



White Paper
Digital Health

Mobile Point-of-Care Value Model

Building a Business Case for Clinical Workflow Improvements Enabled by Mobile Technologies

By Ben Wilson, MBA, MPH, Director, Healthcare IT, Intel Corporation

Jim Athanasiou, Senior Financial Analyst, Intel Corporation

Michael McDonnell, MBA, Strategic Financial Project Manager, Intel Corporation

Introduction: Data-Driven Investment Decisions

Will a potential investment in healthcare information technology (HIT) improve the delivery of high-quality, cost-effective healthcare? Did the solution you deployed deliver financial benefits?

With the number and variety of HIT solutions rising, healthcare decision makers are increasingly called on to answer such questions. Given the potential benefits of HIT-enabled initiatives, their answers are increasingly important. Yet when it comes to prioritizing among competing HIT investments or assessing the post-deployment return on such investments, healthcare leaders are often left with two unsatisfactory choices: rely on common sense and intuition, or engage financial experts and conduct extensive ROI analysis.

Intel's Digital Health Group has developed a family of practical value models that enable decision makers to take a more informed, data-driven approach to HIT investment decisions without the need for exhaustive analysis:

- The healthcare IT value model is designed for evaluating investments in health system-wide transformation initiatives.
- The mobile point-of-care (MPOC) value model focuses on the use of mobile technologies to accomplish goals such as optimizing clinician workflows or improving resource management.

- The telehealth value model assists with assessing the impacts of investments in telehealth solutions to improve chronic care management.

The healthcare value models are adapted from the approach Intel uses to prioritize its own IT investment decisions. Developed based on in-depth discussions and experiences regarding issues that concern healthcare decision makers, these value models have helped healthcare organizations build a quick business case for proposed HIT investments and identify post-deployment benefits.

This paper describes Intel's MPOC value model and summarizes case studies from England, Australia, and the United States where the model was used. Intel offers resources to help healthcare organizations use the models to enhance their HIT investment strategies.

Solutions for a Mobile Environment

In the world of modern healthcare, people and equipment are constantly in motion, and information is increasingly digital. MPOC solutions help clinicians and others make the most of this mobile environment.

MPOC solutions enable hospitals to provide clinicians with secure, convenient, and ubiquitous access to electronic medical records and other digital solutions, at the bedside or other places where such access is needed. By doing so, MPOC investments can be essential to user satisfaction with new digital solutions, and to the solutions' ultimate ability to deliver their intended value.

MPOC solutions enable improvements in clinical workflow through a combination of wireless networks, mobilized applications, and mobile computing devices. These improvements in clinical workflows can enhance productivity, improve quality of care, create opportunities for cost savings, and increase clinician and patient satisfaction.

A second category of mobile solutions, real-time location-based services (LBS), use wireless "track and trace" technologies to provide up-to-date information about the location of people and assets. This real-time visibility can enhance patient identification and optimize asset utilization, which in turn can help organizations ensure that people and equipment are in the right location at the right time.

Value Dials and Key Performance Indicators: Identifying Value

Intel's mobile point-of-care value model provides an intuitive framework for discussing and measuring the impacts of mobile solutions and assessing their value. The focus is on financial effects, but of course MPOC-based initiatives may also deliver many additional but difficult-to-quantify benefits.

Value Dials: Where Is the Impact?

Reflecting Intel's conviction that all IT investments should impact key strategic imperatives, the MPOC value model begins by identifying value dials—broad categories of benefits where MPOC investments can deliver strategic value to healthcare organizations. For MPOC deployments, the primary value dials include workflow optimization, quality of care, cost optimization, and staff and patient satisfaction.

Workflow Optimization

Using MPOC solutions, clinicians experience added convenience when entering and accessing information at the bedside or exam room. They avoid the redundant work and extra steps that occur when using a centralized PC, as well as the delays that occur when clinicians have to queue up for a PC.

Clinicians who previously depended on manual processes can base their workflows on real-time information. This information can give them new power to plan and execute their work in ways that improve the quality, efficiency, and cost of care and improve their own and their patients' satisfaction.

