Powering the Virtual Assembly Line

BY JOHN CHANEY

A little more than a century ago, Henry Ford revolutionized the concept of manufacturing by introducing the assembly line at the Highland Park, Mich., plant of his Ford Motor Company. The idea was to speed the production and workflows behind the creation of automobiles by using interchangeable parts and following a series of logical steps to assemble those parts together into a finished product. Today, Ford's assembly line concept is a mainstay of manufacturing worldwide—from cars to furniture, computers and more.

No Single 'Factory Floor'
Unfortunately, the assembly line concept has not found practical applications across all areas of business and commerce. The construction industry is a perfect example.

While the physical assembly line created a centralized area of manufacturing workflow, construction projects are not created on a factory floor. The construction industry is mobile, with worksites spread across the land. Work environments vary from urban to rural, from hot climates to cold and from above ground to underground. No two construction projects are the same, so there is no single assembly line that can be built to accommodate the industry.

While there is no standardized construction project, all projects feature standardized processes. Each construction job shares commonalities, and each has specific tasks that need to, or should, happen in a certain order so the project can be completed properly and efficiently. Setting up the project, putting together budgets, assembling labor and equipment, selecting vendors, tracking job costs, sharing documents with team members, processing and communicating changes, paying bills and receiving payments are just some of the areas where standardization can significantly improve the efficiency of a project.

However, with literally thousands of tasks involved in any given job, creating standardized processes can be just as daunting as the project itself. Even more daunting is getting every single person involved in the project to agree on the best process or buy into a standard

set of steps to improve workflow. How can construction projects streamline workflows and increase efficiencies? How can they operate more like an assembly line without a factory floor? The answer is through technology.

Tech-Aided Advancements

Technology has been improving construction projects for generations. The hammer and nail was streamlined with the creation of the nail gun. The invention of the crane made it so that buildings once relegated to only a few stories by the limitations of ladders and pulley systems could rise to great new heights. Advancements in heavy equipment made it possible to complete foundations or frame structures in weeks, compared to months or years.

In the early days of computing, the technology behind CAD-assisted design programs were among the most advanced programs created. Later, the industry led with push-to-talk and other mobile communication devices that paved the way for many modern-day smartphone and tablet technologies. Today, many construction-specific software options are streamlining processes for accounting, estimating, project management and equipment management.

Up until recently, these systems had to be installed on a workstation, limiting access outside of an office. Yet as cloud computing and mobile devices become more prevalent, the workforce in the field can access and take advantage of construction-specific software systems. This

is leading to even more streamlined workflows and quicker turnarounds on construction data, financial data and the projects themselves.

Using modern technologies is becoming easier as well. Consider the Internet and websites. A decade ago, putting something online—information, photos, or a website to market or sell something—typically required an understanding of the intricacies of HTML programming, or at least hiring the services of someone who did.

Today, that concept seems like a distant memory as a host of new technologies are available that streamline website creation and the management of web content. There are site-builder programs with easy-to-follow steps. On the back end of these, forward-thinking programmers developed toolkits to condense many detailed HTML instructions into single processes.

Putting data online now can be as easy as moving text and graphics into pre-determined locations within content management systems. These processes often can be accomplished with just one or two mouse clicks. This is the definition of workflow in action: combining and streamlining complex tasks into simple procedures.

Organizing the Organization Process

While construction-specific software has enabled much quicker turnaround on processes and helped projects move faster and be completed more efficiently, another effect of this evolution is that construction companies

that adopt new technologies are able to do even more work, while projects themselves are growing in size and scope. The software behind these projects now has to keep pace with even more data, more people involved and more processes than before. The software has to grow with and adapt to burgeoning projects.

Software that is designed to automate tasks can grow complex and unwieldy to use. Add to this the fact that much of the work on either side of automation—the data-gathering that feeds the processes and the actions that need to occur as a result of them—is still manual and therefore prone to error and omission. The result is a collection of task-oriented automation tools that can take as much effort to manage as it does to simply complete the tasks.

To escape from the spiraling growth in complexity of the tools designed to tackle complexity, developers are building a new layer of intelligence into their software. In addition to automating key tasks, they are creating the capability for the user to define how one task leads to another, how information should flow during task hand-offs, and how individuals should be alerted and prompted into action.

Step by Step

Workflow processes allow software administrators to define and enforce specific rules and create user-defined steps for each task or sets of tasks needed. Each step can be assigned to a user, or group of users, and includes instructions,

due dates, notes and the ability to view the entire workflow. The history of each step can be recorded within the system as well.

These steps can be sequential, meaning the next step is not taken until the current person the task is assigned to completes the task, or parallel, meaning multiple people can step in and complete the task, or several people in a workflow group can "sign off" on a certain task or approval. The users to whom tasks are assigned can receive notifications and deadlines when their role in a task is needed.

