WellEntry: Solving for COVID-19

Healthcare IT Expertise Helps Protect People from Infectious Disease

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Mike Muncy, Chief Information Officer, Aveanna Healthcare

Overview

A Global Pandemic Puts the World in Lockdown

A health-screening solution to prevent the spread of infectious diseases, WellEntry was 7Factor's rapid response to the COVID-19 public health crisis.

In March of 2020, the people of 7Factor – along with much of the nation and world – left our offices to shelter at home as COVID-19 emerged as the most serious global pandemic in over a century.

It was a time of great uncertainty, for us as for everyone. How bad would the pandemic get? Would doctors and scientists find a cure? How quickly could pharmaceutical companies develop a vaccine?

In the early days, the answer to these and so many other questions was: *We just don't know.*

Working From Home, Wanting to Help

7Factor was more fortunate than many during the pandemic's first year. We all stayed healthy and most of us are now vaccinated.

We are also lucky to work in a field well suited to working from home. With a global team distributed across the United States, England, and Japan, we were already adept at collaborating remotely. Our practice of using small, self-organizing, high-performing teams made the transition even easier.

So, after some initial scrambling to figure out details like how to care for the goldfish in our Atlanta headquarters, we adapted almost effortlessly.

For much of the world, however, the transition was not so easy.

We saw the impact through the eyes of our friends in other fields. We saw it in our children, who had to shift overnight to virtual learning. We saw it through our customers, most particularly healthcare companies doing their best to protect us all.

Working from home on our computers, we were safer than most, but we weren't at ease. With the worst public health emergency in generations raging around us, we desperately wanted to help.

A Customer Shows Us the Way

One of our longtime health IT customers is Aveanna Healthcare, the nation's leading provider of pediatric and special needs home care services.

Unlike 7Factor, Aveanna was very much on the front lines of the pandemic. Their 30,000 nurses, therapists, home health aides, and other caregivers provide in-home pediatric skilled nursing, pediatric therapy, autism services, enteral nutrition, therapy, and adult services to families with special needs.

For many of Aveanna's patients, an interruption in home healthcare service could provoke a health emergency. For all of them, it would severely decrease their quality of life.

We asked Aveanna what else we could do to help.

As healthcare experts, the leaders of Aveanna knew they needed stringent safety measures to protect their caregivers, their patients, and their patients' families: Careful cleaning. Masks and gloves. Frequent COVID-19 tests. Daily health screenings to check for symptoms.

Aveanna had implemented some basic contact tracing and symptom screening internally, bolting it onto their existing internal apps.

"We did a little work on our app," says Aveanna CIO Michael Muncy. "But we saw that this was clearly going to turn into another feature and another feature, and our own apps weren't really meant for this."

So 7Factor proposed to build a dedicated health-screening solution, with Aveanna as the product's first big client.

"We have a long relationship with the 7Factor team," says Muncy. ***"They do great work and are fantastic team members. We decided we would enter an agreement with them and use their product."***

The Health-Screening Process

The health-screening concept was simple enough. Before someone enters their workplace, school, or an event, screen them for known symptoms of COVID-19. Take and record their temperature. And ask them several questions provided by the CDC or other public health authorities, variations of which have since become familiar to most of us:

- *Have you lost your sense of taste or smell?*
- *Have you recently traveled to another country?*
- *Have you received a positive COVID-19 test in the past 14 days?*
- *Have you been in contact with anyone who has been diagnosed with COVID-19?*

For anyone with a normal temperature and the right answers to all the questions, let them enter. Anyone else is referred for further evaluation and needed care.

Maintain good records of all screenings, and, if someone later tests positive for COVID-19, use these records to determine who else might have been exposed. Analyze the records to spot any outbreaks before they get out of control. Use the analysis to evaluate the effectiveness of current mitigation strategies.

Scaling Beyond Paper Questionnaires and Spreadsheets

For very small teams or low traffic facilities, health screenings aren't a complicated measure to implement. Many organizations initially did so using paper-based questionnaires or spreadsheets.

Ad hoc systems like this were not, however, secure and scalable solutions for a lengthy crisis or larger organizations. Aveanna needed something better. A stable solution with rigorous HIPAA compliance. An efficient system that would scale to cover their 30,000 caregivers.

