

The Ultimate Guide to Virtual Queue Management

Why Waiting Feels Like Forever

Goldfish notoriously have horrible memories. Their average attention span has clocked in at around nine seconds. Humans had better focus for quite some time: According to a Microsoft study from 2000, the average human attention span was 12 seconds at the start of this century. But much has happened since then, including a digital revolution that has reconfigured virtually every aspect of our lives and – quite literally – our brains.

When Microsoft reinvestigated human attention in 2015, it found that our average attention span dropped from 12 seconds to eight.¹ That's right: we now collectively have an attention span shorter than that of a goldfish. With the rise of the internet and, in particular, mobile devices, we've become accustomed to having access to what we need at our fingertips. So, it shouldn't be too surprising that humans have become far less patient.

While digitization has transformed the way we operate, another aspect of our lives has remained frustratingly stagnant: waiting. In the U.S. alone, Americans spend **37 billion hours waiting in line each year**, which amounts to about 3 years over the course of a single person's life.² With attention spans on the decline, all that time spent waiting is going to feel a lot longer.

Yet, for businesses, queues are a "double-edged sword."³ Long lines aren't always bad. When it comes to generating demand, a wait built into your customer flow can increase the appeal of a specific product – or even build hype for your entire business. Think of that popular brunch place that always has a line out the door or the people who camp out overnight to get their hands on a new limited-edition sneaker.

But on the other hand, even an objectively short wait can create a frustrating experience, leading to cascading negative effects that ultimately hurt your bottom line. A recent Consumer Reports survey found that 66% of respondents were "highly annoyed" by long waits and that almost 50% of people stop mid-transaction when they encounter bad customer service.⁴

So, in a world that's less patient, addressing the waiting experience at your organization is increasingly mission critical. With a **virtual queue management system**, you can delight your customers, guests, visitors, or users right from the start.

In this guide, we'll delve into the world of queuing psychology (yes, it's a real thing) to understand the factors that can make waiting a pain, and show you how you can effortlessly revamp your queues to make guests happier.

¹ McSpadden, Kevin. "You Now Have a Shorter Attention Span Than a Goldfish." Time. May 14, 2015.

² Stone, Alex. "Why Waiting is Torture." The New York Times. August 18, 2012.

³ Lam, Bourree. "The Logic of Long Lines." The Atlantic. January 28, 2015.

⁴ "The problem with customer service." Consumer Reports. July 29, 2015.



Here's what we'll cover:

- A brief history of Queuing Theory
- The psychology of waiting
- How to automate your queue management
- The holistic benefits of a virtual queue management system

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The History of Queuing Theory

A Formula for Waiting

No one likes to wait. And in today's digital-first society, waiting feels more torturous than ever before. Businesses have tried all sorts of tactics to reduce the wait – or at least make it seem shorter. We've largely grown oblivious to these calculated distractions, but television screens, music, or even mirrors (first popularized in the slow-moving elevators of early skyscrapers) are found most places where you have to wait.

