Driven by changing reimbursement models, the rapidly changing science of medicine and increasing competitive pressures on health systems, enterprise-level analytics is critical for healthcare organizations.

Historically, health systems have approached analytics primarily from an incremental, retrospective and operational-siloed approach. This approach, “Analytics 1.0,” has historically labored under several constraining factors, such as inadequate electronic source data (too many manual processes), source data limited to transactional silos (data constrained departmentally) and a focus on the use of analytics to merely satisfy external reporting requirements, versus higher order predictive analyses. Solutions designed for the “Analytics 1.0” environment often followed these limitations, either as manual spreadsheet/database solutions, or niche solutions narrowly focused on operational needs.
Today’s health systems must operate in an entirely different climate. Health systems are now dealing with an abundance of source data, with the growing digitization of medicine including the proliferation of electronic health records, personal health records, mobile technologies, health-related social media and molecular-level profiling. The requirements around analytics have also shifted, being elevated from simple departmental reporting of performance to enterprise-wide, C-suite needs for clinical and business intelligence. Niche analytic solutions have been unable to fulfill these requirements or have not been able to assimilate data from the multitude of source systems required, and thus a new breed of analytic solutions, “Analytics 2.0,” is needed. Table 1 illustrates the evolution of the analytic environment in the healthcare industry.

Healthcare IT News conducted an online survey of 209 respondents from February 1 to March 7, 2012 on behalf of Oracle and Deloitte to identify the driving forces for deploying an Analytics 2.0 infrastructure for healthcare providers. The survey found that while healthcare providers strongly recognize the need for timely access to high-quality analytics, the results achieved thus far have been limited. The demand for a more integrated view of the enterprise has increased as many begin this transformational process, and as a result, Analytics 2.0 is emerging in the industry.

High Demand for Analytics 2.0 Deliverables

Related to finance and business operations, survey respondents cited the following areas within their organization as having an identified need for timely access to high-quality analytics: corporate and clinical risk measurement, resource utilization, predictive analytics for forecasting and market development, financial information about past performance, revenue cycle, and supply chain/spend analytics. On the clinical side, healthcare providers cited a great need for analytics for quality reporting, patient safety, utilization and access to healthcare services (See Graph 1).

The high percentages across all areas underscore the technical importance of extracting information from multiple sources. Driving environmental forces and opportunities – such as the shift from pay-for-volume reimbursement to value-based accountable care; delivering cost-effective, translational and comparative effectiveness research; novel collaborative partnership opportunities with pharmaceutical or medical device organizations; cost-effective care management for high-risk patient populations; health information exchange (HIE); and personalized healthcare – require access to and synthesis of information from multiple source systems. To effectively participate in any of these

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### Table 1

<table>
<thead>
<tr>
<th>“Analytics 1.0”</th>
<th>“Analytics 2.0”</th>
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</thead>
<tbody>
<tr>
<td>• Data derived from manual data sources or single-source transactional systems</td>
<td>• Data derived from multiple transactional source systems</td>
</tr>
<tr>
<td>• Focused on retrospective analyses of unit or department-level performance</td>
<td>• Focused on enterprise-level prospective and predictive analyses</td>
</tr>
<tr>
<td>• Simple questions – “Show me all patients with diagnosis X who experienced outcome Y”</td>
<td>• Hard questions – “Show me the effect of nursing overtime patterns on ICU quality measures and patient satisfaction metrics”</td>
</tr>
<tr>
<td>• Industry solutions – manual reports and dashboards, “niche” analytics applications</td>
<td>• Industry solutions – enterprise health analytic platforms</td>
</tr>
<tr>
<td>• Multiple solutions required – “Build once, use once”</td>
<td>• Single enterprise solution – “Build once, use many times”</td>
</tr>
</tbody>
</table>

initiatives in which survey respondents have indicated high interest (see Graph 2), healthcare providers require a data-holistic view of their organization.

As many healthcare providers are already realizing, bolting “niche” analytics solutions atop multiple transactional systems across departments can be cost prohibitive and short-sighted. Health systems should adopt organization-level strategies leveraging enterprise analytic solutions rather than maintaining a portfolio of niche analytic solutions in order to leverage existing resources and cost-effectively meet current and future needs. An enterprise-wide business intelligence and analytics strategy can economically and holistically address these needs.

Closing the Gap between Current Capabilities and Demand

Current Analytics 1.0 capabilities are not fully meeting survey respondents’ requirements in the financial, operational or clinical domains. Many have indicated they are taking decisive steps to rectify the situation by exploring an enterprise-oriented strategy. Graph 3 highlights some of the critical barriers to address in this evolution.

