Executive summary

Increasingly overburdened healthcare organizations are facing mounting pressures to improve patient outcomes and meet ever-changing regulatory requirements; yet they must accomplish this while struggling to manage an explosive growth in the amount of data they handle. According to the International Data Corporation (IDC), the total amount of global data is expected to grow to 2.7 zettabytes (2.7 billion terabytes) in 2012—up 48% percent from 2011. Healthcare plays a leading role in generating this amount of data. Just a 10-second CT scan can produce 10GB of raw data; and the average size of data resulting from imaging procedures grew from less than 50MB to more than 80MB in 2011. The growth in data volumes is expected to continue, which presents unique storage and transmission challenges for healthcare organizations.

Used effectively, patient data (derived from everything from bedside monitors and lab reports to MRI readings) not only improves patient outcomes, it can also provide valuable insight into ways to control the costs of care. Effective data integration is critical to achieving both. Studies support this, estimating that the use of interoperable personal health records could save $21 billion in healthcare costs annually. Even so, the barriers to interoperability can seem insurmountable.

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In the US, healthcare organizations face an ongoing struggle to integrate their applications to meet new and rapidly evolving standards for the meaningful use of electronic health records (EHRs) as defined by the Health Information Technology for Economic and Clinical Health (HITECH) act. Outside of the US, healthcare organizations must contend with increased competition and limited resources, and embark on integration efforts with solutions that are often dictated by their respective governments. Faced with less standardization and fewer formal regulatory agencies, non-US healthcare organizations commonly implement point solutions, making integration even more challenging.

Across the healthcare industry, data integration is not a new challenge. With information typically fragmented across disparate systems, and without the right strategy or tools, the task of integrating data is seen as too difficult, time consuming, and expensive for most healthcare organizations. Adding to this challenge is the growing diversity and complexity of the technology landscape. But in order to remain viable, data integration is mandatory. It’s the key to any healthcare initiative—from achieving compliance and transparency, to determining actual costs for care and improving patient outcomes. This white paper examines the importance of achieving agile healthcare integration and offers best-practice strategies for helping US health organizations attain this goal.

Interoperability: Are you ready for the challenges ahead?

With healthcare standards changing at such a rapid pace, the need for integration is perpetual and pervasive. Nevertheless, studies reveal that healthcare executives are unprepared to meet today’s interoperability demands. In a recent Core Health Technologies survey of 132 healthcare leaders, 84% of respondents said they fully understood the need for the timely exchange of health information; but only 54% indicated that their organizations had formally assessed the degree of interoperability required across their healthcare delivery community.\(^5\)

According to a recent survey of healthcare leaders, nearly 82% of Chief Technology Officers (CTOs) and Chief Information Officers (CIOs) surveyed said they’re either not using their interface platform effectively and to its fullest capability and to its fullest capability, or they know there are capabilities that they’re not using.\(^6\)

\(^5\) Modern Healthcare and ECRI Institute, The Path to Interoperability: Turning Awareness Into Action, May 2012, p. 3.

Survey data courtesy of Core Health Technologies
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Challenge: EHR adoption

Across the US, meeting Stage 2 Medicare and Medicaid EHR Incentive Program requirements may be the greatest challenge presently facing healthcare organizations. Stage 1 encouraged the adoption of standardized data formats, but utilization rates of EHR technology have remained low. To continue receiving incentive payments, healthcare organizations must move to Stage 2 after two years at Stage 1, which requires hospitals, physicians, and other “eligible providers” to increase interoperability of health information, adopt more standardized data formats, and make their EHR systems more capable than they were in Stage 1.

Organizations seeking Stage 1 compliance often rushed to purchase Drummond Group-certified technology—which, in many cases, was chosen by non-technical groups who focused on cost and meeting immediate regulatory requirements, rather than the long-term needs of the health organization. Much of the technology in place today is simply inadequate to meet new connectivity requirements—primarily, interacting with legacy equipment and complying with new standards such as Health Level Seven International (HL7) 3.0, Integrating the Healthcare Enterprise (IHE), and Digital Imaging and Communications in Medicine (DICOM).