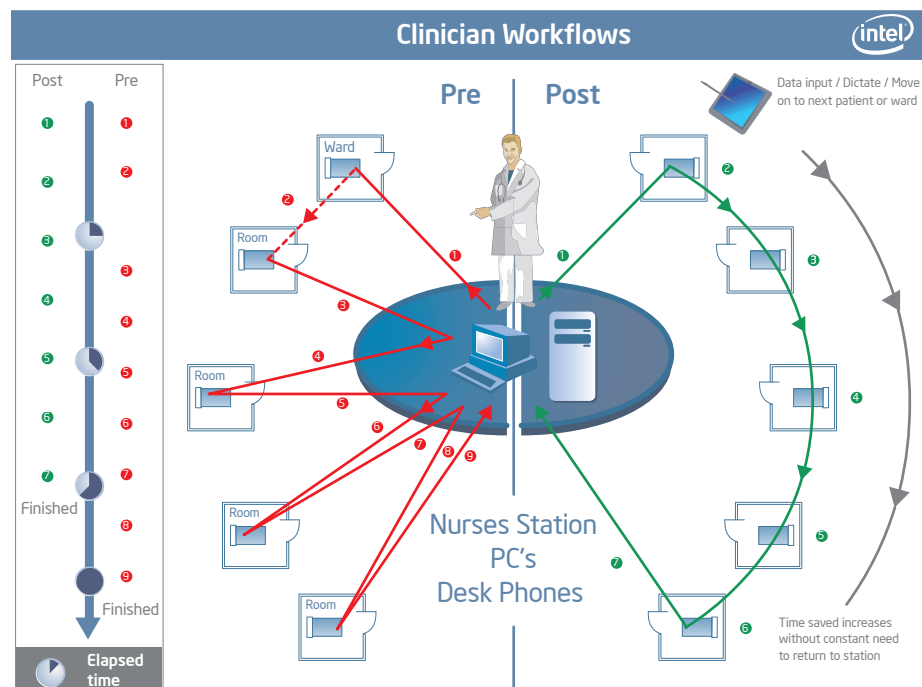


Figure 1. Mobile-optimized workflows save steps and time.

Location-based solutions optimize workflow by reducing effort for the staff who maintain and locate equipment or transport patients for treatments or procedures. These solutions also improve the productivity of clinicians whose workflows are interrupted when people and equipment are not available as needed.

Quality of Care

MPOC solutions improve care by enabling point-of-care charting, avoiding delays and errors caused by illegible handwriting and allowing patient information to be made immediately available to the healthcare team. These benefits can reduce delays in treatment planning, and shorten average length of stay (ALOS).

MPOC solutions also allow clinicians to access comprehensive patient information, reminders, alerts, orders, and clinical decision support at the point of care. Clinicians can use this information to improve treatment planning, decision making, and resource allocation, and can avoid errors or duplicate treatments caused by information that is completely missing or out-of-date.

Location-based services can improve quality of care by avoiding delays in needed treatments and procedures, and avoiding errors in patient identification.

Cost Optimization

Productivity increases and efficiencies due to automation and workflow optimization can lead to cost savings. Access to real-time information may enable clinicians to avoid duplicate or unnecessary procedures, saving time and reducing materials costs. Real-time, location-based asset tracking can reduce equipment loss and avoid replacement and rental charges.

Staff Satisfaction

MPOC solutions enhance staff satisfaction by providing tools that are adapted to the mobile environment and workflows. By enabling clinicians to access medical data and decision support tools and to chart their work at the point-of-care, MPOC solutions give them more time with patients—a factor that can impact staff satisfaction and quality of care. Improvements in staff satisfaction can have a financial impact by increasing staff retention.

Patient Satisfaction

Having more time with patients enhances the patient experience and generally results in greater satisfaction. Many clinicians report that optimized mobile devices intrude less on the clinical dialog than in-room PCs tend to do. In addition, reductions in length of stay tend to improve satisfaction scores. These factors can also improve the patient experience.

Location-based solutions can increase satisfaction by reducing the frustrating delays patients experience when the appropriate clinical personnel or resources are not available at the right time.

**Key Performance Indicators:
How Are the Value Dials Affected?**

To aid in identifying meaningful changes produced by MPOC investments, Intel’s value model associates each value dial with a set of observable, quantifiable, operational metrics called key performance indicators (KPIs). Changes to each KPI are measured against a baseline of “before” performance, and monetary impact is established where possible. For example, KPIs for

workflow optimization typically focus on the time needed to complete a set of clinical tasks, with the same individuals observed before and after the MPOC solution is piloted or deployed.

Table 1 lists common key performance indicators for the MPOC value dials. Additional value dials and KPIs can be established to suit institutional priorities. Many performance indicators can be applied to multiple value dials, but for determining financial value, each KPI is counted only once.

Table 1. Sample Key Performance Indicators	
Value Dial	Key Performance Indicators
Workflow optimization	Time savings Productivity improvements Increase in equipment availability
Quality of care	Reduction in length of stay Reduction in order life cycle Increased regulatory compliance
Cost optimization	Reduction in overtime costs Reduction in materials and supplies costs Reduction in equipment rental/replacement costs
Staff satisfaction	Increase in staff retention
Patient satisfaction	Improvement in patient survey results

Three Examples: MPOC Solutions and the Value Model in Action

Intel solution architects and financial analysts worked with three healthcare leaders around the world to pilot mobile technology-based solutions and evaluate their impact using the MPOC value model.