In the past, organizations had to sacrifice ease of use for flexibility and analytical sophistication. Over the last decade, analytics technology has been evolving at such a rapid pace that analysts and other end-users can now perform functions that previously required programmers and statisticians. At the same time, the healthcare industry faces the challenge of analyzing a growing amount of data to solve increasingly complex problems. Healthcare providers who know how to leverage these powerful capabilities can have a competitive advantage while those who do not face an uncertain future, according to Dr. Mitch Morris, Principal, Deloitte Consulting LLP and healthcare technology leader.

Despite the growing awareness that high-quality analytics can define effective health systems in the new healthcare environment, classic implementations of transactional systems such as electronic medical records (EMRs) often give little attention to analytics. This issue has become magnified as health systems rush to achieve compliance with well-meaning initiatives such as Meaningful Use Criteria from the HITECH Act. Dr. Frederick Lee, Director for Clinical and Translational Informatics at Oracle Health Sciences, advises healthcare providers to step back and realize that decisions made during hasty EMR implementations can impact their ability to cost-effectively conduct analytics downstream. “This is a vestige of Analytics 1.0 thinking – implementing a solution to support operational workflows, without consideration of how this data will be used to power an analytics strategy,” he said. Following suit, forward-thinking healthcare providers have allowed analytic use cases to inform their EMR implementation. The rush to implement EMRs with an Analytics 1.0 mindset can also give rise to false expectations that a health system’s analytics needs will be met by an EMR implementation alone; organizations are often surprised that additional spend for an enterprise analytics solution is needed downstream. “EMRs can get you into the red zone, but today a health system needs an enterprise analytics solution to get into the end zone,” Lee said.

Historically, only the largest, most technically sophisticated organizations with significant IT outlays in budget and resources could build and maintain enterprise data warehouse solutions capable of powering Analytics 2.0 strategies, according to Brett Davis, Senior Director of Healthcare Strategy and Business Development for Oracle. However, even these pioneers have realized that these efforts are not sustainable in the face of an ever-expanding diversity of data types and sources, exponentially complex data quality issues as
more sources come online, and a regulatory and compliance environment that is constantly changing analytic requirements. Moreover, true Analytics 2.0 requires empowerment of clinical and business end-users themselves: Clinicians and managers need agile analysis often at the point of care. “The model of ‘building your own’ data warehouse is no longer sustainable, not that this was ever an option for the average health system,” said Lee.

Academic medical centers have historically been the early adopters of analytics, according to Davis; however, hospitals, integrated delivery networks (IDNs) and ambulatory care facilities are now looking to analytics as a solution. Graph 4 reveals the various stages of analytics adoption by survey respondents who predominantly work for these three types of healthcare organizations compared to those who work for academic institutions, 82 percent and 2 percent, respectively. As enterprise analytics continues to move into the mainstream, an efficient approach is to implement an effective architecture that can deliver defined information to a target audience in a timely manner through whatever format and channel that works effectively for them.

**Analytics 2.0 Success: Combining Data Governance and Technology**

Effective strategies to solving complex healthcare issues involve a combination of leadership, teamwork, technology and demonstrated approaches that can address identified issues on many different levels – strategic, tactical and operational. An effective governance strategy is a requirement to an effective enterprise analytics program – it is the linchpin that maintains alignment among the organization’s mission, analytics program initiatives, data management practices and technical resources, according to Michael Brooks, Specialist Leader in Healthcare Information Management, Deloitte Consulting LLP. “Effective enterprise analytics programs involve close collaboration among executives, technical teams, the user community and other subject matter specialists. More often than not, these programs go beyond data and technology and address a variety of cultural, behavioral and other issues that extend well beyond the IT department” says Brooks.

One of the major challenges for any analytics initiative is resource and budget constraints. Indeed, 48 percent of respondents cited limited access to skills and resources as a barrier. Attracting skilled resources who understand healthcare and analytics may continue to be a challenge. Addressing this resource gap warrants new deployment approaches that are based on a combination of enabling accelerators and pre-configured architectures that can substantially shorten the implementation time, cost and risk of changing requirements. The value of such agility to the organization and its patients can be significant. The quicker organizations can respond to opportunities and challenges, the more competitive they can become.

Diverse healthcare organizations are implementing enterprise data governance strategies that fit within their culture and operating model. These strategies require an assessment of impacted data sources to determine what transformations are needed to obtain
high-quality, action-oriented information. An important component of the process involves change management. With 16 percent of respondents reporting that their healthcare organization is not culturally ready to become a data-driven enterprise, the ability to garner executive sponsorship and guide change management are critical first steps to embracing analytics. This requires the skillful development of a clear vision based on common values and goals, and a resulting change management strategy that addresses process and decision-making integration, as well as technology and data integration.

Oracle has further accelerated the implementation process by designing preconfigured data warehouses based on healthcare industry leading practices. The warehouses can be customized to meet the individual needs of healthcare organizations and adapt in terms of volume and complexity, which benefits both small community hospitals and large IDNs, according to Simon Instone, Director of Oracle’s healthcare solutions for Europe, the Middle East and Africa. Instead of working harder, healthcare organizations of any size can work smarter.