It’s this lack of connectivity that not only drives up healthcare costs, but also hinders patient outcomes. While each standard promotes more comprehensive integration, healthcare organizations are saddled with the burden of integrating legacy systems purchased as much as 15 years ago. It’s no longer possible or practical to replace existing systems from a budgetary standpoint. To truly enhance the patient care process, healthcare organizations must have a strategy for using their current IT infrastructure—which is often still performing as expected (and producing meaningful data), but is not strategically integrated to ensure the right information is getting to the right person at the right time.

Nearly 43% of healthcare CIOs and CTOs said they had only achieved Stage 1 of meaningful use initiatives. About the same number said meaningful use was their top priority.\(^7\)

Survey data courtesy of Core Health Technologies

7 Core Health Technologies, pp. 9-10.
Additionally, with new equipment costs reaching millions of dollars, integration is far less costly than replacing a device or system to meet meaningful use requirements, such as the Continuity of Care Document (CCD) specification (the electronic summary of a patient’s medical information). Many healthcare organizations are updating their internal systems to support the CCD specification; but their new EHR footprint often doesn’t sufficiently address all of the ancillary systems across the health organization, much less outside the healthcare network.

**Challenge: coordination of care**

Another integration challenge is the coordination of care. Patients often transition between hospitals, nursing homes, home health agencies, doctors’ offices, therapists, and other healthcare organizations; yet, in most cases, patient data is trapped within departmental silos, even though patients are receiving care across the transitional continuum. Without an accurate transfer of information, patients are at risk for adverse events, such as medication reactions or worsening of a chronic condition that could become life threatening. The lack of coordinated care also drives up healthcare expenses through the duplication of services and cost of the aforementioned patient episodes. This becomes a serious barrier to forecasting future budgets and maintaining shrinking profit margins. As US health organizations move away from a fee-for-service model to a cost-for-outcome model, better coordination of care will be the essential ingredient for reducing care costs while improving outcomes. This won’t be possible without a robust integration infrastructure.

**Challenge: boundaries of care and growth objectives**

Integration strategies must also take boundaries of care into account. Whether defined by geography or by services, boundaries of care are critical in determining a health organization’s growth objectives. For instance, facilities in rural areas are often tied together based on their proximity to each other. A growth objective for a rural-based provider might be to provide services to treat chronic conditions, such as diabetes and heart disease, in order to increase revenue, reduce readmission rates, and maintain reimbursements through improved long-term care. This might require establishing new labs or imaging centers. Conversely, hospitals in large urban areas often face overlapping services, prompting them to distinguish areas of specialization, such as pediatric oncology or cutting-edge cardiology.

Prioritizing transition of care is an important aspect of a health organization’s growth objectives as well. For example, when a patient moves from the ER to an orthopedic surgeon to a physical therapist to a home health nurse, each provider has a boundary of care; yet each referring provider must have access to accurate, up-to-the-minute healthcare data to avoid costly instances such as duplicate testing or drug interaction incidents. As the number of patients and the volume of data increases, forward-thinking healthcare organizations must be positioned to accommodate this growth by establishing an infrastructure that supports a seamless transition of care that includes web services, a means of integrating web-based applications, and a service-oriented architecture (SOA) that converts software components into various services.

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8 HIMSS and HIMSS Analytics, ROI Research in Healthcare, June 2012, p. 15
9 Core Health Technologies, p. 7.
The journey to agile Healthcare integration

As payments are increasingly tied to patient outcomes, it will be even more imperative for healthcare organizations to facilitate integration with systems outside of their networks. Especially as new technologies emerge, new standards are initiated, and new concepts in system integration are introduced, healthcare organizations must have an infrastructure that meets the requirements of an agile integration platform that includes scalability for growth, security, high availability, agility, and accessibility.

Elements of an agile integration solution

- **Scalability** is critical for healthcare organizations to position them for growth and allow them to handle increased data volumes, while keeping costs under control.

- **A secure integration platform** allows healthcare organizations to be prepared as standards change and to protect the organization from costly penalties resulting from data tampering and theft.

