

# Designing User Interface and User Experience for Business Process Applications to Facilitate Digital Transformation in Oil and Gas Exploration

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## ABSTRACT

*Indomigas, a national company that controls 67% of Indonesia's oil production, is undergoing a significant transformation amidst the global energy transition, digital disruption and organizational restructuring. Despite dominating the market, the company's exploration business processes were hampered by outdated and disconnected digital tools, leading to inefficiencies and inaccurate performance monitoring. This research focuses on strategic digital transformation in the Indomigas exploration division, which specifically aims to develop innovative user interfaces and business process user experiences. Using Design Thinking, this research developed through five phases, namely empathy, definition, ideation, prototyping, and testing. The research began by gathering user insights from in-depth interviews, focus groups, and literature. The final product is a prototype that meets company standards, offering a friendly, innovative solution that meets user needs. This initiative aims to transform exploration business processes, ensuring they are not only innovative and efficient but also increase operational efficiency, speed up decision making, and strengthen business management for Indomigas growth.*

**KEYWORDS:** Design Thinking, Digital Transformation, User Interface, User Experience, Business Process, Exploration

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## 1. INTRODUCTION

Amid the ongoing global energy transition, the oil and gas industry, including Indomigas, is moving towards digitalization to enhance efficiency and performance. According to (Tran et al., 2020) two essential aspects of this digitalization are IT and business optimization, which can assist companies like Indomigas, a market leader in Indonesian oil, in improving their operations. However, the company faces challenges in effectively managing its business processes due to the use of manual and un-integrated methods, leading to inefficiencies and a decrease in project value, as evidenced in the funneling process in 2022.

The importance of innovation in improving organizational performance cannot be overlooked. Such innovation is supported by an efficient flow of information, the core of digital transformation. Approaches like design thinking, as explained by researchers including (De Carvalho Souza & Silva, 2015) and (Shan et al., 2021), offer innovative solutions in business process digitalization and reduce biases in decision-making. Indomigas hopes that by adopting digital transformation and design thinking, it can enhance the effectiveness and efficiency of monitoring and managing the performance of its exploration programs.

This research aims to address the main issue faced by Indomigas: inefficient and time-consuming business process management due to manual and non-integrated practices. The study seeks to understand the needs of stakeholders and users, identify current barriers in business processes, and find innovative solutions to make business processes more effective and efficient. The expectation is that this research will produce a business process application product that meets user needs and benefits Indomigas in its digital transformation.

## 2. LITERATURE REVIEW

### Oil and Gas Exploration

The Law Number 22 of 2001 on Oil and Natural Gas delineates the oil and gas sector into two main components, there are upstream activities involving the exploration and exploitation of oil and gas from the earth's crust, and downstream activities focusing on the management, storage, distribution, and trading of crude oil and natural gas. Oil and gas exploration, as the initial phase in the supply chain, is a complex and multidisciplinary process that integrates geological, geophysical, and other technological sciences to discover new economically viable oil and gas reservoirs, as detailed by (Craig & Quagliaroli, 2020). It begins with license acquisition, the process of obtaining official permission for the exploration and management of oil and gas resources, and involves a series of stages including geological studies, seismic data acquisition, and drilling, each playing a crucial role in evaluating the potential of the well and ensuring the sustainability and safety of oil and gas operations.

### **Business Process**

A business process is a collection of structured activities within an organization aimed at producing products or services for the organization's internal needs or for customers. (Laudon & Laudon, 2020) refer to Porter's categorization of business processes into primary activities, such as exploration and production functions in the oil and gas business, which directly generate value through products and services for customers, and support activities that provide internal support functions like IT, finance, HR, and procurement. This study focuses on business processes involving the steps from ABl drilling proposal submission, exploration funneling including pre-funneling, technical approval of proposals, to technical approval from regulators, illustrating the initial stages in the submission of drilling proposals by the Area teams from Area 1 to 5 to the technical review team in the subholding function of Indomigas.

