



# THE SHIFT TO SMART HOSPITALS

How You Can Deliver AI-Driven  
Medical Devices Efficiently Using  
Pre-Engineered Platforms



The shift to smart hospitals has been growing steadily, but the global pandemic has accelerated the trend. Faced with a shortage of healthcare workers, the need to minimize care expenses, and a demand to shift from fee-for-service to value-based care, many hospitals are adopting AI technologies. In fact, [artificial intelligence \(AI\) in the healthcare market grew by around 167% in the past two years.](#)

Over the next decade, AI is likely to become a foundational technology, automating many mundane and potentially error-prone tasks in the healthcare industry. This means those medical technology developers that fail to make the shift to AI-powered solutions could be left behind.

In this whitepaper, we'll discuss the growing adoption of AI in the healthcare industry, why this presents challenges for medical technology companies, and how they can overcome these obstacles by using software and hardware building blocks.

## SMART HOSPITALS: THE ADOPTION OF AI IN HEALTHCARE

Hospitals around the world are facing enormous pressure to improve their productivity and efficiency without negatively impacting patient outcomes. Many hospitals are turning to software to make decisions and drive actions that reduce the costs associated with patient care.



## HERE ARE SOME WAYS AI IS BEING APPLIED TO MEDICAL DEVICES IN HOSPITALS TODAY:

- **Patient Monitoring.** There's an ongoing shift from ad hoc to continuous patient monitoring, with wearables, embedded biosensors, and other monitors, which collect vital information. Health-care providers are leveraging powerful AI/ML applications to analyze this vast amount of data and deliver recommendations to remote patients.
- **Imaging.** Rather than rely solely on the individual operators to interpret medical scans, AI-powered imaging devices can use computer vision and automation to help identify lumps, spots, or other areas of concern. By augmenting the diagnosis process, healthcare providers can catch issues that a human operator might have missed. Also, AI fosters image enhancement, reducing signal noise and radiation exposure by enabling lower-dosage imaging.
- **Telehealth.** Devices designed to simulate the face-to-face patient-doctor experience remotely enable real-time patient screening, saving a significant amount of time and labor for both doctors and patients. AI in telehealth uses the patient's history in the medical screening process, allowing data-driven decisions and diagnosis. For example, the inferencing ability of telehealth with AI enables the device to comprehend the physical surroundings and the patient's movement patterns, creating alerts when patients are at risk for falling or experiencing a medical event.

Over the next few years, the adoption of smart hospital devices is expected to grow as medical device companies recognize that they have an enormous amount of information at their disposal. This pre-existing data can be used to train machine learning algorithms and integrate inferencing into medical devices.



# THE CHALLENGES WITH DELIVERING AI-DRIVEN MEDICAL DEVICES

Despite the growing demand for augmentation and automation in hospitals, it's still challenging for many technology developers to deliver AI applications to the healthcare market. Here are a few obstacles these companies face:

## .01

### Speed of Innovation

AI technologies are evolving rapidly, with deep learning inference processing performance increasing by as much as [14x per generation](#). AI processing has even dramatically outpaced general compute processing speeds over the last decade.

While these hardware improvements have reduced the cost and energy use associated with computer vision and other AI workloads, this pace of change means technology developers are working to deliver products to market before they become obsolete. In short, managing the lifecycle of devices and components can be difficult for any solution, but this is especially the case for complex, AI-powered medical applications.



## .02

### Stringent Certification Requirements

The medical industry requires devices that are durable because hospitals rely on the uptime of critical MRI machines and other equipment. That's why there are stringent regulations and certifications involved when bringing a new medical device to market, which could take months or years.

- **IEC 60601 Certification** is the baseline for technical product safety standards applicable to most medical electrical equipment. Required by the FDA, it applies to the safety and essential performance of medical devices operating near patients. Because every country has a different version, devices must comply with the standards that apply in each market.
- **ISO 13485** is the standard for medical device quality management systems. It helps with overall quality control, traceability, process validation, and risk management. The most recent is 13485:2016, designed to respond to the latest quality management system practices, and includes changes in technology and regulatory requirements and expectations.

## .03

### Resistance to Change

While many industries have already adopted AI technologies, the medical industry has been slower to change. For hospitals and healthcare providers, there is a perception that using automation and AI, which is inherently complex, poses risks to patient care. In many cases, hospital staff would also need to change their existing workflows to leverage these new technologies.

In turn, this has made some medical technology developers resistant to adopting AI until the technology has fully matured. However, it's possible to introduce change slowly by using AI to augment decision-making, rather than fully replacing the human aspect of healthcare. Those in the healthcare industry resistant to change, therefore, could miss out on the opportunity to increase efficiency and improve patient outcomes.