- **High availability** helps healthcare organizations avoid the costs and risks to patients from system downtime, which can force caregivers to resort to paper-based communications. Downtime also taxes overburdened IT teams with the time and cost of troubleshooting, diagnosing, and repairing system communications issues.

- **Agility** allows organizations to easily adapt as standards change, without incurring costly development time and tying up resources.

- **Keeping data accessible**, regardless of location, helps improve the coordination of care and ensures that healthcare organizations can retrieve data whenever needed for later analysis.

Infor Cloverleaf Integration Suite: a complete integration platform

The Infor™ Cloverleaf® Integration Suite can quickly and cost-effectively help healthcare organizations achieve comprehensive and agile integration and improve patient care outcomes by allowing you to connect technology with legacy systems and ensure that the right information is transmitted to the right person at the right time. The Infor Cloverleaf Integration Suite is the most technologically advanced platform available that allows information exchange between numerous software applications, data repositories, and information technology systems within and outside your enterprise.

Designed specifically for the healthcare industry, the Infor Cloverleaf Integration Suite allows organizations to integrate any data format or system (such as patient history, medications, lab, and imaging) and share that data in real time. The solution also removes the complexity of proprietary interfaces and systems by bringing order to the complex volume of software applications that have been added over time via acquisitions or through growth. It does all of this through a single platform, allowing you to flexibly translate data into modern and proprietary interoperability standards.

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10 U.S. Department of Health and Human Services; Centers for Disease Control and Prevention, National Center for Health Statistics; Health Care in America: Trends in Utilization; 2004, p. 27.
Infor Cloverleaf Integration Suite is a proven, off-the-shelf, standards-based solution that allows organizations to meet the unique industry and regulatory requirements for patient data. The solution also allows organizations to integrate data from business operations, such as financials and supply chain management, as well as data from clearinghouses like the Centers for Disease Control (CDC) and private or state-run health information exchanges (HIEs).

**Infor Cloverleaf Integration Suite in action: a health system**

**The challenge**

A 600-bed, 2-hospital health system staffed by more than 8,000 medical and support personnel needed a reliable, secure way to integrate clinical results directly into physicians’ EHRs without putting a cost or burden on the physicians’ offices.

**The Infor Cloverleaf Integration Suite solution**

The health system implemented the Infor Cloverleaf Integration Suite across 2 hospitals, 8 health centers, 14 imaging centers, 16 lab sites, 6 pharmacies, and 52 medical groups spanning 2 states. They also integrated an independent, 600-doctor practice association with the hospital environment without requiring the physicians to manage the technology in any way. The Infor Cloverleaf Integration Suite helped to significantly improve the delivery of clinical information and increase physician referral fees to $1.2 million.

**Why the Infor Cloverleaf Integration Suite?**

Specially built for healthcare organizations, the Infor Cloverleaf Integration Suite is the cornerstone of thousands of health organizations’ interoperability strategies—ranging from revenue cycle management and cost reduction initiatives to physician office connectivity and compliance projects. The solution provides easy-to-use tools for integrated data communications, while offering all the elements needed in an agile integration platform to not only help you meet Stage 2 objectives and beyond, but also help you achieve meaningful use of patient data, improve outcomes, and maximize reimbursements. Unlike other integration solutions available today, the Infor Cloverleaf Integration Suite’s native integration capabilities provide the flexibility and scalability you need to adapt to the changing healthcare landscape.

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Scalable to meet growth demands

Healthcare standards are not static. To maintain its effectiveness, your integration platform must not be either. For example, the IHE initiative promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical needs in support of optimal patient care. As these standards become more coordinated and integrated, the volume of transactions and data will increase as well, and your technology infrastructure must be ready to support this. While increased data—and the information it contains—can help improve diagnosis and treatment, it places a greater burden on the integration infrastructure. Without a platform that can scale to new connectivity requirements, healthcare organizations resort to point solutions or customized interfaces that require time-consuming and costly development time for each subsequent change or update. This time spent maintaining core applications detracts from the focus on improving patient care. Additionally, organizations lacking built-in scalability won’t be able to substantiate their quality of care, which will ultimately undermine their ability to achieve accountable care objectives. The Infor Cloverleaf Integration Suite allows health organizations of all sizes to process and transmit large volumes of data, offering a scalable and reliable platform that directly supports your efforts toward highly effective and efficient data usage.