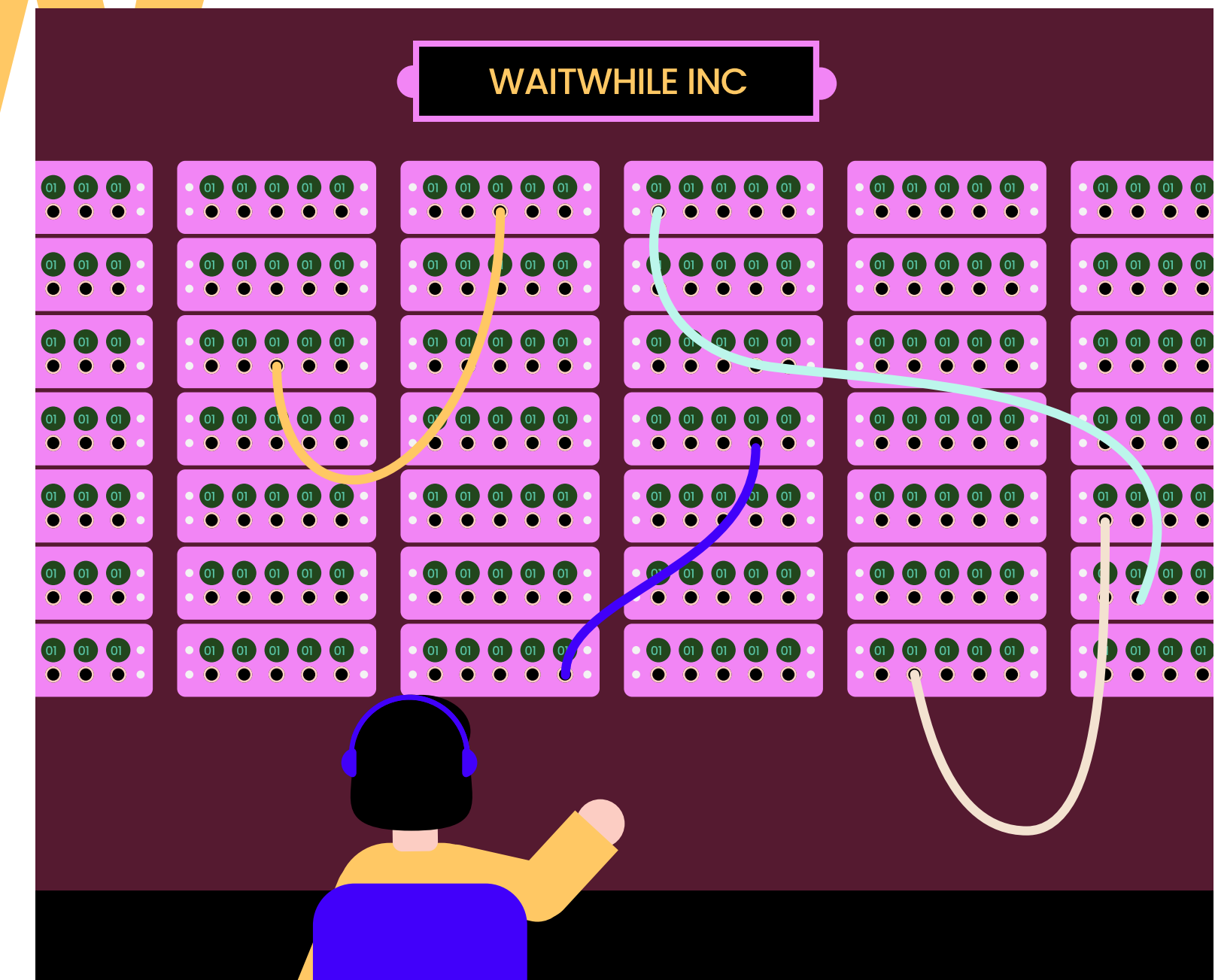
But there's a reason why "elevator music" has amassed such a negative association over the years. Because distractions only go so far. The fact of the matter is that **people simply hate waiting**.

Out of this frustration emerged the field of Queuing Theory, which is the study of the mathematical underpinnings of how queues function. The field dates back to 1908 and is, unsurprisingly, rooted in technological advancement. At the time, Agner Erlang, a young math teacher, met Johan Jensen, an amateur mathematician and the chief engineer of the Copenhagen Telephone Company (CTC). The two struck up a conversation – and then a friendship – and soon Erlang was working for the CTC trying to resolve phone systems getting overwhelmed by demand. Humans do, after all, like to talk.

1908 Now

Back then, phone calls were routed manually by human operators who would connect the caller to the call receiver by means of jack plugs and cord boards.

The challenge lay in determining the number of circuits needed to provide an acceptable level of telephone service—basically to keep phone users from waiting "on hold" for too long before being connected. In addition to the number of circuits, Erlang also wanted to know what volume of calls a single telephone operator could process in a given period of time.



