PHILIPS

Executive Insights

The interoperability opportunity: Improving healthcare with an end-to-end enterprise strategy

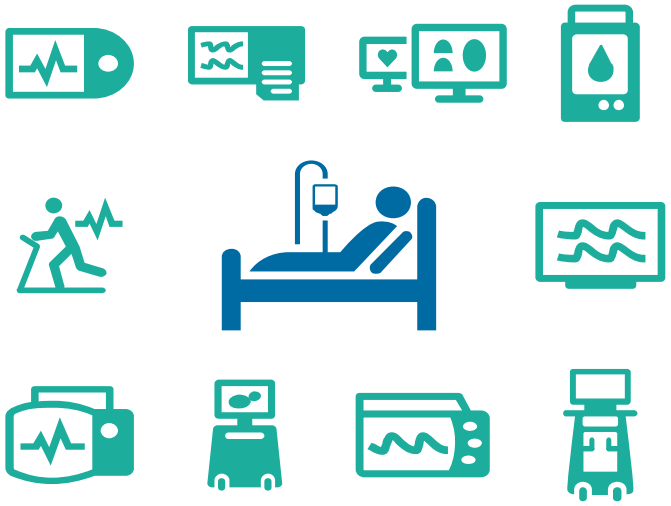
February 2018

The interoperability opportunity at hand

Picture a single patient in a single ICU anywhere in this country. Ten devices are connected to that single patient, and each device is producing data every few seconds or minutes. What can this one patient and the data he or she generates tell us about the interoperability opportunity we have at hand?

- *What happens to that data?*
- *How easily does it travel from one juncture in the enterprise to the next?*
- *How readily is the data accessed and by whom is it used?*
- *How well does the data connect to other data about this patient? About similar patients in the same hospital? About patients treated in hospitals near and far?*
- *How can this single patient's data—along with the data of similar patients—be used both inside and outside that enterprise to help improve healthcare for everyone?*

Now imagine the data generated by millions of patients in healthcare settings across this country; patients served by radiology, cardiology, oncology, and other departments, all connected to multiple devices generating volumes of data.



An enterprise-wide interoperability strategy can ensure that insight-rich data is put to meaningful and appropriate use, helping to transform the delivery of healthcare for everyone.

Interoperability challenges in the distributed data landscape

Achieving true interoperability in healthcare is a complex endeavor, whether it is a device integration or the seamless connection of multiple systems, applications, departments, and institutions.

During a single hospital stay, one patient has many contact points—from medical devices and imaging modalities to PACS and informatics systems. In emergency and operating rooms, intensive care and step-down units, devices and systems generate volumes of data that are critical to clinical decisions.

Although standards organizations have made significant strides, and regulatory incentives, such as meaningful use, have encouraged vendors and healthcare providers to improve system interoperability and content sharing, data inconsistencies and data quality issues persist.

Complicating interoperability efforts are, among other factors, the wide variety of supporting technologies, non-standard messaging formats and workflows, and data governance. Clear data governance can enable the wider distribution of data both regionally or nationally, and efforts are under way to define the right levels of administrative controls for access to patient data.

Network barriers also impact interoperability. Without physical networks, interoperability would not be possible. Today's data/bandwidth costs are significantly lower than they were 10 years ago. Advancements in wireless 4G and the upcoming 5G networks have transformed data-transfer capacity and quality. This trend enhances workflows in healthcare and encourages the demand for a higher level of interoperability.

Primarily, however, interoperability comes down to the data itself. Today's clinical devices and systems regularly produce tremendous amounts of data.

Typical interfacing models can be highly complex and costly to maintain, given the many department interface points a healthcare facility has to maintain. Maintaining many interfaces can introduce errors or system issues. Even upgrading the software of one vendor's system can have a ripple effect on all systems connected to or receiving data from the EHR.

While integrated systems, applications, and devices permeate healthcare, data ubiquity remains elusive.

The changing role of IT administrators

IT departments are faced with managing a highly complex interfacing environment that not only supports clinicians but seeks to improve clinical workflow.

These barriers inhibit not only interoperability but also the wider sharing of information in healthcare. Also challenging are the many source systems that need to be integrated to make sense of data associated with clinical or nonclinical workflows.

