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Original Article

Streamlining Stakeholder Engagement: Automating Design Approval Workflows in the Manufacturing Sector

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Abstract: *This paper discusses the automation of design approval workflows in the manufacturing sector with Teamcenter, a comprehensive digital lifecycle management system, aimed at involving stakeholders and improving operational efficiency. Teamcenter is a management tool that handles both product and production information through the whole product lifecycle, thus allowing for real-time collaboration among global teams and stakeholders. This paper focuses on the automation of approval processes, the advantages of digital workflows, and handlers in integrating business decisions. By digitizing the workflows, manufacturers will be able to improve process management, reduce costs, minimize errors, and speed up time-to-market. Further, the paper discusses how Teamcenter enables smooth collaboration, improved decision-making, and better product development management in a global interconnected environment.*

Keywords: *Teamcenter, Workflow Automation, Design Approval, Stakeholder Engagement, Product Lifecycle Management (PLM), Manufacturing Sector, Digital Collaboration, Business Process Automation, Handlers, Operational Efficiency, Product Development.*

I. INTRODUCTION

Teamcenter serves as a digital portal for the manufacturing sector's product information, facilitating collaboration among all stakeholders requiring access to product and process expertise. Teamcenter facilitates the digital administration of product and production information throughout the product lifecycle. Teamcenter facilitates

- Real-time data access for all users inside the worldwide business.
- Oversee product configuration.
- Regulate design modifications and authorizations.
- Supply data to downstream applications, including enterprise resource planning (ERP) systems.

Teamcenter can serve as a unified repository of product and process information sourced from several authoring tools. Authorized members of the product teams can utilize this shared resource to efficiently locate the information necessary for their tasks. A manufacturer can enhance productivity by allowing individual users to decrease the time spent searching for information by up to 65 percent through this singular source. They can mitigate expensive mistakes and rework by enhancing decision makers' visibility throughout the product lifecycle. Minimize product and lifecycle expenses by reutilizing product and process knowledge across several initiatives and projects. Also, enhance and expedite the product teams' operational performance by delivering coherent and current needs and product specifications with immediate collaboration.

There is information and research that indicate the urgent necessity for this solution that propels the manufacturing industry. The paper [1] establishes a methodology for modeling the product system during the initial development phase, integrating system design with sustainability considerations from a forward-looking perspective. The paper emphasizes the enhancement of modeling components through pertinent behavioral features that encapsulate semantic connections and information. In [2], it illustrates how PLM systems serve as a crucial foundation for attaining a more sustainable paradigm in life, encompassing development, engineering, manufacture, utilization, and disposal of products.

The study [3] addresses the pressing issue of developing integrated PLM solutions within the contemporary European automobile sector. The various authors' perspectives via focus groups, blogs, and in-person meetings within a university community of practice are analyzed and integrated in [4].

II. DIGITALIZING THE BUSINESS PROCESS

The most critical aspect of any manufacturing sector is the procedure for obtaining approval of designs and documentation from a sequence of accountable stakeholders prior to the design's arrival at the production shop floor. The

management of a paper trail for the approval process is challenging because it involves the laborious tasks of revision maintenance, change comparison, and feedback resolution. Digitizing this procedure reduces the duration and maintains a record of modifications for verification and validation, so simplifying the process significantly.

A workflow is the automation of business processes wherein papers, information, or tasks are transferred between participants according to established rules or procedures. Teamcenter workflows enable manufacturers to oversee their product data processes. Workflow originates from the notion that all tasks traverse one or many workflow procedures to achieve a goal. Workflow refers to the automation of corporate processes.

The Advantages of Automating Corporate Processes Encompass:

- *Enhanced efficiency:* Automating corporate operations can lead to the removal of superfluous stages.
- *Enhanced process management:* Organizational business processes are more effectively governed through standardized methodologies and the provision of audit trails.
- *Enhanced customer service:* Standardized business processes augment predictability in response levels to clients.
- *Adaptability:* Computer-modeled processes can be rapidly and effortlessly reconfigured to accommodate evolving business requirements.
- *Ongoing process enhancement:* The resultant emphasis on business processes facilitates their optimization and simplification.
- The standard systems engineering workflow encompasses the requirements, functional, logical, and physical design (RFLP) approach. The procedure is iterative and may be reiterated throughout the design or development of a product.

