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ARTIFACT-BASED APPROACH TO IMPROVE INTERNAL PROCESS QUALITY USING INTERACTION DESIGN PRINCIPLES

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Abstract: *In this paper we focus on improving the performance of internal processes, using interaction design principles, starting from a case report in the pharmaceutical industry. The contribution of the paper is twofold. To researchers, it introduces a conceptual framework that integrates the business artifact-oriented approach with interaction design principles into a structure that can be used to drive process improvement initiatives. To managerial audience, a case report is described, based on the conceptual framework, as an example of how to manage a process improvement initiative, from problem statement to solution design.*
Key words: *process improvement, business artifacts, interaction design, cognitive load, user motivation*

1. INTRODUCTION

Many organizations care for the usability of the products or services they design and build for their customers. However, when it comes to software platforms supporting internal processes, many employees report disappointing levels of user experience with such systems [1]. Often designed taking into account (just) functionality, usability of such systems is not necessarily a matter of concern to management. This may be due to a common view that, as long as employees can get their work done, enjoying using a system is not relevant [1].

Within an organization, failing to address staff UX related to internal tools can lead to lack of engagement, inefficiency, or need for additional training, i.e. significant potential hidden costs. Employees are the most valued assets of an organization; it is therefore crucial to ensure that they enjoy interacting with the organization's internal software platforms or tools [2].

Interaction design can be applied to any business activities; it refers to creating a meaningful relationship between a human and a (software) system [3]. It covers the fields of human factors in software systems, human-computer interface design, psychology of users, aesthetics, or motivational mechanisms.

In this paper we focus on improving the performance of internal processes, using interaction design principles, starting from a case report in the pharmaceutical industry. The organization, performing medicinal product analyses for its customers, needs to improve its analysis report generation process so that it overcomes specific human error issues. The case report result is the design of an internal software platform to effectively manage the analysis reports.

The contribution of the paper is twofold. To researchers, it introduces a conceptual framework that integrates the business artifact-oriented approach with interaction design principles into a structure that can be used to drive process improvement initiatives. To managerial audience, a case report is described, as an example of how to manage a process improvement initiative, from problem statement to solution design.

The rest of the paper is structured as follows. Section 2 discusses the theoretical background: the business artifact approach, the interaction design principles, the research design, and the research framework. Section 3 presents the case report, and Section 4 discusses the results.

2. THEORETICAL BACKGROUND

2.1. Business artifacts

Organizations need to manage all the information related to what they produce, be it products or services. One effective mechanism to record this information is via business artifacts. They represent the context of the business, while the behaviour of the business is manifested in the operations it performs [4]. In the artifact-centric process modelling, equal emphasis is given to contextual and behavioural aspects, and each operation is defined in relation to the business artifact(s) on which it operates [5]. Business artifacts correspond to key business-relevant objects, their lifecycles, and how/when tasks are invoked on them [6].

Traditional business process modeling approaches pay less attention to data aspects of business processes, as they focus on activities [7]; this may reflect as well on process improvement endeavours. Communication between business operations stakeholders is reported to be poorer in traditional activity-flow based approaches than in an artifact-based approach [6].

2.2. Interaction design principles

As the scientific literature reveals, system design issues are caused by differences between designers' and users' concepts of the system [8], this being a core concern in designing a proper user experience [9]. To predict and drive user behaviour, designers use their own experience and knowledge about the system, and a shared understanding of its underlying business objects may close the aforementioned perception gap. A process can thus be redesigned by emphasizing its business context (i.e. employing business artifacts, upon a shared understanding between users and designers should exist) and by redesigning its activities with respect to how the business artifact evolves.

Contributors to the usability of a tool that automates a process are the ease of understanding it (its data aspects) and the ease of interacting with it (evolving its data). Using interaction design principles when designing user activities (tasks) that move an artifact to its next lifecycle stage can therefore greatly impact the overall user experience. These design principles consist of general heuristics (interaction design principles), assessing and addressing task cognitive load and cognitive barriers, and motivation mechanisms. We'll briefly describe them in this subsection.

Interaction design heuristics.

