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Life Sciences

White Paper

Recoding the Life Sciences Value Chain with Digital DNA

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Abstract

"Hold on Beth, that message isn't from Dino Run. It's something to do with daddy's work," Tony said to his 6-year old daughter, who was sitting in his lap, playing the game on his tablet. Tony had missed so many milestones in his daughter's life, simply because he would sit late in his pharmaceutical company's Research and Development (R&D) lab, reading scientific publications and planning his next experiments. On a good day, Tony had to read three to four articles, which would help him devise a plan to confirm the results of other scientists and further build on them to support his theory. Snapping out of his thoughts, Tony realized that Beth had already opened the app that displayed the notification. He quickly glanced at the flashing paragraph, which summarized several relevant publications specific to Alzheimer's disease. Before he left work that day, he had only selected the biological target and certain parameters. Now, only a few hours later, the service had provided him with details on how the target worked. This additional information would help him plan his experiments at work the next day. While his daughter resumed her game, he wondered if other divisions in his company were as lucky to use digital technologies that are capable of changing the way people worked.

The life sciences industry thrives on discovery, and every innovation potentially changes the lives of millions. Industries such as retail and financial services are early adopters of digital technologies, and are exploring alternate ways of driving business and resolving issues. However, the life sciences industry has only recently begun testing the waters through pilot programs—with only a few pioneers whole-heartedly implementing emerging digital innovations.

In this white paper, we explore the penetration of digital technologies within and across the life sciences value chain, and illustrate how some organizations are digitally reimagining their business to drive growth, boost productivity, and ultimately change the rules of the game.

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Contents

Life Sciences – An Industry Undergoing Transition

The life sciences industry has always had a remarkable impact on the healthcare ecosystem. The industry, typically the pharmaceuticals, biotechnology and medical devices space, is marked by rapid advancements in technology. While the benefits of these advancements are difficult to quantify, the ramifications of their non-existence (non-discovery) are easy to fathom. But for the life sciences industry, striking the balance between existing for the greater good and maintaining profitable bottom-lines has been akin to a tightrope walk.

The industry is grappling with challenges such as increased research and development (R&D) costs, declining revenues from developed markets, changing regulatory environments, and increased regulatory oversight. Ideally, life sciences companies need to generate higher revenues at reduced costs to sustain innovation. To achieve this optimal scenario, the industry is building new portfolios, expanding into new geographies, exploring mergers and acquisitions (M&As), adjusting prices to adapt to evolving market conditions, and offering combinations of drugs, devices and services.

Concurrently, emerging digital technologies have drastically altered the way businesses function and how people interact with one another. By creatively weaving the Digital Five Forces—social media, mobility and pervasive computing, Big Data and analytics, cloud computing, and artificial intelligence (AI) and robotics—into their social fiber, aggressive early adopters like retail, financial services and consumer goods have successfully been able to turn risks and opportunities into results. While business-to-consumer (B2C) industries have rapidly reacted to adapt and adopt, the compliance-led business-to-business (B2B) life sciences industry has been cautious in its adoption of the Digital Five Forces.

Taking a segment-specific and a pan-segment view, this white paper maps the industry's adoption of the Digital Five Forces to identify those with high and low penetration. It highlights unique initiatives to tackle hitherto unaddressed problems and to that extent, does not holistically cover digital initiatives that are commonplace. It also cites examples from other industries for life sciences leaders to understand the payback potential of rewriting their digital playbook.

Digital Prescription - Addressing Evolving Challenges

Our analysis indicates a low overall adoption rate of the digital forces in the life sciences industry (see Table 1).

