DIAL D FOR DATA

From clinical decision support to personalized care... a burgeoning healthcare analytics market serves up variety of solutions to contain cost and improve quality of care, writes **Aurnima Rajan**

Is analytics one of the most misunderstood term in Indian healthcare sector? Several data scientists definitely think so. The challenges for implementing this information management approach are many: lack of skilled resources to execute expensive analytics tools, insufficient business case evidence in health and inadequacy of existing legislation, governance and information management processes within and outside the organization as well as data custodianship. These are several perceptions about data analytics which refuse to go away.

Not many care to find out the other side of the story. Like any other new process, healthcare analytics requires considerable capital and operational investment as well as people who can handle the technology. Today, healthcare organizations are really good at episodic care. What they are not good at is at offering integrated care through multiple settings. Different verticals like home health care, primary care and tertiary care are treated as separate entities by managements. Neither organisations nor their Information Technology systems are set up to function as a single entity. They are set up. to function as individual silos in multiple technology platforms and not to openly share information with each other.

Further, experts believe that affordable healthcare specific Enterprise Management solutions are scarce. According to an Ernst and Young study, "healthcare decision support is usually workflow specific, provided within the functional systems of enterprise Healthcare IT Vendors". It adds that most of the solutions are usually not cross functional and cross enterprise. Enterprise software vendors offer data warehouses and online analytical processing tools specific to their applications, but are not an effective enterprise solution, particularly for revenue cycle. "There are technology vendors who offer Business Intelligence solutions, but they need to be custom developed. They are costly to implement and maintain and most companies are not able to afford them. Further, pure healthcare Business Intelligence companies which provide subscription based solutions are limited in number and technology is not cutting edge. They are usually retrospective reporting and benchmarking services," notes the study.

However, some point out that Return on Investment (ROI) from Healthcare analytics would be much higher than the initial cost. "Using Healthcare Analytic solutions, health providers can reduce the time taken to decide the course of treatment for a patient. Such decision support systems will also reduce the overdependence on experts, who are few in number. This will result in overall improvement in the quality of health and also help providers serve a larger number of patients, thus improving their returns. Further, health profiling of population and region wise insights will empowers public health officials to plan initiatives more efficiently and utilize limited resources more effectively," says Puneet

The value of analytics is directly related to the significance of derived insights.

Puneet Gupta, Entrepreneur in Residence, SAP Labs India.

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That's not all. Statistical and qualitative analysis of data provides insights on the patient which help providers effectively arrive at decisions which are most probable to help the patient. "Regional analysis of public health data allows the government to focus their efforts on preventing or eradicating the most serious issues affecting a large number of people, thus bringing focus on the needs of the patient. Empowering the healthcare enterprise to serve the patients better is the underlying principle upon which innovations are built," adds Puneet Gupta.

According to Gupta using healthcare analytic solutions health providers can reduce the time taken to decide the course of treatment for a patient. Such decision support systems will also reduce the over-dependence on experts, who are few in number. "This will result in overall improvement in the quality of health and also help providers serve a larger number of patients, thus improving their returns. Health profiling of population and region wise insights will empowers public health officials to plan initiatives more efficiently and utilize limited resources more effectively," notes Gupta.

And many other experts like Srinivas Tadigadapa confirm Puneet Gupta's claims.

"Starting from reduction of medical errors, improve customer satisfaction, acquisition and retention by being able to smartly diagnose and better quality of care, increased adaptability and better utilization of resources and most importantly regulatory compliance and reduce the risk of fraud," notes Srinivas Tadigadapa, Director Enterprise Solutions, Intel South Asia.

Outside India, the most extensive experiments with the idea of data analytics have taken place in US. Prominent organizations like Mayo Clinic have integrated clinical and Genomic data from across its organization to develop more targeted and effective treatments. Analytics has been implemented in areas like medical imaging where radiologists will be able to detect subtle changes that indicate prob-

lems.

"For radiologists to be able to detect subtle changes that indicate problems, medical images need to be crisp and as close to "apples-to-apples" comparisons as possible. This requires special algorithms to correct image blur or distortion caused by the patient's breathing, heartbeat or movement and to properly align images. To improve care, however, Mayo Clinic went further and added an additional algorithm to detect brain aneurysms in the processed images. This algorithm predicts how likely it is that the images show a brain aneurism. This solution generated a 95 percent accuracy rate in detecting aneurysms, compared with 70 percent for manual interpretation—a 25 percent improvement. Added to the improved clarity of images, this represented a significant improvement in patient outcomes," says James Taylor, in a report published by Decision Management Solutions.