The interaction design literature reports many usability / user experience / interaction design guidelines or heuristics, the best known being [10] (see Table 1). Nielsen's design principles are recognized not only in the software design community, but also in healthcare as standard of heuristic evaluation [11]. Heuristics are systematically designed procedures that lead to near-optimal solutions; they cannot guarantee, however, the achievement of an optimal design solution. These 10 design principles are listed below.

Visibility of system status: The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Match between system and the real world: The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

User control and freedom : Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Consistency and standards: Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions

Error prevention: Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

Recognition rather than recall: Minimize the user's memory load by making elements, actions, and options visible. The user should not have to remember information from one part of the interface to another. Information required to use the design (e.g. field labels or menu items) should be visible or easily retrievable when needed.

Flexibility and efficiency of use: Shortcuts, hidden from novice users, may speed up the interaction for the expert user such that the design can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Aesthetic and minimalist design: Interfaces should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Help users recognize, diagnose, and recover from errors: Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Help and documentation: It’s best if the system doesn’t need any additional explanation. However, it may be necessary to provide documentation to help users understand how to complete their tasks.

Cognitive load.

People understand and use information differently, according to their technical background, biases, mental states, or work environment. Still, most of them have a universal mechanism to process new information [12], determined by their working memory (with a limited capacity) and long-term memory (potentially unlimited) [13]. This way of processing information, i.e. the cognitive load, consists of three types – intrinsic, extraneous, and germane (schema-related). The intrinsic cognitive load is the level of difficulty associated with a specific instructional topic. The extraneous cognitive load is generated by the way information is presented to users and is determined by the (process) interface design. The germane cognitive load is the processing, construction and automation of schemas. The extraneous cognitive load complicates learning; as such, interaction designers should aim to reduce it [13], whilst promoting the germane cognitive load.

Motivation mechanisms.

Motivation makes people do particular actions giving specific reasons for these actions or needs. Thus, including motivation mechanisms in repetitive and sometimes dull tasks can increase figures related to successful task results. Gamification (serious games) means applying game mechanics into the non-game environment [14]. It can increase user engagement, as people enjoy the interactive process full of fun, challenges, and competitive spirit similar to games. Fun and excitement may determine users to spend more time on the system they interact with. Technically, gamification leads to improving KPIs of a process. These KPIs are important in defining the „game“ rules and in communicating to users what the interaction goals are.

Common gamification elements are scoring, leaderboards, ranks, rewards, incentives or journeys. Gamification design principles include goals and challenges, personalization, or social engagement [15].

2.3. Research design

The process improvement solution presented in this research was developed by following a specific Design Science Research (DSR) Methodology for information systems research [16], addressing: (a) “What is the problem?”, (b) “How should the problem be solved?”, (c) “Creating a DSR artifact that solves the problem”, (d) “Demonstration of the use of the DSR artifact”, and (e) “How well does the DSR artifact work?”. We addressed topic (a) in the introduction by describing the problem, i.e. the need to improve the analysis report development process. Topic (b) is discussed in the next subsection by presenting the research framework. We discuss topics (c) and (d) in Section 3, and topic (e) in Section 4.

2.4. Research framework

Starting from the problem described in the introductory section and drawing on the theoretical aspects described above, we constructed a conceptual framework which is shown in Figure 1 below.

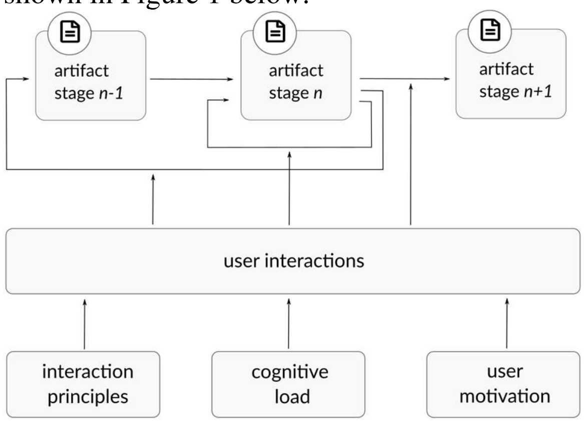

Fig. 1. The conceptual framework

The ground idea of the conceptual framework is that the quality of a process is determined by both its activities and its data aspects. The business-relevant entities that hold the process data evolve as they progress through the operations of the process, and how they progress is determined by the quality of the user interactions. As such, improving these interactions may improve the process performance. User interactions can be improved by following interaction design heuristics, by minimizing the extraneous while supporting the schema-related cognitive load, and by employing user motivation.

