Achieving a Technology-Enabled Strategic Advantage in Healthcare

The Case for a New Healthcare Operating Model
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Variable and Complex Ecosystem
Healthcare is organized as a sophisticated ecosystem. This ecosystem is highly diverse and includes many different relationships between patients, physician groups, hospitals, nursing facilities, government agencies, and insurance companies.

Combining evolving healthcare reform with the variability of these relationships, services, and health plan offerings results in a highly fluid and complex operating model and significant data, risk and service challenges.

Fragmented Systems and Processes
While approximately 50 percent of physician practices and hospitals now have adopted electronic medical records (EMRs), healthcare IT infrastructures include a variety of fragmented and siloed legacy systems. Replacing these systems can take years, cost millions of dollars, and disrupt operational activities. “Stop-gap” measures have been implemented to maintain these systems and link them together using discrete “point-to-point” interfaces.

Operational processes utilizing these systems are also fragmented. To compensate, inefficient manual intervention and error-prone activities occur.

Healthcare IT resources are severely constrained and do not have sufficient capacity to execute effectively on their different initiatives. The systemic issues around bandaging existing systems and processes and addressing new mandated initiatives, including electronic medical records, meaningful use and ICD-10, are pushing the organizations to a “breaking point.”

Reform Activities are Re-Defining the Healthcare Operating Model
Reform and regulatory requirements are significantly re-defining the current operations and execution model, and driving a number of healthcare IT initiatives.

Reform is instilling performance imperatives and driving transformation of processes and metrics with continuous improvements.
In comparison to other industries, healthcare organizations have lagged in adoption of quality and performance metrics. Overlaying performance imperatives on fragmented processes and systems exacerbates issues.

The Centers for Medicare & Medicaid Services (CMS) have recently introduced Meaningful Use Stage 2, and the physician practices and hospitals are required to comply with a number of measures within a limited time frame. CMS has also mandated the 5010 and ICD-10 billing compliance initiatives, which add increased challenges into revenue management. Many organizations are struggling with conforming their systems and processes to the new requirements.

Reform is fundamentally shifting to value-based care with the formation of Accountable Care Organizations (ACOs), Collaboratives, and performance-bundled reimbursement models. The ACO model requires providing clinical care across multiple providers (often with different systems) and synchronizing patient results. Start-up ACOs will spend $500 million in the first year on healthcare information technology (HIT).

Overall, there is significant new emphasis on targeted population management for the ACOs and focusing on aggregate patient groups to enhance clinical outcomes and ensure care is met for at-risk populations.

However, the disparity in different healthcare organization’s systems makes the integration and execution of ACO and population-based models across multiple healthcare organizations very difficult to achieve. Patients are registered with different medical reference numbers (MRNs) and their information is stored in different ways across many systems owned by different organizations. The integration and linkage of records is unwieldy and difficult to execute. Manual and intermediate steps are being taken to create a first-order alignment, but without the benefit of a strategic solution.

Healthcare reform is also promoting private and public health information exchanges (HIE), which are evolving in the marketplace to provide a means to connect different healthcare organizations together at the local, state, and federal levels.

Hospital re-admissions are also being managed closely with future payments based on specified re-admission rates and times.

Key Emerging Trends

Better risk and clinical decision support tools are urgently required. Today’s methods are inefficient, difficult to adjust and costly to maintain.

Given the criticality around high quality patient outcomes and cost-effective treatment delivery, there is an overriding need to acquire and monitor comprehensive, holistic views of all patient health information and activities.

Combined with the longitudinal patient perspective, there is a shift to shared care coordination and execution across teams of healthcare professionals. All professionals must operate together, addressing different aspects of an aggregated care plan; e.g. hospital discharge and transition. These professionals will be operating from their own systems which today are not connected together.

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Consent, security, and protection of patient health information has become very important with the emergence of exchanges and the move to aggregate and share patient information. Safeguards to ensure privacy are paramount.

Bioinformatics and integrated health data analytics are becoming increasingly valuable tools for preventive medicine, testing and applying new treatment protocols, and optimizing patient outcomes. The use and expansion of health data analytics is forecast to grow from 10% adoption in 2011 to 50% adoption by 2016.