Many hospitals' IT organizations have become systems integrators and can face a variety of interoperability challenges, including:

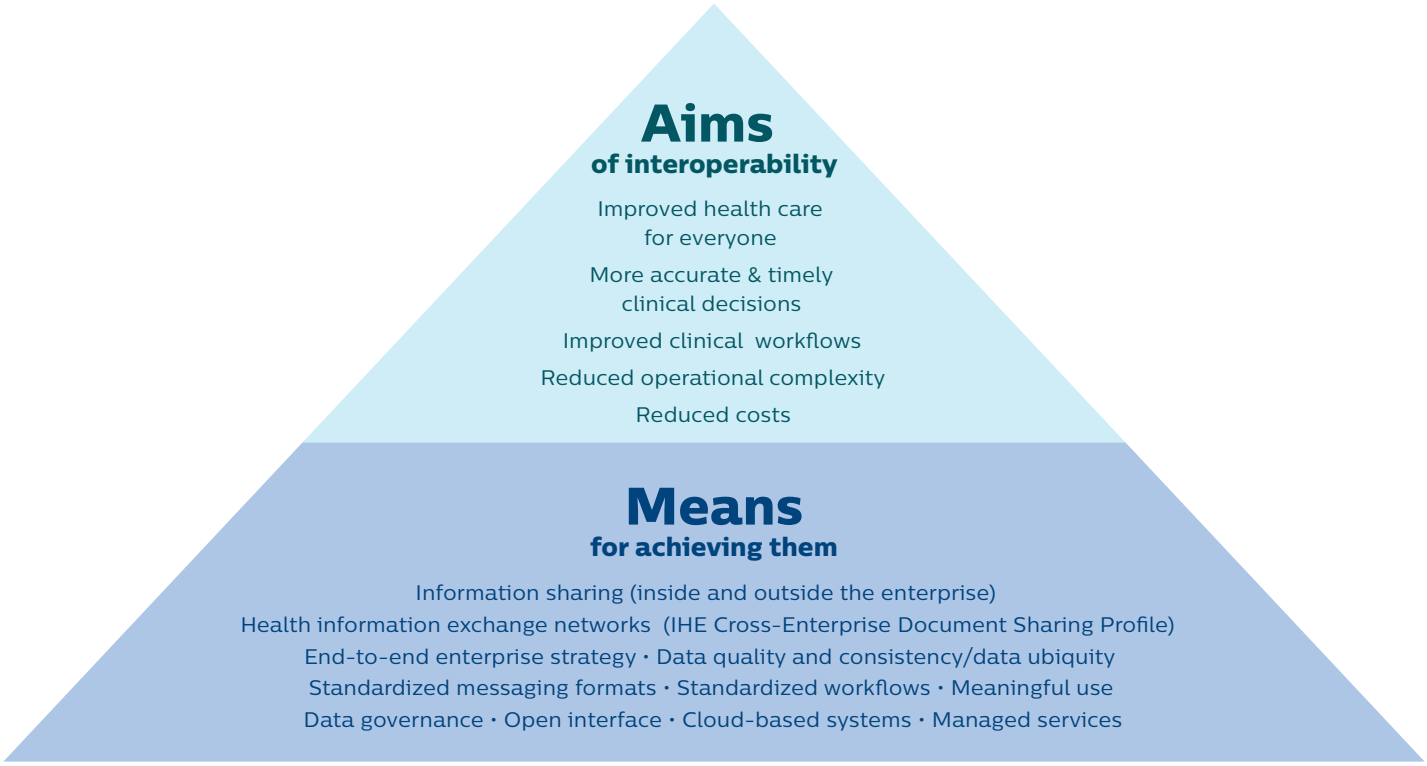
- Potentially hundreds of different medical devices with varying device drivers and compatibilities
- Differing vendors' medical devices that may not interoperate with one another
- Legacy protocols used by existing hospital information systems
- Life-critical equipment with specific requirements necessary to mitigate safety risks
- Varying degrees of interoperability among vendors' own solutions
- Varying levels of standards support, such as IHE or IEEE
- Multiple connection points
- Non-plug-and-play solutions requiring extensive IT resources

The aims and means of interoperability

As healthcare organizations move toward integrating into a patient's EHR more clinical data from devices and hospital information systems, it is important to design and implement an interoperability strategy based on an enterprise versus department-by-department approach. This has not been the case historically, which has resulted in increased complexity for the IT team.