The contribution of the paper is twofold: the conceptual framework adds up to the theory of process improvement in service sector, while its instantiation – the case report presented in the next section – provides insights to practitioners on how an information system concept can be designed to support a process improvement endeavour.

To the best of our knowledge, no similar approaches can be found in the scientific literature. However, in order not to miss any related work, we queried the main scientific databases using 'business artifacts' and 'interaction design' -related keywords. In the closest match, [7], the authors propose an approach to build user interface flow models to help visualize artifact-centric processes and assist the creation of user interfaces. To create the model, the framework considers the relations among business processes, user interfaces, and user roles in an artifact-centric process model. The paper highlights the role of artifact-centric (operational) business process modelling in attaining a natural modularity and componentization of business operations. It is different, however, as it does not use interaction design principles to build the user interfaces.

3. THE CASE REPORT

3.1. Context

The business need of improving the analysis report generation process is twofold. On one hand, there is a commercial opportunity to carry out and deliver more analysis reports (>240 per month, up from 200). On the other hand, the percent of analysis reports stuck in the process for various reasons, such as procedural mistakes, delays, staff shortage or hardware errors, is too high, according to the management.

The organization performs medicinal product analyses for customers all over the European Union, attaching an analysis certificate for each tested product. The certificates are issued based on analysis reports that contain essential quality characteristics of the medicinal product such as aspect, dissolution time, active ingredient dose, chemically related impurities, disaggregation, dye identification, dimensions, water content, etc.

The current problem the organization faces is managing the employees of the quality control laboratory. Due to increased workload, training and instruction are neglected. The employees need therefore to adapt "on the fly" to the rules and the way of working. The most encountered problem that leads to poor analysis reports is the lack of experience of the new employees. These are usually fresh graduates that would normally need a 3 to 6 months training session. The training time is often shortened to 1-3 months due to the workload; the lack of mentors able to train new recruits and lack of personnel also add up. These factors lead to many stuck analyses (caused by human mistakes), which currently jeopardize the effort to deliver the desired target number of analysis reports per month.

Human errors in the analysis setup and in the result interpretation stages are the main contributors to stuck / delayed or compromised anaysis results. Underperforming equipment also round up these figures, but not to the same extent. These human errors consist of failures in following procedures, erroneous dillutions, mixing up product series, incorrect equipment settings, mistakes in filling spreadsheets, mistakes in interpreting results, etc.

To respond to the aforementioned market opportunity, the management team needs to improve the analysis report generation process so that it overcomes these human error issues.

3.2. Performance targets

The management's target value regarding the overall laboratory performance is 240 analyses per month (up from approx. 200). The target value should be gradually reached within one year. The main vectors in this respect are the minimization of human errors and the acceleration of filling the report. For this reason, the following quality characteristics were employed within this case report to measure the performance of the analysis report generation process: average time per analysis (hours), number of finished analyses per month, percent of non-compliant analyses, percent of non-compliant analyses due to human error, average investigation time for blocked analyses (days), average time for filling an analysis report (minutes).

On average, in the last 12 months before starting the present improvement initiative, the average finished analyses per month number was 202, the percent of non-compliant analyses was 16,8%, the percent of non-compliant analyses due to human error was 63,1%, the average investigation time for blocked analyses was 8,1, the average time per analysis was 2,4 days, and the average time for filling an analysis report was approx. 90 minutes.

The performance target values desired by the management are <2% for non-compliant analyses, and human-error in non-compliant analyses <25%. To reach the overall target value of 240 analyses per month, the team in charge with improving the process also investigated how to reduce the average time per analysis, by decreasing the initial (setup & documentation) and the report filling time, which were reported to count for roughly 25% of the overall analysis time. In addition to that, poor communication between staff has been determined as the main cause for the long investigation time for blocked analyses.

To solve the performance issues, the team decided to implement a software platform to manage the information related to an analysis (the business artifacts). They decided to focus on how these artifacts should evolve, and reengineer the interactions of the staff with the process so that they support the artifact lifecycle.

3.3. The analysis report artifact

To be able to properly design the software platform, a proper lifecycle of the business artifacts had to be designed, and clear roles (user types) and user types had to be specified.