There are other dynamics occurring in healthcare, including the emergence of patient "Bring Your Own Device" (BYOD), mobile models, expanded biotech devices, and increased use of iPads and mobile devices by healthcare professionals. All indicate higher levels of passive data collection, telemedicine, and automation in healthcare.

**Challenges to Execute on the New Vision**

The healthcare reform and emerging trends are creating a new healthcare vision and execution model. This vision focuses on a highly interactive eco-system with different professionals across multiple healthcare organizations operating together, and in real-time on shared, cooperative, and longitudinal patient and population clinical activities and optimization of outcomes. Reimbursement models are aligned on these objectives and apply incentives and punitive measures based on goal achievement.

The existing complexities of the healthcare ecosystem, fragmented organization systems and processes, increasing reform mandates, and emerging business and technology trends are difficult to manage and navigate. Combining these complexities with the limited capacity of today’s extended healthcare IT and operational resources becomes untenable to effectively execute and deliver results.

Healthcare organizations traditionally apply strategies to replace existing healthcare information technology (HIT) with new EMR and healthcare delivery systems. HIT replacement models are very expensive, time consuming, and introduce disruption to operations and execution.

Healthcare organizations often create intermediate data marts and linkages from existing systems to overcome the existing distributed systems and data impediments. These data marts are used for synchronizing and aggregating information together and enable the organizations to achieve master patient index, longitudinal health information, operate on shared clinical activities, and provide foundations for analytics. The data mart approach requires significant time and resources, creates high risk, and generates low ROI. Maintaining these models is very time consuming and limits the ability to make adjustments. Real-time patient visibility is lost as well.

Collectively, these traditional approaches prevent healthcare organizations from adapting and flexibly introducing new capabilities quickly, from harvesting their existing healthcare assets, and from collaborating with other organizations.
A New Paradigm for Healthcare Innovation and Execution

Delivering agility and insight to meet the new healthcare vision

Pneuron introduces a new breakthrough paradigm, which enables the healthcare organizations, patients, care coordination, and clinical activities to be connected in real-time across the ecosystem with minimal changes to existing systems.

Pneuron has embraced the challenge to enable superior performance across the innovation and execution disciplines within the healthcare industry. Leveraging advanced research and development, Pneuron has defined a fundamentally new approach to the development and deployment of healthcare solutions. This approach aligns with today’s healthcare trends, provides a platform to improve the relationship between healthcare business and technology resources, and creates value by improving the core innovation and execution disciplines with no or minimal change to the existing systems and infrastructure.

Using Pneuron, healthcare organizations achieve real-time visibility across healthcare activities, longitudinal patient and population insight, and the ability to optimize outcomes. Pneuron’s unique platform provides a suite of tools that can interact with existing healthcare systems and processes across multiple participating organizations and allow ecosystem members to rapidly configure new composite offerings leveraging their existing assets.

Pneuron also enables healthcare organizations to utilize existing HIT accesses without large scale replacement approaches. Pneuron minimizes the need for creating expensive intermediate data mart solutions. Instead, Pneuron is able to interact directly with existing data sources and enable selective access of targeted information and combine the results with other systems. Analytics models can easily be configured or organization’s models can be imported into Pneuron. The analytics can then operate directly on or in close proximity to the existing systems.

Healthcare organizations are able to interact with distributed systems and data within their organization and across participating members, and configure and test new healthcare models that can span different care, analytical, and healthcare delivery requirements.

Pneuron breaks down barriers to the electronic exchange of information and decreases the cost and complexity of building interfaces between different systems while ensuring providers with certified electronic health record (EHR) technology have the tools in place to share, understand, and incorporate critical patient information.

Pneuron focuses on providing healthcare organizations with a Business Oriented Architecture to drive high return on investment (ROI) and strategically align with the organization’s healthcare vision. Healthcare organizations are able to use Pneuron’s highly intuitive visual configuration tools and robust suite of components (Pneurons), to cooperatively build out and evolve composite solutions to meet the new healthcare vision and operating model. The platform’s flexibility allows organizations to rapidly test and adjust composite solutions and analytics as health reform mandates change and new trends emerge.
Healthcare Technology Objectives

Pneuron has defined a set of specific healthcare objectives:

- Achieve targeted 50% improvement in time and cost to market versus traditional data and systems integration and infrastructure approaches.
- Establish event driven, real-time, distributed Healthcare Intelligence without the need for intermediary or centralized databases and the requisite duplication, normalization, and management of corporate data.
- Integrate traditionally stove-piped legacy or third party systems and technologies into cooperating, interoperable services, which support new (horizontal) operating models without replacement or rewrite.
- Combine different technologies, data sources, or components within one unified interoperability model without intermediary technologies or translation.
- Rapidly evolve, test, and deploy new bioinformatics and analytics models (risk, population, treatment).
- Align, connect and create new products, applications, workflows, and operating models for individual and collective healthcare organizations as interconnected, distributed, and available services at low cost, with maximum speed to market and fully utilizing existing HIT investments in IP, technology, and infrastructure.
- Enable the re-deployment of existing healthcare IT resources to further accelerate improvements in innovation and execution.

The Pneuron “Distributed Solutions Platform”

These objectives are being delivered by Pneuron clients through a unique technology and deployment agnostic platform that configures, deploys and maintains highly interoperable, distributed components.

Pneuron clients are solving complex healthcare business problems without the need for centralized database, data integration, application replacement or infrastructure requirements. The result is that our clients are radically accelerating time to value and cost of their enterprise solutions with three deployment objectives:

1. Distribute the Analytics and Business Logic of an application to where the data and computing is occurring.
2. Build applications that are deployment and infrastructure agnostic and which auto scale and virtualize at the workload level.
3. Create a reusable fabric to accelerate and manage future business applications.

“Distributed Solutions”

1. Distributed Analytics: Extract targeted information from any data source and leverage existing infrastructure to deploy a distributed processing approach that delivers analytical value without the costly prerequisites of large data integration projects.
2. Distributed Applications: Rapidly build, deploy, and maintain new applications, which combine natively developed functionality with targeted, non-invasive re-use of legacy capability. Accelerate both existing and newly developed solutions by distributing processing across existing infrastructure.
3. Distributed Processes: Leverage Pneuron’s embedded integration intelligence, distributed processing and workflows to deliver solutions that combine analysis, application functionality, and human interactions to deliver end-to-end business value.
These solution categories are enabled through a “Distributed Platform” that manages and orchestrates all functionality, processing, control, volume, security, availability and resiliency.

This non-invasive design bypasses the need for centralization of solution elements to create value, and also enables enterprise class deployment without traditional technology and infrastructure demands.

### Summary of Pneuron Components

The core of the Pneuron is the development and management of a distributed, lightweight, and elastic approach to building and distributing the required functionality of new solutions.

Pneuron is fundamentally different than traditional HIT approaches where a much more centralized paradigm requires significant overhead, up-front design, and continuous re-architecting as business complexity and scale continue to grow.

Within the Pneuron framework, all functions are fully interoperable, enabling the enterprise to connect, configure and deploy global, high performance products or businesses without the need for the onerous, time consuming and costly data integration, application build, or systems integration projects of the past.

**Pneurons™**

Distributed, lightweight, fixed-function, interoperable processing components positioned on individual source systems, creating a powerful processing network which sidesteps today’s time and cost penalties. The Pneurons enable local access and connection, and processing of data without moving and creating centralized databases. Given the distribution and flexibility, the Pneurons are able to perform any form of analysis to create real time enterprise intelligence, integrate any IP, component, function or application and connect them all together without rewriting applications or creating one-off integration solutions.

**Pneuron Design Studio™**

 Enables the design, development, integration, deployment, and management from a single visual and intuitive user interface. Users are able to configure Pneurons, data sources, variables, queries, data acquisition, business rules, intelligence analytics, and more across the entire enterprise individually or as “instruction chains” (products) of connected Pneurons.
The Pneuron Distributed Platform™ utilizes patent pending “Pneurons™,” which are mini-applications, functions, or services that run a basic set of configurable properties. Pneurons are individual programs that are independent but can be chained together in an integrated pipeline of functions defined.

Similar to how the neurons in the human brain function, each “Pneuron” serves as part of a network of other connected Pneurons to retrieve, analyze and deliver the appropriate messages as configured.

Pneurons can act alone as independent functions or services, be overlaid on top of existing applications or data, or can be connected in real time to other Pneurons, thus creating new products, workflows, or new operating models of any complexity from a single integrated user environment.

