The Future of Kitchens: **Introducing the Smart, Connected Kitchen**

If you have a restaurant, the one thing you must have is a kitchen. For casual and fine dining restaurants, kitchens are complex – from stoves and ovens to refrigerators, from chefs and sous-chefs to cooks, from meats and vegetables to sauces, appetizers and main courses to desserts, its chaos and cacophony. Fortunately, it's mostly hidden. For Fast Casual and Quick Service Restaurants (QSRs), kitchens are a little less complex but a bigger challenge because they're open for all to see.

For all but the past 10-15 years, there was a simple one-to-one relationship between food ordering and food preparation. Guests came into the restaurant, placed their order and either sat and enjoyed the food there or took it home. The relationship between food ordering and food preparation has remained the same for many years: the order taking and food making happened under the same roof. Simple. Easy.

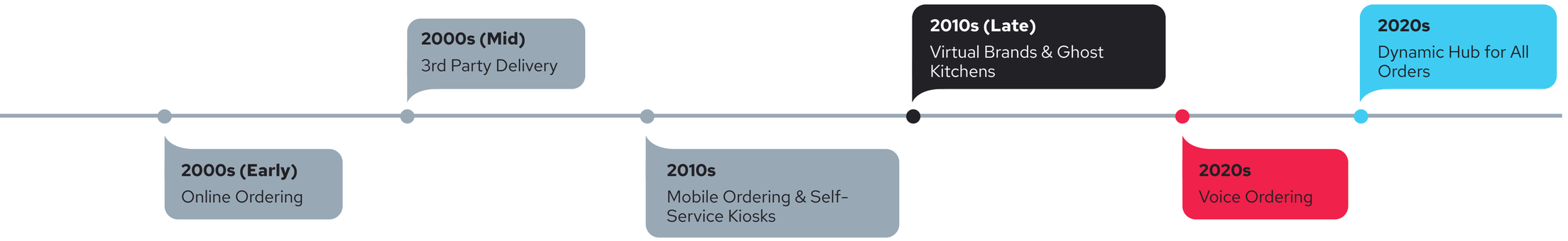
> *Today's kitchen technology falls short of meeting the ever-evolving demands of modern kitchens. At Qu, we're poised to transform kitchen operations with advanced, integrated technologies, just as we've redefined the POS.*
>
> – Amir Hudda, CEO, Qu

Kitchens Today: The (Dynamic) Hub

When the Internet emerged, its impact on kitchens was unforeseen. Online ordering initially allowed restaurants to accept orders through their websites, enhancing convenience for pickup. Third-party delivery services came to market, offering delivery without the need for restaurant-managed drivers which evolved into a marketplace where any brand could offer delivery to homes—prompting restaurants to engage with multiple Delivery Service Providers (DSPs). As costs became apparent, restaurants prioritized establishing their own websites for direct orders but still relied on DSPs for last-mile delivery services.

Then a new category of restaurants emerged—ghost, cloud, or dark kitchens (a.k.a. virtual brands)—that focus solely on food preparation and serve multiple brands from one location without dine-in services. Some existing restaurants added virtual concepts to boost efficiency. Despite challenges, this model's potential remains under exploration.

All these new web-based ordering capabilities culminated in omni-channel fragmentation which had a dramatic impact on the "original kitchen model." The simple one-to-one relationship of taking an order and making that order in the local kitchen broke down. The kitchen became the central hub for making food that served orders coming from a plethora of both in-store and digital channels. Needless to say, the kitchen went from being just a kitchen to the heartbeat and hub of your business.