The roles are as follows: the analyst (running the analysis), the requester (external to the lab), the supervisor (assisting the analyst, checking and validating analysis results). The old process ran as follows: (1) the analyst receives an empty analysis report and the product to be tested, (2) the analyst sets up the analysis (i.e. documentation, analysis plan, approval to proceed for novice staff), (3) the analyst runs the analysis, (4) the analyst interprets the results, fills the report and documents the analysis methodology, (5) the analyst hands the report to the supervisor, (6) the supervisor checks the report and makes necessary corrections / completions, (7) the supervisor submits the report which is once again checked for formal completeness. Each step was assessed for efficiency and time-related issues were found in tasks (2), (4), (5), (6) and (7).

The business artifacts were then defined. The most important artifact is obviously the analysis report, whose redesigned lifecycle is presented in Figure 2. A secondary artifact does exist – the analysis report template, which defines the input and output data, methodology, and guidelines for each distinct analysis type. The template collection should be managed by the supervisors (the software platform should allow adding, removing and editing templates).

The user interactions with the artifact are also shown in Figure 2 and are the basis for designing the software platform user interface, which will be discussed below

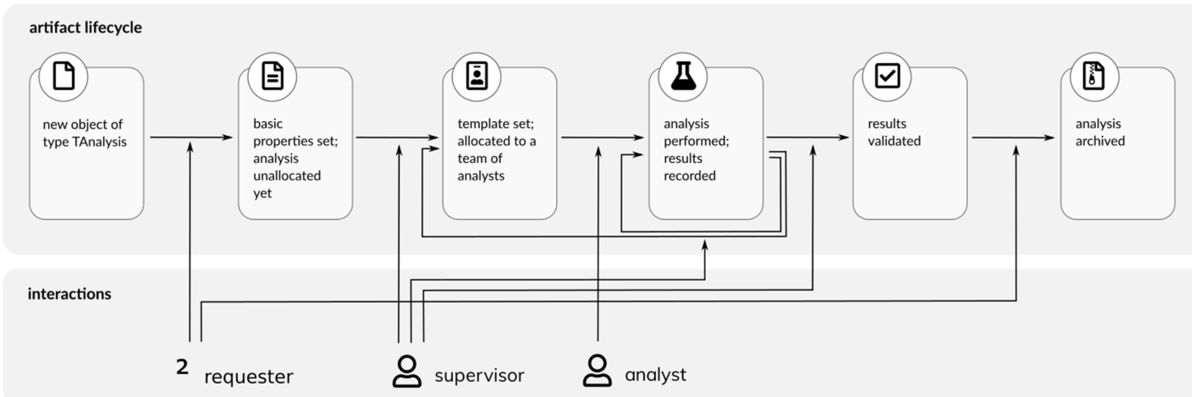

Fig. 2. The analysis report artifact lifecycle

3.4. The report management platform UI

A software prototype to implement the artifact lifecycle and the interactions described in Figure 2 was then designed and built. Three key UI mockups, used to validate the concept, are discussed below. Two of them belong to supervisor and one to analyst use cases.

Analysing a medical product means performing several tests to determine its compliance to quality specifications, like aspect, dissolution time or impurities. To speed up the analysis, these tests can be performed simultaneously. In this regard, an important interaction of the supervisor with an artifact model instantiation (i.e. an analysis) is to dispatch the individual tests to be made to a team of analysts. The supervisor dashboard (Figure 3) shows all artifacts (analyses) in a specific state, like 'unallocated to analysts', 'under progress', 'analyses performed', 'results validated', or 'archived'. A special state is 'in progress', where an analyst can be allocated to each test. In the real world, analysts (employees) may not complete a test, may have an unexpected day off etc., so allocating the analysis team should be flexible. Some tests may be ready before others, so the supervisor can immediately validate them. There's also an overall validation of the test results, once they are all ready, as the results are many times correlated.