They also knew (and we knew too) that they were not alone in this need. Aveanna wanted 7Factor to build it, then make it available to any organization that needed a screening solution to protect their people.

We wasted no time. We got to work.

Problem

The Nexus of Urgency and Consequence

There wasn't time to spend many months or a year building out a solution. Implemented swiftly, an effective health-screening solution could help save lives while getting people safely back to work, school, and play.

But a poorly built solution might make things worse. It could create a false sense of protection, prompting people to lower their guards and expose themselves to greater risk.

It could expose sensitive protected health information (PHI), violating employee privacy and exposing employers to litigation. (This was particularly critical for HIPAA-covered entities, but important for all organizations.)

It could, at minimum, introduce undue back office burdens to organizations already under enormous pressures, some of them short-staffed and all of them trying to control their costs as much as possible.

There was a needle to thread here, a tension to balance between delay and error. The need was urgent, yet mistakes could have serious consequences. **We had to build it quickly, but we also had to build it right.**

A Shifting Public Health and Regulatory Landscape

We also had to contend with science's deepening understanding of the disease, evolving public health recommendations, and a shifting regulatory landscape. In the United States, with little national guidance outside of the CDC, we also had to allow for different state and local practices. And because COVID-19 is a global problem, we planned from the beginning to offer it across borders, adding that additional layer of protection for any organization that wanted it.

"We were developing based on what the brightest minds in infectious disease control were saying," **says 7Factor CEO Jeremy Duvall.**

"They had to turn around new features and changes very fast," **says Muncy.** ***"That turnaround to innovation is so key in a product like this. But they were poised to do that because they were already that firm who did that, unlike a lot of other firms that we've stayed away from."***

We knew that requirements would shift as we built the solution, and that an effective solution could never be one-size-fits-all. So we had to build a health-screening solution that we could custom configure for each organization, easily updating it based on the latest public health and regulatory guidance.

Three Non-Negotiables

This all led us to three non-negotiables for developing WellEntry.

1. Design it Right From the Beginning

Rushed design ends up costing time, and it risks low adoption and poor usability.

To make a meaningful impact on the spread of infectious diseases, WellEntry needed to be efficient and effortless for a wide variety of users in many different scenarios, and it needed the flexibility to adapt to evolving recommendations and requirements. We needed to craft a user-focused experience, and we needed to get that right from the beginning.

We also needed to design a solution that was simple enough to build fast without sacrificing quality.

Upfront time invested in UX design is *always, always* worth it.

2. Maintain Quality Development Standards

A crisis is the worst time to cut corners on quality.

People's health and lives were on the line, and WellEntry would inform critical public health decisions. It would also process and store protected health information.

We would build it on a secure, stable, and scalable architecture. We would establish an automated deployment pipeline for rapid CI/CD. We would implement rigorous testing. And we would preserve our practices and principles of Kanban and Kaizen.

3. Stay True to Our Generative Culture

All-nighters lead to poor quality code, and hustle culture is ultimately unproductive.

We stayed true throughout to our generative culture, which empowers our small, high-performing teams to do quality work while maintaining quality of life. The health and happiness of our engineers is essential to who we are, and we weren't going to sacrifice that, especially when they too were living through a pandemic.

Well rested engineers with balanced lives develop better software. They do it faster, too.

Solution

Solve a Big Problem (Once), Then Configure for Specific Use Cases

We knew our first customer for WellEntry would be Aveanna Healthcare. Most of their users were healthcare professionals working in a distributed workforce model, often traveling to multiple patient homes in a day, and most of them only rarely visited a central office. Each caregiver would screen themselves remotely, with Aveanna's administrators then able to view results.

But we wanted WellEntry to work well for many organizations, not only for Aveanna. We wanted to solve a bigger problem, once, then configure it for specific use cases.

According to Elliot Schoenfeld, one of the software engineers on 7Factor's development team, ***"WellEntry was solving the problem of, 'How can businesses and other organizations stay open in a safe way during the midst of the COVID-19 pandemic? And how can they continue to operate, but keep their people safe?'"***

If we could solve that problem, we knew, we could serve Aveanna well while also helping many more.

"We approached it as solving an industry problem,"* says Duvall, *"not doing a custom implementation job for a good customer of ours."