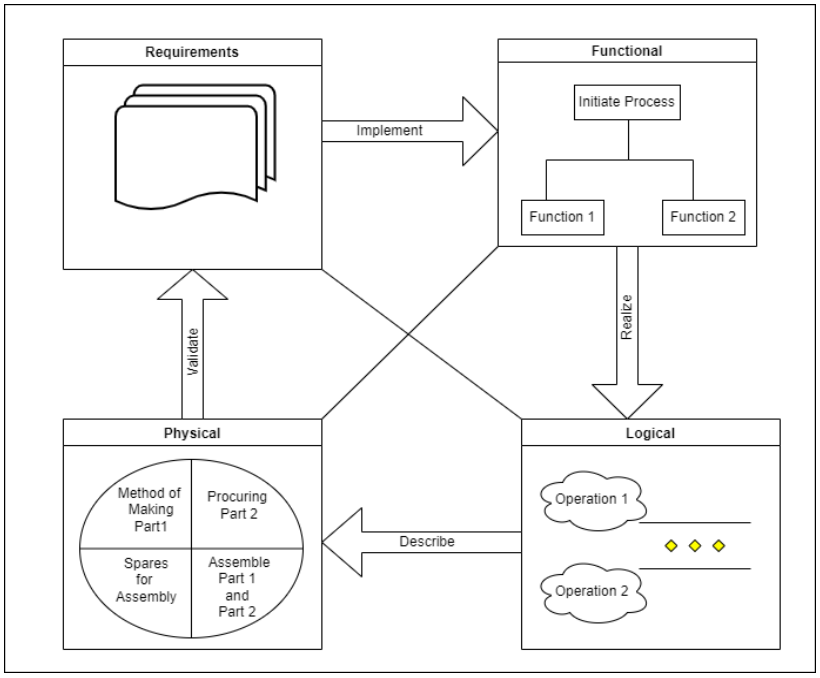

Figure 1: Requirements, Functional, Logical, and Physical Design (RFLP) Process

A. Creating an Effective Approval Process

The efficacy of a manufactured product is significantly contingent upon meticulous design evaluation and a comprehensive review and certification process. These steps can be optimized using a robust module such as Workflow Designer, which allows for the definition of the workflow process.

A workflow procedure delineates the specific tasks and their sequence necessary to represent the business process. Workflow process templates outline a schematic of a workflow process or job to be executed at the place of operation. A task is a vital component utilized to develop a workflow procedure. Each task defines a collection of behaviors, regulations, and resources employed to achieve that task.

Workflows transfer documents, information, and tasks among participants throughout the execution of a particular process. A workflow process may be extensive and intricate or uncomplicated and direct. Specific authorized users are able to execute administrative functions within a process, including the removal of a user who is no longer employed by the firm. A privileged user may be the accountable individual, the process proprietor, or a member of a system administration team. A user may possess elevated privileges in specific processes while being restricted to ordinary user behaviors in others.

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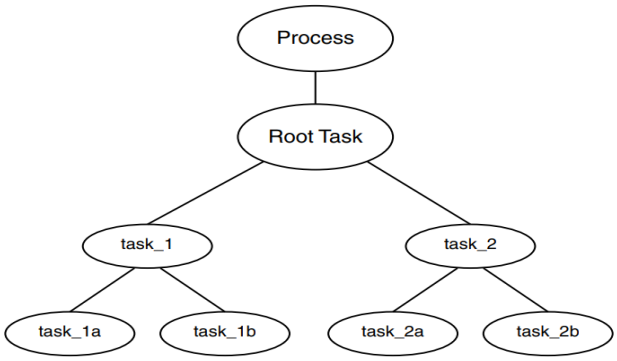

Figure 2: Sample EPM Workflow Process

DoTask offers two alternatives if at least one failure path is established. Completion verifies the fulfillment of a task and initiates the transition to a successful trajectory. "Unable to Complete" signifies that the task cannot be accomplished for multiple reasons. The job employs the EPM-hold handler, which prevents automatic completion upon initiation.

