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Integrating In-House Software Engineers Into Your Organization's Culture

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Learning Objectives

- Discover the challenges that business leaders will confront to remain competitive
- Learn how to create a strategy for how to remain relevant in the rapidly changing AEC industry
- Learn how to build an innovative culture where team members are generating ideas that lead to action
- Learn how to use in-house software engineers to utilize Revit as a platform for doing more, better, with less

Description

As technology becomes more integrated into our daily lives, it is increasingly necessary that architecture, engineering, and construction (AEC) professionals develop industry-specific innovations to improve the workflow that delivers the built environment. Altering your team's composition will advance the level of technological integration into your practice for decades to come. Adding in-house software engineers and programmers to your team can facilitate a higher level of ideation, innovation, and computational design that transforms the uses of Revit as a software into an enhanced industry platform. This integration comes with hurdles that can be overcome through leadership, energy, and team-wide engagement. This lecture will explore how to solve challenges in the AEC industry by integrating software engineers into your firm's culture and pushing the way Revit was designed to serve the industry.

Speaker(s)

Jim Tavernelli serves as President and Chief Operating Officer of KLH Engineers PSC. He has led the firm's reinvention into an innovation centric practice executing its "technical strategy" that has fundamentally changed the way KLH completes its work. His leadership provides opportunities for every employee to be visionaries, advance ideas, and develop new technologies and processes each day. This approach has transformed the firm's culture while building an extensive set of software applications and modified workflows being applied in the AEC industry. He is a licensed Professional Engineer with a Bachelor of Science in Electrical Engineering from the University of Dayton and is a member of industry and community associations.

Alex Jonovski is a Principal and Director of Project Management with KLH. He began his career designing HVAC and plumbing systems, and through his leadership has transitioned into customer-centric Project Manager. Through his current position, Alex examines best practices and modified workflows that can enhance the delivery of design services and provide a greater level of collaboration among designers and contractors. He is a frequent speaker on integrated delivery models and leveraging data across the design and construction value stream. Most recently, Alex co-presented alongside Ratio architects on how engineers and architects can utilize technology to better communicate at the 2019 BILT NA conference in Seattle, WA. He has a Bachelor of Science in Mechanical Engineering from the University of Cincinnati.

Opening

Establish true north – what's your value?

"Technology by itself is not the disruptor. Not being customer-centric is the biggest threat to any business" – Alberto Brea

If you're not familiar, this quote is from a widely shared tweet that's accompanied with a few recent examples of industry changing brands. Alberto's point is that the newcomers leveraged technology, but specifically in a way that alleviated pain points for the customer. "Uber did not kill the taxi business. They did it to themselves with limited number of taxis and fare control". The old guard simply wasn't aware of (or cared to address) these industry-wide consumer issues that were so pervasive they were just begrudgingly accepted as part of the process.

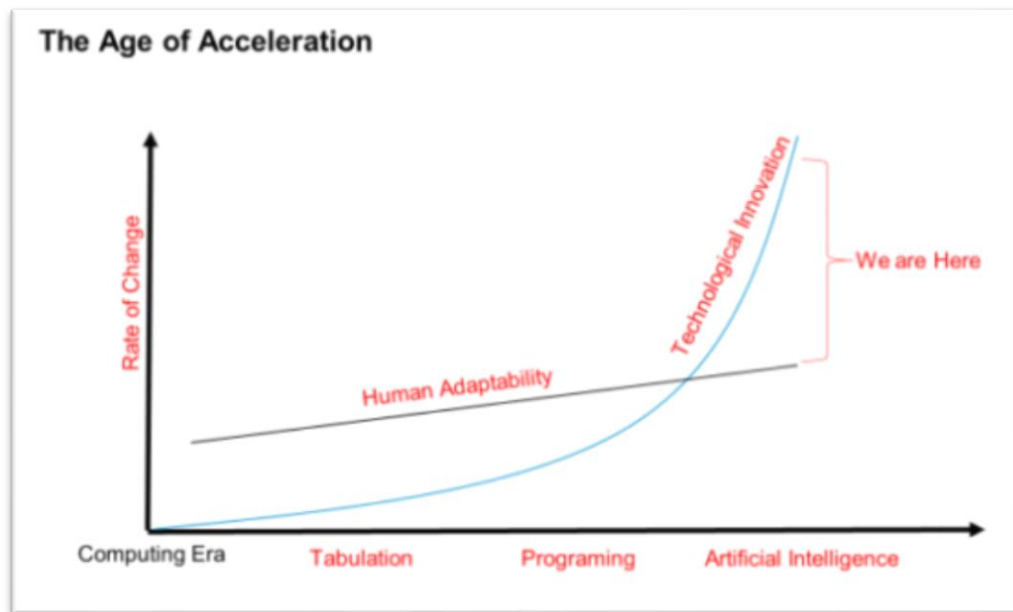
Take note that although Alberto covers a handful of industries, he does not offer up any examples from within building design and construction. It's assumed by your attendance, that you are a group that would embrace technological advancement, but there needs to be an understanding that technological disruption must be customer-focused first and foremost.