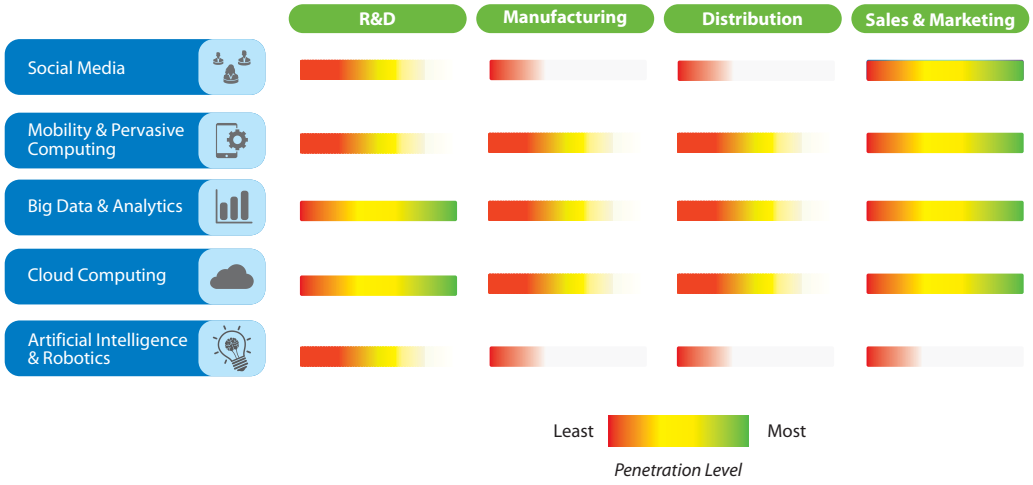

Table 1: Penetration of the Digital Five Forces across the Life Sciences Value Chain[1]

R&D - Overcoming Inhibitors and Optimizing Investments

Drug Discovery – From Trial and Error to Error and Trial

Life sciences companies are struggling to counter skyrocketing R&D costs and declining productivity. To address the latter, new approaches for target identification are being employed. Amgen's deCODE genetics team sequenced the entire genome of 2,636 Icelanders. Genome analytics empowered researchers at deCODE to predict the genome of the entire nation of Iceland[2]. Subsequently, it helped them discover 8,000 'knockout' Icelanders[3](lacking a working version of one of the several vital genes) who could potentially develop genetic disorders like cystic fibrosis. Implementing this approach, multiple targets can be identified *in silico* by mining genomic data.

Data to decisions

Cognitive computing for faster decisions

J&J leveraged the power of supercomputing and artificial intelligence to perform drug effectiveness studies in a matter of days. This was far lower than the 10 months spent when three people were working on it. The supercomputer's cognitive computing capabilities to analyze millions of scientific publications, synthesizing information for a researcher to make critical decisions, helped reduce the time spent.

Box 1

[1] *The penetration levels are qualitative in nature and intend to provide a high-level understanding of the current application of the digital forces across value chain segments. These have been determined based on inferences drawn from data gathered through secondary research, coupled with interviews of field experts.*

[2] *British Broadcasting Corporation, DNA of 'an entire nation' assessed (March 2015), accessed April 6th, 2015, http://www.bbc.com/news/health-32024158*

[3] *Fierce Biotech, Amgen uncovers trove of gene knockouts in 'molecular national selfie' (March 2015), accessed April 6th, 2015, http://www.fiercebiotech.com/story/amgen-uncovers-trove-gene-knockouts-molecular-national-selfie/2015-03-26*

Pharmaceutical and medical device companies are mining historical data (genomic, EHR or EMR) to understand disease patterns, and analyzing it to improve patient outcomes over larger pools. Blood glucose monitor manufacturers have partnered with a startup, Glooko, which has developed a solution that connects traditional diabetes management devices with mobile devices. Integrated with Big Data, Glooko provides data aggregation on a particular patient, as well as advanced analytics for a given diabetic population.[4]

Along similar lines, companies can mine published scientific literature using cognitive computing by applying AI to gather information on identified targets, and to prioritize them, among a multitude of applications (see Box1[5]).

Combining biological target data with a therapeutic candidate library data, *in silico* analytics and predictive modeling can be used to identify candidates with a high probability of success for *in vitro* studies. Hence, clinical attrition rates will also be lowered. Ultimately, the approach results in significant cost and time savings.

Clinical Trials – Ensuring Effectiveness and Efficacy

A majority of the R&D expenses pertain to clinical trials. Accurate and timely management of clinical trials is fraught with multiple challenges including patient recruitment and retention, data capture, medication adherence and protocol compliance.

To harness the growing trend of patients searching online forums for disease and treatment information, most companies are starting to adopt the practice of eRecruiting. AstraZeneca recently tied up with TrialBee—providers of solutions specializing in a direct-to-patient approach. This process involves providing patients with information on trials in multiple therapeutic areas and study phases, and connecting them to stakeholders conducting the clinical trials. This improves enrollments and helps better engage trial subjects.

Patient retention can be achieved using multiple digital initiatives to improve patient engagement, medication adherence and protocol compliance. Gamification, simplified and digitized consent forms, text message or smartphone app alerts can be implemented to address the high dropout rates (sometimes >30%[6]) which is a concern area for investigators and sponsors (see Box2[7]).

Digital solutions also allow for effective site monitoring with integrated clinical and operations data that is made available in near real-time. This helps in faster decision making and cross-trial analysis capabilities to improve current and future trial designs.