The Acknowledge Task employs the Acknowledged and Not Acknowledged subtasks, each featuring its own dialog box.

The Review Task includes the select-signoff-team and perform-signoffs subtasks, each featuring its own dialog box. The Full Participation Required option enables the workflow designer to configure the Review task to await the submission of judgments from all reviewers prior to concluding and proceeding along the designated path.

The Route Task comprises the Review, Acknowledge, and Notify subtasks, each including its own dialog box.

The plain task serves as a foundation for developing personalized tasks, including those for managing custom forms or other site-specific activities for users to accomplish. This task template is equivalent to the EPMTask template.

The Condition Task segments a workflow based on specified query parameters. The subsequent task must include an EPM-checkcondition handler that receives a Boolean value of either True or False.

Validate Task bifurcates a workflow into two or more pathways. The active routes emanating from the job are contingent upon the occurrence of designated workflow faults. This activity is utilized to develop procedures addressing expected failures.

The Add Status Task generates and appends a release status to the workflow process's target objects. It represents a visual milestone inside a workflow process. This type of task is not associated with a dialog box or task advances the workflow process upon the completion or promotion of any one of its several task predecessors. An Or task may have an unlimited number of predecessors.

We will examine a workflow process template delineating the straightforward approval procedure necessary for a final design review, titled Final Design Review, which encompasses the following tasks:

- A review task wherein the designated user is accountable for selecting signoff team members who fulfill specified group or role criteria. The "Wait for Undecided Reviewers" option enables the workflow designer to configure the review task to pause until all reviewers have submitted their decisions, prior to proceeding down the designated path.
- A Do Task to disseminate the review findings.
- Another Do task comprising directives for executing review modifications.
- An Add Status task that modifies the state of the target objects to Released upon the conclusion of the workflow procedure.

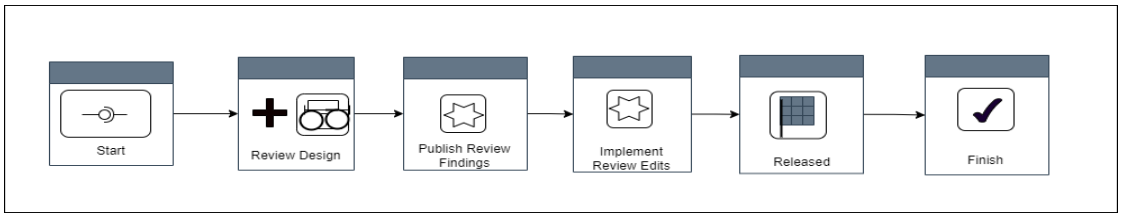

Figure 3: Workflow Process Template

B. Automating Business Decisions with Handlers

Each manufacturing business has distinct requirements and validations that differ across diverse designs and products. Handlers can be utilized to tailor the actions executed in the job, hence configuring the business process according to its specific requirements.

Handlers constitute the fundamental components in a workflow. They are compact ITK applications utilized to enhance and tailor tasks. There exist two types of handlers:

- Action handlers execute tasks, such as attaching objects or dispatching emails.
- Rule handlers verify that a specified rule has been fulfilled. Upon fulfillment of the rule, the handler issues the EPM_go command, so permitting the process to proceed. If the rule is violated, it issues the EPM_nogo instruction, halting the task's progression.

Several of these actions are used to place the task in a special state such as Suspended or Skipped. Not all tasks use all actions.