What the Kitchen Must Know is Highly Complex

Key activities and issues that impact kitchen staff all day long:

Prioritizing Order Preparation

Prioritize orders across:

- **DSP GUESTS**
- **IN-STORE GUESTS**
- **DRIVE-THRU GUESTS**
- **DIGITAL GUESTS**
- **LOYAL GUESTS**
- **FRUSTRATED GUESTS**

Promised Ready Time

Ensure food is ready on time, considering these factors:

- AVAILABLE LABOR
- TIME TO PREP ORDER
- DIGITAL ORDERS
- IN-STORE ORDERS
- # OF GUESTS INLINE IN-STORE
- GUESTS IN DRIVE-THRU

Supply and Inventory

Determine if you have:

- INGREDIENTS TO MAKE CURRENT ORDERS
- SUPPLY TO MAKE FUTURE ORDERS
- ENOUGH ROOM TO STORE INVENTORY

Weather & Special Events

Understand the implications of:

- SPORTING AND SCHOOL EVENT TRAFFIC
- SPECIAL EVENT TRAFFIC
- WEATHER

Menu Updates

Adjust menu on-the-fly based on:

- 86 BASED ON ITEM UNAVAILABILITY
- UN-86 BASED ON ITEM AVAILABILITY

Kitchen Technology: The Forgotten One

It's no secret that technology budgets at restaurants significantly lag those in other verticals. Even before the explosion of labor wages and food costs, margins were thin. Restaurants, particularly larger Fast Casual and QSR chains, slowly started to adopt technology to address new channels and revenue growth opportunities. From demand gen technologies (loyalty and marketing) to back of house technologies (labor, inventory management, and accounting), operations started to get more automated. The pandemic made online ordering and DSP management mission critical and every restaurant went scrambling to adopt those technologies.

Everywhere you looked, new technology was being introduced and adopted by restaurants. Except for one place: the actual store. Yes stores had long moved on from cash registers to POS systems – but that was about it. POS evolved from in-store client-server systems to cloud POS systems. But even cloud-based POS adoption has lagged, particularly for enterprise brands with hundreds or thousands of locations.

But what about the kitchen? QSRs installed Kitchen Display Systems (KDS) to show the worker what needed to be prepared; for complex menus, you have multiple KDS screens in each kitchen. What more do you need? And why fix something that's not broken? Well, the kitchen is officially broken and is screaming for help.

> *"...the kitchen is officially broken and in need of an upgrade.*

The restaurant tech industry has struggled to keep up with the increasing kitchen demands. And that's exacerbated by the fact that the technology pendulum swung too fast too far. The kitchen is now primed for a transformative upgrade.

The Kitchen Needs Immediate Attention: Here's Why

Gone are the days when restaurant brands mostly worked with one or two technology providers that addressed all their needs. The single tech stack is dead and buried. Instead, it has been replaced with a plethora of tech stacks – every technology category has seen tremendous innovation in the past 20 years—each component of the tech stack has become specialized and served by new vendors.

Whether it's POS or KDS, online ordering or kiosks, loyalty or marketing, labor or inventory, payments or accounting, each one has a slew of vendors, all creating their offerings on their own tech stack with the promise of APIs to make sure that everything works seamlessly.

Kitchen Tomorrow: Reimagined

Given the significantly enhanced and complex role of kitchens in today's restaurants, it's no surprise that the focus will turn to not just modernizing the kitchen, but truly reimagining the kitchen—everything from kitchen equipment, to labor, to technology, to operations to processes—it all needs to and will be revisited. And restaurants that realize the importance of this will see a dramatic impact on their financial performance.

52%

of operators plan to invest in tech to boost productivity or efficiency in the kitchen

The National Restaurant Association's Restaurant Technology Landscape Report 2024

