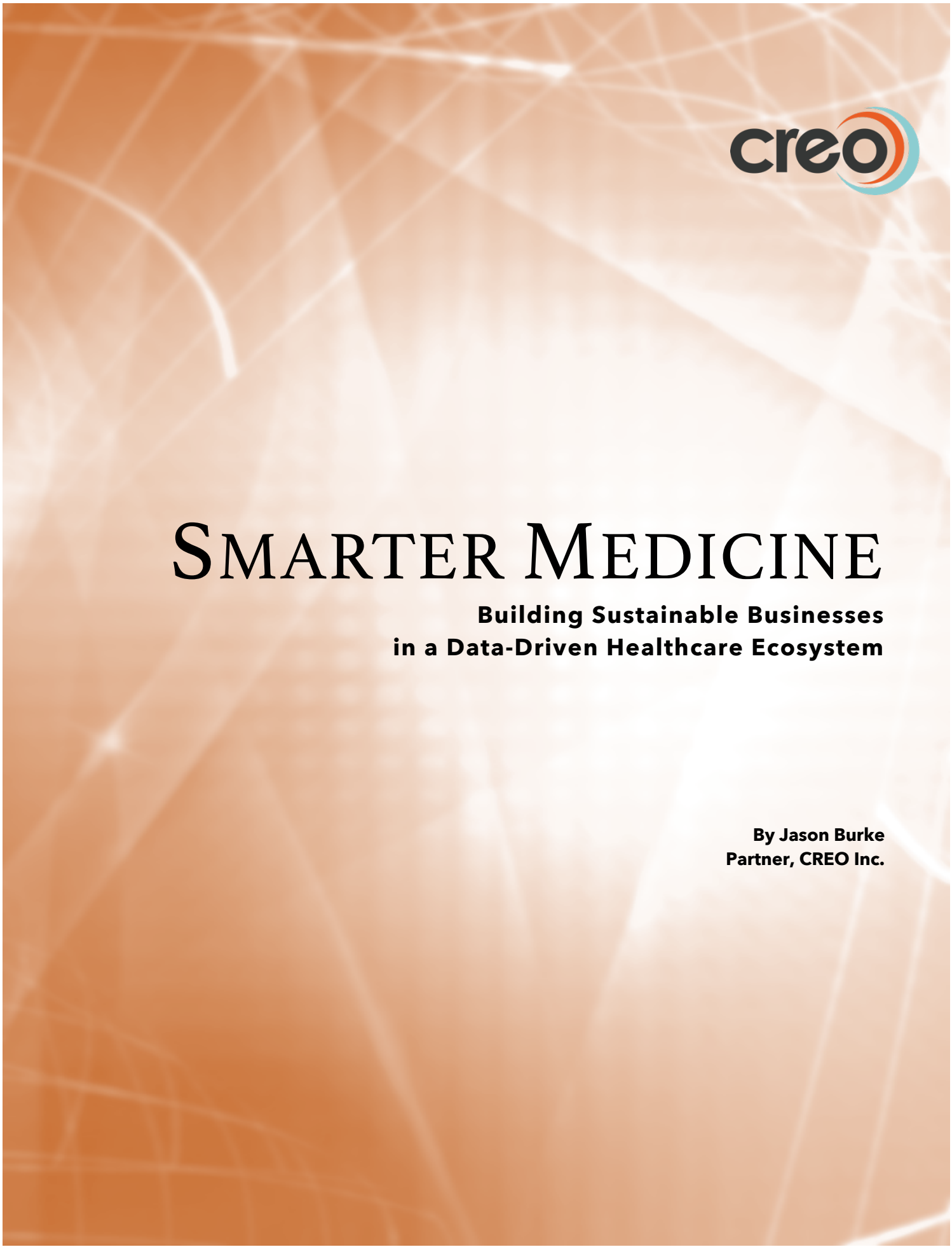

# SMARTER MEDICINE

## Building Sustainable Businesses in a Data-Driven Healthcare Ecosystem

**By Jason Burke**
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*Smarter Medicine: Building Sustainable Businesses in a Data-Driven Healthcare Ecosystem*
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## About CREO Inc.