- Pending: The task has not yet started. A task cannot start until the previous release level has completed.
- Started: The task is active, and action can be taken upon the task.
- Completed: The required actions have been performed. A completed state for a review task means that all signoffs have been performed and the number of approvals is equal to that specified in the quorum for the task.
- Skipped: The task has been skipped by a privileged user. If this is a review task, all signoff subtasks show the No Decision image, indicating the release task was skipped rather than completed.
- Suspended: The task has been suspended. If this is a review task, all signoff tasks are removed from the worklist.
- Failed: A task's state is set to Failed if the task is configured with a failure path and if the failure conditions are met.
- Unassigned: The signoff team for a review task is not yet assigned.
- Aborted: The task is canceled, and the workflow process is exited without being completed.
- The following figure shows the EPM task actions and corresponding states.

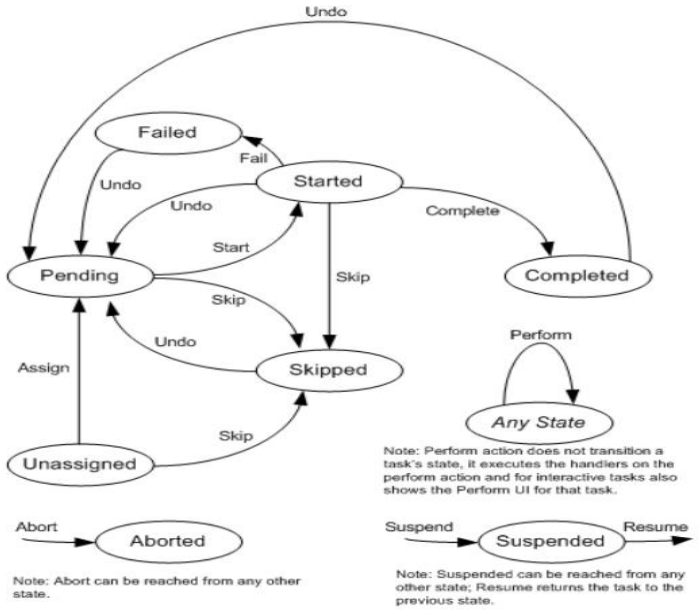

Figure 4: Task Actions and States

C. Access and Error Management

System administrators are able to establish access regulations and provide access privileges for process tasks.

- Access privileges are necessary to enable a workflow user to execute specific workflow tasks:
- Excluding a user from an ongoing workflow.
- Elevating or downgrading a task within a current workflow.
- Workflow task permissions are pertinent to the workflow process template.
- Conferred to a user by access regulations

Upon the initiation of a Start action on a job, all associated handlers are executed sequentially as per their specified order. Upon the completion of all handlers, the state moves to Started, subsequently executing the handlers associated with the Complete action. Upon the successful completion of the handlers on the complete action; the state moves to Completed. If all handlers fail to complete correctly, a workflow error is produced. An error message is displayed if required.

For instance:

If an issue occurs at the commencement of the workflow process, the error message may indicate that the initiation was successful, but a subsequent error was produced by one of the subtasks of the root task.

In a workflow process template containing two tasks, if a handler on the Start action of the second task encounters an error after the successful completion of the first job, the workflow presents a Warning dialog box with the corresponding error message rather than an Error dialog box. The operation was successful. Supplementary information has been incorporated into the error stack. Should an error arise during the development of a workflow process, the workflow process will not be established, and the new workflow process will be absent from the database.

In the event of an error in the root task, the workflow process is automatically terminated. A workflow process devoid of initiated tasks lacks visibility, and in the absence of the root task, the workflow process cannot be executed.

D. Signing-Off On a Business Process

The review task is employed to direct process targets (documents, components, designs, etc.) for evaluation. The assignment comprises two components: select-signoff-team and perform-signoffs.

The select-signoff-team subtask necessitates that the workflow process initiator designate the individuals responsible for conducting the review (the signoff team). This subtask can be set with predefined group or role profiles that the workflow process initiator must select, or it can permit the initiator to choose people ad hoc. This subtask utilizes the selection feature of the Organization application, enabling the selector to search by group, role, or user, and to pick signoff participants either individually or by project teams or address lists.