The inherent complexity of making that shift is magnified as healthcare organizations continue to consolidate, causing their information architectures and systems configurations to be unified. Despite the eventual efficiencies that consolidation will bring, patients, physicians, and other providers associated with different enterprises also need to engage with that growing enterprise as they move through the care continuum. Healthcare data interoperability must also serve the needs of inter-enterprise collaboration.

Now more than ever, there are innovative means to achieving the important aims of interoperability. The healthcare industry—especially the patients it serves—are better because of them.



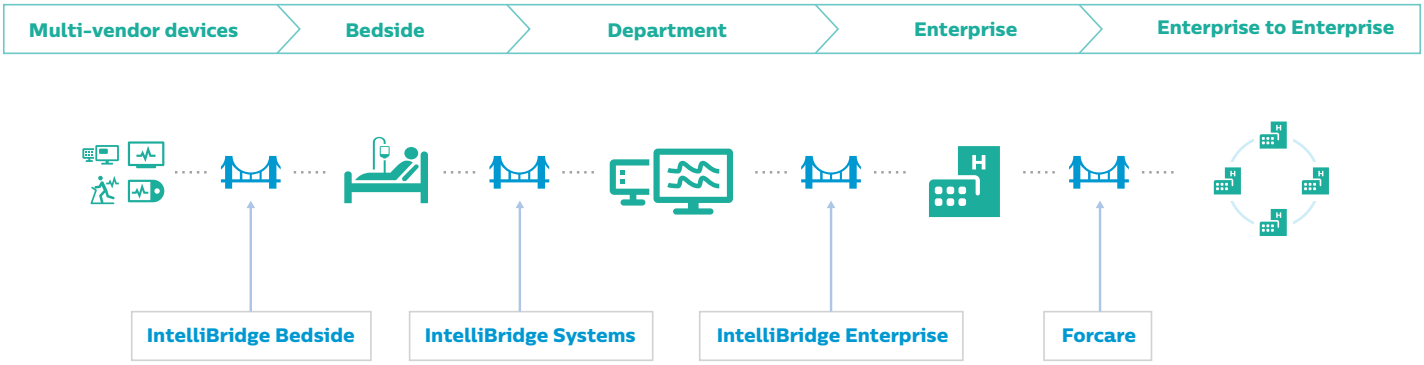
Interoperability on a larger scale

At Philips, we made a deliberate decision to enhance the interoperability landscape by creating an end-to-end enterprise strategy to help our customers overcome interoperability barriers and enable information sharing. We have solutions that provide interoperability for departmental workflows within the hospital and those that enable wider distribution of data across institutions, regions, and countries. **This is one way we are working toward our bold vision—to improve the lives of 3 billion people by 2025.**

At Phoenix Children's Hospital in the United States, parents can check in with their baby in the NICU 24/7—because being connected matters in more ways than one.

Improving interoperability with a family of solutions

End-to-end interoperability



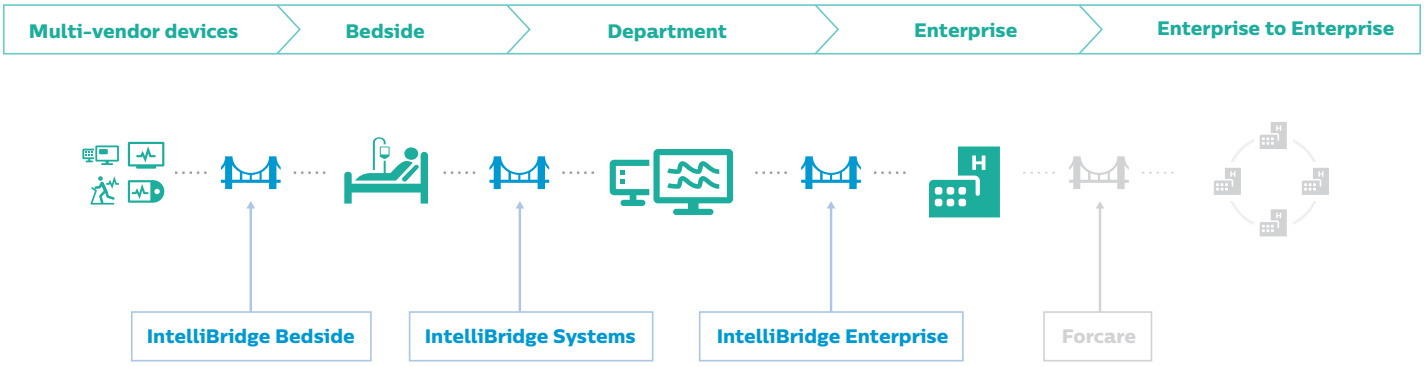
Philips provides a path toward improved interoperability with its IntelliBridge family of solutions, which includes IntelliBridge Bedside, IntelliBridge Systems, and IntelliBridge Enterprise.