Improving patient adherence

Enhanced and embedded communication drives improved compliance

Janssen Pharmaceutical's 'eMeds' initiative is a fully-integrated platform for efficient clinical trial conduct. Trial participants receive all communication through smartphones—trial instructions, dosage regimens, changes in drug labeling and timely reminders to take their medicine. Microelectronics embedded in the blister packaging of medicines note the time and geographic location every time patients remove a pill, allowing immediate interventions, whenever necessary, and logging the patients' treatment adherence. Automated logging eliminates cumbersome paperwork, manual drug count, and verification of patients' drug log, ultimately reducing human error and improving efficiency.

Box 2

[4] *Fierce Medical Devices, Medtronic backs diabetes device connectivity, analysis startup Glooko in $16.5M Series B (March 2015), accessed April 7th, 2015, http://www.fiercemedicaldevices.com/story/medtronic-backs-diabetes-device-connectivity-analysis-startup-glooko-165m-s/2015-03-17?mkt_tok=3RkMMJWWfF9wsRonv6vNZKXonjHpfsX74%2BQuXKSg38431UFwdcjKPmjr1YIGS8Z0aPyQAgobGp5I5FEKQ7TYUbFmt6UIXQ%3D%3D*

[5] *IBM Watson Discovery Advisor Homepage, Accessed April 6th, 2015, http://www.ibm.com/smarterplanet/us/en/ibmwatson/discovery-advisor.html*

[6] *National Research Council, The Prevention and Treatment of Missing Data in Clinical Trials, 2010. Accessed April 13th. http://www.nap.edu/openbook.php?record_id=12955&page=39*

[7] *CenterWatch Weekly, Janssen's eMeds program looks to the future with smartphone-based patient communication (November 2013), Accessed April 7th, 2015, https://www.janssenhealthcareinnovation.com/sites/default/files/cww1744_Janssen2.pdf*

Manufacturing – Spot the Problem Before It Stops You

Digital technologies can be utilized beneficially at every stage of manufacturing, but this segment is given little emphasis by life sciences companies.

The automotive, electronics and chemical industries have long adopted the Quality-by-Design (QbD) model as a standard of practice, with the United States Food and Drug Administration encouraging its voluntary adoption since 2004. The use of analytics for QbD can help define optimal manufacturing conditions and further improve yield (see Box3[8]).

Identifying optimal manufacturing conditions

Running process parameter analytics

One of the top-5 biopharma companies had trouble identifying the root cause of batch failures in its manufacturing of biologics. The company collated data on multiple parameters at various stages of the manufacturing process, and ran analytics to ascertain the optimal quality of inoculums (seed) necessary to reduce batch variability and failures.

Box 3

At General Electric's Schenectady, New York facility for manufacturing advanced cell-phone tower batteries, shop floor personnel use iPads to access data on process parameters to ascertain that they fall within the optimal conditions. Data collection is enabled via the 10,000 sensors spread across the shop floor and RFID tags on every manufactured battery component. The sensors gather data on variables like humidity, pressure and temperature. They also identify the batches of powder being used to make the ceramics and the energy required to produce individual batteries. By running analytics on the collected data, GE identified process problems associated with battery parts failing quality tests. This allows the company to ascertain optimal manufacturing conditions[9].

Supply Chain - Defog and Simplify

Life science supply chains have grown into complex networks owing to rapid globalization involving geographically dispersed suppliers, manufacturing plants, and distribution centers.

To address demand volatility and overcome drug shortages exacerbated by supply chain complexity and geographical dispersion, Teva Pharmaceuticals, Canada, harnessed the power of social media to enable 'spontaneous associations'. The internal social platform enabled employees to post operational problems and seek inputs and solutions from geographically dispersed co-workers. Given the encouraging results this produced, the user base was expanded to include even raw material suppliers.

Improving supply chain planning

Product tracking benefits

Cook Medical (medical device manufacturer), Cardinal Healthcare (distributor) and BJC Healthcare (provider) implemented a pilot project last year that consolidated the supply chain management functions. High-value implantable products were tagged with RFID chips to provide real-time information on product locations, expiration dates, and usage trends to all the stakeholders, enabling improved product allocation. Predictive analytics allowed for accurate ordering, better inventory in hand, and reduced waste.

Box 4

[8] *TCS Research and Interviews, April 2015*

[9] *MIT Technology Review, An Internet for Manufacturing (January 2013), accessed April 7th, 2015, http://www.technologyreview.com/news/509331/an-internet-for-manufacturing/*

Subsequently, lead time from upstream suppliers improved by as much as 60%, manufacturing cycle times reduced by 40%, and service levels (to fulfill orders on-time) exceeded 95%[10].