Discover the challenges that business leaders will confront to remain competitive

The Age of Accelerations

The age of accelerations is here. The cloud, machine learning, artificial intelligence, Big Data, and scalable distributed computing should all compel us to reflect on the prospects of the future more than ever.

In *Thank You for Being late: An Optimist's Guide to Thriving in the Age of Accelerations*, Thomas Friedman points out that the rate of change is not only accelerating within technology, but also in our markets and the environment. In today's world, it's easy to be overwhelmed by the rate of change, and many of us run the risk of being digitally disrupted. It's a matter of survival and the problem statement moving forward is: How do humans and organizations evolve and remain relevant in this age of accelerations?



The age of accelerations graph: technological innovation has surpassed human adaptability

Simply put, technology is evolving, under Moore's Law, faster than the average human being in society can adapt. In the age of accelerations, the issue is that the rate of speed isn't leveling off anytime in the foreseeable future. We must admit to ourselves that even the smartest among us can't keep up with the pace of knowledge discovery. Although our ability to adapt is improving, it can't keep up with the rate of change from the new era of computing powered by artificial intelligence.

The organizations and individuals who will evolve in this age of acceleration will be the ones who acknowledge what used to work in the past is unlikely to in the future. Many players in the construction industry have already taken note, while the majority have not.

Change is coming and it's coming fast, so get your business future ready. We must adapt – and that requires acknowledging our inherent limitations and accepting new challenges. To do this, you need do the following:

- Learn how to feel comfortable in a world that is constantly accelerating
 - Reflect on your leadership style and how you as a leader may need to evolve
 - Have your company act like a start-up
 - Create an environment where employees can be creative
 - Be willing to allow employees to spend time on non-billable initiatives
 - Prepare yourself for a range of scenarios, stay current and relevant
- Be confident in adopting new technology
 - Be willing to take risks and spend money on your people, your processes and your future
- Focus on delivering more value to your true customer
 - Recognize external opportunities and threats

- Act on the opportunities
- Question the obvious and explore the outrageous
- Act with humility
- Be willing to take risks and take on more responsibility
- Be willing to collaborate across the supply chain and build trust
- Defy existing contract law – it's counterproductive to a collaborative industry
- Establish methods to share data in a meaningful way
- Develop a bench of future leaders in your organization to leverage and scale
 - Be intentional
 - Communicate clearly and often
 - Play the role of a leader as a Preacher
 - Encourage participation
 - Enable, empower and support employees
 - Give autonomy and embrace failure

Ripe for disruption

Construction has the lowest digitization index, a measure of technological adoption, of any major industry, making it a big, juicy target for significant disruption. The billion-dollar question, though, is who will create the disruption? Will a construction company become technology savvy before a technology company becomes construction savvy?

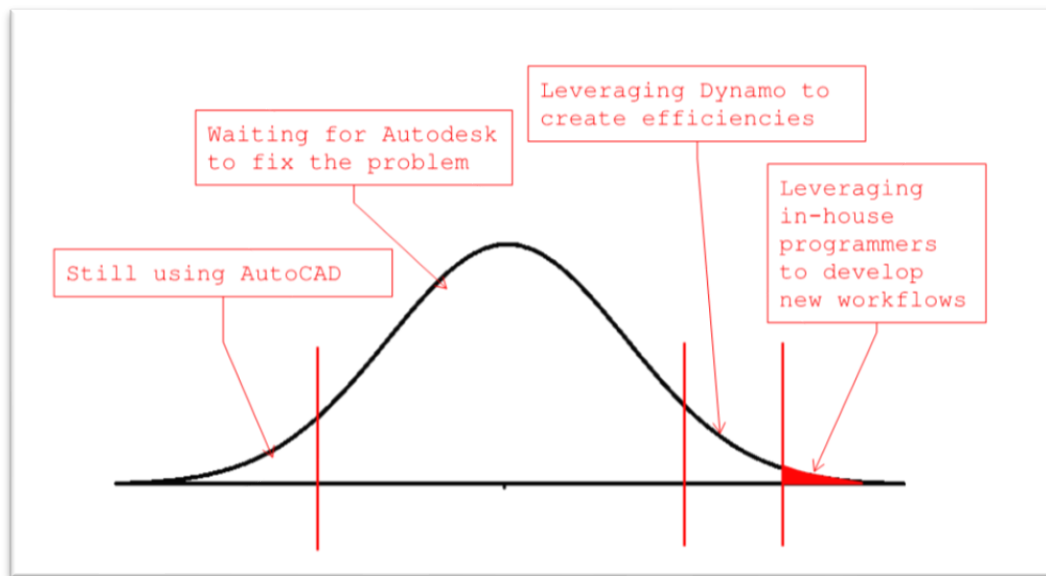
We believe it can be us, but it requires vision and strategy.