Each Pneuron is specialized and has a different function – Predictive Model, Analytics, Application Exoskeleton, Matching, NPL, Data interaction and multiple others – with each either acting independently or collectively depending on the business problem the client seeks to solve.

Pneurons are managed by a hyper light, virtual server called the Pneuron “Cortex™.” These services and applications can be deployed across the enterprise and the Cloud, integrating with existing systems yet all managed within a highly distributed, clustered, and fault tolerant cooperating model managed seamlessly by the Cortex.
Use Case Examples

Pneuron’s breakthrough paradigm and system provides healthcare organizations with technology-enabled strategic advantage to execute the new and evolving healthcare vision, delivering significant ROI, aligning to individual and cooperating healthcare organization initiatives, and a platform to introduce new capabilities quickly, overcoming the limitations of fragmented systems and processes.

Graphic: Pneurons distributed to any sources, integrated into a network to create real time, non-intrusive but highly resilient and coordinated intelligence with output to any target system or BI tool.

Pneuron healthcare customers are focused on addressing highly complex distributed challenges in a new, rapid and agile manner. These projects are delivering value in less than 50% of the time, cost and risk of traditional solutions and the business case used to justify them.

Specific use cases:

1. Master Patient Index creation across multiple providers
2. Patient Activity Synchronization, Monitoring, and Longitudinal View
3. Dynamic Patient Risk Scoring
4. Population Analysis and Stratification
1 - Master Patient Index

Pneuron enables real-time integration and linkage of patients across multiple entities, flexible matching rules and record indexing, and the visualization and drill-down of matched patients across multiple healthcare entities. **No** changes are required for existing systems.

Using Pneuron, organizations configure and automatically integrate patient representations across multiple healthcare entities without complex programming. Different rules and models can be applied based on the patient data. Also, real-time monitoring adjusts for patient additions and changes in their demographic and health information.

Graphic: Design Studio distributing Pneurons to 9 different medical facilities to build real time Master Patient Index.
2 - Patient Activity Synchronization, Monitoring, and Longitudinal View

Pneuron synchronizes patient health activity data across multiple practices and providers, enables the automatic consolidation of disparate patient data sources, provides automatic updates across the ecosystem when patient changes occur, and presents the comprehensive, longitudinal, and holistic visualization and analysis for all patients.

With this approach, Pneuron enables shared care coordination, patient health monitoring, and action tracking across multiple participating practices, hospitals, and healthcare delivery systems. This enables high efficiencies and optimal effectiveness in patient outcomes, applies real-time monitoring for additions of patients and changes in their patient demographic and health information, and provides a rich analytics foundation to evaluate individual and aggregated patient treatment models, protocols, and outcomes.

3 - Dynamic Patient Risk Scoring

Pneuron integrates different risk factors utilizing data from multiple distributed systems, reference data, and governmental sources, enables easy adjustments of risk factors, scoring models, re-modeling of patient risk, and provides visualization and drill-down of patient risk groups across different health information and criteria.

In this case, the client used Pneuron to integrate multiple data systems and governmental data, create agile and iterative risk models, enable the incorporation of risk strategies and findings into actionable execution across existing healthcare systems, and provide the evolution of different risk strategies with low cost experimentation and evaluation.
4 - Population Analysis and Stratification

Pneuron integrates different data and enables the application of flexible population stratification scenarios, allows for adjusting population models and aligns to different criteria. Actionable intelligence results can now be sent back to key healthcare systems of record and provide visualization and drill-down of population groups across different health information.

Graphic: Design Studio distributing Pneurons to data sources, running distributed analysis and visualizing results in real time.
The Opportunity

Looking ahead, the relentless challenges of competition, regulation, and globalization will wear down businesses that are not well positioned with leading innovation and execution capabilities. In response, companies must find new ways to leverage existing IP, energize collaborative development and build external linkages, all while dealing with a legacy of highly distributed data, applications, and infrastructure.

Pneuron’s revolutionary distributed approach re-defines focus toward value creation while hiding implementation details. By avoiding the traditional and costly re-structuring of IP into duplicated and centralized resources, Pneuron accelerates initial build, simplifies deployment, and minimizes the ongoing maintenance of new solutions.

For more information on the Pneuron Solution and the benefits it can bring to your organization, please feel free to reach out to the following Pneuron contacts:

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