While Philips IntelliBridge Bedside and Philips IntelliBridge Systems focus on getting data from medical devices into the bedside monitor and department, Philips IntelliBridge Enterprise uses standards and frameworks to enable departmental interoperability between applications, systems, and devices to the EHR. Forcare's sophisticated interoperability platform lets you bring together data from multiple sources and vendors, simplifying communication among systems. In this way, Philips provides a scalable and modular technology platform to support multi-vendor* data interoperability throughout many points of care within and between enterprises.

*Philips Open Interface

The Philips Open Interface, introduced in 1993 with VueLink and improved in 2010 with IntelliBridge Bedside, followed by IntelliBridge System in 2016, is the world's most widely used medical device communication protocol. It is used with more than 80 medical devices from more than 40 vendors. It services a wide variety of point-of-care device types, such as hemodynamic and special parameter monitors, anesthesia machines, ventilators, and other therapy devices, to send data to Patient Data Management Systems, Event/Alert Management Systems, and EHRs via Philips IntelliBridge connectivity solutions.

Improving interoperability with a family of solutions



Philips IntelliBridge Bedside

- Provides point-to-point connectivity between Philips bedside monitors and third-party devices for device settings, numerical data, waveforms, and alerts
- Its device identification and port adapter allows plug-and-play connectivity with over 130 devices

Philips IntelliBridge Systems

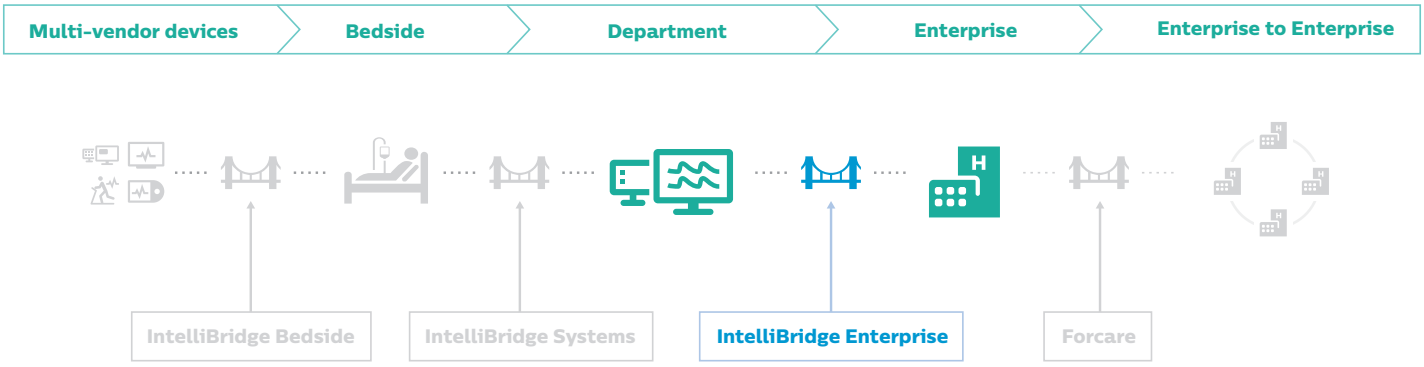
- Provides IHE-compliant interfaces to connect more than 200 popular patient care devices (both Philips and third-party devices) to hospital information systems. Philips collaborates with leading medical device manufacturers to develop interfaces as new devices are introduced and to keep existing interfaces up to date
- Automatically associates patient demographic information with patient care device data for a more comprehensive patient medical record as part of Philips IntelliVue Information Center

Philips IntelliBridge Enterprise

When you are delivering care, time is critical. The idea of connected care is about using interoperability to make data available promptly. It helps you collaborate wherever you are in the continuum, across inpatient and outpatient facilities, and even into patients' homes. In an ever-changing healthcare landscape, achieving this takes highly capable enterprise systems.