The perform-signoffs subtask is thereafter assigned to the designated signoff team, requiring them to evaluate the target objects and provide their approval. Altering the review task by adding or removing tasks may result in an error that inhibits task execution. During the execution of this action within a workflow process, the perform-signoffs task presents three options to each signoff team member: Approve, Reject, and No Decision. Choosing either Approve or Reject executes the task. The default selection is "No Decision," and choosing this option does not execute the task. If user authentication is necessary prior to executing this review job, the require-authentication handler must be incorporated into the Perform action of the task. Upon the implementation of user authentication for this job, a password input field is displayed beneath the Comments section. Users must provide their password in this field prior to clicking Apply to finalize the job.

E. Inbox Management and Approval Process

All tasks assigned to a user are displayed in the Tasks to Perform folder under the MyWorklist component. Upon fulfillment of the completion conditions for a task (for instance, the requisite quorum of approvals for a perform-signoffs task has been obtained), the task is deemed complete and is thereafter removed from the folder. Entries in the Tasks to Perform section are color-coded to assist the engineer in prioritizing tasks according to their duration. Black signifies that the work has no length. Green indicates that the task's length has not yet been surpassed.The color red indicates that the task's time has been surpassed. Upon completion of a task, it transitions from the Tasks to Perform list to the Tasks to Track list. When a user initiates a process but is not accountable for the active task, Teamcenter allocates the work to the Tasks to Track folder. Upon fulfillment of the task's completion requirements, the task is deemed complete and then removed from the folder.

F. Teamcenter in the Emerging Engineering Sector

Teamcenter enhances innovation and boosts productivity by linking individuals with the necessary product and process knowledge to operate efficiently within a globally focused product lifecycle. Teamcenter's established digital lifecycle management solutions are constructed on an open PLM framework.

To minimize expenses and explore foreign marketing prospects, contemporary leading firms are distributing diverse operational functions worldwide. Teamcenter enables immediate collaboration by allowing worldwide teams to connect, interact, and exchange information on-demand inside a community framework. With Teamcenter's community collaboration features implemented, global teams can: • Facilitate iterations more efficiently, obtain accurate solutions more swiftly, and expedite overall product development by up to 25 percent.

- Facilitate visual communication across several disciplines, empowering individuals to collaborate effectively in order to enhance decision-making.
- Involve suppliers, partners, and customers in your teams by facilitating secure information sharing that safeguards the interests of all stakeholders.
- Streamline your review and approval workflows, evaluate more new concepts, and enhance your change process by up to 30 percent. Facilitates comprehensive product lifecycle management. Businesses cannot utilize their product lifetime as a business asset without comprehensive visibility over the full lifespan.
- Upon implementation of the end-to-end solution, manufacturers can: • Enhance revenue growth by synchronizing decisions with market demands across the product lifecycle.
- Optimize time and expense throughout your product's lifetime by achieving comprehensive visibility into the operating phases.
- Master change by comprehending its effects on the entire product lifecycle.
- Accelerate market entry by automating prevalent activities that span numerous lifecycle phases.

III. REFERENCES

[1] Einger M, Dickopf Apostolov T, Schaefer P, Karl-Gerhard F and Keßer A 2014 Initial Approach for Sustainable Product Development Process based on Methods of Model Based systems Engineering Product Lifecycle Management for a Global Market pp 287- 300

[2] Duque Ciceri D, Garetti M and Terzi S 2009 Product Lifecycle Management Approach for Sustainability Proceedings of the 19th CIRP Design Conference -Competitiv Design pp 147- 152

[3] Bergsjö D, Vielhaber M, Malvius D, Burr H and Malmqvist J 2007 Product Lifecycle Management for Cross-X Engineering Design International Conference On Engineering Design (Paris: France)

[4] Corallo A, Latino M E, Lazoi M, Lettera S, Marra M and Verardi S 2013 Defining Product Lifecycle Management: A Journey across, Features, Definitions, and Concepts Industrial Engineering (Hindawi Publishing Corporation) p 10