Supply chains also need to address the global issue of product counterfeiting. Product tracking technologies are being employed to tackle these. When combined with the digital forces, these technologies can provide additional benefits such as process improvements, expiration management, and supply chain planning (see Box 4[11]).

Sales and Marketing – Revamp Your Perspective

Preparing the Launch pad

Deciding the launch strategy is a complex decision in itself—presence and expansion to multiple countries with unique and dynamic regulatory and healthcare environments have made product launches a remarkably intricate affair. Use of analytics can help in and expedite decisions to maximize sales. An example is that of Bayer HealthCare during the launch of two oncology drugs. Instead of using its 11 distinct reporting platforms, which generated a multitude of redundant, and sometimes conflicting reports, Bayer leveraged an analytics solution designed to combine all of this data into a single platform. This platform provided actionable insights to make better market-data driven decisions[12].

Creating New Access

Product complexities, entry into new product segments and geographies, associated regulatory requirements, increase in competing products, and the evolving physician interaction environment have all made the job of the sales representative more difficult. One of the approaches the industry now adopts is employing digital channels to access doctors instead of an intruding clinic visit, to optimize the short face-to-face time that sales reps get with busy doctors. These channels include websites, podcasts, iPad apps and portals, where they can ask questions about drugs (discussion forums), order free samples and find information on insurance coverage. In fact, current customer engagement platforms allow for sales rep-directed detailing, doctor self-detailing, and updates on medical news for both, while simultaneously capturing statistics on digital assets accessed and downloaded, ratings, and feedback.

Listening to the Customer

An interesting avenue to apply analytics is in unearthing the prescribing patterns of physicians. Cloud solutions can help obtain near real-time data from providers to run analytics, and gather close to real-time insights. The inferences obtained can be provided expeditiously to the sales reps in the field through mobile apps for tailoring their pitch in favor of the company's product.

Patients are increasingly accessing the internet for studying diseases, treatment protocols, and posting personal medical experiences. The unstructured nature of this data demands the use of natural language processing (NLP) with analytics support to devise or alter marketing strategies that leverage the patient sentiment information. While patient forums like Patientslikeme are providing de-identified data to big pharma companies for analysis, third-party vendors like Treato are providing social media listening solutions to the life sciences industry.

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[10] Social Media for Business Performance, TEVA Pharmaceuticals enhances communication through social media, sees supply chain improvements (February 2012), accessed April 8th, 2015, https://smbp.uwaterloo.ca/2012/02/997/

[11] Becker's Hospital CFO, Revolutionizing the physician preference item supply chain: How to achieve end-to-end product visibility (February 2015), accessed April 8th, 2015, http://www.beckershospitalreview.com/finance/revolutionizing-the-physician-preference-item-supply-chain-how-to-achieve-end-to-end-product-visibility.html

[12] Verix Case Study, Bayer Health Care New Product Launch, accessed April 8th, 2015, http://verix.com/analytical-applications/live-launch/

Empowering the Employee

When it comes to repairing high-value capital equipment, trained technicians are required to travel to distant customer locations, thus adding to a company's administrative costs. Extending the applicability of wearable technologies, which support video communication and on-the-field audiovisual manuals, mobile devices like Google Glass can aid in remote repairs, thus reducing the travel overheads the company incurs.

Driving Customer Engagement

Patient Centricity

Engaging the patient is at the core of the 'Patient Centricity' concept (see Box 5[13]). This engagement has implications on R&D, regulatory approvals and post-market success. Sanofi US' diabetes patient engagement approach began as a simple Facebook page and a Twitter feed, later progressed to a blog, and now, it has an entire website dedicated solely to diabetics[14]. It recently joined the 'Be Healthy, Be Mobile' program of the World Health Organization and International Telecommunication Union for an mDiabetes program. This program involves sending SMS reminders to patients on varied topics including monitoring of their blood glucose levels and food intake[15].

Monitoring patient health in homes and hospitals

Driving perpetual remote monitoring to allow quick decision-making

Philips's Hospital to Home program exemplifies the tele-health approach. One of their products is the eICU, which enables intensivists to remotely monitor ICU patients round-the-clock using audiovisual feeds to report any changes in a patient's condition, and immediately alert on-site caregivers about potential issues. The system allowed a hospital with 430 ICU beds to save 34,000 ICU days and 2,000 lives in 2013. Philips forged an alliance with Salesforce.com to deliver a cloud-based healthcare platform to monitor patients with chronic diseases in their homes with two applications—eCare Coordinator and eCare Companion. The platform is envisioned to not only enable collaboration among care team members but also improve confidence in their decision-making process, by incorporating additional patient data from multiple sources including EHR and EMR, diagnostic and treatment information obtained through Philips's imaging equipment, monitoring equipment, and personal devices and technologies like Apple's HealthKit.