We anticipated that, in addition to use cases similar to Aveanna's distributed workforce model:

- **Factories and office buildings would use WellEntry.** Many people would arrive daily at designated entry points for in-person screenings, some with access to smartphones and other technology, and some without.

- **Schools would use WellEntry.** Parents would complete screening questions for their children, often prior to arrival or in the carpool lane.

- **Event planners would use WellEntry.** Large numbers of people would arrive at entry points for one-time events.

We also knew that medical science's understanding of COVID-19 would evolve as studies continued. And we knew that public health guidance would follow where the science led. WellEntry needed the flexibility to adapt quickly to this shifting landscape.

Our solution?

1. **Focus on solving the big problem of screening at scale for symptoms of infectious diseases.**
2. **Design it to be robust across many use cases.**
3. **Identify which requirements were likely to remain static, and which were likely to change.**
4. **Build it to be easily configurable across all fluid requirements.**
5. **Customize the implementation for each customer's use case.**

Design the User Experience Right from the Beginning

Mindful of the complex challenges of the project, Duvall reached out almost immediately to Justin Cullifer, founder of APG Emerging Tech, which partnered with 7Factor to provide user experience design and product management of WellEntry.

"User experience, user-centered design, and a rapid prototyping approach are the background I brought to the project," says Cullifer, *"and I think that really accelerated our ability to deliver."*

Cullifer began by asking a lot of questions about how Aveanna's caregivers would use WellEntry in their daily workflows.

"How did they start their day into the first patient's home, then the second, the third?" asked Cullifer. *"We digitally walked a mile in their shoes, so that the app works with them, rather than being some oddball tool that doesn't really integrate well into their workflow."*

He then expanded his discovery to consider other potential use cases.

"Aveanna's caregivers were pretty well equipped and connected because of EMR and other healthcare technologies," says Cullifer. *"But we began thinking about people in rural areas, and thinking about school districts where kids are being bused in from the countryside where they don't have cell signals. How would they use WellEntry?"*

If WellEntry was to make a meaningful impact on the COVID-19 crisis, it had to serve these users too.

"We knew that designing alternative use cases that accommodated people without technology was important," says Cullifer. ***"How can we design this thing so that anyone ranging from an elementary school student, all the way up to a senior citizen can use it with the least amount of explanation possible?"***

Use Rapid Prototyping to Optimize Design

Once initial discovery was complete, Cullifer began to design WellEntry, using Axure to rapidly prototype realistic, clickable, interactive wireframe experiences in a zero-code environment. He shared the prototypes with key stakeholders for fast feedback, long before a single line of code had been written.

"In an Axure prototype," says Cullifer, *"we can change in a few seconds what would take a developer hours or days to recode. It allows us to expedite the process and make sure we haven't missed any requirements."*

After several iterations and refinements, Cullifer landed on two primary workflows, with accommodations built in for users without smartphones or reliable Internet connections.

For users entering a facility with defined entry points staffed with trained screeners:

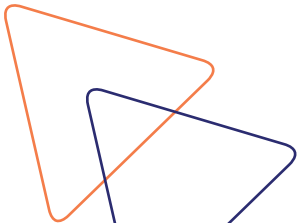
- **Complete a brief questionnaire on the smartphone app, or, when needed, administered by the screener.**
- **Display a personalized QR code for the entry point screener to scan, identifying the user with their screening record.**
- **Check their temperature with a forehead thermometer, then record it.**
- **Get cleared for entry or referred for further evaluation and care.**

For distributed workforces such as Aveanna's caregivers, working remotely in patients' homes, Cullifer designed an alternate, self-screening process:

- **Complete the questionnaire on the smartphone app.**
- **Take and record their own temperature.**
- **Get cleared to go to work or referred for further evaluation and care.**

After several rounds of feedback and refinements, all stakeholders signed off on the design, and 7Factor's engineers were cleared to begin development.

"The design isn't going to win any awards for its beauty,"* says Cullifer, *"but in terms of usability, it absolutely could. It works well across many use cases, and really requires very little training, which is a big deal."



Choose the Right Technologies and Frameworks for the Challenge

To develop WellEntry, we chose technologies that would allow us to work quickly, scale rapidly, extend and configure effortlessly, and maintain robust security for protected health information.