Learn how to create a strategy for how to remain relevant in the rapidly changing AEC industry

With an appreciation of those challenges, an organization needs to set a vision and establish a strategy on how to drive towards that destination.

The Bell Curve – A Distribution of the Industry

It's very realistic for an organization to find themselves in a position where their vision is not achievable with the means readily available today. Faced with that reality, and still the desire to achieve that vision, leaders in the company need to embrace a start-up mentality and create those means. That is a willingness to spend money, sacrifice short term profits, and take risks.



A view of the industry in terms of Autodesk platform adoption

As is many times the case, leaders may find that new technology must be created as part of that journey. It is only at this time the organization should begin considering the use of internal programming. Now it is not leveraging new technology for the sake of leveraging new technology. It is part of the strategy towards an envisioned future. This is necessary to ensure the development of a programming team that is focused, resilient, and scalable.

Making a vision tangible

That technology gap between current day and envisioned future can be the guiding stones to the development of a strategy. It's important to translate into initiatives that can be easily communicated, understood and measured.

Additionally, the organization will need to learn how to actually execute the strategy itself, since this type of purpose above and beyond completing the day-to-day work may be new to many. The adoption of agile methods involving scrum teams and kanban boards are examples that can be used. Again, the effectiveness of these tools is dependent on the development of a strategy first.

For example, announcing the adoption of a “data-driven project delivery model” can be seen as a destination, but it alone does little to guide how to get there. Creating initiatives such as “100% Revit by 2020” or “100% Calculations in a Central Database by August” and combining those with the training of agile methodology provides direction tangible enough for people to grab onto.

Empowering in-house talent

Through that exercise, leaders may initially undersell their ability to bridge that gap with the skillsets currently in the organization. However, they may be surprised to see they are closer than they think.

The clear communication of a vision and strategy is motivating in a variety of ways. It's the first step of a firm moving with intent and sets off a chain of events. This renewed purpose will probably cause some to leave the company but will be a powerful engagement tool for those that remain and lean in. Those that resonate will search for ways they can either lead or support. It's crucial to gain an understanding of individual strengths, show them how they can leverage that strength towards the initiative, and then get out of the way.

For example, there may be individuals who are already programming hobbyists or they're unknowingly creating smaller-scale efficiency tools for themselves. These "doer/programmers" can be a powerful foundation for the creation of a programming team since they can align the needs of the core business with the abilities of the development team.

The Search for Like-Minded Partners and External collaboration

No one company operates in a vacuum from the rest of the world. Regardless of size, scope or operation, every organization has interactions with others during the course of business. Clients, vendors, competitors, otherwise – the nature and substance of those relationships need to mature and align with the development of an organization that is driven towards a destination. The possibilities of that envisioned future are capped if driven towards in a siloed bubble. With collaboration towards company's inputs and outputs, then that ceiling of possibilities is significantly raised, as is the potential for industry wide change.

Learn how to build an innovative culture where team members are generating ideas that lead to action

Developing the strategy is the easy part. It's totally normal to feel great about the strategy thinking it's going to send the company to new heights. Unfortunately, it won't take root by simply unveiling the strategy on a magic Monday and expecting it to be heard, understood and subsequently executed. The leader's job is just getting started.

Culture eats strategy for lunch

Peter Drucker, the American management consultant, educator and author, famously stated that "culture eats strategy for lunch." If the culture is not strong and healthy, the best strategy in the world will not make a lick of difference. Leadership must focus on how to establish the desired behaviors within the company that will ultimately execute the strategy with energy, enthusiasm, courage, and grit.