Solving the Kitchen's Biggest Problems

	Order Accuracy	Promised Ready Times	Production Optimization	Staff Experience	Kitchen Equipment
PROBLEM	Order accuracy is the top frustration in restaurants, leading to guest dissatisfaction and increased stress for staff.	Inaccurate and unreliable order ready times are compromising both guest satisfaction and DSP experience.	Inability to know how much food to prepare and have ready when resulting in food waste and slower speed of service	High staff turnover due to intense pressure of often dealing with frustrated guests and delivery drivers.	Lack of visibility into the health and usage of kitchen equipment leads to inefficiencies and potential operational issues.
SOLUTION	AI-enhanced tool providing kitchen staff and managers with complete visibility into all orders, including advance notifications and real-time updates.	AI-based estimates that leverage omni-channel order data, store labor availability, and estimated prep times to provide more accurate ready times for all orders.	AI generated insights into food preparation that takes into account historical data as well as external factors like local events, weather, and inventory also impact production.	A platform that provides consistent access to critical information, streamlining workflows and reducing manual tasks, so staff can focus on core responsibilities and enhance operational performance.	A dashboard that offers comprehensive visibility into operations, equipment health, safety, and compliance.
RESULT	Enhanced guest experience with more accurate orders and reduced staff stress.	Improved guest satisfaction and DSP experience through more accurate promised ready times.	Balanced food preparation to avoid long wait times for guests and reduce food waste from over-preparation.	Improved staff experience leads to lower turnover and less time spent on recruitment and training.	Increased control over kitchen equipment, leading to enhanced longevity, safety, and compliance.
KPI	Guest Satisfaction, Frequency, CLTV, Revenue	Guest Satisfaction, Frequency, CLTV, Revenue	Food Waste, Guest Satisfaction, Revenue	Labor Costs, Employee Turnover, Guest Satisfaction	Equipment Costs, Food Quality, Throughput

Qu's Smart Kitchen: The Next Frontier

Challenges present opportunities. At Qu, we started addressing the opportunity with our Qu Kitchen platform a couple years ago. The next phase is evolving this into Qu Smart Kitchen, a hyper-connected and intelligent kitchen platform that uses AI and modern tech to equip teams with the information they need to work more efficiently and confidently, relieving the unknowns and pressures from multiple competing channels.

Qu's Unified Commerce Platform is the foundational layer that supports and enables Qu's Smart Kitchen solutions.

01 Orders from all channels flow into Qu Kitchen (KDS)

02 AI driven accurate promised ready time is calculated based on order volume, labor, and prep time

03 Order ready time is shared with guest or DSP in real-time

04 AI-driven insights of how much food to produce and when are displayed

05 Smart devices, such as robots and traditional kitchen equipment, are managed centrally through Qu

06 A unified kitchen control center featuring AI insights, real-time communication, and optimized order routing ensuring optimal order production.

Result: Faster fulfillment speeds with increased staff efficiency, processing at the chip level, accurate and on-time order delivered to the guest or DSP. All powered by Qu's Smart Edge technology.

Unified Commerce Platform (UCP): Foundational Data Layer

The most important component of Qu's Smart Kitchen platform is Qu's Unified Commerce Platform. It provides the fundamental capability to see data across several products, those that are provided by Qu, but also those that are built by our partners. It provides the visibility required across order channels, labor, inventory, loyalty, marketing and more. Smart Kitchens need to integrate order data from all channels, available labor, and inventory levels. Additionally, data from loyalty and marketing systems is crucial and will be examined further.

- **Unified Menu Management:** Across channels
- **Unified Brand Management:** Across brand and co-branded
- **Unified Fulfillment Management:** Order accuracy
- **Unified Cloud Management:** In-store and above-store
- **Unified Tech Stack:** Purpose built for QSR and Fast Casual
- **Unified Data Foundation:** Better and faster decisions