CREO is an innovative management consulting firm that shapes growth companies into healthy successful organizations. We provide holistic support for organizations through our expertise in growth management and digital transformation. Our approach creates alignment around vision and strategy with the goal of driving execution and results.

For more information, please visit http://www.creoinc.net

# INTRODUCTION

What makes a sustainable health care business in the 21st century? That question weighs on the minds of many health and life sciences executives as they try to chart a course through the changing waters of health care.

For other industries, sustainability, growth, and profitability go hand-in-hand: a sustainable business is one that generates enough revenue and profit to compensate employees, reward investors, and continue to invest in growth if possible. Though discussions of profit in health care can sometimes seem uncomfortable, health care is nonetheless a business, and sustainability must be a priority if patients are to continue to receive the care they deserve.

This paper builds the case that sustainability in health and life sciences is now dependent on organizations developing data- and analytics-related capabilities that drive better health outcomes at lower costs. Like businesses in other industries, health and life sciences organizations are now competing in an information-based economy. They face a commercial landscape in which an organization's ability to harness data to derive new insights about how to operate – how to bring value to patients, streamline business operations, decrease health expenditures, manage financial risk, and much more – determines that organization's ability to be both profitable in the short term and sustainable in the long term.

**The Future is Now**

"We are witnessing the Rise of the Data-Driven Physician… These developments have significant potential to advance patient care and empower tomorrow's health care providers to predict, prevent, and cure disease—precisely."

Lloyd B. Minor, MD
Dean
Stanford University School of Medicine

## A DATA-DRIVEN LANDSCAPE

The market forces dominating the health and life sciences markets today are challenging the cost basis for discovering, delivering, and insuring care delivery. As health care expenditures in the US have continued a steady rise towards 20% of the gross domestic product, stakeholders from regulators to patients have all challenged the financial viability of the existing business models. Drug therapies that cost $2B-$3B to develop are not affordable to patients. And fee-for-service care delivery models are more tailored to "sick care" than "health care." Fundamental changes are needed to improve the cost, complexity, and effectiveness of medical care and reimbursement.

Table 1 illustrates a few of the market drivers for health and life sciences firms as they strive to transform their businesses to address these challenges and opportunities.

| | Life Sciences | Health Plans | Health Care Providers |
|---|---|---|---|
| **Grow Revenue** | • Develop and commercialize products into increasingly tailored markets<br>• Drive adherence to capture revenue<br>• Develop service revenue streams to diversify and drive efficacy | • Capture larger populations that diversify risk<br>• Expand reimbursement models to cover behavioral and other evidence-based care services<br>• Develop adjacent services in population health, IT, and related businesses | • Grow geographic catchment to provide greater volume<br>• Capture value-based incentives<br>• Develop emerging treatments, technologies, and delivery businesses as new revenue streams |
| **Reduce Costs** | • Streamline the time and costs of the product development process (e.g., recruitment)<br>• Manage expenses to just-in-time operations (e.g., clinical trial materials) | • Reduce expenditures through effective well care, not just sick care<br>• Negotiate reimbursement rates downward by provider performance on quality measures | • Reduce unwarranted care variation and supply costs<br>• Shift service delivery locations to lower cost alternatives |
| **Manage Risks** | • Characterize target populations and comparative effectiveness earlier to ensure market viability<br>• Demonstrate product superiority to ensure formulary inclusion | • Target reimbursement to value-based therapies that provide both upside and downside risk<br>• Delegate financial risk to providers, and shift networks to high quality, low cost provider ecosystems | • Reduce penalties in quality and outcomes<br>• Optimize outcomes through pathway standardization |

*Table 1. Health and life sciences market drivers*

In reviewing the trends in table 1, the role of data and analytics in building sustainable businesses becomes clear. A partial inventory of capabilities that organizations need to have in order to successfully deliver against those drivers includes:

- **Comparative effectiveness and evidence-based care** – aggregating both internal and external data in order to develop comparative, risk-adjusted analytical models for safety and efficacy
- **Risk management** – characterizing risk factors, prevalence, and propensities across both predetermined and emergent cohorts of patients; optimally deploying limited resources to mitigate risks based on estimated clinical and financial impact and expected mitigation effectiveness.
- **Value-based reimbursement** – analytically modelling tradeoffs between predicted utilization, expenditures, outcomes and costs in order to establish the financial viability of contract terms and associated thresholds on performance measures.
- **Service location optimization** – balancing physical capacity, service specialization, human capacity, geographic distance, and other factors in order to prescribe service delivery locations that distribute available capacity and increase return on assets without compromising customer satisfaction or outcomes.
- **Streamlining product development** – reducing the number and duration of clinical trials through analytically tailored trial designs (e.g., indications, inclusion / exclusion criteria, site identification, patient recruitment) based on real-world evidence.
- **Just-in-time materials management** – predictive modelling of supply-side factors (e.g., manufacturing capacity, materials availability) and demand -side factors (e.g., demand concurrency, volume, customization) in order to balance costs and availability.
- **Performance and quality management** – using analytics to predict and improve both clinical and business performance, incorporating risk prediction and mitigation strategies to ensure financial goals are maintained
- **Reducing care variation** –analytically differentiating between warranted and unwarranted patterns of care delivery differences, aligning data-driven patient cohort definitions to observable and impactable improvements in outcomes, costs, and quality.

This list of course is far from comprehensive. But it serves to illustrate the industry imperative for data sciences and analytics. These trends lead forward-looking industry leaders to three conclusions:

1. **Health-related enterprises – providers, plans, life sciences firms – must become more data-driven organizations in order to be commercially viable businesses.** The competitive landscape and its associated battle for growth will be won or lost based on each organization's ability to harness data to make better decisions. The winners will be the organizations that learn to practice "smarter medicine."

2. **The definition of "data-driven" cannot be limited to history lessons.** Simply using descriptive statistics (counts, sums, averages, and percentages) to describe things that have already happened is insufficient to address the new business imperatives. Rather, organizations are competing on their ability to anticipate and respond prospectively to emerging opportunities and risks.

3. **In order to become a data-driven enterprise, organizations must develop new institutional assets and competencies that reflect the new operating models**. Most organizations today lack the required people, processes, technologies, culture, and strategic oversight needed to accurately gain predictive insights into complex issues such as health outcomes, costs, and quality. Additional investment is needed in order to reach this new "smarter medicine" level of data-driven performance.

**By the Numbers**

Despite the benefits, health and life sciences organizations have largely failed at leveraging new capabilities in data and analytics. A 2019 survey by market research firm Black Book found that:

- 80% percent of healthcare leaders said their use of analytics for decision-making and strategic planning is "negligible"
- 90% of data in provider organizations goes unutilized
- 78% of staff-indicate that leaders rely on "superficial analyses to retroactively justify decisions they have already made."
- 77% of health systems lack a clear analytics strategy

# SUSTAINABLE COMPETENCIES

If sustainability and growth require organizations to effectively cultivate new insights into actionable intelligence, then health and life sciences firms must develop new capabilities that enable the creation, dissemination, and leverage of these insights. These "competencies" provide the operating rigor needed to successfully navigate between business questions, available data assets, analytical methods, appropriate interpretations, and associated actions or decisions that deliver the anticipated business value.

It is important to note that health and life sciences organizations already have many of these competencies in varying degrees today. The goal is to further develop them in order to deliver smarter business operations.


*Figure 1. Competencies of data-driven sustainability*
*Source: author*

## GOVERNANCE

Once an organization makes a commitment to develop stronger data-driven competencies, a long list of exciting analytical opportunities usually emerges fairly quickly. It is perhaps not surprising that one of the most important aspects of a successful analytics and data sciences strategy is governance.