Historically, data analytics has acted as a solution for the complex issues that the healthcare system throws in front of practitioners. A good example of this is how Doctor John Snow prevented the spread of a serious outbreak of cholera in London's Soho in 1854. "Doctor John Snow mapped the cases, with the map essentially representing each death as a bar and clearly showing that cases were clustered around the pump in Broad (now Broadwick) Street. After further investigation Snow discovered that a 59-year-old woman collected water every day from the Broad Street pump; the water was taken on Thursday, August 31, and she died of cholera on the Saturday. At a local brewery and a local workhouse, workers were surrounded by cases but appeared unaffected because they had their own water supply. Eventually Snow discovered that the pump in Broad Street was polluted by sewage from a nearby cesspit where a baby's nappy, contaminated with cholera, had been dumped. Snow's approach had not only changed the understanding of cholera transmission, but had also changed data analysis and visualization," recalls Silvia Paiai, in a white paper entitled "Bigger Data for Better Healthcare".

There is a general consensus that analytics has the potential to 'transform' the sector. Given the fact that analytics is about using large volumes of health data for statistical and qualitative analysis, as well as predictive modelling, there are two main areas of application for such tools. First, in curative care, healthcare analytics is used to decide the next course of action by examining the case history of similar cases. This is mostly used for decision support systems, clinical research and new areas like gene mapping.

Second, in the area of preventive care where health records of a population are analysed to create regional health parameters, predict the possibility of diseases, and prevent them from occurring by designing programs and initiatives to address the root cause. This is mostly used by agencies and authorities responsible for managing and improving the health of the population.

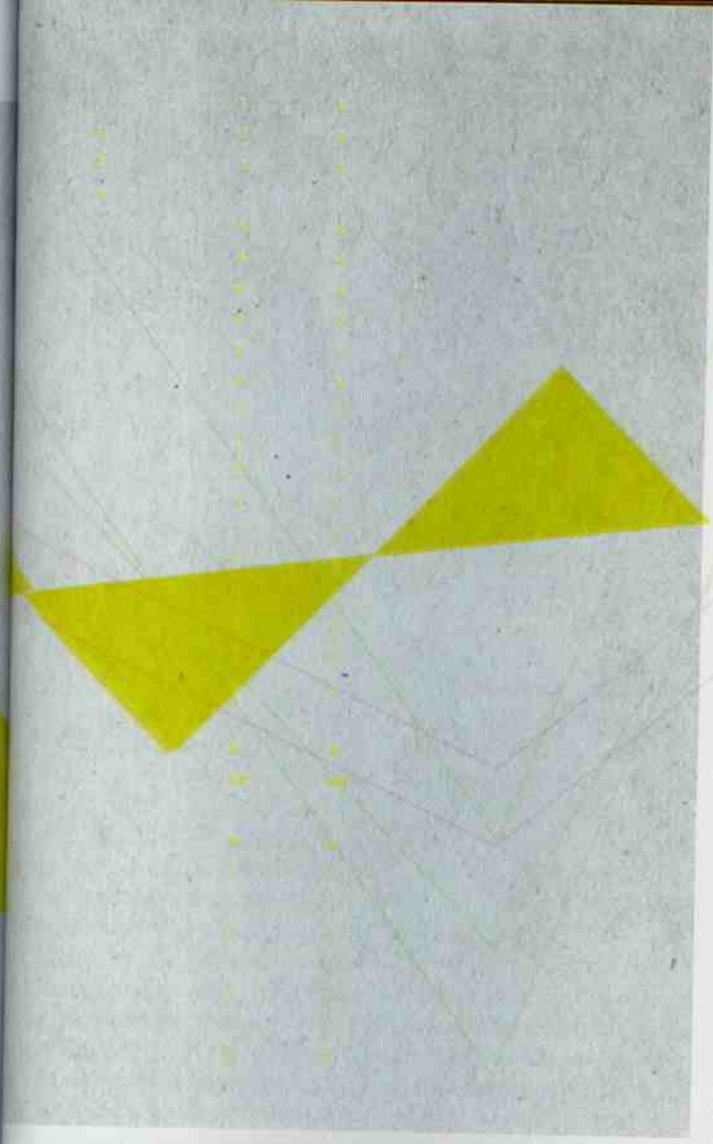
Industry Size

More than anything else, the huge returns of data analytics in sectors like retail and e-commerce has transformed mindsets. "Analytics really has enormous potential in almost every field where data is generated. It has already shown dramatic results in many sectors including retail and e-commerce, where organizations implementing and using analytics gained well returns at early stages itself. Healthcare industry is among the few sectors having highest percentage of unstructured data, like patient's historic health records, diagnosis reports, prescriptions, treatment results and so on. This makes it a bit challenging to develop some impactful analytical use cases that can actually make substantial differences in the healthcare sector. Otherwise healthcare analytics has already started showing results in smaller but influential areas like speeding up the new medication process, identifying optimal