Developing an intentional culture is not easy. It's why there are so many consultants and books in the world espousing to have the best 10 step solution to get your culture marching lock-step beside you. It requires an extraordinary amount of introspection. It starts with deciding how you will behave differently and how you will drive change through the organization. It takes guts and vulnerability. You have to put yourself out there. It will not manifest itself through posters on the wall. Leadership must be committed to start by executing the strategy in a top-down style, otherwise, like so many companies have experienced, everyone will inevitably get busy and the short-lived momentum will die. So how do you not let the momentum die? Lean and agile methods are perfect solutions to keep the energy high and the momentum going on the execution.

The Kanban

The Kanban is a workflow management method designed to help you visualize your work, maximize efficiency and be agile. In Japanese, “kanban” is literally translated as billboard or signboard. It originated in manufacturing, but it has become more widely known in the agile software development world. Awareness and education have led it to being recognized by businesses across various industries.

Leaders can establish a routine of daily kanban huddles by appointing team members to huddle around a board to track near-term, task-oriented “tickets” by verifying that work is progressing on a daily basis, and if not, resources can be deployed to help immediately. The tasks are designed to produce minimally viable products (MVPs) such that the team develops an agile, iterative mindset. The daily kanban huddle provides a foundation for driving cultural change as it encourages accountability and daily collaboration. Aligning a small team to the rhythm of daily huddles will enable the team to work and complete tasks quickly making quick progress toward a larger goal, and soon everyone will realize that great things are possible.



A typical daily kanban huddle

The pattern that will naturally emerge from the kanban is that most desired outcomes will require programming resources whether this is sourced internally or externally. In the event your organization is blessed with the dual doer/programmer talent, their time and attention will become a scarce commodity because everyone will want a piece of them. Their ability to create tools and workflows for the user, because they themselves are a user, is truly unique. Working within the Revit API can unlock the potential of automation and data-driven collaboration. Despite all the fantastic benefits from custom software development solutions, there are unanticipated consequences that require proactive leadership.

The Role of a Leader as a Preacher

Once the vision and strategy have been communicated, the most important role a leader can play during the execution is the role of a preacher. Leaders need to constantly speak to the company's goals with passion and conviction. You believe in the vision so profoundly that you would do anything to ensure its success. Leaders influence others by preaching the vision and values, reinforcing the narrative and promoting unity and a sense of adventure in a culture that is taking risks and reinventing themselves. This is particularly true when actively inspiring timid or skeptical employees to be vulnerable and get involved.

When software development is key to your strategy, fear and skepticism can begin to erode positive culture. This is the opportunity for the role of a leader as a preacher to be most influential. Be proactive in preaching:

- why automation needs to be embraced by the organization as an opportunity and not as a threat. Throughout history, innovation and automation have been a means to enhance jobs to bigger responsibilities. Similar to example of the bank teller and the advent of the ATM. Although the ATM eliminated the act of cash handling by the bank teller, it did not eliminate the job of the bank teller. Instead it elevated the bank tellers role to be more customer facing and consultative.
- that the company is becoming a technology company and not a software company. Without clarity, employees will create the narrative and the narrative can be that you are turning the company into a software company. Similar to the concern regarding automation, employees will perceive themselves to be on the outside looking in. Leaders need to get in front of this concern early and often.
- Encouragement to get involved. An employee does not need to have a programming proficiency to get involved. Nor will their contributions be measured in terms of an ROI. When seeking more participation, measuring ROI will scare them away and they will likely never engage.
- that bonus monies are not being depleted to pay for the software engineer you just hired. Be transparent with the company's intentions to invest in software and software engineering talent as part of the execution strategy. Be clear that those roles as being added so your employees can do more, better, with less, while positioning them to take on more capacity, thus not altering their bonus potential.

The intensity of presence of the preacher is greatest in the early days of the execution. The preacher can be characterized as the employees' biggest cheerleader. Leaders need to continuously find creative ways to preach the "why" and keep the energy and enthusiasm levels high. The most effective means to do so is by simply acknowledging the positive progress through celebrations.