Over the course of 11 years, Erlang published three seminal papers that basically created the field of Queuing Theory. In 1909, he wrote "The Theory of Probabilities and Telephone Conversations," which showed that the Poisson distribution (a probability calculation) can be directly applied to telephone traffic. In 1917, he delivered the "Solution of Some Problems in the Theory of Probabilities of Significance in Automatic Telephone Exchanges," which contains his classic formulas for call loss and waiting time.

Finally, in 1920, he published "Telephone Waiting Times," the foundational work on the subject. Erlang's studies, formulas, and theories were so important to the field of telecommunications that to this day the international unit of telephone traffic is known as "the Erlang."

Mathematicians and statisticians have since followed in Erlang's footsteps to tackle long queues and have developed a slew of probability formulas.

If you really dig into the field of Queuing Theory, you'd be surprised by just how much research exists—not to mention the (at least) dozens of different formulas to consider. But most of us aren't mathematicians. We're simply looking for the best way to make our customers, guests, students, or visitors happy by making their wait as pleasant or short as possible.

So, we're not going to bore you with the math. But do know that your queues can be deconstructed mathematically, and that modern virtual queuing solutions like Waitwhile are powered by complex algorithms that seamlessly integrate hundreds of variables to surface operational insights to help you cut your wait and deliver the most accurate wait times possible.

$$P_0 = \left[\sum_{n=0}^{c-1} \left(\frac{1}{n!} \rho^n \right) + \left(\frac{\rho^c}{c!} \right) \left(\frac{1 - \left(\frac{\rho}{c} \right)^{K-c+1}}{1 - \frac{\rho}{c}} \right) \right]^{-1}$$

Here's just one of the probability formulas that have been developed in the study of Queuing Theory.



The Psychology of Waiting

The Human Side of Queuing Theory

There's a more subjective side to Queuing Theory to consider that may be even more important than the math: **human psychology**. According to MIT operations researcher Richard Larson, "Often the psychology of queuing is more important than the statistics of the wait itself."⁵

The topic has been explored at length by various researchers at top universities, surfacing key insights for businesses.



What's at Stake

You undoubtedly spend enormous amounts of time working to perfect your customer or visitor experience. But all that effort can be instantly upended by a poor waiting experience.

Ziv Carmon, a researcher at INSEAD, and behavior economist Daniel Kahneman found that memories of a queuing experience are strongly influenced by the final moments of a guest's experience.⁶ When a wait ends on a good note, we tend to look back on it positively. But if negative emotions take over the final moments, we'll tend to judge the entire experience with cynicism.

Even if your post-wait service is stellar on its own, **a poor queuing experience can negatively impact** how your customer or visitor perceives it. If your guest is fuming after what felt like a tediously long wait, their mood has already been soured. So your post-wait customer service needs to work that much harder to turn things around. And because the visitor is already carrying negativity with them, they're much less likely to be receptive to your efforts – and thus more likely to leave with a negative point-of-view on the entire experience.

This notion is supported by over 10 years of research by Qiuping Yu of the Georgia Tech Scheller College of Business. Over various studies, she found that customers who wait longer than expected will actually take longer when their turn finally arrives. This could be because they spend more time complaining or want to milk their time once the wait is over, asking for additional services to justify the time spent in line.⁷

So, attention paid to making your guests' waiting experience as pleasant as possible will pay off in the long run. There are a number of strategies you can employ to cut their wait – or at least make them *feel* like it wasn't that bad.

⁵ "The surprising psychology of waiting in queues." Behavioral Design. March 11, 2013.

⁶ Ibid.

⁷ Yu, Qiuping. "When Providing Wait Times, It Pays to Underpromise and Overdeliver." Harvard Business Review. October 12, 2020.

Optimizing the Queuing Experience

The most obvious way to reduce wait times is to first figure out how long your guests are waiting and to increase your service capacity accordingly, which usually means hiring more staff and/or getting a larger space – both of which can be prohibitively expensive. So without expanding your services, your best course of action is to manage your guests' *perceived waiting time*.

Communicating Wait Times

Georgia Tech Scheller College of Business's Qiuping Yu has extensively studied the subjectivity of waiting, and has uncovered several actions businesses and service providers can take to make the queuing process less burdensome.