Organizations seeking to grow new analytical capabilities will be faced with many questions and challenges that require good governance practices, including:

- **Strategic Alignment**: how should analytics best support the organization's business strategy?
- **Investment Oversight**: how do we make decisions about the specific business functions, organizational structures, and operating capabilities we are developing and deploying?
- **Analytics Governance**: how do we make good build / buy / maintain decisions regarding analytical models across the organization's business functions?
- **Data Governance**: how do we agree on common data-related definitions, metrics, and quality standards?

- **IT Governance**: how do analytical and data sciences needs and perspectives get reflected in enterprise architecture and IT-related decision making?
- **Deployment and Operations Support**: how do we support the widespread use of new analytical tools, solutions, and data by federated users across the enterprise?
- **HR Management**: how do we manage the creation and introduction of new roles and compensation models?
- **Change Management**: how do the people in existing business and IT functions evolve to accommodate these new capabilities, and how do we avoid conflict?

Carefully considering and planning for these questions early in an organization's data sciences journey helps to avoid surprises once investments are already in motion.

## Data Sciences Infrastructure

An organization's computing and data infrastructure – computational capacity, storage, and data assets – are critically important to the overall success of analytics. Elements of infrastructure most strongly connected to data sciences efficiency and effectiveness include:

- **Scalable storage**. Data storage requirements often increase as organizations advance their data sciences programs. Not only do data sciences initiatives often acquire new sources of data, even existing data sources need to be copied, expanded, enhanced, and stored.
- **Scalable computing resources**. Some analytical methods require high-performance computing environments in order to handle the size and complexity of computational tasks in a reasonable period of time. These tasks may be heavy mathematically heavy, requiring millions or billions of mathematical operations. They might also large amounts of data to be processed, potentially representing millions of observations or more. Being able leverage computing resources that can scale up on demand – such as cloud-based computing environments – is often a cost-effective way of ensuring data sciences operations can be executed as required.
- **Data provisioning & curation**. In order for data sciences teams to be effective, they need ready access to as much of the organization's data assets as possible. As simple as that sounds, it is often quite difficult to implement. The use of data warehousing technologies helps in the aggregation and access of enterprise data. However, data scientists often need access to data not already resident in the warehouse, necessitating additional data integration (for internal data) and/or contracting and data interchange (for external data). Beyond simply gaining copies of the required data, data sciences teams need to restructure, standardize, enhance, and otherwise curate the data in preparation for use in

analyses. The use of data quality tools enables organizations to automate some aspects of data curation.

- **Metadata management**. As organizations come to terms with the rising volumes of data that support their operations, they often identify a need to better manage their metadata – the data about their data. Metadata management systems and initiatives focus on helping organizations track issues such as data lineage, definitions, interpretations, business owners, existing use, standards, controls, and appropriate documentation. This information is immensely valuable to data sciences teams who are trying to understand the data they are using.
- **Strong security and compliance postures**. Data sciences initiatives often challenge an organization's ability to accommodate the needs of teams undertaking data sciences work. Preserving the security of the enterprise and ensuring adherence to regulatory controls and constraints are major priorities that must be balanced with broader usability of data assets. Typical challenges include securely exchanging critical data with 3rd parties, managing access to protected health information (PHI), ensuring compliance with Stark laws, managing distribution of sensitive insights, limiting data storage proliferation, and similar issues.

**Novel Drug Discovery**

"Machine-learning algorithms can sift through millions of compounds, narrowing the options for a particular drug target…AI systems—unconstrained by prevailing theories and biases—can identify entirely new targets by spotting subtle differences at the level of tissues, cells, genes or proteins between, say, a healthy brain and one marked by Parkinson's—differences that might elude or even mystify a human scientist."