strategies to commercialize treatments, measuring, tracking and improving performance more effectively and efficiently," observes Badal Bordia, principal technology consultant at Advaiya Solutions.

Healthcare information technology market in India is expected to reach $1,454.7 million in 2018 from the present $381.3 million, mainly due to fast adoption of technology by stake-holders, according to Frost & Sullivan. Healthcare information technology market in India is expected to reach $1,454.7 million in 2018 from the present $381.3 million, mainly due to fast adoption of technology by stake-holders, according to Frost & Sullivan.

In fact given the expense associated with analytics, some might ask whether healthcare analytics is a required competency for an organisation. The short answer is that analytics is not a choice anymore. "A healthcare enterprise does not have a choice but to develop this competency or partner with someone who has this competency. Let's examine a few simple fundamental changes that are happening around us. Firstly, we are actively getting more and more data about our bodies through a variety of lab tests and imaging studies. Cost of DNA testing is dropping to a point where it will become mainstream in the future - resulting in even more data about our insides. We will also have data from our micro biome (that occupy 90% of our body) through its testing - a single stool sample can generate several gigabytes of data. Larry Smarr, a computer scientist measured over 1 billion data points from his body- from heart rate to blood serum levels," says Praveen Suthrum, founder of Next Services, which provides cloud-based revenue cycle management services and healthcare delivery solutions to physician groups.



"Secondly, Apple Health's announcement at the WWDC this month brings together a platform approach to health data - integrating all the patient apps and devices that are capturing data into a large pool. At the gross level, patients are generating more and more data – through Fitbit, Withings, Nike band and so on. Thirdly, Electronic health records are actively digitizing medical encounters. Most Americans are now on a digital record platform - it's only a matter of time when most patient encounters across the world will be through an electronic medical record platform. Each medical episode then generates a quantum of data. Further, doctors are increasingly reliant on data (mostly through lab results now) than they have ever been in the past. They do not diagnose simply based on gut-feel but base their medical judgment based on data about the medical encounters, billing and payment. For a healthcare enterprise, there is no way to escape the data spectrum across the process of care. They'd rather do something about the data they hold," says Praveen Suthrum.

Who said analytics will not work for a traditional system?

Praveen Suthrum, founder of Next Services

It is easy to see why other countries have begun looking for alternatives to ineffective gathering and use of information. "Using Healthcare Analytics, the health care industry in India can anticipate, shape and optimize outcomes by accessing and analysing data about patients, symptoms, diagnoses and treatments from various knowledge sources. Even if they follow a traditional system, analytics can enable evidence-based, personalized medicine for lifetime health maintenance and disease prevention—in addition to episodic and acute care," says Gaurav Vohra, CEO of Jigsaw Academy.

Probed about the biggest advantage of analytics, he says, "The biggest advantage of using analytics is that it allows the manager to make data backed decisions. Instead of relying on generic reports and dashboards, analytics applications drive effective decision-making throughout your organization. It not only improves decision making it also helps with: Better alignment with strategy, realizing cost efficiency, responding to user needs for availability of data on timely basis, improving competitiveness, producing a single unified view of enterprise information, synchronizing financial and operational strategy, increase revenues and sharing information with a wider audience ."

Clearly, analytics has infected the Indian market and has generated a strong feel good factor in the sector. With global success stories reported widely in international media, hope is palpable in the air.

Affirms Srinivas Tadigadapa from Intel: "With specific reference to India, analytics can help in sharing the best treatment plan in a geography with low doctor penetration. Having said that, majority of data in healthcare is in manual form in India. But, that should not stop us from implementing analytics from the available digitized data which is enormous and can help the country in improving delivery and treatment of diseases."

One reason why Indian healthcare sector is closely monitoring the analytics revolution is because it can shape and optimize outcomes even for traditional systems. "Who said analytics will not work for a traditional system?" asks Praveen Suthrum from Next Services.