Wait Time Estimates

In a study looking at banking call centers, Yu found that providing customers with wait times actually reduced the average wait time overall. That's because during congested times, customers less willing to wait abandoned the line, but the same customers were less likely to walk away during non-peak times if they knew the wait wasn't that long. With fewer people queuing during peak hours, the average wait time was reduced while the total number of customers served remained constant.

Pessimistic Wait Estimates

Everyone loves when things move faster than expected. Yu found that overestimating the wait time had a positive impact on customer experience. Unsurprisingly, in cases where waits were longer than expected, Yu measured a significant negative impact on customer satisfaction – so it's better to overestimate than underestimate.

Frequent Updates

People value transparency from businesses and service providers. In another study that looked at rideshare queues, Yu found that providing frequent progress updates improved customer experience. Even when long wait times were quoted, users who were regularly updated on their status experienced "faster perceived progress" and abandoned queues at lower rates.

So, the actual time a person spends waiting in a queue doesn't really matter. If you are upfront with visitors and give them a slightly pessimistic wait time estimate with frequent updates on their progress, your guests are likely to feel like their wait actually wasn't that bad.

Reducing Unoccupied Time

There's another quirk to human psychology to consider that has an impact on your guests' waiting experiences: **unoccupied time**. In the early 2000s, executives at a Houston airport were inundated with complaints about long waits at baggage claim. Even after they hired more staff and reduced the wait to an average of 8 minutes, the complaints continued.

After a strategic analysis, the executives found that the walk from the arrival gates to baggage claim was only a minute long. So, the airport moved the arrival gates further out, and routed bags to the most distant carousel – increasing the walk from plane to baggage claim 6X. The complaints about long waits completely stopped.⁹

This experiment is a great real-world demonstration of one of David Maister's "Psychological Principles of Waiting": that when people have nothing to do in a queue, it makes them feel as if their waiting time is longer than it actually is. By eliminating this "unoccupied time" passengers spent standing by baggage carousels and turning it into "occupied time" (walking), the perceived waiting time dropped significantly.

⁹ Stone, Alex.

Your best course of action is to manage perceived waiting time.



To summarize, here's what queuing psychology researchers have uncovered over the years:

People value transparency

Providing **wait time estimates** decreases average wait-times and increases customer satisfaction.

Don't overpromise

Actually, underpromise. **Pessimistic wait estimates** – or overestimating wait times – have a positive effect on your guests' experience.

Keep your visitors in the loop

Regular **updates** decrease queue abandonment and increase overall satisfaction.

Give your guests something to do

Standing in line (even with distractions) makes the wait feel longer. By redirecting your visitors to another activity or giving them the freedom to do whatever they want, you reduce **unoccupied time** in a queue, making waiting feel less burdensome.

But how do you harness these psychological insights and efficiently apply them to your business? Enter: the virtual queue.

Applying These Insights

The Virtual Queue Solution

A virtual queue solution like **Waitwhile** allows your guests to join a line remotely. You have the flexibility to allow your guests to join your waitlist from whatever location(s) work best for your operating strategy – whether that be from a kiosk, on their phones with a QR code, or through your website before they've even left their homes.

Once they've signed up, your customers can wait anywhere while doing anything they like (no unoccupied time), so waiting doesn't really feel like waiting at all. The virtual queue provides your visitors with AI-powered wait time estimates and updates them on their progress.

Given that virtual queues seamlessly apply many of the insights around the psychology of waiting, you'd expect them to be a boost to customer satisfaction. And they are. In a 2021 study of virtual queues, researchers at Vanderbilt and California State University found that¹⁰:

- **Virtual queues reduce customers' pre-service complaints about wait times.** Their study measured a nearly 25% decrease in these types of complaints.
- **Virtual queues enhance overall satisfaction for guests.** The researchers measured a nearly 11% increase in positive online ratings.
- **The effects of implementing a virtual queueing system are lasting.** According to the researchers, the impacts of a virtual queue can be seen from the first year, and they sustain in the long term.