Claudia Wallis
Scientific American

## Modelling

Some leaders mistakenly believe that if they have a team capable of developing business intelligence reports, then the organization is well equipped for analytical modelling. Generally speaking, that is not true. Effective analytical modelling involves a broad set of skills and techniques beyond data manipulation and report writing, such as:

- **Question refinement**. The process of analytical modelling is somewhat different in emphasis from report development. In report building, an analyst spends the majority of time constructing a report that answers a specific question. In analytical modeling, the question is not generally predefined. The data scientist focuses a lot of time on the question(s) – is this the best / smartest question to ask, what other questions also must be asked, can the question be answered with the data, and what analytical methods are most appropriate to each question. The best data scientists challenge the natural tendency of organizations to ask and answer large numbers of questions without a clear understanding of what decision will be made, or what action will be taken, differently based on the results of the analysis. Given that there are an infinite number of questions

that can be asked but limited resources to answer them, the best data scientists help direct attention on high-impact questions and answers.

- **Maturity model**. Because data-driven business operations require new institutional competencies, companies relatively early in their data sciences journey are not able to effectively jump into predictive and prescriptive analytics. Rather, they proceed through a series of increasingly sophisticated phases of insights and actions. The maturity of insights (x-axis in the accompanying figure) starts with counting the occurrence of the phenomenon being observed. Once the data is being counted, teams can explore what factors are associated with the observed data, and what model describes the relationship between those factors such that the future behavior could be predicted. Similarly, the maturity of action (y-axis) starts with simple actions based on collecting the data, but gradually matures into detecting in real time what is happening such that the outcome can be influenced and eventually optimized.

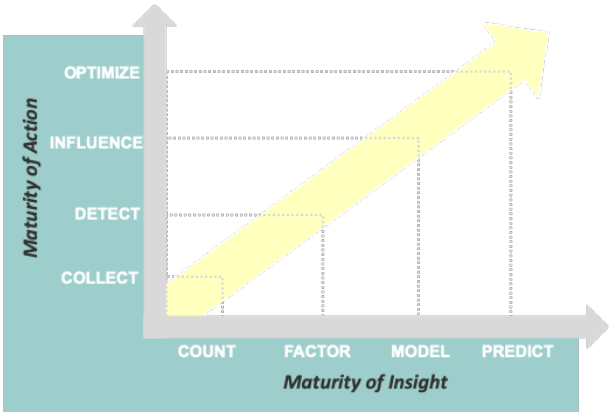


*Figure 2. Analytical maturity model*
*Source: author*

- **Interpretation & communication**. The value of any analytical model is only as strong as the organization's ability to harness the insights, accurately interpreting the results and driving appropriate decisions and actions with the key stakeholders. Immature organizations in this area focus on developing new reports, dashboards, and statistical documentation characterizing a model's mathematical performance. More advanced organizations transition into more powerful and empowering approaches for sharing insights, including storytelling, data visualization, embedding results within line-of-business systems, and business process automation (i.e., automating business actions based on analytical results and predictions).

**Personalized Modelling**

"Predictive models using machine learning algorithms may facilitate recognition of clinically important unanticipated predictor variables that may not have previously been identified by "traditional" research approaches … machine learning can enable patient-level prediction, which moves beyond average population effects to consider personalized benefits and risks."

Roski et. al
*Artificial Intelligence in Health Care.*
National Academy of Medicine

## Process Development

In order to develop sustainable businesses that are data-driven, organizations need to develop business processes that guide how teams develop and deploy new insights across the enterprise.