"On the contrary, the Indian healthcare system is contemporary and the issues that India struggles with are similar to those of the West. It's the right time to take a systemic approach to healthcare data analytics by establishing standards for clinical and administrative data. This will help the government in organizing this information for large scale population health management. Using HA, the health care industry in India can anticipate, shape and optimize outcomes by accessing and analyzing data about patients, symptoms, diagnoses and treatments from various knowledge sources. Even if they follow a traditional system analytics can enable evidence-based, personalized medicine for lifetime health maintenance and disease prevention—in addition to episodic and acute care. Healthcare analytics has the potential to transform how healthcare is delivered in developing countries. There are far fewer doctors than we need - India has 0.7 number of doctors per 1,000 people compared to 2.5 in the US and 2.8 in the UK. India is also considered the world capital for diabetes, heart disease and cancer-three of the most deadly diseases. Using healthcare data from an electronic health record and video, it may be possible to monitor patients and possible deliver care without needing the patient and the doctor to be co-located in the same place. Most diseases manifest because the diagnosis has not been established soon enough even though the body provides several symptoms," says Suthrum.

It's not just urban India which will benefit from analytics. Thanks to the population-profiling features of analytics, even rural population can enjoy the benefits of data analytics.

"India is a large, diverse country with 72 percent of the population living in villages. The government has setup a network of about 27,000 Community and Primary Health Centres to provide healthcare to 1.3 billion Indians. This is limited and not enough to provide effective delivery of health services in the remotest corners of the country," explains Puneet Gupta.

"While the government invests in strengthening this infrastructure, what we need today is profiling of people and regions on various health indexes. This will help agencies like the National Health Mission design, plan, and execute their programmes more effectively," adds Gupta.

"For instance, regions more prone to water borne diseases ought to have programs that prevent its occurrence, while regions with a higher rate of malnutrition will have programmes that provide targeted care. The National Health Mission is already running many important programs like Child Health Program, Maternal Health program, and others, but to increase the effectiveness of these programmes and measure the impact, it is important to use analytics. The cost of patient care will be definitely reduced when healthcare analytics is used as it eliminates the requirement of expensive curative care which is borne by the Government," notes Gupta.

The idea of implementing analytics still has some well-known backers today, such as Unity Stoakes, co-founder of StartUp Health and Senior Vice President and Global Head-Cloud, Infosys, Vishnu Bhat.

"Today, a significant proportion of the cost and time spent in the drug development process is attributable to unsuccessful formulations. By enabling researchers to identify compounds with a higher likelihood of success, Big Data can help reduce the cost and the time to market for new drugs. Big Data analytics can take healthcare to a new level by enhancing the overall quality of patient care, enabling faster and more holistic decision-making, and reducing the cost and the time to market for new drugs. Additionally, by integrating learning from clinical data into the early stages of development, researchers are now able to customize drugs to suit aggregated patient profiles," says Vishnu Bhat.

It's easy to see why healthcare enterprises have begun looking for an alternative to the current business model. "The process of data analysing in healthcare is similar to many e-commerce websites where they use patterns emerging from aggregated information to predict the predispositions of individual customers. But in the context of healthcare in developing countries such as India, the implications are significantly more profound. It's the difference between selling books and saving lives. And it's why the value of data in the healthcare sector can never be adequately emphasized or even overstated. At the level of individual patients, big data will enable faster and more holistic decision-making, blending personal information with aggregated trends. At the macro level, data aggregation across regions and geographies will deliver larger samples for more statistically accurate clinical studies, health trending and such like. And it will enhance the overall quality of patient care while simultaneously reducing costs associated with under or over treatment," adds Bhat.

The IT department keeps a check on new technologies being setup in the hospital while keeping in mind the best available options in the industry.