Box 5

The Doctor's Diagnosis

Feedback is not only vital to address quality concerns and identify product improvements but also to build customer loyalty. Medtronic has provided its sales reps with a mobile tool, the mPXR, which allows them to capture customer feedback and forward it directly to the Quality and Complaint Handling team, who can then effectively address product performance issues and detect trends at an earlier stage[16]. Smith & Nephew's orthopedic division provides its entire line of products in an electronic template. Doctors can compare patients' X-rays with these templates to estimate the closer-to-correct size of the implant required[17].

[13] Philips, Philips secures 510(k) clearance to market the first clinical applications for its new digital health platform (October 2014), accessed March 26th, 2015, http://www.newscenter.philips.com/main/standard/news/press/2014/20141001-philips-secures-510k-clearance-to-market-the-first-clinical-applications-for-its-new-digital-health-platform.wpd#.VWRKkCGqqko

[14] Social Media.org, How Sanofi US created a patient-centered blog in a highly regulated industry (August 2014), accessed April 10th, 2015, http://socialmedia.org/blog/laura-kolodjeski-sanofi-us-created-patient-centered-blog-highly-regulated-industry/

[15] PMLive, Sanofi joins WHO-backed diabetes mHealthprogramme (February 2015), accessed April 10th, 2015, http://www.pmlive.com/blogs/digital_intelligence/archive/2015/february/sanofi_joins_who-backed_diabetes_mhealth_programme_664300

[16] Medtronic, 2013 Key Developments, accessed March 26th, 2015, http://www.citizenshipreport.medtronic.com/2013/responsibility-in-the-marketplace/2013-key-developments/index.htm

[17] Smith & Nephew, Electronic and Website Services, Accessed April 9th, 2015, http://www.smith-nephew.com/sustainability-new/policies-and-principles-old/economic-contribution-principles/electronic-and-website-services/

Serve the Provider

Superior after-sales service to healthcare providers is an important differentiator in today's competitive environment. In a pilot study, a global life sciences major enabled its diagnostic products installed in hospitals and clinics to report on their environmental temperature, hours of service and other such operational parameters. Not only does this enable the company to schedule preventive maintenance for these devices but also allows it to study device utilization, which is an additional benefit to customers. In a subscribed service model, customers can view the usage statistics for all devices they own on a dashboard, allowing them to distribute the workload and ensure equal utilization of all devices[18].

Enterprise - Departmentally Divided, Digitally Unified

A truly efficient organization is one where all value chain segments operate in sync. However, organizational silos have led to disconnected value chain operations—such as the disconnect between sales and marketing teams. This gap can be addressed with a portal that is mobile friendly, which provides the combined capabilities of a social network and a cloud-based content storage and management system. Sales reps can access the latest content and communicate any customization requests to the marketing team with the help of the social network capability, allowing the marketing team to assess the effectiveness of the content it develops.

The industry now needs to extend its view of the value chain to include even doctors and patients. For instance, the marketing team responds to customer feedback, complaints, and queries on various platforms, including social media. The marketing team can leverage social media analytics to derive insights into customer sentiment, product-need gaps, and feature requirements. The R&D team can use this data to develop new products and services which address current and potential customers' requirements and complaints.

Beyond engaging with customers, the Digital Five Forces are uniquely positioned to foster greater partnerships. Consider a disease management model where the Digital Five Forces can enable partnerships among stakeholders to provide the patient with comprehensive wellness and care (see Figure 1). Among the future trends, another