¹⁰ Hu, Kejia, Xu, Xun, & Ao Qu. "The Psychology of Virtual Queue: When Waiting Feels Less Like Waiting." September 28, 2021.

Why Virtual Queues Boost Customer Satisfaction

Virtual queues invisibly reconfigure the traditional waiting process. Though your guests may still have to wait to be served, the conventionally static activity of standing in line is transformed into one that is flexible and productive.

- **Guests get their (wait) time back**

A virtual queue eliminates the need to stand in a physical line, freeing up time for your visitors to do something fun or productive while they wait. They can grab a coffee, take a walk, run some errands, etc. – anything other than gradually deflating in a mind-numbing line.

- **Faster service**

You can choose to have your guests complete activities related to the services you offer while they are waiting, such as filling out forms, signing a waiver, perusing a menu to choose what to eat, completing a payment, or customizing an order for quick checkout. That way, when it's their turn they'll be even more impressed by the speed of your service.

- **Control**

The core to why virtual queues are such crowd pleasers is that they give customers agency where they didn't have any before. Allowing your visitors to do what they please while they wait gives them flexibility. And with frequent updates on wait time status, your guests always feel like they are in control of their time. You can even offer them the option to text you directly to ask for a time extension if they're not ready when it's their turn. Virtual queues turn a waiting process that felt totally out of the customer's control into one that prioritizes the customer without any negative impact on your business workflows.

With a virtual queue solution, you reduce wait and service times while serving happier customers at greater numbers. The financial benefits of this efficiency hack are pretty straightforward. As is onboarding a virtual queue management platform, which can be set up in under an hour.

In the next section, we'll dive into how virtual queue systems can completely automate your queue management and show you the cascading benefits of adopting this digital approach.

The Benefits of a Virtual Queue Management System

Traditional physical lines are disliked by staff and guests alike. They're slow, frustrating, and laborious to manage. A virtual queue management system not only allows you to automate repeatable tasks, but gives your customers time back. And, it's flexible enough to handle any queue structure you may be employing – no matter how complex.

We'll unpack how virtual queue management works and highlight the broad benefits – that go beyond the waiting period – of adopting a virtual solution.

How Virtual Queue Management Works

For any business or organization, there are five basic steps to the customer or visitor journey: arrival, the queue, service, departure, and follow-up. Though at first it may seem like a virtual queue only addresses the first half of the journey, virtual queue management actually brings efficiency and expediency to the entire visit.



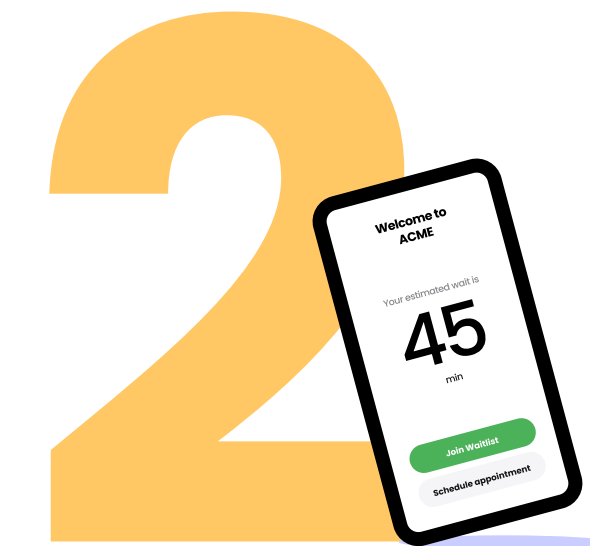
The Arrival

Guests can join your queue virtually and wait from anywhere. This flexibility allows you to provide the check-in options that make the most sense for your business. On-site, you can utilize kiosks or QR codes that visitors can access with their phones. You can also let guests join a queue via text message.

If you want to provide the option for guests to join a queue before arriving at your location, you can link to your virtual waitlist on your website or – with [Waitwhile](#) – even on your Google Maps listing. Additionally, you can geofence your virtual queue. That way, only guests that are within a specified radius of your location will be able to sign up.

