

AI Team Reduces Bottlenecks and Updates GPI Software

Industry: Packaging design and manufacturing
Based in Atlanta
Over 12,000 employees
Annual revenue: \$4.1 billion
Operates facilities in 54 locations worldwide



Graphics Packaging International (GPI) designs and manufactures folding cartons, unbleached paperboard, coated recycled board, and microwave packaging and machinery. It is one of the largest packaging manufacturers in the world.

“The new system has streamlined a key GPI business process that is crucial to ensuring that the company runs as efficiently as possible in a highly cost-sensitive market. Requests for appropriations can now be efficiently routed and processed among GPI’s numerous locations in Europe and North America.”

PROBLEM

- Legacy software proved outdated and inefficient
- Internal communication when handling appropriation requests were too slow
 - Each request required sequential approvals using a hard-coded serial process

SOLUTION

GPI partnered with Architecting Innovation for one year to address these technological issues. During this time, AI recommended and implemented new a requisition approval system using NSERVICE Bus, Angular, and other technology stacks.

PROBLEM

- Approval bottlenecks have been greatly reduced.
- Significant time and money is being saved setting up and maintaining workflow rules.
- Programming talent is no longer needed for rule changes.
- Flexibility has been increased now that dynamic workflow rule changes are possible.
- Dependencies on outdated software have been eliminated.

THE CHALLENGE

The packaging market is highly competitive with pricing being the driving factor. Profitability depends primarily on the efficiency of a company's operations, but Graphics Packaging International's (GPI's) system for handling internal appropriation requests was slow and inflexible. The system used a hard-coded serial process that required sequential approvals for each request. If a required approver happened to be on vacation, the process stalled.

Besides the bottleneck-inducing serial processing requirement, GPI's system for handling appropriation requests was also limited by relatively static definitions for approval workflows. Changes in an approval chain required coding to implement and it was not practical to make changes to workflows while requests were "in flight."

What's more, GPI's aging system was based on older technology with the primary platform being InfoPath 2007. Upgrading InfoPath might help some, but the InfoPath platform has been capped by Microsoft at 2013 with some lingering incompatibilities with modern mobile devices.

GPI's existing workflow management system for handling appropriation requests was:

- Prone to bottlenecks
- Costly to maintain
- Based on aging infrastructure software

PROJECT GOALS

GPI needed a sophisticated workflow management system that could break the serial approval bottleneck by enabling an appropriation request to travel on multiple parallel approval tracks simultaneously. The desired routing of a request was complex, allowing branches in the approval chain and calling for a request to potentially travel both horizontally and vertically through the organization chart as the request was updated and approved.

The goal was to make workflow rule modifications flexible, easy, and dynamic, while permitting rule changes to be made while requests were in flight. Changes should not require coding or necessitate delays in workflow processing. Furthermore, the system should be based on a modern software architecture.

The requirements:

- Branching approval chains
- Parallel processing of workflow tracks
- Simplified, dynamic workflow modifications
- Modern underlying software

WHY ARCHITECTING INNOVATION?

The CTO of GPI, Seth Roach, had had great success using Architecting Innovation (AI) to implement a previous accounting-based application. That project had been a direct referral by Particular Software, the creator of NServiceBus, an industry-leading Enterprise Service Bus (ESB) solution. AI had used Particular's NServiceBus to implement a number of projects requiring highly-scalable and robust micro-service architecture-based solutions, so the company had the requisite knowledge and experience.

To implement the accounting project, AI had utilized Particular's NServiceBus to great success, and GPI's CTO knew he wanted an NServiceBus-based solution for a new and improved appropriation request tracking system, his goal being to move his internal development team off of monolithic applications and onto messaging-based architectures.

On the accounting project, AI had proven their ability to work as a team with GPI's internal developers, facilitating a smooth transition upon project completion. That and AI's experience with NServiceBus made the vendor selection fast and painless.

AI's qualifications:

- Extensive NServiceBus and micro-service architecture expertise
- Proven ability to work with GPI's internal development team

THE SOLUTION

The new solution uses NServiceBus sagas to manage the actual status and orchestration of inflight workflows. A "saga" is one of the primary concepts of Enterprise Service Bus technology such as Particular's NServiceBus. In the case of GPI's new requisition approval system, NServiceBus sagas were used to keep track of all the states and statuses for inflight approval flows across all of the users responsible for monitoring, approving, or implementing appropriation requests.

The new system allows users to request funds for their projects and, based on the criteria for approval of their particular request, dynamic, parallelized approval-based workflows are created. The workflows allow for typical approval and denial steps, but also allow conditional branching and unlimited parallel paths to final approval. As steps are completed notifications are automatically sent to affected personnel.

Besides facilitating the initial entry of new requests, the Angular-based front end for the new system provides dashboards for reviewing the inflight status of workflows. The interface also includes facilities for communication and collaboration among various approvers along an approval chain.

The solution architected by AI uses SQL Server to keep track of the required order, conditions, and precedence of approvals in the various workflow chains. Updating the needed paths for approvals is accomplished via an Angular-based interface that facilitates easy updates to the database. With that administration front end, GPI can:

- Insert new steps at any level or parallel path
- Delete previous and not-yet executed steps
- Re-assign step approvers, including approval delegates

It is even possible to edit workflow approval paths while applicable requests are in flight, so the system is simple to administer and easily adapted for changing circumstances. Code changes are generally not required in order to alter workflow paths and rules.

SOLUTION TECHNOLOGY STACK

- Angular
- ASP.NET MVC
- ASP.NET Web API
- NServiceBus
- Entity Framework
- SQL Server

SOLUTION DETAILS

- Modern Angular-based front end
- NServiceBus sagas manage status and orchestration of inflight workflows
- Appropriation request approval chains can be conditional and employ parallel approval tracks
- An admin tool simplifies and streamlines edits to approval chains that are kept in SQL Server

RESULTS

The entire project was completed in just one year, with a significant transfer of knowledge and expertise from AI messaging based architecture experts to GPI's internal team.

The results allow GPI, a large company operating in 54 locations worldwide, to streamline a key business process, crucial to ensuring that the company runs as efficiently as possible in a highly price-competitive market. Approvals can be efficiently routed and processed among GPI's locations in Europe and North America.

All key project goals were accomplished. Appropriation request approvals are no longer bottlenecked through an unnecessarily serialized approval process; they can proceed through multiple conditional, parallel tracks simultaneously. Due to the new workflow rules engine, changes to rules no longer require code modifications. In part as a result of the success of this project, GPI has since retained AI for two additional projects, an SAP-Salesforce interface and an invoice batching system.

Looking to create your own success story?

Request a consultation below, and someone from The AI Team will reach out shortly. If you'd like to learn more about AI's services, [click here](#).

[Request a Consultation](#)