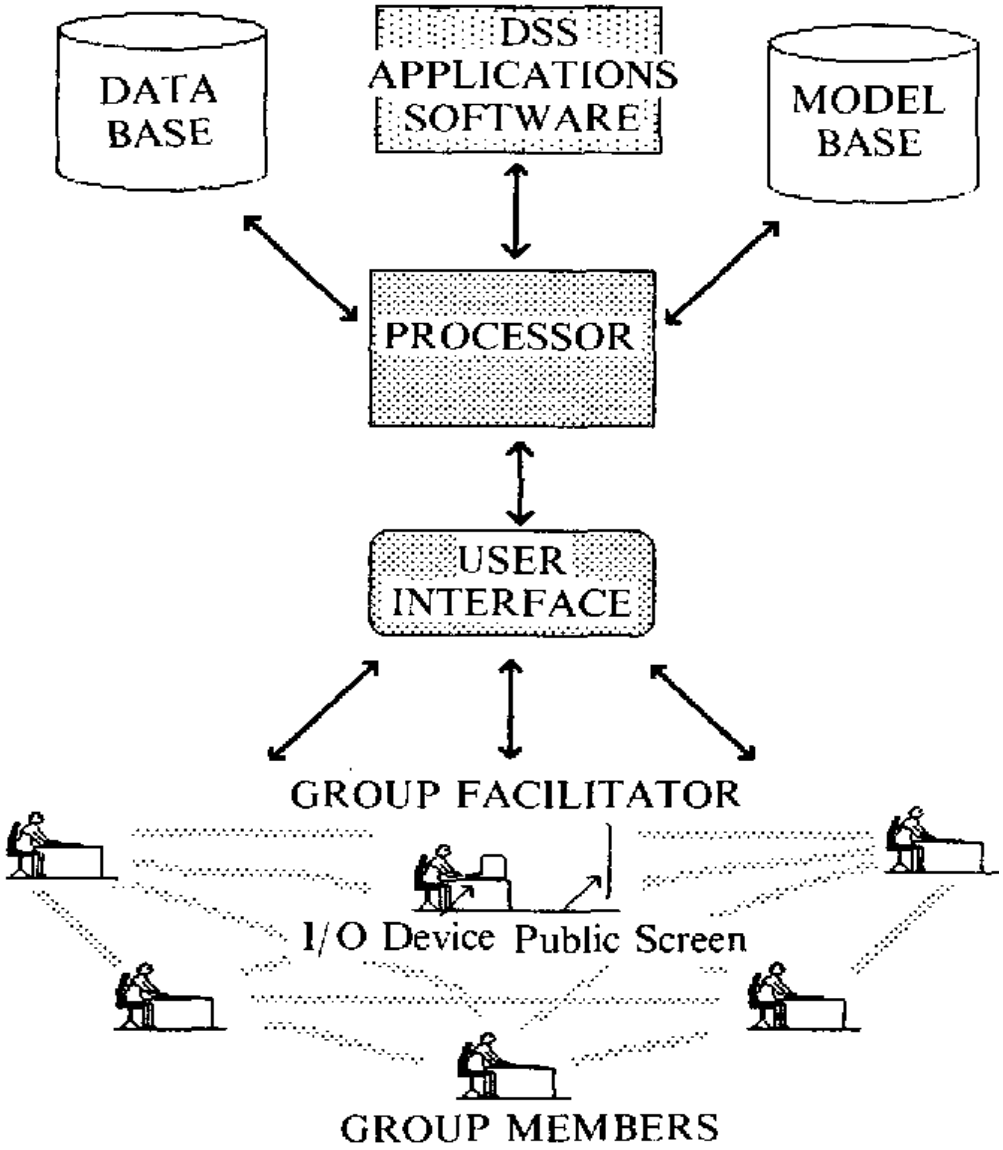

Fig. 2 An illustration of the connections between ACM & DSS. [19]

Knowledge development follows a double loop pattern that propels the formation of a meta-knowledge subsystem. One feature of adaptive learning is its fundamental feedback loop, which consists of identifying and correcting violations from the operational standards. The secondary loop, which is a component of "generative learning," is in charge of bringing creative changes to the operational standards [19, 20].