Your check-in screen can be as detailed as you want. Collect the information you need to speed up the service process and even allow customers to pay ahead of time. If you want to move certain guests like VIPs to the front of the line, you can flag them automatically without anyone else in line seeing the preferential treatment.

Your virtual queue(s) can also integrate seamlessly with your [appointment calendar](#). With both walk-ins and bookings centralized in a single system, you have the flexibility to adopt the operating model that makes the most sense for your needs.



The Queue

Once a guest joins your virtual waitlist, they get a precise wait time estimate. Studies have shown that transparency is key to increasing customer satisfaction. A virtual queue management solution will be upfront about the expected wait and automatically update your visitors throughout the process.

In [Waitwhile](#), wait times are estimated using machine learning. They're tailored to your unique operations, eliminating the chance of human error. If anything changes, estimates are updated in real time and your guests are automatically notified.

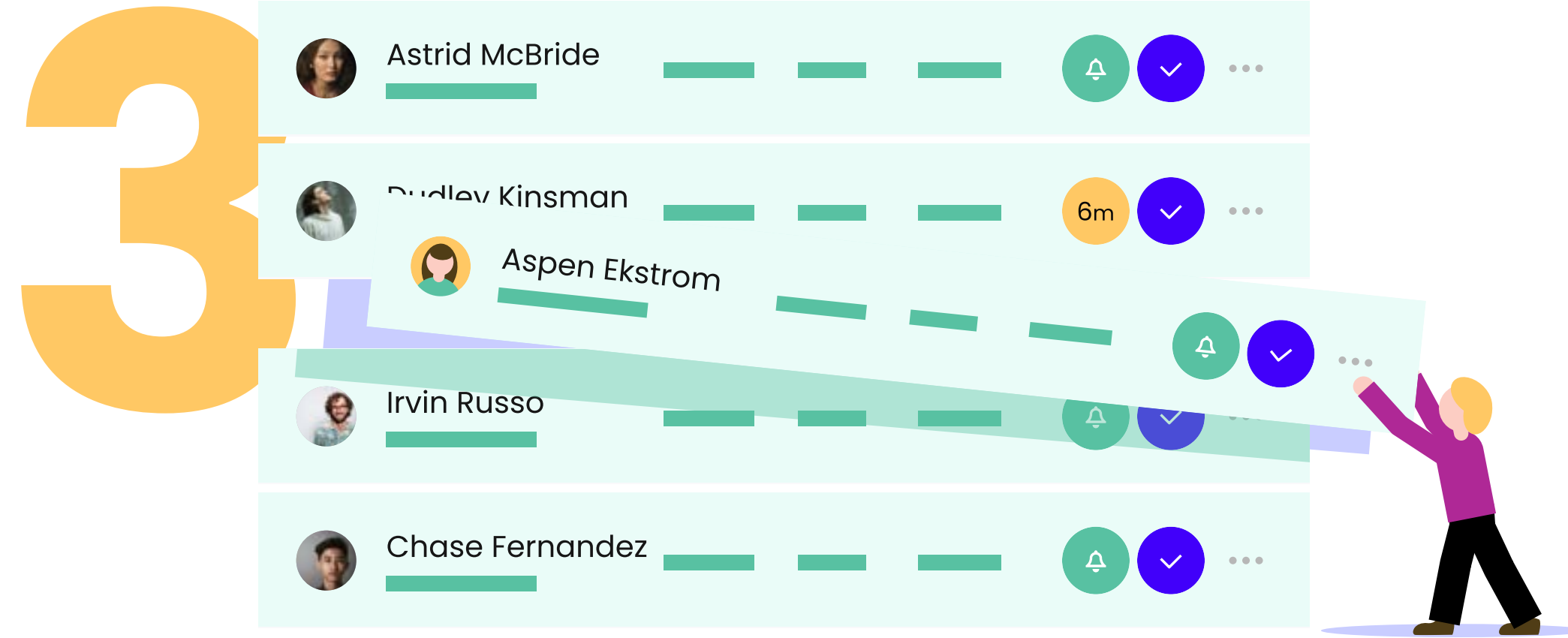
You'll also be able to relay important information beyond wait time estimates throughout the queuing process – and keep the line of communication open. In a virtual queue, customers can send questions or update you on their status (e.g., if they're running late) directly via text.

