



USE CASE: LHP BUILDS AUTO GENERATED, WEB-BASED REPORTING FOR FUNCTIONAL SAFETY TESTING

CASE STUDY



CHALLENGES – CONVERTING MANUALLY-INTENSIVE POWERPOINT FILES TO ELEGANT WEB-BASED APPLICATIONS

TE-6, the Functional Safety Verification List, was a PowerPoint file used to record the necessary data and completion of steps. The document consisted of a list of systems and a corresponding set of data. Project information and approvals were also captured, documenting the name of the engineer who approved the data.

The existing process relied heavily on manual procedures that had to be performed by multiple people collaborating into one document, with one gatekeeper receiving pieces of content from a variety of people. The gatekeeper then had to populate the correct content into the document, in the proper order. These manual steps had to be performed correctly for all seventy (70) systems listed in the document.

The project leader (PL) for the project determined the list of systems that needed to be captured within the document. The PL then manually populated the document with those systems, each system represented by a row of blank answer sections that needed to be properly completed. Then, the PL would have to determine which engineer knew the most about each system. The PL manually compiled those names into a list that cross-referenced the engineer(s) to their area(s) of expertise, populated that list into an email communication, and then sent out the template of this document to every engineer on the list, identifying which engineer was to complete which system.

ABOUT THE PROJECT

Industry

- Automotive

Company Name

- U.S. Automotive Manufacturer

Tools/ Technologies/ Skills

- Python, Django, PowerPoint

Goals of the Project

- Modernize Customer's legal process for testing

Application Area

- Web-Based Applications, Functional Safety Verification

Each of the engineers would individually complete their assigned sections—usually one or two sections per engineer. Then, each engineer would email their file back to the PL. The PL had to: 1. Open each individual return email; 2. Open the enclosed attachment; 3. Use copy-and-paste to extract the appropriate data from each returned file; and 4. Compile all that data back into a master file, in the proper location, and in the proper order.

This all-manual process would take hours and was quite vulnerable to human error. One of the challenges was that the engineers were required to adhere to very specific visual format requirements for each section, and many of those format requirements were not readily apparent or were difficult to understand and maintain. It was challenging to comply with the format requirements accurately and completely. Even the font name, alignment, and size, had to remain compliant despite the use of an all-manual tool that had no built-in safeguards to help prevent undesired changes. It was like driving on a steep mountain road without guardrails. Changes would often creep in somewhere in the loop from the PL to the engineers and back. The user could accidentally slip and alter font selection and size through nothing more than using the wrong type of paste option or an erroneous mouse click, often without the change being readily apparent.

THE SERVICES LHP DELIVERED

LHP delivered a web-based solution for TE-6 that solved two primary problems:

Auto-Generated Reports

The web interface allows each engineer to insert their data without having to manage formatting, and then the tool generates a properly formatted report at the end. Separating formatting requirements from the data itself greatly reduced the time required to complete the report, freeing the engineers to focus on the accuracy and completeness of the data.

Consistency

Separating the formatting requirements from the data and placing the report generation logic in the script also greatly increased the overall quality, consistency, and reliability of the final reports. The tool itself became the “guardrails,” preventing an unauthorized user from accidentally violating format requirements.

LHP also built an internal site that the customer could go onto that was compatible with their sign-on process.

HOW LHP'S SERVICES IMPROVED PRODUCTIVITY

The TE-6 solution converted what used to be a very manual and human-centric PowerPoint-based document into a simple web-based project workflow solution that helped eliminate human error and saved significant time. This work also served as a valuable foundation to build upon for addressing the more complex needs of their next document conversion project.

RESULTS AND FUTURE PLANS

LHP delivered a web-based solution that accomplished the following:

- Seventy (70) web-based system processes were created that aligned to the legal processes formerly done in their manually updated PowerPoint file.
- The solution was built into their virtual server farm and delivered as a web-based solution.
- The solution supports the auto-generation of reports, from updates to management approvals.

As of November 10, 2021, the last project was being wrapped up and code work was completed. There were still a few release issues being worked out, and testing on the last report started the following week. Testing for the latest documents are still in progress. As a result, we expect a few more formatting updates to the reports.