Consider this simple example: Once a job purchase order is created, that purchase order can be automatically routed to the project manager for approval. The project manager would receive a notification and would be able to immediately approve or reject the purchase order. If the purchase order required a secondary approval (perhaps if it exceeded a certain dollar amount), then it would automatically be routed to the necessary party after the project manager signed off. Once all applicable approvals were in place, the workflow could be designed to automatically issue the purchase order, setting into motion the order and payment processes.

Of course, workflow steps could be as simple or as intricate as companies choose them to be. With step-by-step instructional text written into the workflows, end users can see what would happen if they chose option A or option B. This is similar to software installation "wizards" commonly encountered when installing a program on computers.

While predefined workflows are certainly giving users reliable guides to follow in day-to-day tasks, the new generation of workflow software is helping companies go beyond single-task automation. This software links tasks together, which in turn links the people of an organization together—creating a streamlined flow of reliable information and encouraging best practices and better collaboration throughout the organization.

These intuitive workflows are helping make the software very easy to use. Workflows operate in the background to combine multiple, complex tasks into simple steps that are virtually transparent to the user. That means effectively managing data in construction software today can be almost as simple as navigating the Internet or sending an email.

Open Access

The next step is to provide access to the software and these intuitive workflows to everyone inside (and even to the right people outside) the organization to create a truly collaborative work environment.

Cloud computing has opened up a host of opportunities to expand traditional construction software beyond the constraints of the home office. In deploying a web-based system, companies no longer have to download extensive software packages onto static workstations. Working in the cloud means users can access the software on any device—workstation, laptop, tablet or smartphone—with an Internet connection. Furthermore, users don't have to clog up their device's storage with a hefty program.

The data processed in the software is stored directly on a server and can be hosted internally by the company or externally through hosted services. In either case, the data is secure and encrypted, ensuring that those without the proper authority or permissions cannot access the software.

Meanwhile, those with mobile devices are realizing even greater accessibility. In addition to the hardware—laptops, tablets and smartphones—that allow remote access directly to the software while away from the office or on a jobsite, a number of mobile-friendly applications allow users to handle a multitude of functions. This makes it even easier to handle tasks such as submitting payroll information, entering time, ordering materials, sharing documents, scheduling services or creating work orders—all remotely, yet all tying directly into the full software program for immediate results.

These technologies have created a firm foundation on which to extend critical data to everyone, no matter where they are or when they need it. They also make it possible to further expand workflow concepts by opening them up to everyone. This means that everyone on a project team can have their tasks seamlessly interconnected to create a collaborative work environment that elicits input from all involved.

Constructing a Collaboration Circuit

It nearly always requires teamwork to drive a project to success. Any

kind of significant work rarely gets completed without input, participation and feedback from multiple parties. This is especially true in the construction industry, where multiple teams with dozens or hundreds of workers have to collaboratively band together to complete a project.

However, getting everyone involved in a project on the same page at the same time has been one of the preeminent challenges for the construction industry. Onsite project managers historically have worked from different sets of data than the accounting staff in the office, and in many

cases, different departments use different software. The first step to realizing collaboration is getting everyone to use the same tools. Yet, when it comes to software, this is easier said than done.

Many companies have attempted a one-system approach and implemented manual workflow guidelines. While these steps may make sense to one department, they might be muddled and overbearing for another. For example, project managers have often found it easier to enter their information into spreadsheets rather than access accounting software that requires navigating countless menus and modules, as well as a multitude of clicks to achieve simple data entry.

However, when software includes the ability to implement customizable workflows, buy-in and adoption from employees of all departments becomes easier to attain. These integrated workflows ensure that a project or action cannot move forward until everyone has done their part. Though this sounds like it would be a hindrance to projects, it actually streamlines work and speeds up progress due to built-in accountability and real-time progress tracking.

The shorter the learning curves and the fewer processes and steps asked of users, the better chance they will accept a one-system approach. That one system ensures everyone is working from the same data at the same time. Workflow prompts, alerts and deadlines ensure that the people

who are needed for a task are undertaking and completing it in a timely fashion. And by bringing everyone together with a uniform, virtual assembly line, it becomes easier to discuss issues and find proper resolutions to them when they do arise.

Setting up workflow processes in the software—how administrators want the processes to flow, the order of the steps, who is assigned steps, etc.—is perhaps the most cumbersome task associated with workflow software. But well-designed workflow systems offer logical, easy-to-use formats and are flexible in their ability to be customized to suit companies' needs.

Many forward-thinking companies are even extending this software workflow approach beyond their own walls by using it to work collaboratively with vendors, subcontractors and owners.

Transparency is critical to the success of workflow technologies. Whereas manual attempts to implement workflow processes throughout organizations can often fall flat, those that are integrated into the day-to-day software operations succeed in their subtlety. Much like Henry Ford's assembly line or the ease of navigating today's Internet, the best results are achieved when users don't have to think about how to arrive at their desired result. CE

John Chaney is CEO and co-founder of Seattle-based construction software provider Dexter + Chaney. For more information, email jchaney@dexterchaney.com *or visit* www.dexterchaney.com.