- **Analytical lifecycle management**. Analytical initiatives are best managed using a process framework that supports and encourages iteratively refining questions, data assets, and analyses. Sharing some common tenets with agile software development lifecycles such as Scrum and Kanban, a strong analytical process framework helps organizations reliably manage project development and delivery while acknowledging the inherent differences between analytics and other forms of software development.
- **Data governance**. As organizations seek to make data-driven insights a part of their operations and cultures, one thing becomes obvious: the overwhelming amount of time and energy associated with analytical investments is linked to the data itself, not the math. The effective development, curation, and use of managed data assets are required competencies for sustainability; in their absence, organizations waste up to 60% or more of their investment every time they ask an analytical question. The field of data governance has emerged as a series of disciplines that help organizations gain stronger mastery over their data. By directly tackling issues such as data stewardship, documentation, quality, standardization, master data management, and similar topics, data governance removes the barriers to effectively leveraging data, and helps organizations develop a stronger source of truths across all business operations.
- **Product management**. One of the most important advances in sustainability involves shifting from treating analytics initiatives as one-time "projects" to treating them as institutional "products" – engineering long-term assets that the organization will leverage over and over again. Principles used in commercial product development are useful in the creation of analytical assets, as they encourage a more comprehensive approach to characterizing requirements, use cases, stakeholders, workflow, and support needs.
- **Strategic performance management**. There are an infinite number of things that can be analyzed. Top-performing organizations excel at directing their analytical attention into areas that materially impact the execution of the organization's core strategy. One way of doing that is through implementing a formalized strategic performance management (SPM) process and associated business intelligence framework. SPM tools and methods help organizations make strategies more concrete and transparent for both leaders and staff. In addition, SPM processes offer an applied case for data governance (i.e., the performance metrics), and they help to establish the priorities from which analytical programs can advance.

## Cultural Empowerment

Successful leaders know that the power of any organization lies with its people. If the goal is to cultivate a sustainable business that leverages insights for competitive advantage, one of the most crucial considerations is how to evolve the organizational culture to support the new business expectations.

- **Leading by Example**. Major cultural changes usually start at the top. If employees see organizational leadership embracing data sciences as a way of making more informed decisions, they are more likely to pursue data-driven operations within their own sphere of influence. If they see data sciences as a core component of the business strategy and priorities, they are more likely to ask how they can contribute to it. Generally speaking, when leaders become data-driven, their organizations become data-driven as well.
- **Knowledge Worker Engagement**. We don't just want to develop new analytical insights – we want a workforce that is driven and motivated by data. One term that has emerged recently to describe people in data-driven organizations is the citizen data scientist. Gartner defines a citizen data scientist as "a person who creates or generates models that leverage predictive or prescriptive analytics, but whose primary job function is outside of the field of statistics and analytics." That definition can be somewhat constraining, however, in that we don't just want creators – we want people who use analytics, people who improve data, people who communicate data effectively, people who know how to manage the process of creating new insights, etc. For example, data governance programs that include data stewardship engage knowledge workers to take personal accountability for key institutional data. These data stewards, as well as internal champions for specific analytical models, become subject matter experts that serve vital roles in terms of engagement:
    - they are experts that consult on what their data / model actually means
    - they are quality managers that ensure their data / model is highly usable and consistent
    - they are coaches for how to get the best insights from analyses involving their data / model
    - they are advocates for leveraging well-managed data, definitions, and models in lieu of propagating new ones unnecessarily
- **Data visualization**. One way to drive knowledge worker engagement is by eliminating the technical knowledge barriers associated with analytics. Though it is true that specialized skillsets are needed to conduct sophisticated forms of computational or statistical methods, it is also true that a tremendous amount of data-driven work can be carried out by non-technical staff if deployed through software interfaces that are easy to use. Data visualization technologies today represent the easiest way of putting ad hoc analytical investigating power into the hands of any user motivated to ask and answer

questions. They also provide an easier and more compelling way of communicating results and interpretations to other stakeholders.

- **Change management**. All of this cultural empowerment is exciting, but for many employees, it is also intimidating. In the face of what looks to be significant change, many employees experience a fear response. Am I still valuable? Will I have a job? Will these new roles mean our existing roles go away? Can I really learn to be valuable in a data-driven enterprise? How do I protect my unique value? Given the emotional sensitivity that often accompanies questions like these, senior leaders may be reluctant to directly confront these issues, preferring to let things "work themselves out over time." Unfortunately, lack of executive visibility, engagement, and accountability for change management is usually interpreted as license to resist change. Given that incumbent organizational processes, job responsibilities, and cultural norms vastly overpower anything "new" being introduced, leadership should dedicate specific capacity and resources to change management in order to protect their data sciences investments and ensure successful adoption.