While we took the ICU patient as an example earlier, in reality, most patients will encounter the need for healthcare interoperability in less critical settings, such as routine lab testing, radiology diagnosis, general surgery, and cardiac therapy. As patients and providers gradually accumulate data about single or multiple health events, whether acute or chronic, all the data needs to be gathered, organized, analyzed, reported, and communicated to the next step in the care continuum.

Improving interoperability with a family of solutions



Philips IntelliBridge Enterprise

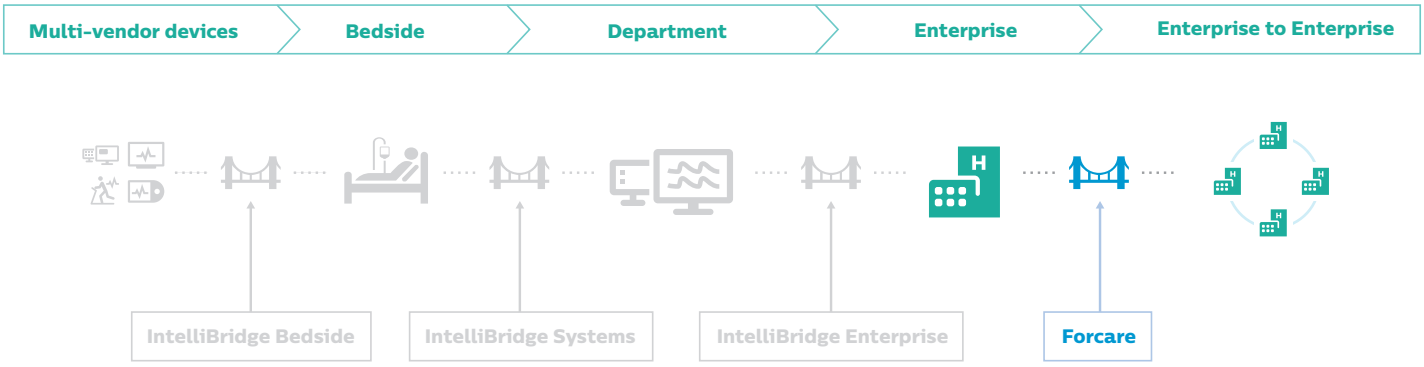
IntelliBridge Enterprise (IBE) is an interfacing platform designed to work across Philips solutions and to reduce the number of interface points to the Clinical Information Systems or EHR. It empowers healthcare organizations to control the cost of enterprise interoperability and enhance the efficiency of clinical workflows. It also helps care providers make informed clinical decisions by leveraging data from patient care devices, informatics systems, and EHRs.

As data interoperability becomes a reality, IntelliBridge Enterprise fills the void for information, gathering meaningful data for better clinical and business insights using analytics platforms and solutions. By committing to standards, such as IHE, and building a platform that can be extended, IntelliBridge Enterprise helps enhance data collection and improve workflow. By providing a single point of contact between Philips solutions and the EHR, IntelliBridge Enterprise also helps simplify your integration solution, bringing down the overall cost of ownership.

Features of Philips IntelliBridge Enterprise

- Acts as centralized, HL7 messaging service to interface Philips systems with the hospital's clinical information systems or EHRs
- Implements necessary communication protocols, mapping and message delivery, as well as data filtering, transformation, and routing
- Simplifies interface complexity and enhances the value of IT investments by providing a single point of interoperability with Philips systems
- Helps reduce the complexity and cost of systems interfacing because it is an enterprise-based, extensible interfacing platform that is based on standards (such as HL7 [v2/v3/CDA], IHE, FHIR and DICOM)
- Provides a single point of contact between your EHR and most Philips solutions
- Offers improvements in workflow as well as management tools to assist IT with interface troubleshooting

Exchanging information anywhere, at anytime



Health information exchange and content sharing

Philips expanded its interoperability strategy by adding software and solutions to implement health information exchange networks based on Integrating the Healthcare Enterprise (IHE) Cross-Enterprise Document Sharing (XDS) Profile. Using communication protocols defined in this profile, clinical information systems can electronically exchange documents (eg, medical summary, lab results) to facilitate treatment involving multiple patient encounters in different healthcare settings.