To fulfill these requirements, we chose:

- **TypeScript for its static type definitions, type inferencing, and type-checking, all of which would help us develop faster with fewer errors.**
- **Terraform for environment setup and infrastructure configuration, giving us simple scalability to support any volume of screenings.**
- **Actionhero for rapid, stable configuration of the backend API server.**
- **Vue for simplified development of the frontend user and administrative portal.**
- **React Native for the mobile app, allowing for easy cross-platform development.**

With the right tools in place, we got to work developing WellEntry.

Build It Fast and Build It Well

Development proceeded swiftly.

"It wasn't really difficult or new for us,"* says engineering manager Chelsea Green, who led 7Factor's development team for most of WellEntry's development. *"It wasn't anything we haven't implemented in other things that we've built. And with Aveanna already having worked with us for a number of years, we're very familiar with the healthcare space and its requirements."

Two months after the idea for a health-screening solution was first conceived, the first production version of WellEntry went live.

"The speed to market has been incredible from those guys," says Muncy. *"With a lot of product development, you put in a request, get in the backlog, and you're waiting months before you see even one feature. With the 7Factor team and the WellEntry product, they're turning around new features and changes very fast."*

"When it comes to implementing software and building things the right way,"* says Duvall, *"our process and our software engineering life cycle is so advanced that we can bring a brand new product to market in less than two months: in production, with site reliability, with the appropriate high availability switches in place. And that's a testament to the work that the team has put into how we go about building products in our process."

Customize with a Consultative Approach

As we had planned from the beginning, we customized each customer's implementation of WellEntry to meet their unique needs.

"WellEntry wasn't designed as a SaaS product that you buy out of the box," says Duvall. *"The expectation was that people would come to us and have a conversation on how to implement it, because it's different in so many different scenarios."*

"As a CIO, you have to have great partners to do your job," says Muncy. *"A vendor will sell you something, send you an invoice, and they're gone. A partner stays with you, and makes sure your needs are met on a continual basis. I can't speak highly enough about 7Factor. They integrated themselves thoroughly with our teams."*

As a software development services company, white glove treatment is the only way we know, and we had built WellEntry to be highly configurable in order to support such service.

This allowed us to create a health-screening solution that was both feature-rich and simple to use. WellEntry supports many diverse use cases, but any given implementation provides only what the customer needs.

"You're not just seeing a bunch of features that don't apply to you,"* says software engineer Amy Maraisane. *"You experience only what you need on the app and the portal."

Listen to Customers, But Think Ahead of Them Too

These close relationships with our early customers gave us a fast feedback loop that accelerated WellEntry's continued improvement.

"Instead of building a roadmap that was very static and very specific," says Duvall, *"I think we were much stronger for coming to market with creativity and saying, 'Hey, so you tell us what you want and we'll change it.'"*

There were some surprises along the way.

Pre-Arrival Screening Through the User Portal

In our original conception, WellEntry's app was for screening, and the user portal was for account creation and records review. But as adoption grew, many users requested the ability to fill out their screening questionnaire through the web portal instead of in the app.

We responded quickly to add this capability, then rethought our original division of roles. We concluded that the app and portal should be more thoroughly integrated, and we've since been working to make this so.

Printed QR Codes Prove More Popular Than Planned

To accommodate users who did not have smartphones or reliable Internet connections, Cullifer included an option to print out personalized QR codes rather than displaying them on a smartphone. This avoided delays while a screener looked up the person's record. The feature proved more popular than Cullifer had anticipated.

"The QR code idea gained a lot more traction than any of us were expecting," he says. *"A daycare client in Canada printed out QR codes for each of their students and attached them to their backpacks. They scan them every day when they screen their kids for symptoms."*

Vaccine Tracking

Customer requests and feedback guided many of WellEntry's improvements, but there was one feature we added despite a pronounced lack of interest from our customers.

Prior to the approval in the United States of the Pfizer, Moderna, and Johnson & Johnson COVID-19 vaccines, we anticipated that organizations would want to track the vaccination status of their people.

"We asked a bunch of clients and did a lot of focus groups and surveys," says Green, *"asking what they would want to see for vaccine tracking. We got literally zero interest. No one even wanted to hear about it."*

Despite the complete lack of interest, we were convinced that vaccine tracking was an important feature for the big problem we were trying to solve. Vaccine tracking would give customers another tool to keep their people safe from disease.