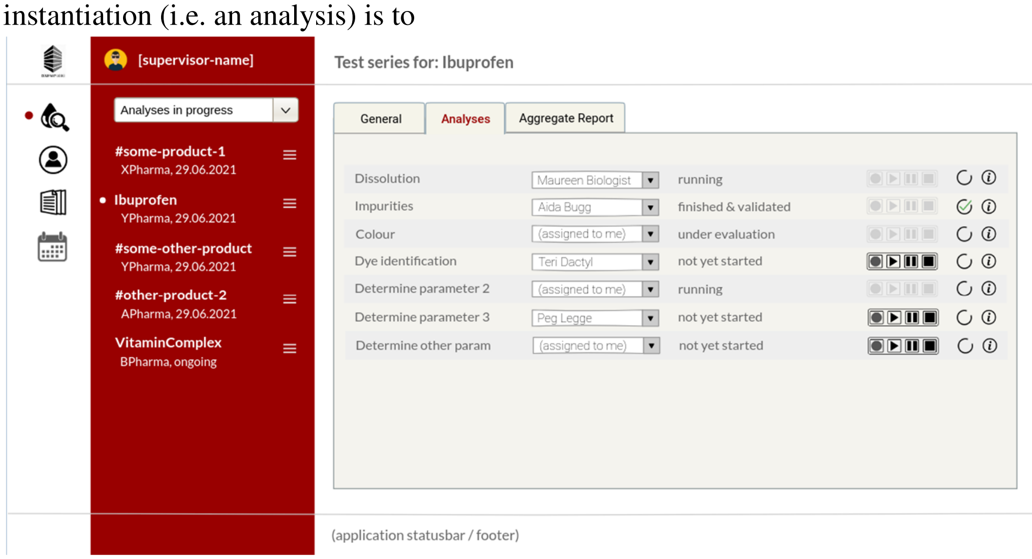

Fig. 3. The supervisor dashboard mockup

The supervisor has also a helper screen showing the calendar of all planned analyses. This helps him/her understand the workload of each team member (a critical factor, in the current setup, for delays and human errors). The mockup is presented in Figure 4.

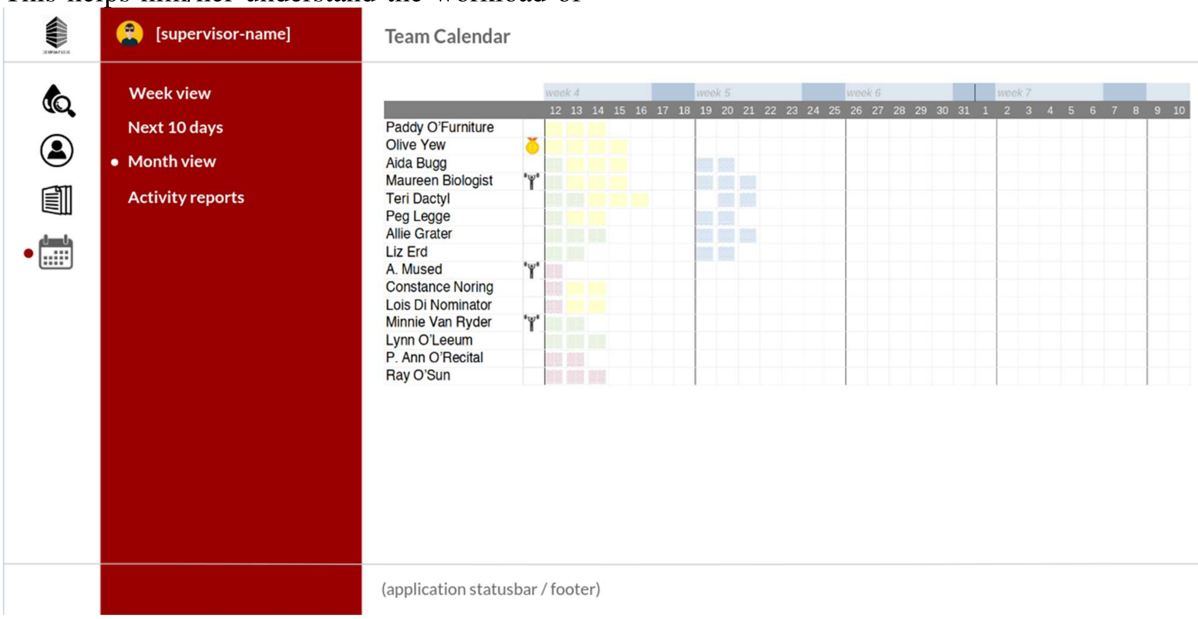

Fig. 4. The analysis calendar

The analyst dashboard is shown in Figure 5. The analyst sees all the tests allocated to him. For each test, he sees the methodology (based on a template selected by the supervisor in the first artifact lifecycle step) and hints (also selected by the supervisor when setting up the analysis). An important remark here is that the platform enables running all tests simultaneously, and – once a test is ready – the analyst can directly submit it for validation. There's no need to write a report any more, as all the necessary info (e.g. obtained values, methodology) is already there.