With accurate wait time estimates, guests are free to wait from anywhere. And you get to choose whether or not you want guests to see where they are in line. You can make the entire virtual waitlist (and wait estimates) visible to guests on their personal devices or displayed on a monitor in your physical waiting area.

The Service

When you're ready for a guest, send them a notification via SMS or email with a click. To speed up the service process, you could tell them what to bring or relay any other important information. With pre-programmed messages, your employees will simply have to click a button to deploy detailed, personalized notifications.

Because a virtual queue seamlessly integrates the insights from the queueing psychology research discussed earlier, your guests are going to already be impressed with your customer service when it's their turn. In fact, they're likely to feel like no time at all was wasted waiting.



Follow-up

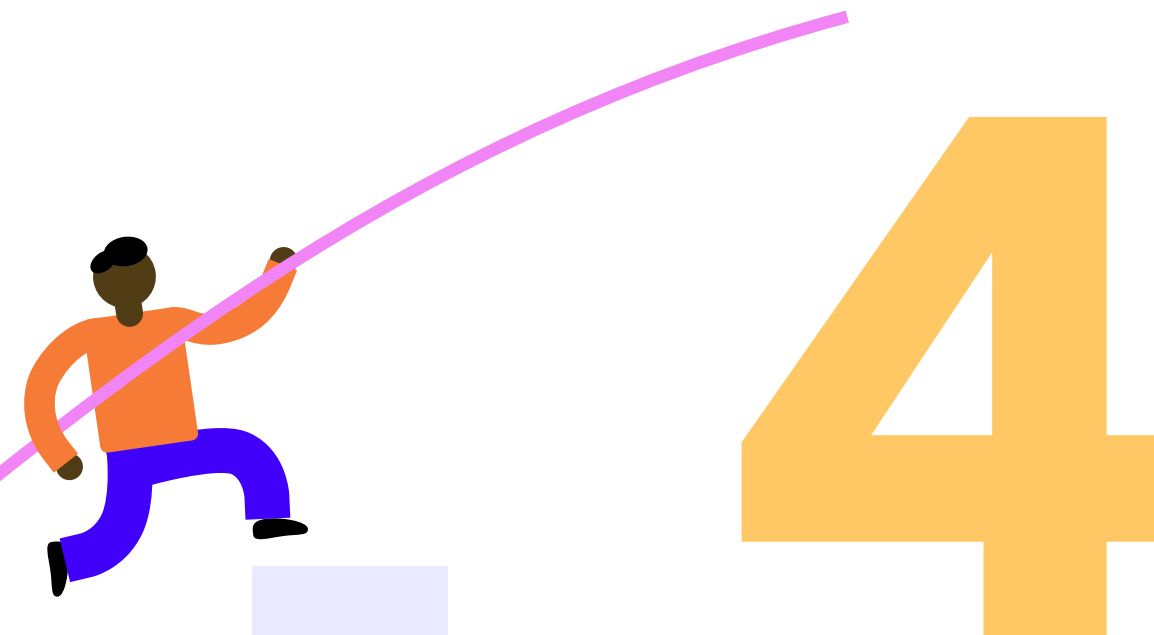
Any notes your staff may have taken about the visitor will be logged to their profile so you can keep track of preferences and other important details.

To keep the conversation going post-visit and generate repeat business, you can also automatically deploy customer communications via text or email. Thank your visitor for coming as a nice personalized touch. Send them a promo to use next time. Encourage them to leave a review or fill out a survey, or solicit feedback to improve your operations.

Departure

Once a transaction is complete, you mark the guest as "served" in your virtual queue management system. If there are multiple steps to your service process, the guest can automatically be entered into any additional queues as required (and then repeat the process from Step 1).

At the end of the service, the guest's visit is complete. Your virtual queue management system will log important data about the visit, such as total visit time and automatically feed that information into an analytics dashboard.