Similarly, in order to expand the use of tacit knowledge—that is, staff members' specific experiences and areas of expertise—in case processing, ACM system consumers will amass corporate knowledge through the use of IT tools and social dynamics. Any DSS project must carefully examine how business owners interact with one another. Managers are viewed as active, purpose agents rather than as atoms, as stated by Adam Perry [19]. The Decision-Making Network (DMN) can be visualised, and its internal workings can be examined when the organisation addresses a decision situation. [19].

1.3 Expanding the DSS paradigm through ACM adaptation of big data analysis

Both organised and unorganised information—that is, information found in both database and documents—are used in big data analysis, and one of the knowledge sources may be the ACM system.

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Big data analytics may also be used by adaptive case management systems. Numerous document-intensive corporate procedures are automated by ACM systems, & big data analytics may enhance the intelligence of these processes and the efficacy of decisions made [19, 20]. There are two possible intersections where big data along with ACM can benefit the organization's operations: In addition to being a platform for automation of company processes, the ACM system has the potential to be a source of data for applications that use big data and a customer of analytics based on big data [20].

1.4 Feedback loops and collaborative efforts

The practice of applying lessons learnt from various projects or activities to the same, related, or unrelated activities as a strategy with an end goal of improving performance is known as a feedback loop [20, 21]. Agile methodologies, which break work tasks into cycle with frequent execution and ongoing feedback loops, frequently use loops of feedback. The agile team can respond swiftly to changes because to the feedback loops, which also make it possible to implement lessons discovered throughout the project. Many businesses have been leveraging lessons learnt from prior experiences to inform the development and design of new goods, ensuring that the success elements are used again and that the same mistakes are not again [20]. This might be accomplished by holding frequent, brief meetings in which the members of the agile team discuss any roadblocks and follow up on accomplishments and future plans [21].

II. METHOD

- **Methods of qualitative research:** In qualitative research, one of the basic techniques is the case study method. Case studies are characterised as examinations of one or more discrete entities (individuals, groups, occasions, etc.) that have intricated internal relationships with external variables. These analyses consider the historical, social, political, and/or financial circumstances of the cases in question as well as data from a range of sources, including documents, conversations, observations, and artefacts.

Selecting a case method of study as an approach to research necessitates using appropriate and accurate research instruments together with clearly specified protocols [21]. The following phases comprise the research procedure:

(1) Specifying the research issue;
(2) Selection of cases;
(3) Preparation of the tools for data collection;
(4) Data collection;
(5) Qualitative data analysis;
(6) Conclusions.

III. RESULT

3.1 Organisation and areas of concern

The study's organisations that participated are emblematic of the healthcare industry. Every firm has integrated the ACM methodology into its daily operations [22, 23]. These are the organisations:

- Katowice Municipal Hospital;
- Sosnowiec Municipal Hospital.

3.2 The studies' purview

The study' objective was to provide an overview of the companies' growth, with a focus on the advantages and commercial difficulties associated with adopting ACM and changing the organisation' [23] management of information strategies. The study's findings have demonstrated a number of improvements and developments in the field of information management.

***Case 1* – keeping an eye on hospital refrigeration storage equipment's operational circumstances: An explanation of the issue.** One important feature of the decision support system currently being

constructed for the neonatal pathological departments of a research hospital in Poland is the ability to monitor the operational conditions of the refrigeration storage equipment in the scenario under consideration [23].

- **The data sources and research techniques:** In addition to reviewing papers (internal documents, vendor fact sheets, software specifications, and [21]), the study employed the observation approach. The selection of case studies and papers was determined by the materials' subject-matter value.
- **Analysis of qualitative data:** Temperature is measured using probes equipped with digitally sensors for temperature, and the data is provided by measurement transducers that S4BI sp. z o.o. created and installed. The probes have a precision of 0.1*C & an accuracy of ± 0.5*C, allowing them to monitor temperatures between -55*C and 125*C.