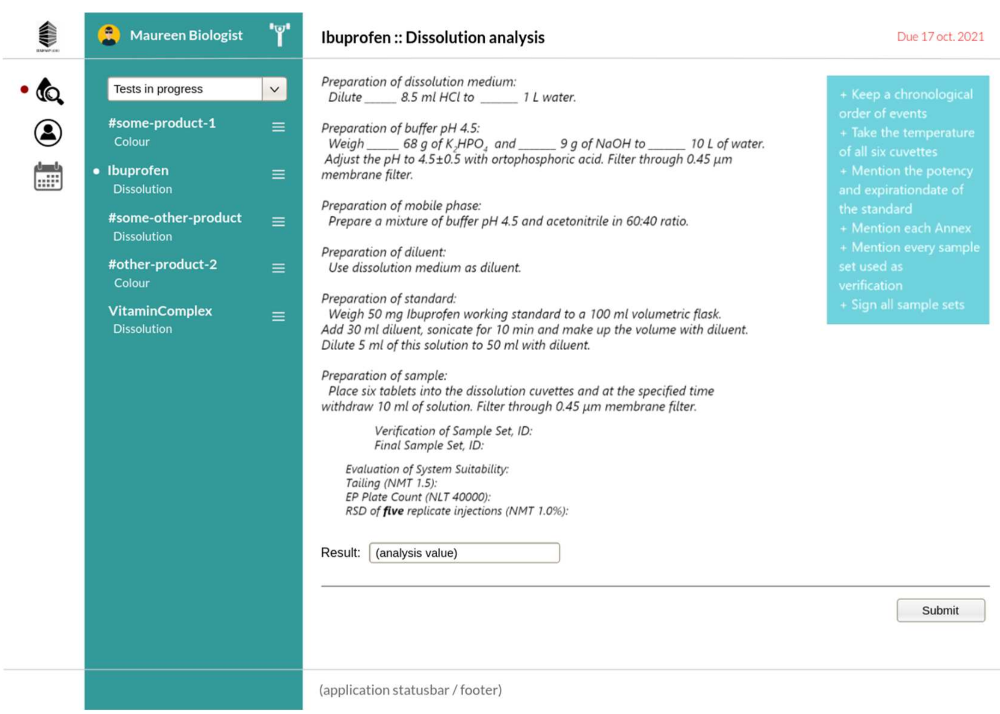

Fig. 5. The analyst dashboard

We'll now briefly explain how we applied the interaction design principles to the mockups above. We'll first discuss Nielsen's interaction design heuristics.

Visibility of system status is clearly revealed by each role's dashboard. The supervisor sees how tests progress in almost real time, and can always see the analyses history using the combo on the red pane. He also sees the analyses calendar. The analyst views all "his" tests, both under execution and submitted. Match between system and the real world became an intrinsic characteristic of the platform, as it actually mirrors the "real" artifact life-cycle. User control and freedom is reflected in the flexibility of managing tests. A note here on undo/redo features: once submitted, an analyst cannot recall a test, as this would break the supervisor's activity flow. Or, once allocated, it would be unethical for a supervisor to reallocate the test to other analyst, as the "initial" one may have already started it. The mockups are designed to be consistent by using the same layout and icon set. Error prevention is done via test templates and guidelines. Recognition is implemented by having a dashboard for each role, so that current tasks and associated data are instantly visible. Flexibility has already been discussed. The mockups focus on the user's current task, thus the design is minimalist; aesthetics is obtained via a uniform color scheme, fonts and symbols. The panels that group information were designed to contribute to the screen's visual balance. By using templates and validaton, recovering from errors is obsolete, as the interface prevents users to "get" in an error state. Technical errors related to analysis results cannot, however, be prevented via the platform. Contextual help and documentation is built in – the user gets the exact guidelines he needs for the task he's working on.