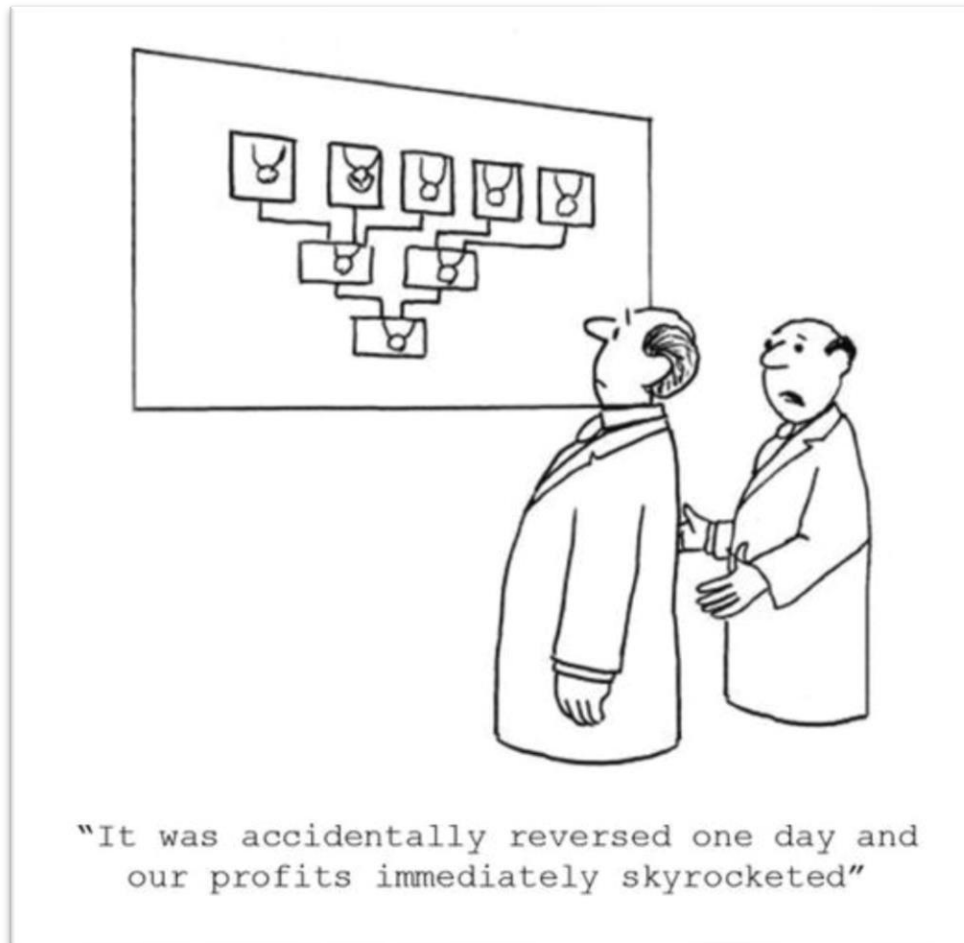
Celebrating Victories

It's no secret that celebrating is a great way to rally culture and build momentum. It is easy and can be very cost effective. There are a number of tangible and intangible benefits from celebrating in the workplace and how to do so should not be tricky. Simply follow your instinct and don't be afraid to be silly.

For example, spot awards are an effective way to publicly recognize an employee for positively contributing to the strategy or living up to the company's values. Additionally, an internally based social platform like Yammer, is an efficient means to share good news in an informal way that provides your culture with a sense of pride and fulfillment.

Finding your groove

With each passing day, the energy of the kanban strengthens and the team becomes more confident in their abilities to execute. Your preaching has empowered others to be vulnerable and plug into the energy. The celebrations have inspired the organization to believe in direction of the company and the culture is authentically engaged. This is the magic of the transformation process. Things that were previously believed to be impossible are now viewed to be possible. Your organization's culture is now executing the strategy bottom-up and you can't help but smile. The team is playing offense and it's time to accelerate.



It's not as easy as the cartoon suggests, but a culture that can execute bottom-up is a wonderful thing

Time to double-down

It's become obvious that the doer/programmer model is a differentiator, but how can it be scaled? Start by capitalizing on low-risk strategy to supplement the team with interns or co-op students from local universities. Then develop a process that converts ideas from the trench into workable tools within the users' Revit toolbar ribbon. Establish a tool deployment and training process and let the breakthroughs begin.

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The People

Prior to hiring anyone, the first step is to fully understand the strengths and weaknesses of the team. Organizations may be surprised to find leaders and programming hobbyists already within the walls. They just needed to be shown the opportunity and empowered.

Those internal "doer/programmers" can serve as a strong foundation for a software engineering team. As they begin to notch small wins, the desire to increase velocity will inevitably follow. Hiring co-op/intern software engineers is a relatively low risk strategy of increasing the capacity of the "doer/programmer" team capacity. These young software engineers bring fresh perspective to very old problems in the industry and are eager to embrace an innovative, "start-up" type of culture.