***Case 2* – Predictive upkeep and analysis: An explanation of the issue.** At one of the biggest research hospitals in Poland, the forecasting maintenance technique was used for defining (predict) the service life of the X-ray tubes used in Computed Tomography (CT) scanners [21, 24]. This issue is being discussed for two reasons: first, the extremely high cost of X-ray tubes; and second, the rule forcing hospital to go through a public a contract, or the public purchasing process when the purchase reaches a specific threshold.

- **Information sources:** The data consists of daily DICOM test images taken prior to the exams. Typically, these images are CT scans of manikins that have predetermined characteristics, such as size, shape, and material [25, 26]. Every image has a header file additional to the scan, which includes details about the picture capture date [27], the scanner's parameters and settings, and photograph-specific data (such the area each pixel represents or the separation between images) [28, 29].
- **Processing models:** The system uses the test images to calculate the signal-to-noise, grey level contrast, and edge blur ratios once a manikin-based test is finished. The MMC systems receives ratios from the camera and the data from the picture header file. The system also stores data on failure incidences and checks/inspections [29, 30]. Because there is a lot of data in this instance, optimal analysis necessitates taking advantage of tools and techniques unique to big information processing solutions.

IV. DISCUSSION

***Case 1*-** The study's scenario illustrates unequivocally how ACM platforms allow firms to change their operating strategies in addition to streamlining their IT infrastructure-related tasks. An organisation can continue to streamline its core processes with the use of ACM and analysis of big data [29, 30], especially by improving accuracy and safeguarding crucial operational areas. Better outcomes in knowledge administration and assistance with decisions are explained by ACM systems [30].

***Case 2*-** Businesses that follow the ACM principles integrate the ability to generate and evaluate innovations on a daily basis with essential business functions, hence reducing the risks and difficulties associated with business process optimising. Because process operators can alter processes dynamically, the organization's whole business management system is open to fresh, innovative ideas from a wide range of staff members, [28, 29], without running the danger of chaos from unchecked process changes.

V. CONCLUSION

The new ACM-related business model seems to be more efficient and capable of meeting the majority of modern corporate needs, such as collaboration and support for important decisions. Making decision based on evidence rather than gut feeling or internal knowledge can be improved by enhancing the DSS model provided by ACM by including big data analysis. Users of ACM and knowledge workers benefit

from better decisions and consistent results than ever before when they have access to reliable sources of information that are constantly updated and accurate, as well as the analytical tools needed to make sense of it. The manner in which employees with knowledge carry out their duties and the company's overall operations may be impacted by this method of decision supporting. Agile encourages open communication with clients, providing them with updates on planned features, advancements in development, and possible obstacles. This openness fosters a sense of cooperation and trust. Agile makes it easier to react quickly to concerns and feedback from customers. Problems are found and fixed quickly, indicating that customers' opinions are respected and increasing satisfaction.

The current ACM platform is developing quickly. Because of the system's process orientation, it provides additional opportunities to create institutional, systemic links between knowledge management, decision support, and a company's primary business operations. The incapacity of process leaders, executive and line managers, to promptly respond to swift alterations in the company landscape is progressively undermining its flexibility. Large data sets provided insights for analytical tools. They contribute to the expansion of the context and backgrounds that are available for rational, precise, and coherent decision-making. They are logically expanding the DSS component of the ACM system. Through the integration of analytical instruments, adaptable process control, and comprehensive information availability into a unified platform, enterprises can leverage big data to enhance their operational efficiency. While big data analytics is still relatively new, the first initiatives' outcomes have been very promising. The early initiatives were entirely motivated by business needs and concentrated on finding innovative methods to boost sales and cut expenses. Time-to-value acceleration has been deemed essential for company.

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