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Topic Analysis And Synthesis (TAS)

Good Process Is Evolved, Not Designed

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# Abstract

Time management in software process design is crucial for the success of the project. It involves allocating resources to complete tasks on time while staying within the approved budget. Effective time management requires the planning, scheduling, monitoring, and controlling of all project activities. The idea that good processes are evolved, not designed, suggests that processes should be allowed to develop and change over time, rather than being rigidly designed from the outset. This approach is consistent with the idea of evolution, which involves the gradual development and adaptation of organisms over time. In the context of software development, evolution can refer to the gradual development and improvement of processes over time, while design can refer to the intentional creation of a process from scratch.

*Keywords: allocating resources, consistent, evolution, gradual development, adaptation, intentional creation, crucial*

# 2. Introduction

Over the last few decades, software has assumed a vital and pivotal role in our society. Our reliance on the functionalities and services provided by computerized systems has steadily grown. Virtually every modern product or service incorporates and/or utilizes some form of software. For instance, companies are currently selling (or have intentions to sell in the foreseeable future) systems designed to automate building operations and integrate internet features into household appliances.

The software development process plays a crucial role in determining the outcome, and the effectiveness of the process can significantly impact the quality of the final product. A well-defined and efficient development process helps in managing resources effectively. This includes time, budget, and human resources. When the process is streamlined, developers can focus on writing high-quality code, performing thorough testing, and addressing issues promptly. A robust development process includes built-in quality assurance measures. This involves testing at various stages of development, including unit testing, integration testing, and system testing. When testing is an integral part of the process, it leads to the identification and resolution of defects early on, preventing them from becoming more significant issues later.

## 2.1 Motivation

Software development projects typically have deadlines and milestones. Effective time management is essential to ensure that the project progresses according to the planned timeline. Delays in the development process can have cascading effects on the entire project schedule, potentially leading to missed deadlines and increased costs. Time management involves allocating resources effectively. This includes not only developer time but also other resources such as testing, quality assurance, and documentation. Properly managing time ensures that these resources are utilized optimally, preventing bottlenecks and optimizing productivity. The software development process is often dynamic, with changes in requirements, scope, or technology. Effective time management allows for flexibility in adapting to these changes without causing significant disruptions to the project schedule. A well-managed process can absorb changes more seamlessly.

## 2.2 Problem Statement

Increasing organizational efficiency and achieving optimal outcomes often hinge on the ability to create and implement effective processes. However, the challenge lies in developing processes that not only align with organizational objectives but also seamlessly integrate with the workflow, address stakeholder needs, and are adaptable to evolving requirements. The lack of a systematic approach to process creation can result in inefficiencies, miscommunication, and suboptimal performance.

Current processes may be undocumented, outdated, or not adequately meeting the demands of the dynamic business environment. Stakeholders may experience confusion about their roles and responsibilities, leading to delays, errors, and decreased productivity. Additionally, the absence of clear guidelines and standardized procedures can hinder collaboration and decision-making.

The problem statement revolves around the need to establish a structured methodology for effective process creation. This involves defining clear objectives, mapping existing processes, gathering comprehensive requirements from stakeholders, and designing processes that are not only efficient but also adaptable to change. The challenge is to create processes that foster a culture of continuous improvement, are easily understood by all team members, and align with industry best practices.

Ultimately, the goal is to address the complexities of process creation by implementing a systematic and collaborative approach. By doing so, organizations can enhance operational efficiency, improve communication, and ensure that processes evolve in tandem with the ever-changing landscape of business requirements.

## 2.3 Objective

The primary objective is to establish a streamlined and adaptive framework for effective process creation within the organization. This framework aims to enhance operational efficiency, improve stakeholder collaboration, and ensure the agility required to respond to evolving business needs. Design processes that are not only efficient but also flexible and adaptable to changing circumstances, allowing the organization to respond effectively to dynamic business environments. Establish standardized documentation practices for all processes, including flowcharts, SOPs, and guidelines, to provide clarity and consistency.

# 3. Background Material

Scholars and professionals recognize that software development extends beyond the mere creation of proficient programming languages and tools. It is a collaborative, intricate, and inventive undertaking. Consequently, the excellence of a software product is significantly influenced by the individuals, organizational structure, and processes employed in its creation and delivery. This vision traces its origins to the achievements of the 1960s and 1970s. During these two decades, researchers and practitioners dedicated their efforts to pursuing three primary objectives.

*Development of structured programming languages.* The development of structured programming languages represents a pivotal evolution in the field of computer science. Structured programming is an approach to software development that emphasizes the use of well-organized, modular, and easily understandable code structures. The goal is to enhance code readability, maintainability, and reliability. The development of structured programming languages has played a crucial role in improving the quality, readability, and maintainability of software. It has influenced not only the syntax of programming languages but also the way developers approach problem-solving and code organization.

*Development of design methods and principles.* The evolution of design methods and principles represents a dynamic journey in the realm of creative and systematic problem-solving. Over the years, designers and theorists have contributed to the development and refinement of various approaches, methodologies, and principles to guide the design process. The ongoing development of design methods and principles reflects a continuous quest for more effective, user-centric, and sustainable approaches to solving complex problems across various domains. As technology and societal needs evolve, designers continue to explore new methodologies and refine existing principles to address the challenges of our time.

*Definition of software lifecycles.* A software lifecycle, also known as the software development lifecycle (SDLC), is a systematic process or methodology used in the planning, creation, testing, deployment, and maintenance of software applications or systems. It encompasses various stages that guide the progression of a software project from its initiation to its eventual retirement. The primary purpose of a software lifecycle is to provide a structured framework for managing and controlling the software development process, ensuring that the end product meets specified requirements and quality standards. Different software development methodologies, such as Waterfall, Agile, and DevOps, may have variations in the specific phases and their order within the lifecycle. The choice of a lifecycle model depends on the project's characteristics, requirements, and the organizational context.