# ANALYTICAL OPPORTUNITIES

By developing data sciences and analytical capabilities, health and life sciences organizations unlock a wide variety of opportunities for developing sustainable advantages in both the business and science of health care. The table below highlights a small subset of areas where organizations are investing in new business-sustaining capabilities, transitioning from traditional to newer data sciences-based approaches to business value creation.

| Objective | Traditional | Newer | Analytical Implications |
|---|---|---|---|
| **Develop new therapies** | • Blockbuster therapies for broad populations based on clinical trials | • Targeted therapies for smaller populations developed through clinical trials and observational analytics | • Data mining of real-world evidence; data-driven study design and recruitment |
| **Improve health outcomes** | • Diagnosis-driven disease management programs | • Precision interventions targeting tailored cohorts | • Data mining of real-world evidence; closed-loop analytics of prevention and intervention efficacy |
| **Standardize care practices** | • Policy-based standards from published research | • Care variation analytics targeting unwarranted differences in treatment patterns and decisions | • Cost- or outcome-biased triage of opportunities; grouper methodologies; governed outcome measures |
| **Streamline business operations** | • Documented operating procedures and best practices | • Empirical process measurement, automation, and optimization | • Operations research and simulation methods using date/time event data |
| **Decrease health expenditures** | • Service constraints and supply chain rationalization | • Real-time detection of fraud, waste, and abuse; evidence-based supply standards | • Collusion analytics; care variation and anomaly detection and remediation |
| **Engage with patients** | • Broad-based outbound campaigns | • Multi-channel bi-directional engagement with mobile device data feeds | • Behavioral response propensity modeling; near real-time data aggregation and risk modeling |
| **Mitigate financial risk** | • Employers and insurers bear risk through actuarial analysis | • Providers and patients bear risk through both "well care" and "sick care" | • Multi-dimensional risk prediction combining clinical (EMR) and financial (claims) models |
| **Optimize sales activities** | • Influencer prioritization and KOL development | • Real-world comparative evidence for formulary and institutional targeting | • Market intelligence analytics; formulary and product lifecycle modelling |

*Table 2. New opportunities for data-driven value creation*

# GAINING EXECUTIVE SUPPORT

Many organizations have internal champions that are able to effectively articulate the potential value of a richer strategy regarding analytics and data sciences. And yet, perhaps not surprisingly, many executives are hesitant to advocate for and invest in new capabilities. A few of the more commonly cited objections to a stronger data and analytics investment are described below.

## OBJECTION #1: MY SOFTWARE VENDORS WILL GIVE ME WHAT I NEED.

Many executives – particularly those with the unenviable task of trying to control the proliferation of new technology vendors within the enterprise – believe that their existing vendors will deliver any capabilities needed if given enough time. And it is certainly true that "analytics" is considered a top priority for most software vendors today.

However, imagine going to war, but only being able to use the exact same weapons as your enemy. Then imagine that every combat uniform you had was sized for soldiers two feet shorter than your troops. While buying commodity capabilities is often preferable to rebuilding those capabilities, analytical insights are only as powerful as their fit to the unique operational attributes of the organization being analyzed, and to the unique competitive priorities and opportunities inherent in an organization's strategy and business model.

In addition, leaders need to carefully consider the current pace of analytical innovation. The health analytics market is experiencing exceptionally high growth, exceeding $14 billion in 2019 and expected to grow at a CAGR of 23.5% to $40 billion in less than five years. At this pace of growth, adopting a "wait and see" posture may disadvantage an organization, both in the short-term (e.g., efficiency, profitability) and the long-term (e.g., competitiveness, organizational development and learning).