Under the umbrella of Forcare, Philips can provide a fully compliant IHE-XDS-based solution for cross-enterprise content sharing, including:

- Audit Trail & Node Authentication
- Basic Patient Privacy Consent
- Mobile access to health documents (IHE FHIR implementation)
- Many content profiles (eg, medical summary, lab results)
- Cross-Enterprise User Assertion
- Cross-Community Access
- Patient Information Cross-Reference

Because Forcare solutions are based on open standards, there is no vendor lock-in. Our products fit your existing applications, avoiding costly investments. We believe in pooling knowledge and best practices—within our own team and with our customers and their networks. That is why we actively participate in the IHE initiative with a goal of making healthcare better for everyone.

We also understand the need to keep sensitive healthcare data in safe hands, which is why our products are highly secure and have extensive patient consent capabilities.

Forcare's sophisticated interoperability platform lets you bring together data from multiple sources and vendors, simplifying communication among systems. In short, it helps you ensure the right data gets to the right system at the right time.

Philips responds to business needs and market changes

Responding to new business models with interoperability

There are many important business trends that are affecting overall healthcare operations delivery. In particular is the increased amount of healthcare devices, applications, and associated activities being managed by healthcare organizations as services contracted from third-parties, rather than capital purchases managed internally.

The healthcare industry has responded as other industries have and is well on the way to adopting SaaS (Software as a Service) and cloud computing. Certainly, cost is a driver of these trends. Healthcare organizations also have other reasons to go outside the enterprise—the advancement of diagnostic and treatment technologies, skills shortages, the application of big-data algorithm techniques to business, and clinical healthcare problems.

As healthcare organizations transition to a more distributed, services-oriented business model, it is important that they cultivate key partners who they trust to work with them holistically. Just as providers and prescribers tailor a treatment plan to the unique needs of the patient, so, too, must solutions be tailored to the unique needs of the healthcare organization.

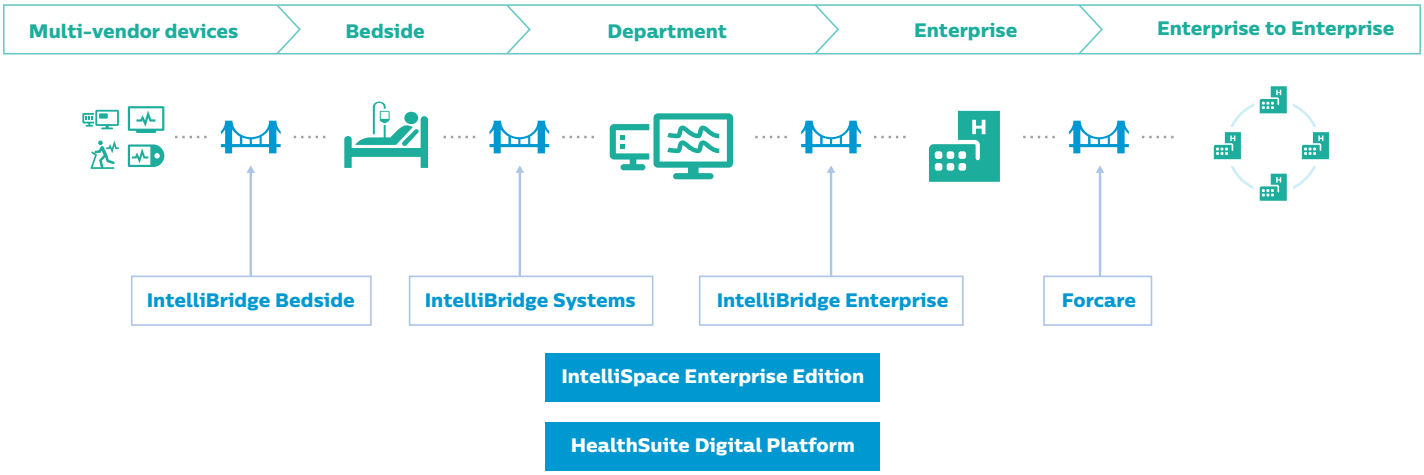
Philips delivers services for you

Philips has a well-established track-record with many customers of long-term, multi-vendor managed equipment services for devices and imaging modalities. We have recently extended those models to incorporate risk-sharing and outcome-based reimbursement.

Philips recognizes that, as a long-term partner, we need to work together with healthcare organizations in transitioning to services-based models. In the monitoring domain, Philips Interoperability Consulting, for example, provides expert assistance to IT specialists and biomedical engineers; applying a structured approach, well-established principles, and extensive expertise to support customers in getting their systems to interoperate.