A software process refers to a set of interconnected activities, methods, and steps that are systematically followed to design, develop, test, deploy, and maintain a software product. The software process is an integral part of the larger Software Development Lifecycle (SDLC), guiding the progression of a software project from its initiation to its completion and beyond.

# 4. Methods and Methodology

Designing a process typically involves a structured and deliberate planning phase at the outset. This phase includes defining goals, objectives, and the overall framework of the process. Evolving a process is an ongoing and iterative approach that emphasizes continuous improvement over time. It recognizes that processes can be refined based on real-world feedback and changing requirements.

A great process derived from guided evolution is characterized by its ability to learn, adapt, and improve based on real-world experiences and feedback. It embraces a culture of continuous improvement, ensuring that it remains effective and aligned with organizational goals in an ever-changing environment.

Here are the few steps that can be followed in order to “Evolve a Process”:

1. *Identify problem statements.* Identifying the problem statement involves recognizing a specific challenge, requirement, or need that requires a software solution. This initial step is crucial for understanding what the software aims to address or achieve.
2. *Document approaches*. Once the problem statement is identified, the next step is to document various approaches or potential solutions to address the identified problem. This documentation may include outlining different strategies, technologies, or methodologies that could be applied during the software development process.
3. *Test approach.* Before implementing a full-scale solution, it's essential to test the chosen approach or approaches. In software development, this often involves creating prototypes, conducting feasibility studies, or running small-scale tests to evaluate the viability and effectiveness of the proposed solutions.
4. *Iterate approach.* Based on the testing results, feedback, and lessons learned, it may be necessary to iterate on the chosen approach. This involves making refinements, adjustments, or changes to enhance the solution's effectiveness, address any identified issues, and align more closely with the desired outcomes.
5. *Practice.* In the context of software development, "practice" refers to the implementation of the refined approach into the actual development process. This step involves putting the documented and iterated approach into action, coding, and building the software solution based on the finalized strategy.

This iterative and feedback-driven approach aligns with agile and iterative software development methodologies, where continuous improvement is a fundamental principle.

Let's consider the example of a software development team working on a project to improve the efficiency of a customer support system for an e-commerce platform. The team has identified the following problem statement: *“Customers are experiencing delays in receiving responses from the support team, leading to dissatisfaction and negative feedback.”*

1. Identify Problem Statements:

The team recognizes that the delayed response time is a significant issue affecting customer satisfaction and potentially impacting the company's reputation.

2. Document Approaches:

The team documents various approaches to address the identified problem. This may include strategies such as implementing a chatbot for basic queries, optimizing the ticketing system, and integrating machine learning algorithms to prioritize and route tickets more efficiently. Each approach is outlined with potential technologies, methodologies, and their expected impact on response times.

3. Test Approach:

The team decides to start with a small-scale test focused on implementing a chatbot for basic queries. They create a prototype of the chatbot and conduct a feasibility study to assess its effectiveness. During this phase, they measure response times, gather user feedback, and identify any challenges or limitations of the approach.

4. Iterate Approach:

Based on the test results, the team learns that the chatbot is effective for handling routine queries but struggles with more complex issues. They decide to iterate on the approach by refining the chatbot's capabilities and integrating it with a more sophisticated ticketing system. This iteration aims to enhance the solution's overall effectiveness and address the limitations identified during testing.

5. Practice:

With the refined approach, the team moves to the implementation phase. They integrate the improved chatbot with the upgraded ticketing system, incorporating the lessons learned from the testing and iteration phases. The team codes and builds the software solution, ensuring that it aligns with the finalized strategy to reduce response times and improve overall customer support efficiency.

Throughout this process, the team continuously practices effective communication, collaboration, and documentation. This real-life example demonstrates the application of the "Evolving a Process" steps in the context of software development to address a specific problem and iteratively improve the solution based on testing and feedback.

# 5. Observations

The methodology gives us a structured process for software development, starting from problem identification to the implementation of the refined solution. This structured approach helps ensure a systematic and organized development workflow. The process begins by emphasizing the importance of identifying specific problems, challenges, or needs that require a software solution. This problem-centric approach ensures that the development effort is aligned with addressing real-world issues. The method emphasizes the significance of documenting various approaches or potential solutions once the problem is identified. This documentation serves as a reference and guide for the development team, providing insights into different strategies, technologies, and methodologies. Before moving to full-scale implementation, it highlights the importance of testing the chosen approach through prototypes, feasibility studies, or small-scale tests. This testing phase is crucial for evaluating the viability and effectiveness of proposed solutions. The process includes an iteration step based on testing results, feedback, and lessons learned. This iterative approach allows for refinements and adjustments to enhance the solution's effectiveness and address any identified issues. It reflects a commitment to continuous improvement throughout the development lifecycle. The final step involves the implementation of the refined approach into the actual development process. This step emphasizes the practical aspect of coding and building the software solution based on the finalized strategy, moving from planning and testing to active development.

The author explicitly mentions that the iterative and feedback-driven approach aligns with agile and iterative software development methodologies. This alignment suggests a focus on flexibility, adaptability, and continuous improvement, which are key principles of agile development. The overall process reflects a commitment to continuous improvement, where each step contributes to refining and enhancing the software solution. The emphasis on feedback, iteration, and practice aligns with the idea of ongoing improvement throughout the development lifecycle. In summary, the observations suggest a well-structured and adaptive approach to software development, emphasizing problem identification, documentation, testing, iteration, and continuous improvement in line with agile methodologies.

# 6. Conclusions and Future Work

# 7. References