Optimizing Physician Dictation and Respiratory Therapist Workflows at Saint Clare’s Health System

Saint Clare’s Health System, northwest New Jersey’s largest community health organization, used MPOC solutions to optimize two clinical workflows at its Denville Hospital in Denville, New Jersey: bedside charting by rounding respiratory therapists, and dictation of progress notes and other clinical documentation by a select group of physicians who were mandated to use dictation.

Analysis using the MPOC value model showed that the optimized workflows produced measurable benefits for value dials of workflow optimization, quality of care, cost optimization, and staff satisfaction. Table 2 summarizes these findings and indicates the financial impact where one was determined.

The increased productivity and reduction in dictation costs would save Saint Clare’s USD 51,000 annually prior to expenses, yielding a three-year net present value¹ (NPV) of USD 103,000. Large-scale deployment would save over USD 347,000 annually prior to expenses, yielding a three-year NPV of USD 619,000. Factoring in expenses, payback would come within one year.

Table 2. Saint Clare’s Health System MPOC Pilot

Value Dial	Key Performance Indicators	Benefits and Value
Workflow optimization	Time savings by rounding respiratory therapists	Savings of 55 minutes daily, producing a 13% productivity increase and a daily financial impact of USD 83 per therapist
	Dictation-related time savings by physicians	Productivity enhanced by 2%
	Dictation-related time savings by administrative staff	Productivity enhanced by 12%, saving a potential USD 36 daily for full deployment
Quality of care	Increased compliance with regulatory mandates	Improved records compliance by 22.5 points
Cost optimization	Reduction in costs for dictation services	Reduced by 52%, for potential annual savings of USD 130,000 for full deployment
Staff satisfaction	Increases in staff satisfaction with tools	Increased 20%

1. Net present value analysis brings forward all costs and savings, and values them in the present day, enabling comparison of projects with different time scales.

Enhancing Rounding Phlebotomist Workflows at Salford Royal NHS Foundation Trust

Salford Royal NHS Foundation Trust in Manchester, England, evaluated the impact of an MPOC solution on rounding phlebotomist workflows in an acute eldercare ward. Ten phlebotomists (allied health professionals who draw blood) followed an optimized workflow that took advantage of their ability to access clinical information in real time and chart their work at the bedside.

The optimized workflow produced significant improvements to the quality, cost, and efficiency of care. The workflow reduced phlebotomists' administrative burden and enabled them to avoid

drawing blood when an order had been discontinued. These factors reduced materials costs and produced a time savings amounting to 25 percent of the phlebotomists' work hours. The reduction in unnecessary blood draws also lowered patients' potential exposure to infection. Table 3 summarizes the results of the pilot.

Value model analysis indicated that the mobile workflow of the 10 phlebotomists would generate gross savings on wages and materials of GBP 47,727 (USD 97,660) annually. Over three years, the investment would generate net present value of GBP 70,000 (USD 143,254) on these two factors alone, and would pay for itself within one year.

Table 3. Salford Royal NHS Foundation Trust MPOC Pilot

Value Dial	Key Performance Indicators	Benefits and Value
Workflow optimization	Productivity improvements (time savings)	Mobile workflow generated 20% time savings, improving capacity management and timeliness of blood draws. Overall time savings saved two headcount positions, freeing two phlebotomists to handle growth in other areas.
	Efficiency	Approximately 10% of blood draws (for canceled orders) were eliminated, adding further time savings and bringing total time savings to 25%
Quality of care	Reduced length of stay	Potential reduction in ALOS due to lower risk of infection and faster collection and processing of samples. Patients who are waiting for a blood draw before discharge can be released sooner.
	Reduced risk of infection	Estimated reduction of 10 percentage points (based on Salford estimates) in the number of venipunctures lowers the risk of infection, which reduces the cost of treating acquired infections
	Compressed order lifecycle	Samples get to the lab faster
Patient satisfaction	Improvements in patient satisfaction	Bedside charting gave phlebotomists more time with the patient and resulted in their being perceived as more caring. Patients were subjected to fewer "sticks," avoiding a source of discomfort and anxiety
Cost of care	Reduced lab work	Fewer blood draws reduces load on lab, saving time and materials
	Reduced materials	Fewer blood draws reduces use of gloves, syringes, etc.

Improving Asset Location at St. Vincent’s Private Hospital

St. Vincent’s Private Hospital (SVPH) in Sydney, Australia, is a 248-bed acute medical and surgical hospital that is considered one of Australia’s leading private healthcare providers. SVPH conducted an 8-week pilot to evaluate the business case for using radio frequency identification (RFID) technologies in a mobile solution to improve the tracking of medical equipment. SVPH tagged 51 items of equipment, and trained employees in two departments to use AeroScout visibility solutions in locating and recovering the items from throughout the 10-story hospital.