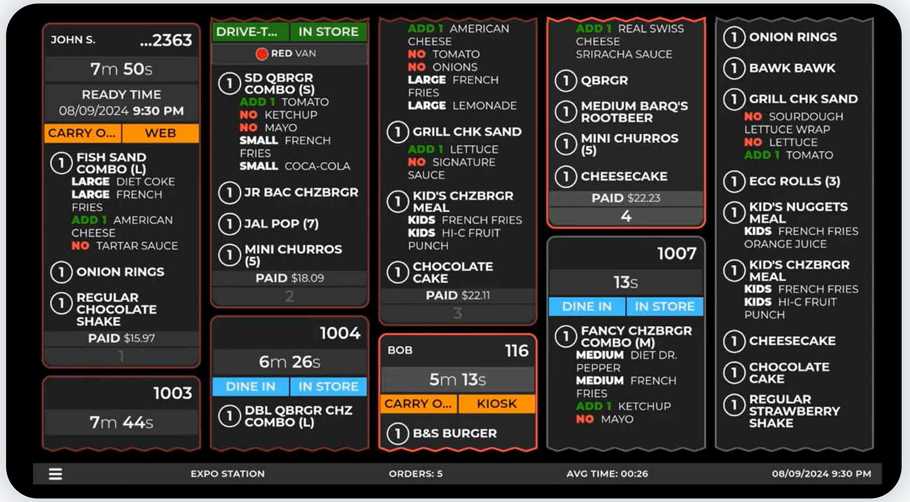
> *"It's my job to support our business with technology that can scale rapidly, and that can respond to the next opportunity. The answer has to be hours and days, now. It just has to be. That means a different approach. That's the rise of Unified Commerce.*

– Doug Cook, CTO, Jack in the Box

Qu Kitchen (KDS): Streamline and Manage Food Preparation

Before exploring the new components of a Smart Kitchen, it's important to recognize the role of Qu Kitchen: a modern KDS solution that not only offers the traditional capabilities of a KDS but several new and unique features that make the food preparation process easier and more efficient.

- **DYNAMIC CELLS:** The ability to maximize screen real-estate with wrap around tickets that eliminate wasted space and show full orders contiguously.
- **STANDOUT MODIFIERS:** Color-coded modifiers with clear ADD/NO tags that visibly highlight changes to a standard item.
- **CAR INFO**: Car model and colors for drive-thru orders make it easier to validate orders taken on one screen/window and presented from another.
- **ORDER TYPE & SCREEN SEGMENTATION:** Clear display and color coding of Order Type (In-store, Online, DSP name, etc.) and the ability to reserve certain KDS screens tied to certain Order Types or within the same screen, different sections for different Order Types.

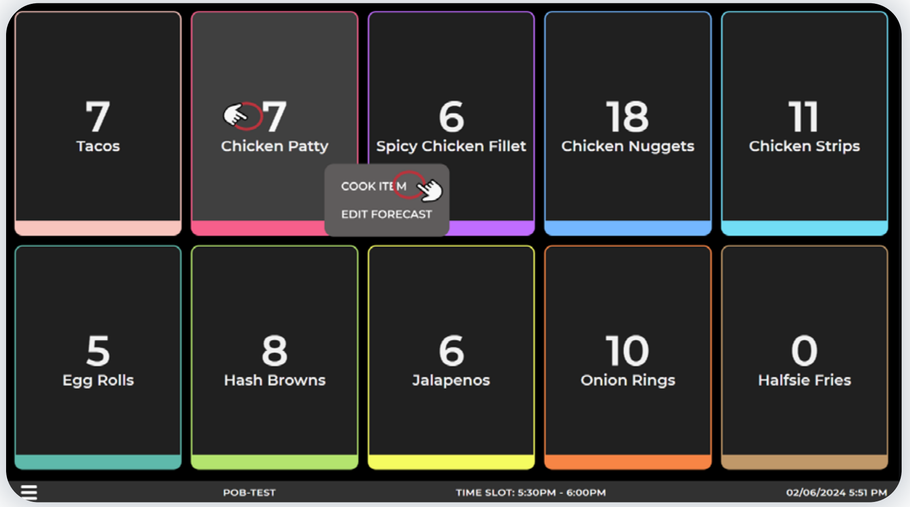


Easier and more efficient food preparation process

Production Optimization Board (POB): AI-Enhanced Kitchen Productivity

This AI/ML-powered component optimizes food production timing and quantity, enhancing throughput and reducing waste. It addresses key challenges by determining how much food to prepare and when, based on configurable time intervals and historical trends.

- **HISTORICAL ORDER HISTORY:** Order history based on time of day and day of week.
- **UPCOMING LOCAL EVENTS:** Events happening in the area.
- **WEATHER PATTERNS:** Data and historical patterns tied to similar weather.
- **CURRENT ORDER VOLUME:** Update forecast based on incoming digital, DSP and in-store orders.