### **Digital Transformation**

The digitalization of business processes is a key component of the broader digital transformation process, where companies, including those in the oil and gas sector, use technology and data to improve and modernize their operations, focusing on the user at the core of their strategy, enhancing security, and providing added value to users, shareholders, and the environment. According to (Yu et al., 2020), amidst efforts for energy transition, major oil and gas companies are not only heavily investing in digital technologies but also significantly altering their entire business models to adapt to this new era.

### **Design Thinking**

Design thinking is a user-centered approach to problem-solving and innovation, involving structured steps to understand user needs, identify problems, and develop innovative solutions. Stanford University's d.school and authors like (Gordon et al., 2019) outline its five stages—empathize, define, ideate, prototype, and test—which are iteratively cycled to ensure solutions truly meet user requirements. This approach is crucial for successful digital transformation, focusing on user-centric and innovative solutions to meet customer needs. In digital transformation contexts, design thinking serves as a tool to create effective digital solutions, with techniques ranging from understanding user profiles and challenges (empathize) to defining core issues (define), brainstorming creative solutions (ideate), materializing concepts into tangible forms (prototype), and refining through user feedback (test).

### **Previous Study**

To deepen the understanding of research gaps, an analysis was conducted on eight previous papers covering topics such as design thinking, user interfaces, business processes, and organizational performance. These studies highlight the importance of design thinking in enhancing innovation and decision-making across various contexts, including platform-based ventures and mobile learning environments (De Carvalho Souza & Silva, 2015; Kamble et al., 2023). The papers also discuss the implementation of design thinking in software development and upcycling, revealing variations in

application depending on company size and the stages employed (Canedo et al., 2020; Shan et al., 2021). Special emphasis is placed on the empathy and prototyping stages for digital product development. With the advent of innovative digital products, the subsequent challenge is to ensure continuous growth and improvement of business processes that support sustainable practices and focus on user benefit and ease of use (Alomari et al., 2020; Sohns et al., 2023).

### 3. METHODS

In this research phase, the process begins with identifying the problem and conducting a literature review related to the topic, followed by data collection which includes both primary and secondary data. Primary data is obtained from two sources: direct user interviews and Focus Group Discussions (FGD). The interviews involve respondents who represent user personas from both the holding and regional business entities, encompassing those handling domestic and overseas business. The FGDs involve a larger group of participants, more than five, representing similar business personas. The collected data is then recorded and documented for further analysis in subsequent stages. The Design Thinking method is employed, involving stages of empathize, define, ideate, prototype, and test, culminating in an analysis of the entire process and drawing conclusions within.