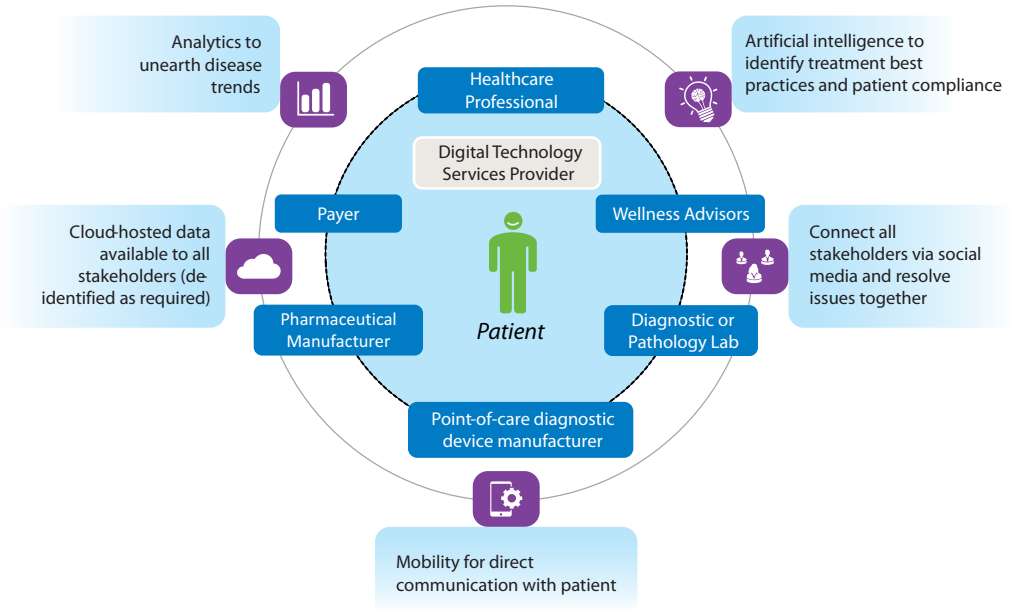

Figure 1 : Partner Ecosystem for Disease Management Enabled by Digital Technology

[18] TCS Research and Interviews, April 2015

trend that digital forces can play an effective role in enabling is that of personalized medicine to treat specific population subsets. The digital forces can also enable the leveraging of partnered research to derive greater value with lesser investments, agile manufacturing for low volume production and localized supply chains to cater to the dispersed demand.

Digital Diagnosis and Treatment

Organizations pioneering the adoption of the Digital Five Forces have done so by establishing dedicated digital solutions units tasked with the evaluation and enablement of supporting infrastructure, processes, tools and technology. These organizations need to work closely with various functions of the business to foster an appreciation and understanding of the business value of digital technologies. Apart from a structured process to achieve this interlock, a common set of organizational prerequisites need to be addressed for the effective penetration of the digital forces.

The regulated nature of the industry has led executives to perceive compliance as the major barrier for digital adoption. However, our research suggests that other important issues are at play (see Figure 2).