The main decisions related to design were however influenced by the goal of minimizing extraneous cognitive load and promoting the germane cognitive load. We achieved this by implementing the test template mechanism. This greatly supports the learning process of a new analyst. The supervisor can customize the displayed guidelines for each individual test, so he can add more general ones for a newbie, or can hide the "obvious" ones for a skilled analyst.

User motivation has been implemented via a simple badge mechanism. To minimize human error (the "game metric"), those analysts providing the most accurate results (i.e. no rework needed) get badges.

These are gamification elements in the form of rewards that symbolize the achievements of learners; the top analysts (symbol:) are those whose result accuracy is over 95% in the last month. Among them, the "champion" (symbol:) is highlighted. Everybody in the system sees the badges: the supervisor sees them e.g. in the calendar view, while each user sees his badge right in the dashboard, next to his username.

4. DISCUSSION

Relevance to the managerial audience. The problem addressed in this paper is relevant to the managerial environment as it addresses issues of interaction of people (employees, in our case) and organizations. Organizations many times invest in system usability and user experience when building their products or services, but many employees report a poor user experience with their organization's internal software systems. This translates into inefficient tasks, unnecessary long training times, risks of human error, and lack of motivation. The initial process analysis stage in our case report confirms this issue. We therefore focused on employee UX for improving the analysis report development process.

Utility and efficacy of the DSR artifact. Although the need of improving employee UX in internal processes is not only understandable but also desired by management, a practical way of implementing it is not always straightforward. Effective approaches address both the data aspects and the activities of a process. Our DSR artifact (the conceptual framework introduced in Section 2) this idea by using the business artifact concept as a driver of process improvement initiatives. Moreover, to be effective, the interactions of the users (staff) and the business artifacts should also focus on learnability, i.e. they should generate a minimum extraneous cognitive load. The case report in this paper, driven by the conceptual framework, showed how effective interactions between users and business artifacts can be designed, by discussing three key UI mockups of a software system to automate the analysis reporting process.

Contributions. To the managerial audience, the main contribution of this paper is the case report, as an example of how to manage a process improvement initiative, from problem statement to solution design. To researchers, the contribution of this paper is the conceptual framework. Its novelty consists of integrating the artifact-oriented approach with interaction design principles into a structure that can be used to drive process improvement initiatives.

Generalizability. We argue that the approach presented in this paper can be adapted to any service-providing organization. However, while defining business artifact lifecycle should be straightforward in most of the cases, effectively applying interaction design principles relies on understanding the root causes for human error within the process. This is important for designers in their attempt to minimize cognitive load when sketching UI mockups.

5. CONCLUSIONS

Although many organizations value their products or services usability, their software platforms supporting internal processes are reported to be less user friendly. This happens although employees are the most valued assets of an organization. In this paper we focused on improving the performance of internal processes, using interaction design principles, starting from a case report in the pharmaceutical industry. The case report result was the design of an internal software platform to effectively manage the analysis reports. It showed how effective interactions between users and business artifacts can be designed, by discussing three key UI mockups of a software system to automate the analysis reporting process.

The contribution of the paper is twofold. To researchers, it introduces a conceptual framework that integrates the business artifact-oriented approach with interaction design principles into a structure that can be used to drive process improvement initiatives. To managerial audience, a case report is described, as an example of how to manage a process improvement initiative, from problem statement to solution design.

Although the approach presented in this paper can be adapted to any service-providing organization, effectively applying interaction design principles relies on understanding the root causes for human error within the process. This is important for designers in their attempt to minimize cognitive load when sketching UI mockups.