"We went ahead and built vaccine tracking anyway," says Green. *"And pretty soon after the vaccines were approved by the FDA, we got a ton of requests for vaccine tracking. So it was cool to see that we had anticipated the need for something that ended up being useful."*

"That was a great example of us knowing our customer," says Maraisane, "and providing the solution ahead of time."

Results

The Ripple Effect

WellEntry is currently keeping people safer at a wide variety of organizations, including:

- Caregivers and patients at Aveanna Healthcare and several smaller home healthcare providers
- Factory workers and other staff at Wise Foods factories
- Hospice and palliative care providers and patients, as endorsed by the National Association for Home Care & Hospice
- Office staff at mortgage credit score tech firm CreditXpert
- Schools, daycare centers, and residential counseling services for children and families
- Government entities such as the Metro Atlanta Chamber of Commerce

As of May 2021, **WellEntry has screened over 200,000 people and referred nearly 5,000 for further evaluation.** Not all of those 5,000 will have gone on to receive a positive COVID-19 test, but for each one who does, WellEntry prevented them from inadvertently infecting their fellow employees, patients, students, or customers.

WellEntry's daily screenings also encourage a culture of health and safety awareness. Prior to the COVID-19 pandemic, many people, particularly in America, would go to work sick, believing they "weren't sick enough" to stay home. But WellEntry encourages everyone to consider with greater care the impact of their own sickness on the people they come in contact with.

There are too many variables to know just how many lives have been saved by WellEntry, but we're confident that many have.

"For every one person that WellEntry flags and they were in fact positive, WellEntry saved lives,"* says Schoenfeld. *"And that's the core principle that's very, very impactful."

If we've saved even one life, then all the work has been worth it.

An Evolving Vision of Infectious Disease Prevention

It remains unclear if or when COVID-19 will cease to endanger humanity. Many scientists now predict that it will become endemic, though treatment and vaccinations will greatly mitigate the threats to health and life.

What is certainly clear is that infectious diseases will continue to threaten humanity, as they always

have. In a hyper-connected global society with a booming population straining the resources of a planet undergoing rapid climate change, pandemics like COVID-19 are likely to become more common.

We hope that WellEntry can support a larger shift toward a more proactive culture of disease prevention in all areas of our lives.

"We have a wellness division that we were able to launch this year," says Aveanna's Muncy. *"Companies are seeing the value of tracking employee health.* ***Helping ensure everyone is healthy and has had their vaccines is going to become a big deal, especially for production facilities and frontline workers. WellEntry is poised to be in this space."***

"I would like to see it become an integrated part of each organization's workday," says Cullifer. *"What else would we like to know on a daily basis to make sure people are okay? Now, it's so simple. And it's so cost-effective.* ***What better time than now to start getting that sort of pulse on the organization?"***

People are Meant to Be Together

In the meantime, here at 7Factor, it's deeply satisfying to know WellEntry is helping to keep people safe as they come together to work, learn, or play.

"People are not meant to be apart from each other," says Maraisane. *"So it's nice to be a part of helping people be in their communities and be working."*

"I have a son who's 14," says Eric Turner, another 7Factor software engineer on the WellEntry team. *"And it seems like every other week his school is finding somebody who's got an infection. And then school is canceled. Plans are disrupted. It's very detrimental to all parties, including the parents.* ***WellEntry can help people stay in school. So I'm really proud to be a part of a real usable solution for schools."***

"Aveanna's caregivers are going out into the field to care for people with all sorts of medical issues and special needs," says Green. *"They go to these people's homes and spend time treating them and doing all sorts of services for them. So it's really nice to know that WellEntry is helping them continue to provide those services with some level of knowing that they're safe."*

"I don't want to make people sick," says Duvall. ***"WellEntry serves as a constant reminder that you need to be safe and protect the folks around you. If WellEntry encouraged one random person to think about that and make a better choice, then I consider that an incredible win."***

Whatever the future holds, 7Factor wants to do our part to protect people from disease: through our work with our healthcare IT customers, through our continued development of WellEntry, and however else we discover our talents can best be applied to keep people healthy and well.

We build good things

Let us show you how