Just how much scalability will you need? Consider the case of one Infor customer, which had been capturing 6 million messages per day. After connecting internal diagnostic equipment, such as heart monitors and blood and oxygen monitors to patient EHRs, the number of messages increased to 26 million per day.

Scale up, while scaling down IT costs

To meet scalability and redundancy requirements, health organizations have historically installed massive computing power via multiple servers. This strategy is neither practical nor sustainable. The Infor Cloverleaf Integration Suite offers the option of running in a virtual environment so your organization can scale up as needed, without compromising performance. Virtualization also helps minimize hardware needs, improve stability across the organization, and better project future hardware and budget requirements. In addition, the Infor Cloverleaf Integration Suite runs in a multithreaded environment, efficiently using CPU power and memory, so data backups occur transparently in the background without affecting system performance.

The University of Texas MD Anderson Cancer Center recently announced the Moon Shots Program, a $3 billion effort to reduce deaths from five types of cancer by the end of this decade. To accomplish this, the institution must derive meaningful use from enormous amounts of patient data, making connectivity and scalability critical to this project.

Security to protect patient privacy

Because other providers must be brought into the coordination of care in any healthcare system, it’s no longer sufficient to be able to securely exchange information only within the care network. Transmitting data over the Internet poses a critical security threat. An organization that is audited for a potential Health Insurance Portability and Accountability Act (HIPAA) privacy security breach can be fined up to $1.5 million in a calendar year for a single violation.13 The Infor Cloverleaf Integration Suite protects your organization with secure, end-to-end data encryption and transmission across your integration infrastructure. Although healthcare organizations are not required to implement a certified integration platform to achieve meaningful use, Infor recognized the need to help healthcare organizations meet the highest levels of security. To accomplish this, Infor partnered with the Drummond Group, a test lab and certification firm, to certify The Infor Cloverleaf Integration Suite to HIPAA Privacy Rule (HIPAA 164) standards.

High availability to ensure quality care

In the past, health organizations did not view their integration platform as a Tier 1, strategic platform. But in today’s healthcare environment, no provider has a tolerance for downtime. Most organizations rely heavily on both business and clinical applications around the clock, so visibility into the health of these applications is critical. The Infor Cloverleaf Integration Suite provides logging and monitoring to guarantee application availability.

### Infor Cloverleaf Integration Suite in action: a US state’s health department

#### Challenge

A US state’s health department needed a way to provide managers and policy makers with immediate access to critical data residing in various counties and in different application systems.

#### The Infor Cloverleaf Integration Suite solution

The Infor Cloverleaf Integration Suite allowed the state’s health department to transform a manual set of data collection processes and disparate applications into an integrated system for reporting and analysis of critical public health and safety information. Today, as lab reports are processed, the health department can send immediate alerts for early detection and intervention. Lab data needed for disease surveillance programs is accessible within 48 hours, compared to the previous average of 10 days. Additionally, the health department can now make connections between diseases and infected persons or populations in multiple locations on a federal level, allowing the department to respond to national biohazard security threats (such as smallpox or anthrax), quickly identify and respond to regional outbreaks and environmental hazards, and securely transmit data from their immunization registry to the CDC.

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The result is that IT departments have immediate visibility into the source of a problem, reducing troubleshooting and network management time. If a connection goes down, the system sends an alert in real time, allowing IT teams to proactively diagnose and repair the interruption before it affects patient care. This functionality is not available in point solutions. Additionally, the Infor Cloverleaf Integration Suite is more reliable than point-to-point connectivity, making it ideal for organizations that have yet to adopt an integration strategy or are struggling to manage changing communication standards.