# .04

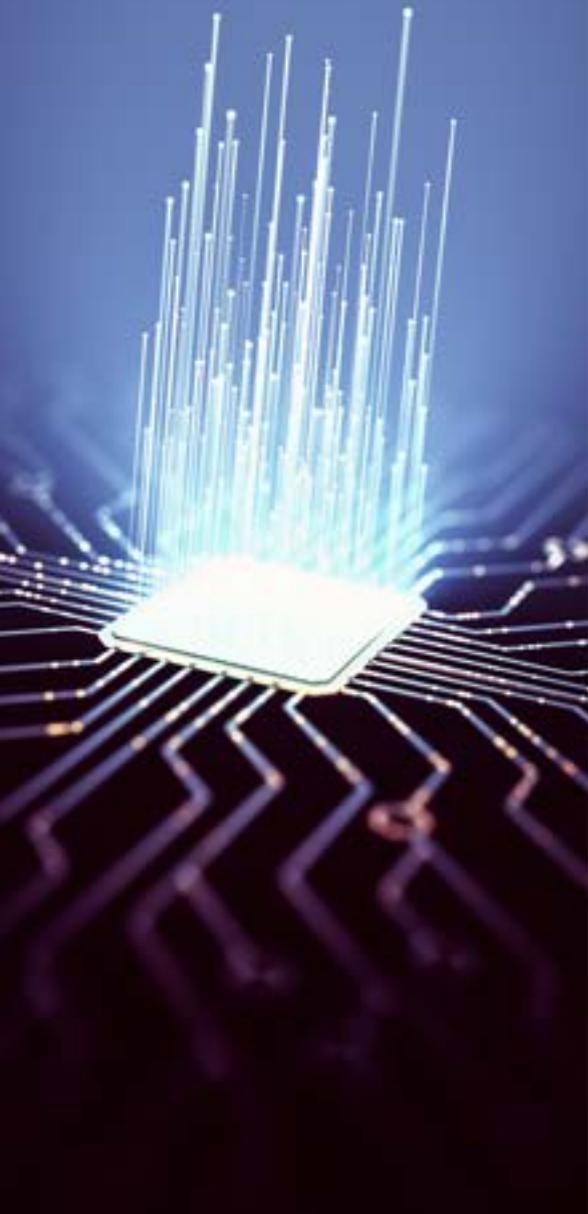
## The Risk of Falling Behind

Developing AI-powered applications is complicated and time-consuming. Many machine learning frameworks and inference engines have different requirements, use cases, and operating environments. Then these applications need to be deployed to compatible hardware, further complicating the development process.

Many medical device companies see the challenges involved with adapting to the latest AI technologies and are hesitant to make the shift. There is a greater risk, however, in falling behind competitors that are meeting the demands of smart hospitals.

## LEVERAGING BUILDING BLOCKS FOR STREAMLINED AI-POWERED DEVICE DEVELOPMENT

While many medical technology companies choose to build custom AI-powered solutions from the ground up, this approach is more complicated, time-consuming, and expensive. Instead, medical application developers should consider using pre-defined software models and pre-designed modular hardware as a starting point.





## A MODULAR PLATFORM FOR CAMERA-BASED HEALTHCARE APPLICATIONS

Kori™ is one example of a hardware building block that accelerates delivering an AI product to market, even with some customization. This hardware solution is a modular platform for camera based applications that are optimized for AI. That makes Kori™ ideal for computer vision applications for patient monitoring and visual collaboration.

Besides its enclosure, Kori™ features alert, networking, and teleconference components. These components have been pre-tested and 60601 pre-certified, dramatically reducing the time and cost associated with certifying a new AI device for the healthcare market.

[Get to know Kori™ here](#)

## PRE-DEFINED SOFTWARE MODELS

There are a number of machine learning platforms that medical technology developers can choose from like NVIDIA Clara Guardian and Holoscan, Google TensorFlow, and Intel OpenVINO. These ML platforms offer pre-trained models, transfer learning toolkits, deployment SDKs, analytics tools, and other capabilities. Leveraging pre-defined software building blocks can get you [80% of the way to your functioning application](#).

Using pre-trained software can even reduce development times from over a year to just two months. That's because it can take [upwards of 80 weeks to develop a ML model from scratch](#), with months spent collecting and labeling data and then training the model to produce accurate predictions. Pre-trained, optimized models require minimal tuning and pruning to achieve performance targets.