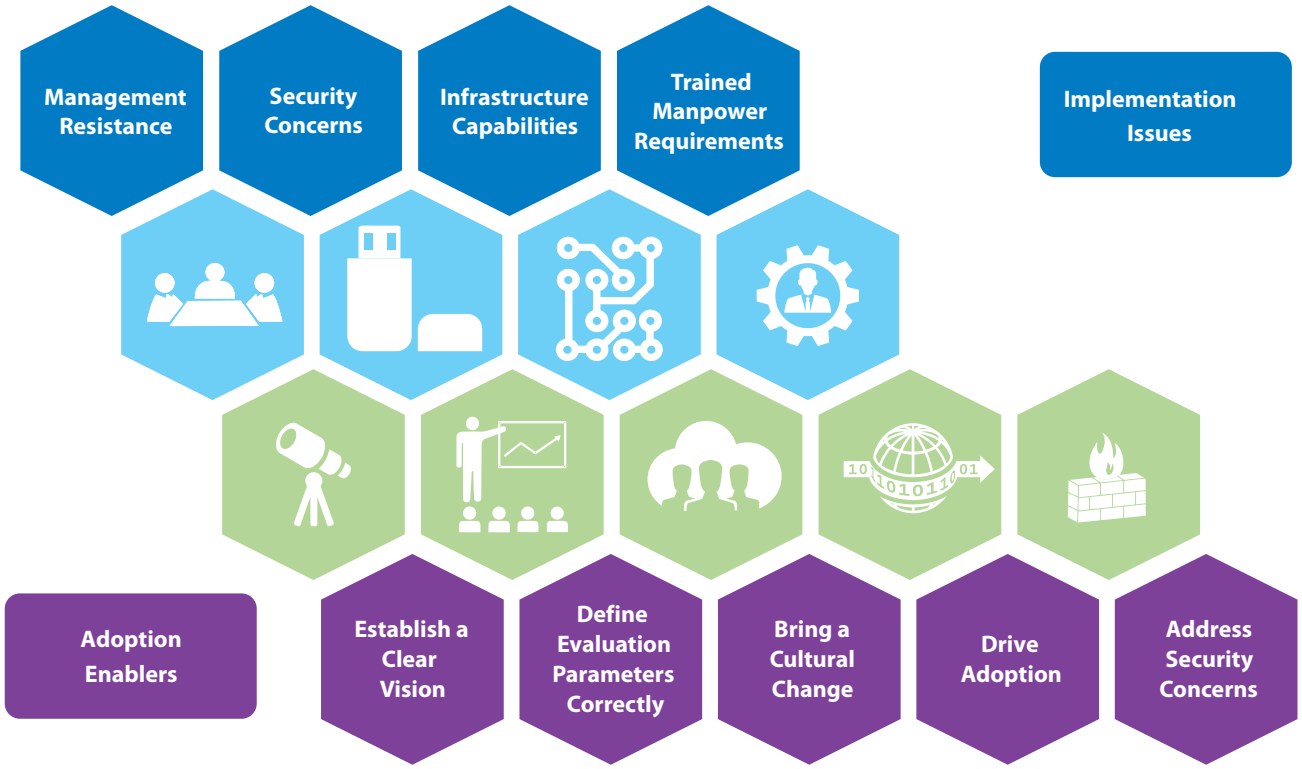

Figure 2 : Digital Dogma

Implementation Issues

Management ownership and resistance: The management's attitude to not look beyond traditional models of business processes and customer engagement is an impediment to implementation. The decision makers, especially CFOs, tend to look at digital initiatives skeptically using metrics like Return on Investment (ROI), which do not capture the true value of digital technologies.

Lacking a vision, digital strategy, and clarity on initiative sponsorship and funding, the random introduction of digital tools have led to underperformance and the failure to justify the perceived ROI. Moreover, the mere introduction of digital tools without widespread adoption can also become a futile exercise.

Security concerns: High-impact security breaches involving large corporations have made headlines in the recent past. These organizations had to deal with not only data theft but also damaged reputations. In the life sciences industry, compliance with patient privacy laws make the issue even more sensitive, and extra caution needs to be exercised when guarding data. With the growing trend of Bring Your Own Device (BYOD) witnessed in the industry, security concerns have increased manifold.

Infrastructure capabilities: Many leaders realize the opportunities that digital technologies can unlock. However, older and inflexible systems, the upgradation of which requires significant investment of time, effort, and money, act as discouragement.

Trained manpower requirements: Lack of trained manpower impedes not only implementation but also the gainful utilization of digital technologies. An ideal situation is to work with experts who have the right technology as well as domain knowledge.

Adoption Enablers

Establish a clear vision: A clear digital vision from the leadership communicates their support to ground-level employees and motivates them to willingly embrace a change. A corresponding strategy with defined objectives and milestones helps employees appreciate that vision, and drives them to adopt an innovative approach to realizing it.

Define your evaluation parameters correctly: Digital technologies are disruptive in nature and their adoption may require changes to internal business processes and even business models. ROI considerations should, however, include a combination of tangible and intangible benefits. A simple digital tool to record customer complaints can help a sales representative reduce call burdens, better understand the issue, allow for efficient prioritization, and also offer an intangible advantage – improve brand image and loyalty when customers feel they are 'heard'. The methodology of assessing gains should accommodate a company-wide perspective.

Bring about a cultural change: At an organizational level, a cultural change is necessary. As employees have already incorporated digital technologies in their personal lives, they can easily be adopted at the workplace too.

Drive adoption: To ensure widespread adoption, it is imperative to educate employees on the usage and benefits of digital initiatives.

Address security concerns: Although protecting sensitive data is a difficult task, it primarily requires investing in appropriate IT security measures, upgrading these periodically, setting up appropriate policies, and stringent penalties for lapses on the part of employees and vendors.

Following the Digital Prescription

Our research leads us to conclude that the life sciences industry will likely undertake the following initiatives (see Figure 3) within individual value chain segments and at an enterprise-wide level.