**Agility to meet ever-changing standards**

While some vendors propose a one-size-fits-all integration solution, the reality is that your integration platform must be agile enough to connect at any time with hundreds (or thousands) of other systems and to continually update that connectivity. The enterprise-ready Infor Cloverleaf Integration Suite platform allows you to keep pace with changing standards, increase data volumes, and respond to new interoperability needs by being able to rapidly integrate new applications into your existing IT environment.

The Infor Cloverleaf Integration Suite also supports a wide range of healthcare standards, including HL7 2.x, HL7 3.0, IHE, meaningful use, Continuity of Care Document (CCD), and any XML schema, as well as allowing you to process proprietary message structures. Rather than requiring additional training or massive coding time, the open-platform solution allows your development teams to use established skills to connect with outside organizations. Adaptable by data model (such as the healthcare standards previously mentioned) and by data protocol (such as raw TCP/IP, HTTP, and secure FTP), the Infor Cloverleaf Integration Suite helps translate standards into data that enhances health records. For example, the Infor Cloverleaf Integration Suite allows you to integrate with existing systems to translate patient data into a CCD format with an investment of thousands of dollars versus millions.\(^4\) Likewise, the Infor Cloverleaf Integration Suite can help you make a seamless transition to meeting increased requirements for lab result acceptance, as per Stage 2 standards. With point solutions, healthcare organizations are often forced to wait for various vendors to take ownership of integrating the latest standards into their applications, which can be a time-consuming and expensive undertaking. With the Infor Cloverleaf Integration Suite, new standards can be implemented quickly and seamlessly throughout your integration environment at a much lower cost.

**Accessible data is meaningful data**

By exposing and using the valuable information isolated in your existing technologies, the Infor Cloverleaf Integration Suite helps you reduce the overall cost of ownership of legacy systems and applications. The solution improves the accessibility of data that would otherwise remain trapped in disparate repositories and helps you streamline message exchange between hospital applications, databases, and external systems. This results in data that’s cost-effectively transformed into meaningful, value-rich information.

Other keys to making data meaningful is being able to apply analytics to track trends and establish care strategies, which is why retrieving data from proprietary databases is a growing concern among healthcare leaders. It can cost millions of dollars and take weeks for a third-party EHR vendor to extract data. The Infor Cloverleaf Integration Suite can quickly and cost-effectively pull data from varied and hard-to-reach data sources, applications, and processes, bringing the data to the forefront for reporting and analytics.

\(^4\) Assuming that Stage 1 objectives have been met.
Infor Cloverleaf in action: a medical institute

The challenge

A specialized medical institute that conducts life-saving work for numerous healthcare organizations needed a way to support multiple standards and automatic data integration on various technology platforms that reside outside of their network.

The Infor Cloverleaf Integration Suite solution

The institute implemented the Infor Cloverleaf Integration Suite to automate orders and securely transfer clinical data across service centers in two states. The solution integrated a range of information—from test results, procedure requests, and patient admission-discharge-transfer information—between the organization’s data systems and those of its clients. With the Infor Cloverleaf Integration Suite, the institute now has the flexibility and proficiency it needs to manage HL7 messages, create connections to hospital partners, and transition data to any system.

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With all the elements needed for an agile integration platform, it’s no wonder that healthcare delivery and insurance organization leaders ranked the Infor Cloverleaf Integration Suite as the “Top Complex Data and IT Integrator HIE solution” from a field of 259 system integrators. In addition to outstanding integration technology, you can count on unmatched support as well. Whether you’re just beginning integration initiatives or are ready to move to the next level, Infor can guide your organization through each phase with the industry’s broadest support for consuming, aggregating, transforming, and redistributing data. For more information about how the Cloverleaf Integration Suite can help you achieve your goals for increased interoperability, improved patient outcomes, and lower costs of care, visit www.infor.com/cloverleaf or contact an Infor representative at 1-800-260-2640 or healthcare@infor.com.
About Infor

Infor is the world’s third-largest supplier of enterprise applications and services, helping more than 70,000 large and mid-size companies improve operations and drive growth across numerous industry sectors. To learn more about Infor, please visit www.infor.com.

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