## PRE-DESIGNED HARDWARE

When it comes to leveraging pre-designed hardware, the building blocks vary by use case. For example, an AI-powered imaging medical solution might use a medical display, camera, and embedded system with on-device inferencing capabilities, among other components.

An important area to focus on is where inference will occur: in the cloud, using an onsite server, or locally in an embedded system. In general, the closer AI processing is to the sensors, the less networking and storage requirements there are. This will determine whether it makes sense to use a specialized embedded system, edge device, or edge server.

Pre-designed hardware can also be a great starting point for a more customized solution. If there's a need for more specific requirements like proprietary connectors or certain branded components, the pre-designed hardware can be modified to fit these needs.

## ENHANCED SUPPLY CHAIN VISIBILITY WITH MBX HATCH™

**MBX Hatch** is a hardware orchestration platform that gives technology developers full transparency into engineering, procurement, manufacturing and logistics, with accessible and actionable data on products, orders, inventory, shipments, and more. Hatch is the most advanced toolset for managing complex hardware programs. Here's what you can expect:

- Lifecycle management with component-level visibility
- Detailed supply chain data and tracking, including component country of origin
- Harvested data options such as software licenses, mac addresses, asset tags, component serial numbers, and captured test results
- Easily accessible and actionable real-time inventory data on a global scale
- Ability to manage kitting with third-party goods
- Image management for software version lockdown and control
- Integration of Hatch with QMS systems to transfer

## THE BENEFITS OF PRE-DEFINED SOFTWARE & HARDWARE

Using predefined software and hardware models has proven to be a faster, easier, and less expensive alternative for most medical application deployments.

For one, these hardware building blocks have a base level of pre-certification and pre-testing, which greatly reduces the time it takes to bring them to market. By avoiding reinventing the wheel as much as possible, technology developers can match the hardware with their performance needs, bringing the unique aspects of their solution to market faster.

In addition, the hardware building blocks are designed to be compatible with and optimized for certain ML platforms. Each ML platform has unique requirements, and there are different hardware building blocks available that are designed and pre-tested for these platforms. An optimized hardware and software combination is crucial because there's always a trade-off between cost and performance when deploying resource-intensive AI applications.

Finally, using hardware building blocks gives technology developers flexibility. When creating a solution completely from scratch, every design decision can potentially lock the developer into using certain hardware components, operating systems, or software for the life of the product. Building blocks allow technology developers to switch out specific aspects of a device more easily. This gives technology developers the ability to incorporate newer technologies into the compute system of the device, yielding performance gains without taking the unit out of commission, potentially extending its useful life.



# CONSIDER A TRUSTED PARTNER FOR DEVELOPING AI MEDTECH SOLUTIONS

**W**hile technology developers can bring a medical device to market on their own, the right partner can offer expert guidance that significantly reduce the risks and costs. MBX Systems is a specialist in hardware engineering solutions for many industries, including medical technologies.

The MBX approach to engineering complex solutions is using the right combination of preconfigured hardware building blocks and customization to tailor devices to specific requirements. This “middle ground” dramatically reduces time-to-market for medical technology developers because this hardware is pre-certified, pre-tested, and optimized for specific ML frameworks.

In addition, the building blocks approach enables medical technology companies to upgrade their devices while they’re already in the field, reducing the risk of obsolescence or falling behind competitors. For example, once a new generation of an AI application is developed and validated, the computer system on a Kori™ device can be replaced immediately without waiting for the entire product to become obsolete. This accelerates the speed of innovation while also increasing the lifespan of these medical devices.

Whether a technology developer is building a new AI-powered medical device or looking to augment an existing device with AI capabilities, a trusted hardware solutions partner like MBX Systems can offer advice and strategic guidance for designing, building, and integrating the product. More importantly, using pre-defined software and hardware allows medical technology developers to focus on what they do best while adapting to an AI-centric future.

## ABOUT MBX

MBX Systems provides purpose-built and deployment-ready hardware platforms on a foundation of customized services and interactive software tools for technology companies that deliver complex products as integrated hardware/software solutions. Building on 25+ years of experience and product deployments in 175 countries, the MBX ecosystem features MBX Hatch™, the industry’s most advanced toolset for orchestrating hardware program data and action. Hardware solutions are manufactured in ISO 9001:2015 and ISO 13485:2016 certified facilities using the award-winning Forgev infrastructure developed by MBX to automate customers’ high variability manufacturing requirements for faster time to market. For more information, visit [www.mbx.com](http://www.mbx.com).

Contact [MBX Systems](#) and let us help you gain even more value from your medical device manufacturing.