Reduce waste, improve throughput, and ensure timely production

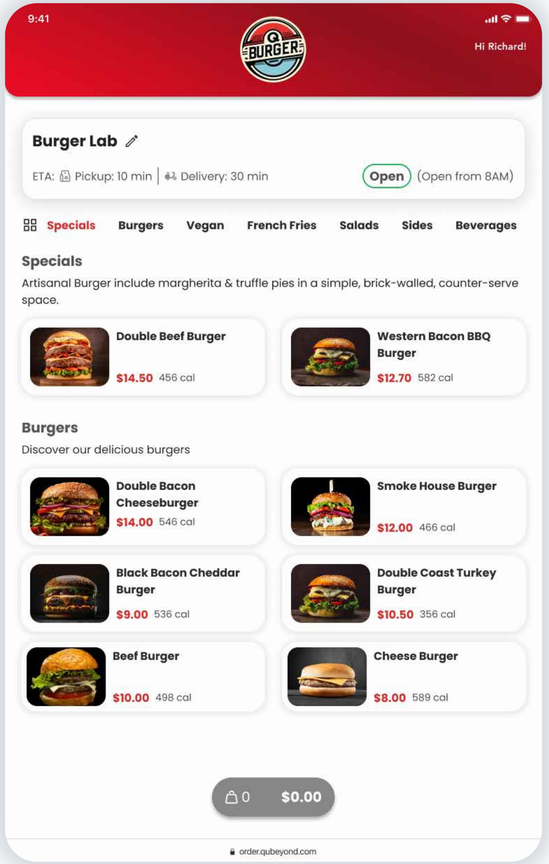
Promised Ready Time (PRT): AI-Based Delivery Estimates

After the order comes to the kitchen, an estimated ready time must be accurately calculated. This new component of Qu's Smart Kitchen is the Promised Ready Time calculator. It is an AI-based product that uses the following data points to better estimate the ready time for digital orders.

- **OMNI-CHANNEL:** Orders coming in from ALL order channels – digital and in-store.
- **STORE LABOR AVAILABILITY:** Labor availability in the store.
- **SMART ESTIMATED PREP TIME:** Estimated prep-time based on the size and items in the order and known prep-times.

> *Our kitchen prioritizes online orders to avoid penalties from drivers who miss pickups, which impacts walk-in customers. But if you have data, you can attempt to dynamically change that wait time in your online ordering platform, in your digital platform, where the promised time is a static number versus fluctuating.*

– Nandu Gandhi, former Chief Technology and Data Officer, GoTo Foods



Accurate and reliable order ready times

Order Ready Board (ORB): Guest Facing Order Status

After a calculation of ready time is created, it then must be given to the guest or delivery driver. This new component of Qu's Smart Kitchen is the Order Ready Board. This product provides a visual status of all orders. It can be placed at the front of the store for guests and DSP drivers, in the kitchen for staff, or used as an expo screen for managers to track all orders and their statuses.

- **GUEST EXPERIENCE:** Shows order status to guests and delivery drivers at the front of the store.
- **STAFF ORDER TRACKING:** Provides kitchen staff with a list of current and scheduled orders.
- **FLEXIBLE BOARD:** Anyone can see a visual status of all orders in the kitchen, depending upon placement of the ORB.

Enhanced visibility and communication throughout the order fulfillment process

Smart In-Store Cloud (SIC): Fast and Efficient In-Store Cloud

While Qu's current in-store cloud offers enhanced redundancy and speed, the value of that product is the software that brings public-cloud processing into the store for relevant operations. The intelligence is in the software, the hardware itself is a typical PC architecture device.

This enhanced Smart In-store Cloud builds on our existing in-store cloud by upgrading the hardware to an AI-chip based device that brings even more speed, efficiency, and processing of the unique AI algorithms at the chip level.