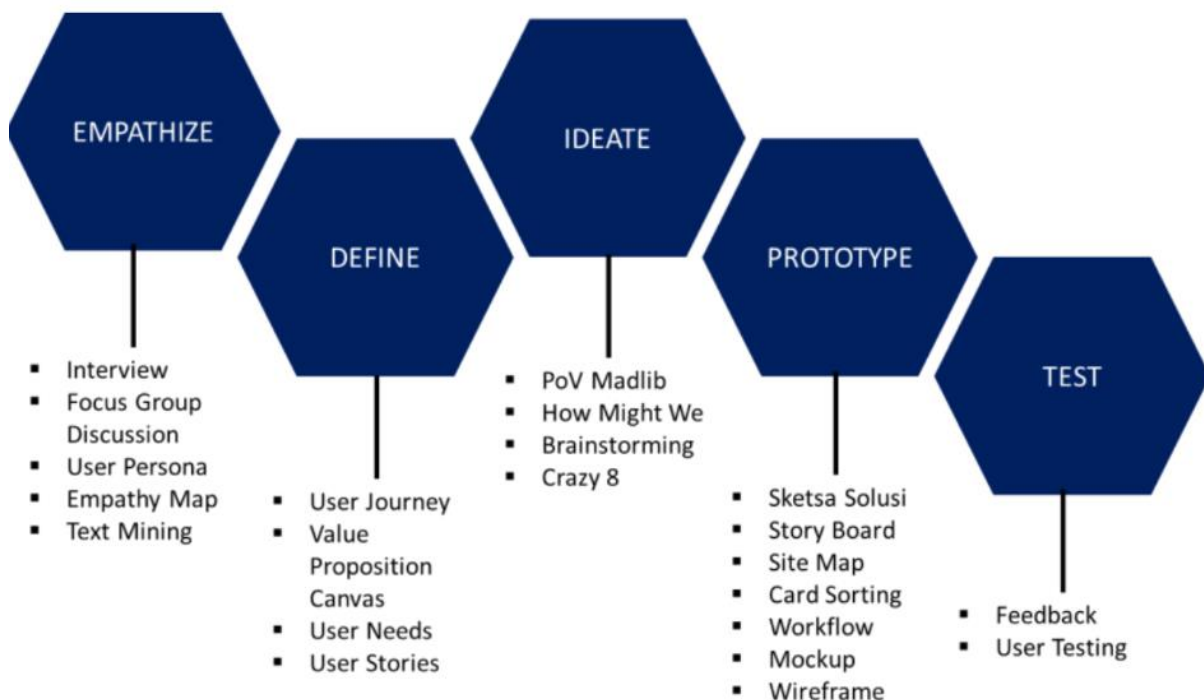


FIGURE 1. Research Workflow

### 4. RESULTS

In the design thinking process, the first crucial step is completing the empathy phase. This phase is informed by two data sources: interviews and focus group discussions, utilizing a set of tools such as user personas, empathy maps, and text mining.

These observations help identify the primary issues selected by users, notably the challenges in tracking documentation and processes. For more detailed information, refer to Table 1.

**TABLE 1.** Problems That are Defined from Empathy Step

Business Process	Activity	Problem	Total Vote
General	General	There is a concern regarding the audit process	1
		Business processes are disorganized when audited	0
		Difficulties in tracking documentation and processes	17
Pre-Funneling	Review	Work delays due to workload overload	3
		Forgetting key points when assessments are conducted on different days	4
		Excessive follow-up actions required	10
		The current funneling process is more challenging with numerous follow-ups:	0
		Changes in advisors during the pre- funneling stage	6
		Advisors in the pre-funneling stage are not significantly aiding the process	6
		Scheduling conflicts for discussion with the QR team	3
	Documentation	Excessive Minutes of Meetings (MoM)	0
		Concerns over losing documents on personal laptops	0
		Delays or setbacks in the MoM process	13
		MoM files are too large	3
		MoM language is too casual	0
		Updating MoM sufficiently in a single document	9
Funneling	Review	Work delays due to workload overload	2
		Forgetting key points when assessments are conducted on separate days	1
		Lack of connection between pre-funneling and funneling	11
		Funneling is pressured by time and becomes challenging if delayed	2
		The process prior does not accommodate mid-course program changes	0
		Numerous program changes made by partners	2
	Documentation	Excessive Minutes of Meetings (MoM)	0
		Concerns over losing documents on personal laptops	0
		Delays or setbacks in the MoM process	13
		MoM files are too large	3

Business Process	Activity	Problem	Total Vote
		MoM language is too casual	0
		Updating MoM sufficiently in a single document	9
	Approval from Operators and Partners	The approval process for TCM is perceived as very difficult	0
		The timeline for operator approval is not aligned	5
		Discrepancies between operator evaluations and internal evaluations	6

After defining the problem, we embarked on devising solutions through ideation. One of the methods used for generating ideas is the 'Crazy Eight' technique. As depicted in Figure 2, one of the teams during the focus group discussion utilized this method to brainstorm. The ideas proposed center on transforming the application into a comprehensive one-stop solution with a clear workflow. Features proposed include notifications, finalization deadlines, documentation handover, comparative analysis of operator and non-operator evaluations, a timeframe for drafting Minutes of Meeting (MoM), and a visually presented list of follow-up actions.