Virtual Queue Best Practices

Here are some tips from [Waitwhile customers](#) on how to make sure your virtual queues are delivering on all fronts:

- Make sure you have a **reliable WiFi connection** so your customers can easily access your virtual queue, especially if the cell phone coverage in your area or building isn't the strongest.
- Hold a **training session** for your employees on how to use your virtual queuing platform to ensure everyone is on the same page. See if your virtual queue provider can run the training or has existing material you can use.
- Regularly **survey your employees** to learn of ways to improve their satisfaction with your queuing system.
- Gather **feedback from your visitors** so you can spot any snags and continue to elevate your guest experience.

The Broad Benefits of Virtual Queue Management



As you can probably already tell, a virtual queue management system will energize your operations beyond the queuing experience. Here are just some of the benefits you can expect.

Operational Analytics

A virtual queue management system like [Waitwhile](#) automatically logs data as you use it. It uses machine learning to understand your operations and propose improvements. The longer you use it, the more fine-tuned the recommendations become.

You'll be able to see when business is busiest, which employees and services are most in-demand, and more. With easy-to-understand analytics, your staff can uncover operational snags as they happen so your team feels empowered to make real-time decisions to get back on track. And, you can segment the data by any visitor identifier to uncover cohort trends – just decide what kind of information you'd like to collect from your guests when they check in.

From a business analytics standpoint, you can surface correlations between wait times and no-show rates, customer satisfaction, and even sales. Then, your virtual queue management platform can help you set goals and show you how to achieve them. For example, you may be able to learn that if you reduce your wait time by 7 minutes, your customer satisfaction score will increase by 25% and you'll see an increase in orders by 15%.

Using these data points, you can make business decisions about things like staff and resource distribution or operating hours that have a direct positive impact on revenue and customer satisfaction.

Manage Multiple Locations

With a virtual queue management system, you can centralize multiple locations within a single dashboard. Not only can you see the big picture at a glance, but you can also get information at a regional or store level.

With the analytics capabilities, segment and view data as required to identify geographical trends or surface localized needs.

Visitor Communication

Because a virtual queue is – well – virtual, you unlock a reliable line of communication with your visitors when they join your line. Get on the same page with guests by talking to them before, during, and after their visit. Address issues or questions in real time, provide personalized updates, and thank them for coming.

You'll be able to choose a mode of communication that makes the most sense for your business. Or, let your guests choose whether they prefer to be reached via SMS, email, push notifications, or voice messages.

Because communication is digitized, you can reduce the number of staff it takes to tend to your queue. Visitors have an easy way to reach you, and your staff can answer questions and send personalized updates to always keep guests in the loop.

For repeatable communications (like status updates, important visit information, and thank you messages), your virtual queue management system can deploy messages automatically – saving everyone valuable time.

Customer Retention

The visitor journey doesn't end once you've said goodbye. A virtual queue management solution allows you to delight customers with personalized follow-up messages to make them feel appreciated, so you can drive repeat business and encourage positive reviews.

Send automated personalized thank you messages after a visit for that extra touch. You can also request feedback and enable your staff to take immediate action to deepen customer engagement and drive CLV.

Remember, a virtual queue management system like [Waitwhile](#) automatically stores visitor data (and can anonymize it, if necessary), opening up new marketing opportunities. Segment your lists and create email or SMS campaigns when you're having a promotion or introducing a new product or service.

Plus, when they come back for another visit, historical notes and preferences will be stored so your staff can effortlessly deliver an elevated and personalized experience that your guest won't soon forget.

Deliver a personalized experience that your guests won't soon forget.

Get rid of lines. Make guests happy.

Waitwhile is a digital queue management platform that helps businesses and organizations deliver better waiting experiences for their guests through automated, personalized, and virtual-based queue experiences. Waitwhile lets customers wait from anywhere and track their status in real-time online – while helping businesses automate customer flows and reduce wait times with machine-learning.

Used by thousands of companies across every industry around the world, Waitwhile has saved 150+ million customers more than 10,000 years of waiting in line.

[Schedule demo](#)

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