6. REFERENCES

1. M. Castagno, “Six ways a great UX will help employee engagement,” 2015. https://www.beezy.net/blog/2015/04/six-ways-great-ux-will-help-employee-engagement.
2. M. Peruzzini, F. Grandi, and M. Pellicciari, “How to analyse the workers’ experience in integrated product-process design,” J. Ind. Inf. Integr., vol. 12, pp. 31–46, Dec. 2018, doi: 10.1016/J.JII.2018.06.002.
3. K. H. Huarng, S. Bresciani, and A. Ferraris, “Experiential interaction design model,” J. Bus. Res., vol. 118, pp. 486–490, Sep. 2020, doi: 10.1016/J.JBUSRES.2020.07.017.
4. R. Liu, K. Bhattacharya, and F. Y. Wu, “Modeling Business Contexture and Behavior Using Business Artifacts,” in Advanced Information Systems Engineering, 2007, pp. 324–339.
5. G. Kang, L. Yang, and L. Zhang, “Verification of behavioral soundness for artifact-centric business process model with synchronizations,” Futur. Gener. Comput. Syst., vol. 98, pp. 503–511, Sep. 2019, doi: 10.1016/J.FUTURE.2019.03.012.
6. A. Nigam and N. S. Caswell, “Business artifacts: An approach to operational specification,” IBM Syst. J., 2010, doi: 10.1147/sj.423.0428.
7. S. Yongchareon, C. Liu, X. Zhao, J. Yu, K. Ngamakeur, and J. Xu, “Deriving user interface flow models for artifact-centric business processes,” Comput. Ind., 2018, doi: 10.1016/j.compind.2017.11.001.
8. D. Norman, The Design of Everyday Things. New York: Basic Books, 1988.

9. M. Chamorro-Koc, V. Popovic, and M. Emmison, "Human experience and product usability: Principles to assist the design of user–product interactions," Appl. Ergon., vol. 40, no. 4, pp. 648–656, Jul. 2009, doi: 10.1016/J.APERGO.2008.05.004.
10. J. Nielsen and R. Molich, "Heuristic evaluation of user interfaces," Conf. Hum. Factors Comput. Syst. - Proc., pp. 249–256, Mar. 1990, doi: 10.1145/97243.97281.
11. K. Miller et al., "The design of decisions: Matching clinical decision support recommendations to Nielsen's design heuristics," Int. J. Med. Inform., vol. 117, pp. 19–25, Sep. 2018, doi: 10.1016/J.IJMEDINF.2018.05.008.
12. Cabañero, Hervás, González, Fontecha, Mondéjar, and Bravo, "Analysis of Cognitive Load Using EEG when Interacting with Mobile Devices," Proceedings, vol. 31, no. 1, p. 70, Nov. 2019, doi: 10.3390/PROCEEDINGS2019031070.
13. L. Hsu, "A tale of two classes: Tourism students' cognitive loads and learning outcomes in face-to-face and online classes," J. Hosp. Leis. Sport Tour. Educ., vol. 29, p. 100342, Nov. 2021, doi: 10.1016/J.JHLSTE.2021.100342.
14. S. Deterding, D. Dixon, R. Khaled, and L. Nacke, "From game design elements to gamefulness: Defining 'gamification,'" Proc. 15th Int. Acad. MindTrek Conf. Envisioning Futur. Media Environ. MindTrek 2011, pp. 9–15, 2011, doi: 10.1145/2181037.2181040.
15. Y.-F. Wang, Y.-F. Hsu, and K. Fang, "The Key Elements of Gamification in Corporate Training - The Delphi Method," Entertain. Comput., p. 100463, Oct. 2021, doi: 10.1016/J.ENTCOM.2021.100463.
16. K. Peffers, T. Tuunanen, M. A. Rothenberger, and S. Chatterjee, "A design science research methodology for information systems research," J. Manag. Inf. Syst., vol. 24, pp. 45–77, 2007, doi: 10.2753/MIS0742-1222240302.

ABORDARE BAZATĂ PE ARTEFACTE PENTRU ÎMBUNĂTĂȚIREA CALITĂȚII PROCESELOR INTERNE FOLOSIND PRINCIPII DE PROIECTARE A INTERACȚIUNII

Rezumat: În această lucrare ne concentrăm pe îmbunătățirea performanței proceselor interne, utilizând principiile de proiectare a interacțiunii, pornind de la un raport de caz în industria farmaceutică. Contribuția lucrării este dublă. Pentru cercetători, introduce un cadru conceptual care integrează abordarea orientată spre artefacte în afaceri cu principiile de proiectare a interacțiunii într-o structură care poate fi utilizată pentru a conduce inițiative de îmbunătățire a proceselor. Pentru publicul managerial, este descris un raport de caz, bazat pe cadrul conceptual, ca un exemplu de gestionare a unei inițiative de îmbunătățire a procesului, de la declararea problemei până la proiectarea soluției.

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