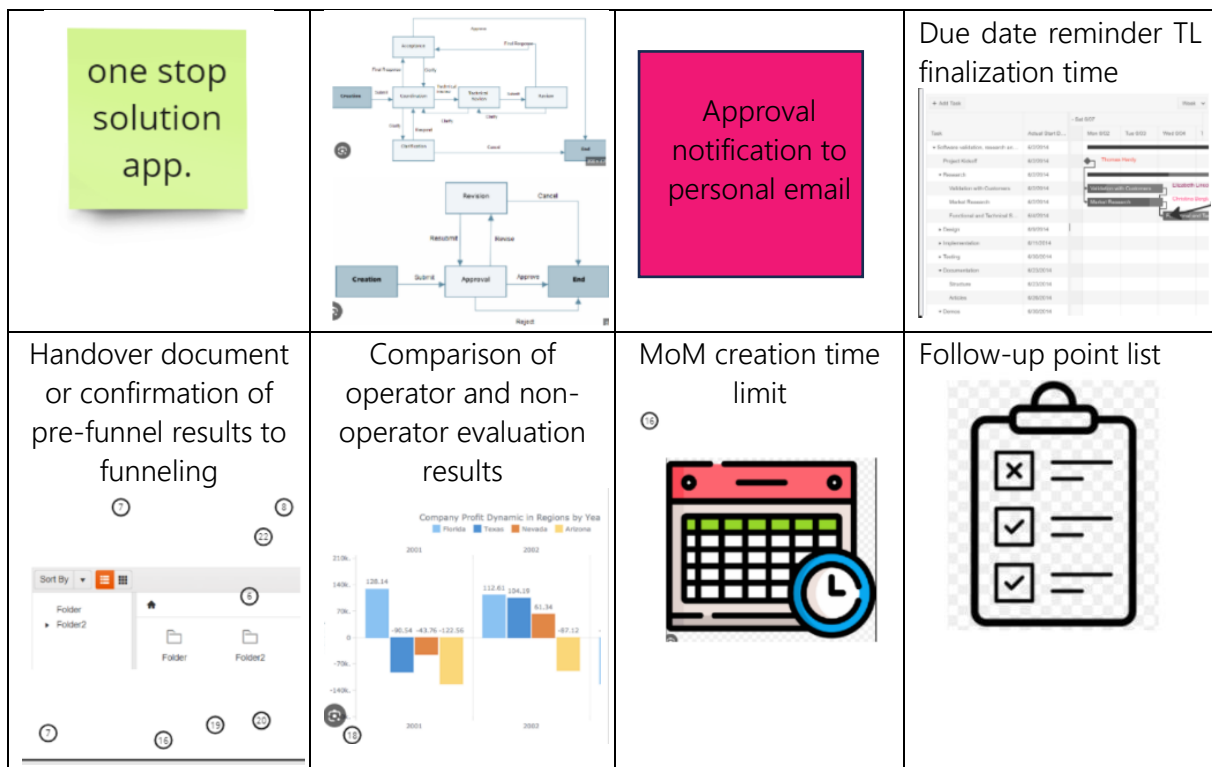


FIGURE 2. Idea Solution from Crazy Eight Technique

After completing the brainstorming phase for solution generation, the next step is the creation of prototypes, beginning with a low-fidelity prototype using Microsoft Power,

as shown in Figure 3. This initial prototype is then iterated upon and enhanced to develop a high-fidelity prototype, as illustrated in Figure 4.