- **SPEED:** AI-ready in-store cloud with faster processing speeds.
- **STORE LEVEL:** Run AI/ML models at the store.
- **MORE EFFICIENT:** Improve inference at the Edge (taking Edge Computing to new levels).

> *Qu's groundbreaking Smart In-store Cloud, powered by Edge Computing and a cutting-edge architecture, empowers brands to keep serving great food, delighting guests, and — most importantly — driving revenue, even when network and internet connections are unreliable.*

– Brian Crum, VP, Product, Qu

Device Orchestration Platform (DOP): Smart Device Manager

20%

growth in the next 5 years

QSR and fast-casual operators are increasingly investing in smart kitchen technologies to boost efficiency, cut labor costs, and enhance food consistency. Industry forecasts suggest the market for these appliances could grow by over 20% in the next five years.[1]

As kitchens increasingly adopt diverse smart devices—from safety sensors to advanced cooking tools and automation robots—these devices will likely be from various vendors with different proprietary software. Qu's DOP will unify the management and control of all these devices into a single platform. DOP technology is future-ready for devices yet to be developed.

- **DEVICE ORCHESTRATION:** Integrates and manages diverse smart kitchen devices.
- **HANDLES VARIOUS DEVICES:** Includes sensors, cooking devices, robots, and future devices to surely be developed.
- **VENDOR INTEGRATION:** Works with devices from different vendors and proprietary software.
- **UNIFIED MANAGEMENT:** Provides seamless orchestration from a single platform.

[1] SOURCE: HTTPS://WWW.GRANDVIEWRESEARCH.COM/INDUSTRY-ANALYSIS/SMART-KITCHEN-APPLIANCES-MARKET

Smart Expo Application: Kitchen Command Center

The Smart Expo application is a key component of Qu's Smart Kitchen Platform, designed to enhance efficiency and precision in modern kitchens. This AI-driven tool combines automation with human expertise for optimal order production and delivery. Key features include:

Unified Order Management

The application consolidates upcoming, active, and fulfilled orders from all channels onto a kitchen-facing order status screen. This unified view allows expedite managers to monitor and manage orders efficiently, ensuring no order is overlooked.

AI-Powered Insights

Leveraging advanced cognitive AI services, the application provides real-time prompts and suggestions to expedite managers. These insights help in making informed decisions to enhance the speed and accuracy of order preparation and delivery.

Manual & Automated Interventions

The Smart Expo application strikes a balance between automated processes and human judgment. Managers can manually move orders across production stations to manage kitchen volume effectively, while AI-driven prompts assist in optimizing the workflow through a touchscreen interface.

Real-Time Communication

Direct communication with guests or delivery service providers (DSP drivers) is facilitated through the application. This feature ensures timely updates and coordination, enhancing the overall guest experience and delivery efficiency.

Order Routing Optimization

By dynamically routing orders across various production stations, the application ensures that the freshest food reaches the right order at the right time. This functionality minimizes delays and maximizes operational efficiency.

Qu's Smart Kitchen: Go Beyond

Restaurants have always depended on their kitchens. Once simple, one-to-one order-to-preparation processes have evolved into a multi-channel operation with online orders, third-party deliveries, and in-store transactions. This shift has turned kitchens into bustling hubs of activity. Today's kitchen technology is not enough to meet the evolving needs of the kitchen.

Qu is prepared to redefine kitchen operations with integrated, advanced technologies, just as we transformed POS. Qu's Smart Kitchen goes further, incorporating AI to optimize food production, estimate order ready times accurately, and manage diverse smart devices. With innovations like the Production Optimization Board, AI infused Smart In-store Cloud, and Device Orchestration Platform, Qu reimagines kitchen efficiency and accuracy, ensuring a seamless and modern guest experience and operation.

To see how Qu's Smart Kitchen can improve your operations and guest experience, contact us at:

sales@qubeyond.com

Are you ready to explore Smart Kitchens?

https://www.qubeyond.com/kitchen/smart-kitchen