To continue to respond to and anticipate the changing needs of the market and our customers, we are now going beyond devices and delivering increased services offerings to help healthcare organizations transition to the newer models in various areas of their business.

Making interoperability work for you



Philips IntelliSpace Enterprise Edition

IntelliSpace Enterprise Edition is a premium end-to-end managed service offering hosted within the healthcare organization. It integrates Philips IntelliSpace clinical applications portfolio into a scalable, modular, and interoperable solution for clinical informatics and data management. With a strong focus on TCO (total cost of ownership) and risk sharing, the managed service offering provides many benefits to the IT administration and clinical teams. The offering leverages these key interoperability platform and service elements:

- IBE platform and Enterprise Integrated Solutions (EIS) services ensure seamless interoperability within the hospital enterprise to drive the right clinical workflows and minimize the cost of implementing and maintaining interfaces
- Forcare allows the enterprise to remain connected to its wider ecosystem, enabling cross-enterprise services and solutions

Philips HealthSuite Digital Platform – Interoperability on the Cloud

With data ecosystems expanding, and the application of big-data algorithms increasing, it is important to expand the interoperability strategy and to connect data from every area of the ecosystem. At Philips, we build platforms to enable interoperability with cloud-based systems, while bridging the gap with traditional IT by providing hybrid IT systems on premises. The HealthSuite Digital Platform interoperability services offers these capabilities on the cloud, helping to integrate data efficiently and to build applications, solutions, and workflows specific to the needs of care providers.

We provide powerful end-to-end solutions and a service model that focuses on intra- and inter-enterprise interoperability.

Philips Enterprise Integrated Solutions—the people and the process

Assembling the required integration skill sets to get different platforms from different vendors to speak to one another and helping them work quickly and efficiently to collect, organize, and distribute patient data to the healthcare providers who need it is a challenge realized by many.

Philips EIS is a global services team that has broad and deep skills in delivering healthcare interoperability solutions. EIS delivers a range of integration solutions, from basic integrations focused on Philips products/platforms—including multi-modality solutions—to enterprise integration solutions that span Philips and customer products/platforms. EIS also provides technology-delivery services to support custom technology engagements with healthcare organizations. Coupled with our new Forcare services team, Philips can expand our intra-enterprise integration offering to include inter-enterprise clinical collaboration that supports data sharing across more of the patient care continuum.

Our interoperability experts help you tackle the challenges by providing expert assistance for IT specialists and biomedical engineers. By applying a structured approach, well-established principles, and extensive expertise, we collaborate to understand and resolve your IT and clinical challenges and get your systems interoperating. Working closely with your team, our Interoperability Consulting services can help you realize the potential of your workflows and processes.

Philips interoperability consultants supplement our 50+ combined years in patient monitoring and 30+ years in healthcare informatics with knowledge of relevant standards, including interfacing (such as HL7 or DICOM), integration (such as IHE), and best practice methodologies (such as ITIL, or PRINCE2).

Evaluating your needs to supply and support the right solutions

Baseline assessment	Design consultancy	Interface implementation	Verification and testing	Maintenance and sustainability
Assess your current workflow and IT system requirements Define solution specifications and user acceptance-test scenarios Create a tailored statement of work (SOW)	Support your in-house team in implementing the interfacing according to the specifications and requirements	Implement and complete according to specifications and requirements Provide consultation throughout	Check whether acquisition, aggregation and distribution of data is correct Support the use acceptance test (UAT)	Provide ongoing feedback Modify interface when needed

Summary

The interoperability challenges are many, but so are the opportunities to positively influence patients and providers through more integrated care delivery models. Healthcare organizations will need to look holistically at data sharing strategies that span the full patient care continuum, and to technology and services providers who think like they do and who are willing and able to deliver on those strategies. The future of care will be about connecting the dots, removing disconnects, and sharing data along the value chain. Interoperability of data to support the collaboration of players will be key.

There is much focus on the healthcare industry, and much pressure for it and for us to do better. We are adopting the efforts and initiatives from other industries and are continually challenging ourselves to look around and within. The challenge is ours for the taking. With teamwork, choice vendor selection, and vision, the healthcare system we create as a result will be one from which we all benefit.

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