LESSONS LEARNED

- The TE-6 report has been in use for over a year. Reception to it has been positive. From a project leader's perspective, it has saved the customer a lot of time.
- The customer has dozens of different TE reports that must be created and managed, and they update the document formats annually. As of November 2021, LHP had converted five of them to the web-based solution. (None of the other TE reports are as complicated or receive as many employee inputs.)
- To aid the customer in getting the project up and running as quickly as possible, LHP utilized a virtual

machine that we continue to support. The long-term application should be moved to a server that is controlled by the customer's IT team.

- Having a single point of contact made development much easier. Many engineers have had conflicting opinions on how to implement features, and when left to the group, they often wanted LHP to come up with a solution that satisfied all their requests. It was much easier to identify the most important solution and work with a single point of contact.

MEETING THE ADDED CHALLENGES OF TE-7-1

Building upon the TE-6 work, LHP is also converting for the customer a TE-7-1 report, Vehicle Control ECU Development Schedule (Overall Cooperative Control). This document is much more complex than the TE-6 described above:

- A single TE-7-1 is tied to a specific car model and year.
- In its present form, it is essentially a timeline-based calendar with rows stacked below the timeline for each system, all created and maintained manually using clipart placed in a specifically formatted PowerPoint table.
- Each system row gets expanded into a sub-report that consists of a page of its own with its own timeline, formatted in similar fashion to the parent user interface. The TE-7-1 report is three layers of drill-down deep, but it is similar to the TE-6 in illustrating the broad scope of the systems documented. All of this work was being performed manually, in manually formatted PowerPoint tables,

- using manually drawn lines and clipart for both iconography and slider controls.
- In addition, the data are tightly interwoven with each other. For example, a single data point on the highest level of the PowerPoint is directly tied to output graphics on the more detailed lower-level pages that themselves consist of multiple data points. At the same time, these data points impact the data in other high-level rows on the same page.
 - Presently, the customer manually creates and maintains multiple 7-1 reports simultaneously, reflecting each model car they are building. Also, each report is typically updated at eight events (gateways) over the two-year development cycle for that particular model and model year, where the data from the previous event report is manually brought into the next one. The customer modifies the latest copy to show what has been changed, while also preserving the historical data captured in previous versions.
 - Many of the graphical elements in the report illustrate deliverables and their due dates, with the documentation of progress steps carrying particular importance; for a given step in the progression, if all other elements are further along, the project is graded by its least progressed element. (Think of it like an ocean ship convoy which is only as fast as its slowest vessel.)

Due to all this complexity and multiple changes by the customer, delivery of this project was delayed. The value in this tool is the collaborative document-building and automatic Microsoft Office formatting capability that LHP brought to the project. At this early stage of

the most complex report, our focus has been on getting this first iteration working. The reports themselves are specific to the customer. We will have a better idea of what needs to be refined as the customer's engineers test it over the next couple of weeks.

Although this solution is specific to this customer, methodologies and parts of it can be applied to other customers trying to solve similar problems.

This solution also eases the customer's training burden. It makes it straightforward to generate a report without first having to train the user on complex formatting rules.

The most effective customer motivators for adoption include:

- ease of use
- automation of grudge tasks
- fewer screens or mouse clicks
- less opportunity for accidental error
- interlocking system safeguards taking the place of "consensus by committee"
- time savings

However, the biggest motivator is consistency. The tool enforces standards compliance by empowering the customer to do things only one way: the right way.

CONCLUSION

This case study tells the story about an evolving and increasingly complex project. Even the client admitted that the project experienced an incredible amount of scope creep. LHP delivered on their commitments, which speaks volumes about our willingness and ability

to be a true partner and pivot with our clients, even when their future-state vision is being both informed and driven by our work.

LHP has clearly delivered a transformational workflow solution to the client. It is so valuable that additional client teams have requested their workflows be incorporated into these solutions. The value proposition reflected in the client's organic enthusiasm for LHP's products and services is undeniable.