These software engineering co-ops will eventually graduate and hiring them full-time is a natural growth strategy to incorporate programming talent into an organization. With the initial team of software programmers developed in-house, incorporating additional hires becomes easier. New hires at this point would not need to be tasked with potentially insurmountable lifts. They just need to join the existing team that's working in cohesion to support the core business en route to the envisioned future. This is because leadership has already identified that vision, developed the strategy, and kick-started the expectations of how a software engineer exists within an environment that was previously void of custom programming.

The Process

The workflows to incorporate programming is as important as having programmers on the team, and they generally fall within a few different swim lanes.

There needs to be a standardized pathway for ideas for to be captured, vetted, and prioritized prior to beginning development. This process can also act as the handshake between the programming team and the rest of the organization. The influence of the firm at-large is key as it helps ensure the developed technology remains true to the needs of the users. Vetting and prioritizing is needed to keep programming focused on the strategic plan and vision that the firm is driving towards.

This can be achieved by having the core business users of the future tools to share their ideas by writing 'stories'. A story is built from a template and conveys the pain points they're trying to

eliminate along with features and business value of such a development. Review meetings are then set up for programmers and story authors to review the idea. From there, the stories are prioritized by a central oversight team and entered into the programming queue.

With the releasing of tools comes the need for awareness and training. It provides little value to develop a catalog of custom tools if the users of that tool aren't trained to effectively use them. Standardizing the release of tools on a recurring basis will help create structured rollouts and expectations on when updates should arrive. Embedding a summary of each of those rollouts within already occurring staff and department meetings, or as a replacement splash screen when opening Revit will also increase awareness. For training, 'how-to' documents should be developed and released alongside each tool. These should be accessible in a central location accessible by everyone, such as your private intranet. Ideally, trainings should also leverage the "just-in-time" philosophy and be readily available as the user navigates through the tool itself. For more in-depth items, these tutorials should be supplemented with hands-on training and demos.

Feedback will be inevitable as tools are released. An avenue needs to be created for feedback to be delivered and tracked back to the programming team. These bugs or suggested improvements need to be actively received with some type of follow up to the user that submitted that item. Without it, the core business may lose trust in the programming team.

To help expedite both training and feedback, the concept of 'minimal viable products' can be implemented. This technique releases early versions of tools prior to the development of all features. This allows for feedback to be incorporated as the tool is developed and correct issues along the way.

Recap

It starts with you

The addition of software programmers alone will not transform your firm into an innovative force. It begins with you. You, as leaders, need to set a vision and develop a strategy. Empower others within the organization to apply their strengths towards this vision and be open to sharing both the responsibilities and rewards. There will be doubt, second-guessing, and difficult moments. This is to be expected. There will be times when the team will be discouraged. Your role will be to bring the energy, share encouragement, and keep pushing.

Prior to hiring software engineers, you should first take stock of your current team. Leverage those already in the organization that have an interest in programming. Build the capacity of that team by surrounding those individuals with low-risk programming co-ops/interns. Bring those individuals on full-time as they graduate and use this as a foundation to build your development team.

Remember to work with your team to develop processes for taking ideas to functioning tools, training, and facilitating feedback. How your programming team works alongside the core

business needs to be structured in a way that allows everyone to operate towards their strengths.

Without the right context, simply adding programming could result in minimal returns. However, when you acknowledge your responsibility in crafting a collaborative and innovative company, and then create that environment, then the addition of software programmers could be transformational.

Kanban ticket examples

You're encouraged to take action as you walk out of this presentation. It's recommended to start out small and gain momentum with your team by notching a few quick wins. The team can then transition to larger goals as they mature and gain confidence. Below are a few ideas to get you started.

- Identify your doer/programmers
 - Send out a survey to find out who in your firm has programming experience or interests. You may find that some of your programming team is already on board.
- 100% Revit
 - This industry is becoming increasingly data-driven and this trend will continue in the coming years. You need to operate within a platform that allows you to design in a data-rich environment. If you're still operating in AutoCAD, it's time to make the shift to Revit.
- Create the Single Source of Truth
 - All too often, data lives in many different places and when things change, it then needs to be updated in many areas. Are your panel schedules programmed to update when you update the floor plan or single-line diagram? Do the accessories within your door hardware schedule update when you insert a particular door in your model? Create a single source of truth so that data lives in one location and leveraged in many.