Value model analysis showed that the tracking solution would improve value drivers such as the quality and cost of care, staff productivity, and patient and staff satisfaction. Measurable improvements were identified in KPIs such as equipment availability, time spent tracking assets, and equipment replacement and rental costs (Table 4). The pilot showed that improvements in productivity as well as equipment replacement and rental costs for a single tagged item would produce an annual monetary benefit of AUD 22,000 (approximately USD 20,700) net present value.

Table 4. St. Vincent’s Private Hospital Location-Based Services Pilot		
Value Dial	Key Performance Indicators	Benefits and Value
Workflow optimization	Time spent tracking an asset and updating its status	Improved 15%, saving AUD 14,000 annually
Quality of care	Availability of clinical equipment	Improved 60%
Cost optimization	Total annual equipment replacement cost	Reduced 20%
	Total annual equipment rental cost	Reduced 15%
Staff satisfaction	Time spent by nurses tracking orders for equipment	Decreased 20%

Building Success

Well-designed MPOC solutions play a vital role in the emerging digital hospital. They help maximize investments in clinical applications by empowering clinicians to access those applications securely and conveniently, when and where they need to. In doing so, they help clinicians fulfill their mission of delivering high-quality, patient-focused care while assisting hospitals in containing rising healthcare costs.

Of course, technologies alone do not create value. Successful deployment requires organizational leadership, cultural readiness, effective training, and detailed attention to the complex interplay between technologies and clinical work practices. Mobile devices must be matched to the needs of clinical users and their workflows.

Intel shares healthcare leaders' vision of the integrated digital hospital. We're working to facilitate its evolution, and our technologies provide its foundation—from the data center to the point-of-care bedside (see sidebar, Designed for Clinicians).

We also bring value to the healthcare industry through tools such as the MPOC value model. Intel's value models can enable healthcare decision makers to:

- Evaluate competing investment priorities and align them with strategic objectives
- Reduce investment risks and identify investments most likely to deliver strategic value
- Build a business case for investments in mobile solutions and other HIT-enabled initiatives
- Generate agreement on intended outcomes and explore ways of measuring them

Intel offers program resources to assist healthcare organizations in applying these patent-pending value models. A set of free resources is available, along with advisory services to organizations that want to conduct a customized analysis. Please contact your Intel representative to learn more and see a demonstration.

Designed for Clinicians

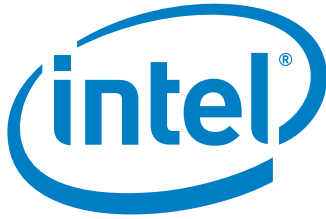
Intel has collaborated with healthcare leaders around the world to develop a platform specifically for clinicians in acute-care environments. The mobile clinical assistant (MCA) offers a variety of value-added features, including:

- Data entry via keyboard, pen/stylus, or voice recognition
- A 10.5-inch screen for easy viewing
- A sure-grip handle for easy carrying
- A sealed, hardened case that's easy to wipe off with disinfectant and shock-resistant if dropped
- A digital camera for wound documentation or patient identification
- Built-in bar code or radio frequency identification (RFID) readers that can simplify user authentication, patient identification, and electronic medication administration

In recent deployment of the MCA at the University of California San Francisco Medical Center,² the time needed for vital signs documentation was reduced by 60 percent, clinical data latency was cut by more than 2 hours, and the number of time-consuming clinician logins dropped from 42 to 12 per shift. Nursing satisfaction increased on all measures compared to the experience of using a desktop PC or computer carts.

Intel is working with healthcare vendors to create integrated solutions incorporating this innovative device.

2. Improving Quality of Care and Nursing Workflow: A Clinician Usability Pilot of the Motion™ C5 Mobile Clinical Assistant. http://motioncomputing.com/about/news/case_study_C5_UCSF.pdf.



Learn More

Intel delivers research-based innovation for health and healthcare. Informed by nearly a decade of ethnographic studies, Intel develops new health technologies and collaborates with healthcare professionals to enable seamless interaction and high-quality information exchange throughout the healthcare system.

Learn more about Intel in Healthcare. Talk to your Intel Digital Health representative, or visit us at <http://www.intel.com/healthcare/>.

Read more about the MPOC pilots and value analysis. See:

- Assessing the Value of Mobile Point-of-care Solutions for Three Clinical Workflows, Saint Clare's Health System, Denville, New Jersey.
- Demonstrating the Business Value of Real-Time Location Services to Track Medical Equipment, St. Vincent's Private Hospital, Sydney, Australia.
- Demonstrating the Business Value of Optimized Workflows Based on Mobile Point-of-Care Technologies, Salford Royal NHS Foundation Trust, United Kingdom. http://download.intel.com/healthcare/pdf/8018_whitepaper_NHS_v4.pdf

Learn about the mobile clinical assistant at <http://www.intel.com/healthcare/ps/mca/index.htm>

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