In another effort to democratize enterprise analytics for healthcare, Oracle has productized the data model – which is upgraded with new applications developed by third-party software vendors – that represent the whole of the integrated view of healthcare across clinical, financial, supply chain and other systems. “We’re fundamentally trying to shift the economics and speed with which an institution can deploy enterprise analytics,” said Davis. Speed is important to 57 percent of respondents who cited cost-effective, timely implementation and 35 percent who cited faster access to information and reporting as factors for their organizations to deploy analytics.

Building analytics applications from the ground up or resorting to a tools-based approach can be unsustainable. It can be more economical – especially in an era of multiple IT initiatives meeting complex mandates and requirements – for healthcare organizations to take advantage of a platform approach to analytics with productized components, given that many analytics challenges organizations face are similar. This approach appeals to respondents who cited the ability to leverage their existing technology; user-friendly analytics tools; and analytics initiative aligned with other health IT initiatives within their organizations as factors for implementing analytics. “Whatever the use case – preparing to be an ACO, operational efficiency, managing patient populations more efficiently through personalization – it’s the same data,” Davis explained. “Build the infrastructure so you integrate once and use many times versus taking the silo approach.”

The Real-World Power of Analytics 2.0

Twenty-eight percent of survey respondents cited documented effective uses of analytics as a factor in potentially deploying the technology. Oracle’s and Deloitte’s collaboration can deliver value for healthcare organizations. For example, an academic medical center shortened its process of identifying protocols for Phase II clinical trials and recruiting patients from 18 to 24 months to less than three months. The acceleration bolstered the medical center’s position as an academic research leader in its specialty, benefited its pharmaceutical collaborators and resulted in collaborations with new pharmaceutical companies.

With analytics, healthcare organizations can leverage information to better manage their resources and supply chains. One healthcare provider applied analytics to identify the root causes for its denied insurance claims. By gaining insight into physician practice ordering patterns, another healthcare provider standardized implant purchases, which streamlined ordering processes and reduced costs. Healthcare providers have also analyzed utilization patterns to better coordinate staffing while managing overtime and contractor costs.

Where is your organization in terms of use of BI / Analytics?

- Extensive use of analytics to improve operational efficiencies: 20.1%
- Extensive use of analytic capabilities for translational research and clinical effectiveness: 8.6%
- Predominant use of standalone departmental datamarts: 12.9%
- Enterprise data warehouse planned and under development: 13.4%
- Enterprise data warehouse implemented and operational: 16.7%
- Currently don’t use analytics, but planning to soon: 19.6%
- No clear analytics strategy/do not intend to pursue: 8.6%

Source: Healthcare IT News Business Intelligence/Analytics Survey, February 2012
Analytics 2.0 goes beyond helping to solve the economics of healthcare to the future of healthcare, which is already here for visionary healthcare organizations. Thirty percent of respondents cited looking for new revenue streams with pharmaceutical or medical device industries as a strategic driver for their organization to evaluate secondary use of transactional data. Revenue-generating partnerships are being considered by community hospitals and health systems, normally the milieu of research institutions. The timing is good: The pharmaceutical industry’s business model is undergoing a seismic shift, thanks to healthcare costs, bar-raising comparative-effectiveness requirements and the move from blockbuster drug to targeted drug, among other pressures. The pharmaceutical value chain – including discovery, clinical trials and post-marketing – requires real-world healthcare data that is clean, normalized and longitudinal. As a result, new business opportunities are emerging in which pharmaceutical companies are looking to collaborate with healthcare organizations to ethically leverage their transactional data.

Building a Sustainable, Data-Driven Healthcare Enterprise

There is an emerging awareness among leading healthcare providers, payers and other organizations that a more complete view of enterprise performance and market dynamics is needed to excel in today’s environment. Analytics can make it possible to get the insights decision makers need and is quickly becoming recognized as a new game changer, according to Brooks. A number of healthcare organizations have already begun the journey, according to the Healthcare IT News February 2012 online survey results.

What should help move the needle from early adoption to critical mass is the awareness of the areas Analytics 2.0 can positively impact (See Graph 5). As healthcare providers begin to engage in quality and cost initiatives, new partnerships and revenue streams, and other projects, it is anticipated that awareness will shift to deployment. According to the survey, 17 percent of respondents said their organization is currently not evaluating secondary uses of transactional data and nearly 9 percent said their organization has no clear analytics strategy and does not intend to pursue one. Sooner rather than later, nonparticipation will no longer be an option for survival.

Healthcare organizations that understand the benefits of Analytics 2.0, however, will be in a position to rapidly and nimbly participate in current and future initiatives and not only survive but thrive in the new healthcare environment.

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