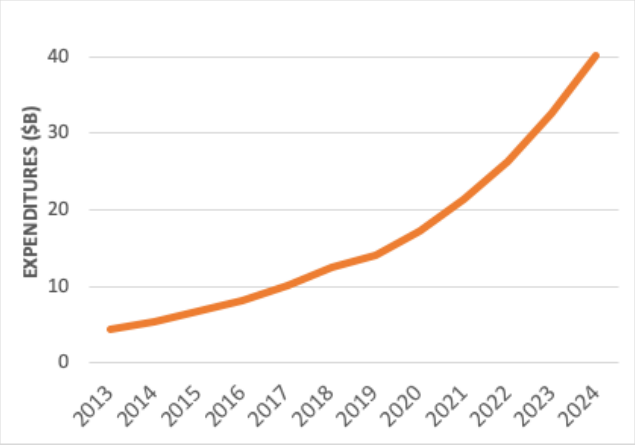


*Figure 3. Health analytics market growth*
*Source: Black Book and author*

## Objection #2: My company cannot afford this.

It would be easy to conclude that empowering a data-driven workforce is an incredibly expensive ordeal. Yet most organizations can begin adopting data sciences and analytical capabilities with little-to-no incremental investment. Many software tools are open source (free), and the addition of a single data scientist to an otherwise under-empowered workforce can produce payback periods measured in months. The key to managing the expense is in constraining the scope: focus new analytical investments and resources in areas where there is high confidence that improvement is attainable.

## Objection #3: This is too hard for us.

Many executives express uncertainty with pursuing analytics and data sciences due to the expected difficulty of the effort. Barriers that contribute to a general sense that the journey is too daunting include:

- lack of confidence in institutional data
- end-user understanding of statistical methods, processes, and interpretations
- lack of executive-level expertise in the fields of statistics and data sciences
- change management associated with the new capabilities
- the need to recruit new and potentially expensive skill sets to execute the new function
- the risks of finding negative insights about the organization

Of course, there is always effort involved with growing a business. And as with all growth, it is a journey that is likely best undertaken incrementally. By limiting the scope, organizational leaders are better able to validate each of these concerns and develop approaches that ease the transition.

## Objection #4: We already got this.

Perhaps one of the most unfortunate myths is a mistaken belief that existing people, processes, and technologies are already on the path for delivering these competencies. Though internal selling and defensiveness are natural responses to shifting industry and organizational expectations, leaders need to be able to see beyond the hype of both vendors and their own teams in order to realistically discern whether their organization is indeed well positioned for competitiveness and growth. In many cases, "what got you here won't get you there."

# CONCLUSIONS

There has never been a more exciting time to work in health and life sciences. With growing volumes of electronic medical records and claims data available for analysis, the industry has – arguable for the first time in history – very real opportunities for understanding the complex relationships between costs, efficacy, safety, individual behaviors, and risk.

Market leaders will be those organizations that develop the new institutional competencies required to compete effectively in a data-driven health care ecosystem: data sciences infrastructure, analytical modelling, business process development, governance, and cultural empowerment establish a strong foundation for both innovation and growth.

# HOW CAN CREO HELP

CREO is an innovative management consulting firm that shapes growth companies into healthy successful organizations. We provide holistic support for organizations through our expertise in growth management and digital transformation.

CREO's Analytics and Data Sciences (ADS) practice helps customers innovate, grow, and transform their businesses through the power of analytics and data sciences. Our customers capture distinct market advantages due to their ability to execute smarter clinical and business decisions. Our services include:

**Analytics Strategy**

*Advise on transformational roadmaps and innovative products*

- Strategy development
- Innovation opportunity assessment
- Dats sciences-related investment analysis
- Interim analytics leadership

**Analytical Execution**

*Providing predictive insights for smarter decisions and optimized operations*

- Population health, disease & risk modeling
- Clinical research analytics
- Strategic & operational performance analytics
- Customer analytics

**Data Governance & Management**

*Improving and leveraging trusted, high-performing data*

- Data curation & quality
- Data stewardship & literacy
- Data aggregation
- Technical architecture

**Organizational Development**

*Helping to build data-driven cultures and world-class operational teams*

- Analytics and data sciences process development
- Designing data sciences teams
- Staff augmentation
- Cultural development

*Figure 4. CREO Analytics and Data Sciences Services*

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