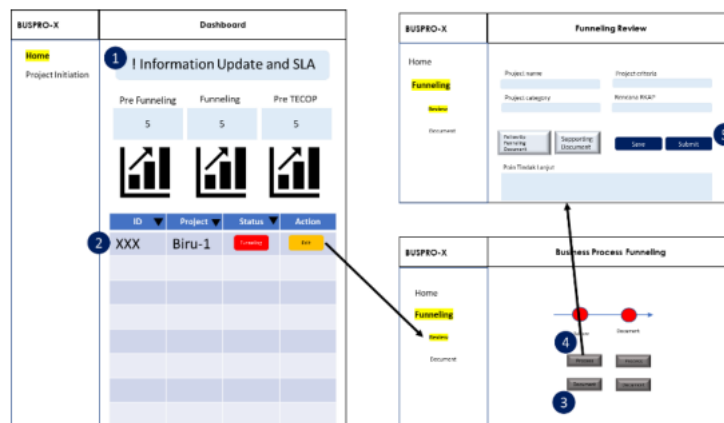


FIGURE 3. Low Fidelity Prototype

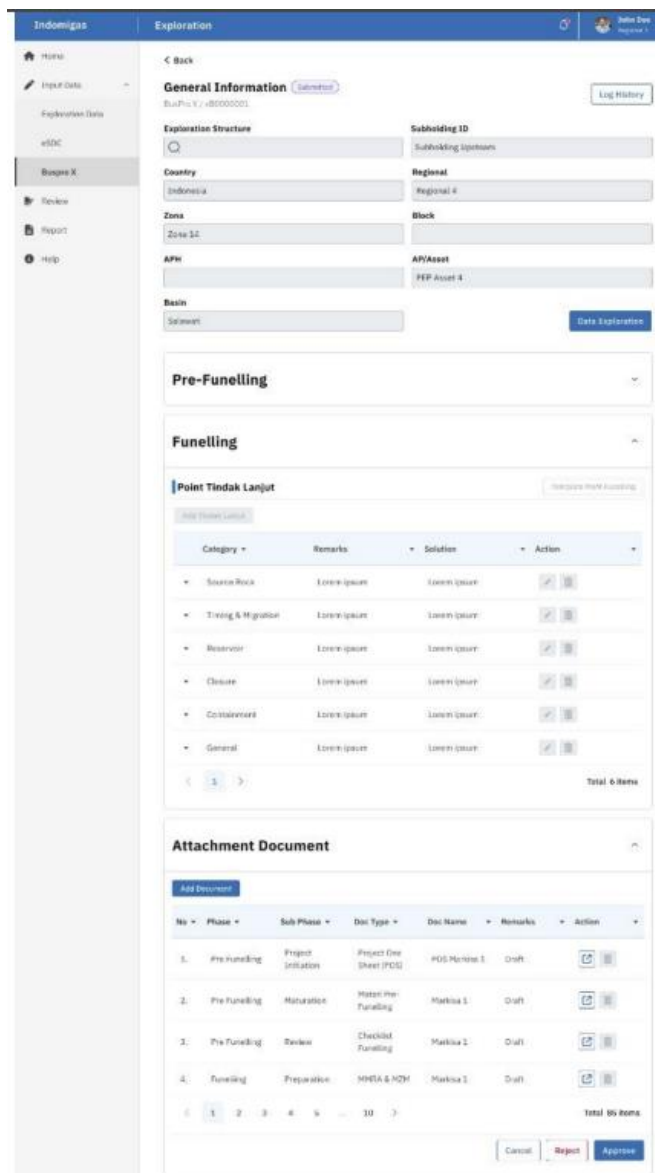


FIGURE 4. High Fidelity Prototype

## 5. CONCLUSIONS

The study explores strategic digital transformation in Indomigas' exploration division, aiming to innovate user interfaces and user experiences in business processes. Utilizing Design Thinking across five phases—empathy, definition, ideation, prototyping, and testing—the research harnesses user insights to develop a prototype aligning with company standards. This endeavor is designed to innovate and streamline exploration business processes, thereby enhancing operational efficiency, expediting decision-making, and fortifying business management, ultimately fostering Indomigas' growth.

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