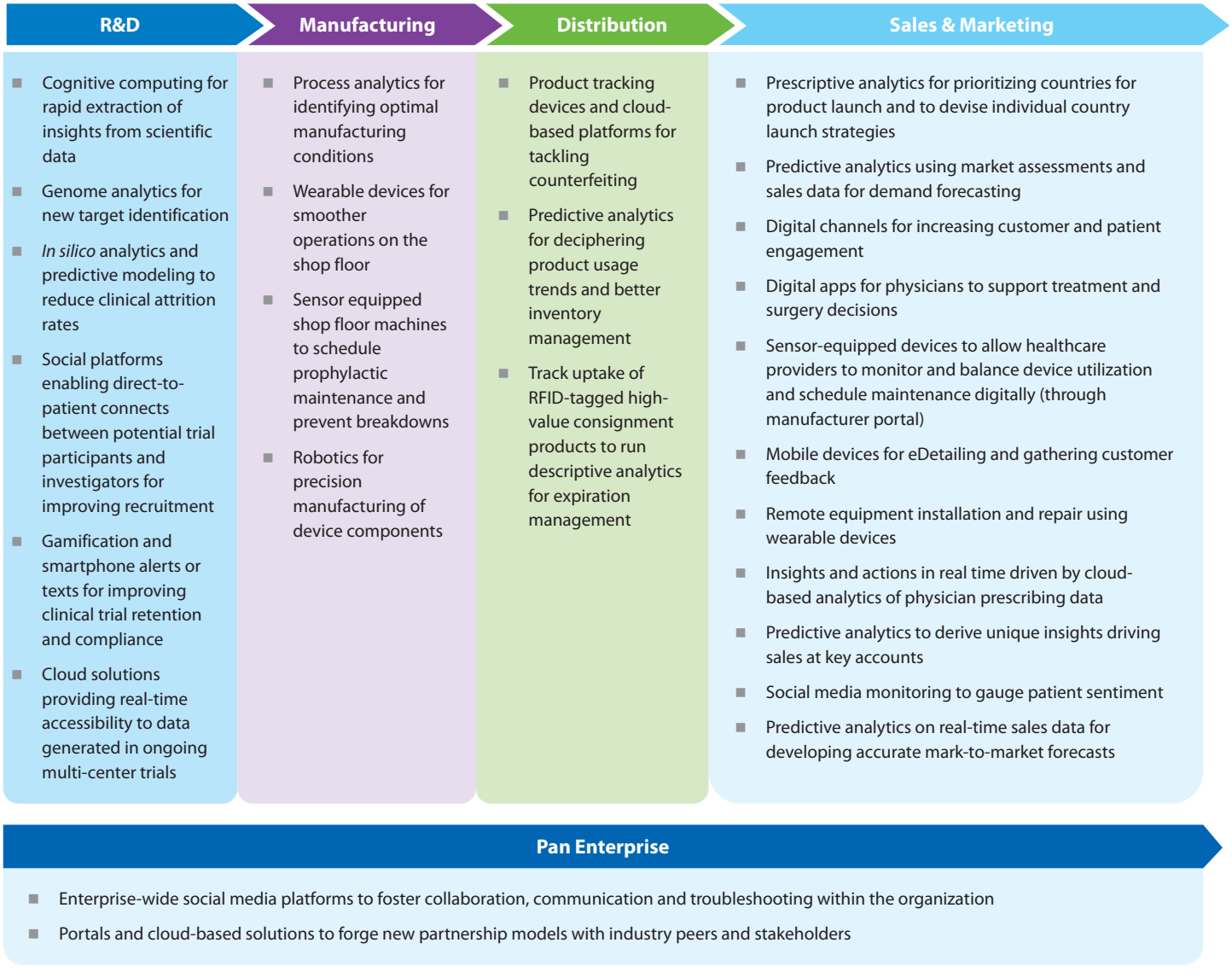

Figure 3: Critical digital adoption initiatives

Reimagine Tomorrow

With smart phones, smart homes, smart buildings and now, emerging smart cities, the default is digital. Businesses and enterprises, followed by industries, will be the next 'smart' institutions. The few industries ahead of the pack in the adoption of digital technologies have created a path for the rest to follow.

The life science industry needs to actively examine potential applications and implications of the Digital Five Forces. To fully realize benefits, companies need to set up platforms, policies, organization structures and governance. Creating an environment conducive for enabling the digital forces will empower businesses to reimagine themselves. Penetration of the technologies should be explored not only within specific value chain segments but also at the enterprise level, by leveraging a combination of the Digital Five Forces to solve critical business issues.

The next day at work, Tony's mind wanders to the previous night's game about dinosaurs falling off cliffs, to their doom, resulting in their eventual extinction. When he comes back to reality, he sees a distinct analogy emerge - of life science companies like his own and realizes that those who do not accord the appropriate priority to the adoption of digital technologies risk becoming the dinosaurs on the edge of the digital cliff.

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With over two decades of experience in the life sciences domain, TCS offers a comprehensive portfolio in IT, Consulting, KPO, Infrastructure and Engineering services as well as new-age business solutions including mobility and big data catering to companies in the pharma, biotech, medical devices, and diagnostics industries. Our offerings help clients accelerate drug discovery, advance clinical trial efficiencies, accentuate manufacturing productivity, and amplify sales and marketing effectiveness.

We draw on our experience of having worked with 12 of the top 15 global pharmaceutical companies and 8 of the top 10 medical device manufacturers. Our commitment towards developing next-generation innovative solutions and facilitating cutting-edge research - through our Life Sciences Innovation Lab, research collaborations, multiple centers of excellence and Co-Innovation Network (COIN™) - have made us a preferred partner for the world's leading life sciences companies.

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