Sanchit Vir Gogia, chief analyst and CEO, Greyhound Research

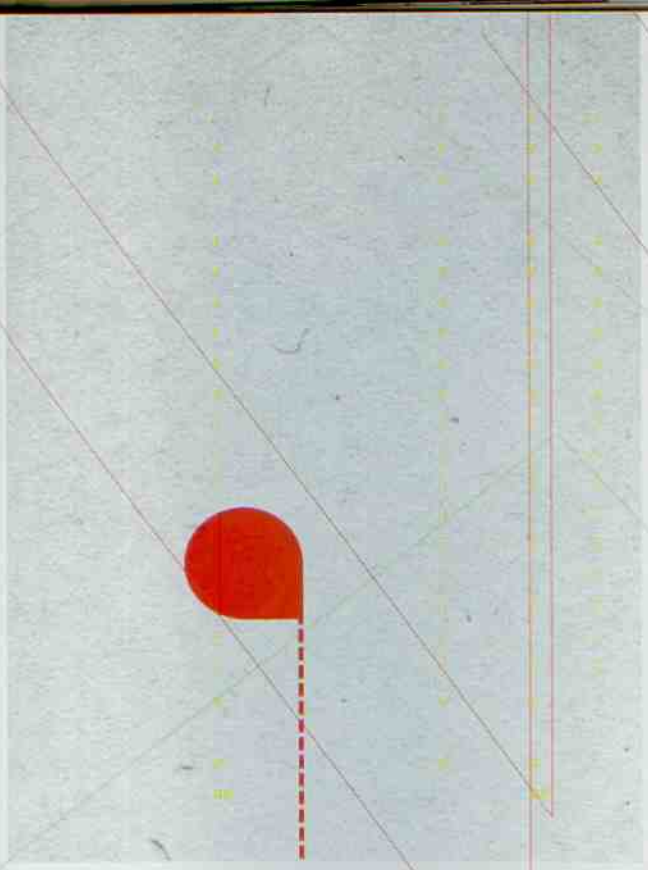
Healthcare analytics can help people and organizations make sense of all of the data.

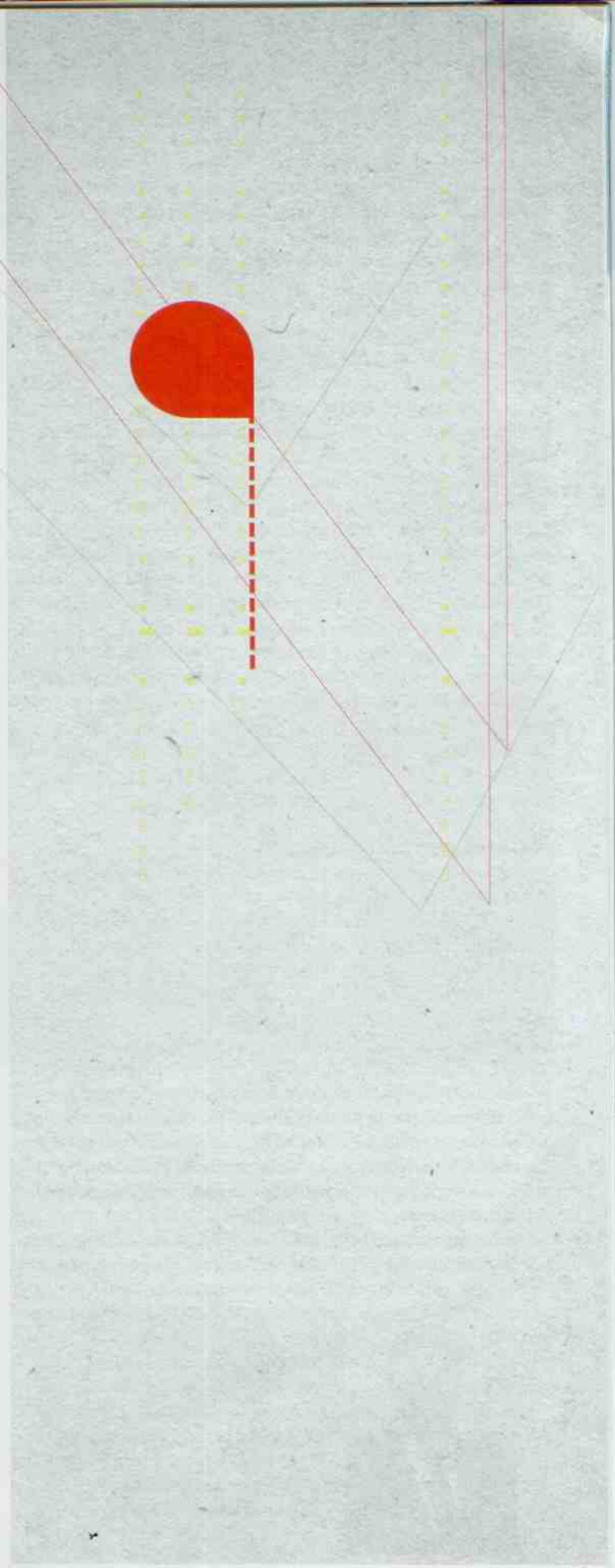
Unity Stoakes, co-founder of StartUp Health

President of StartUp Health, Unity Stoakes, reiterates Bhat's views. "Those organizations that understand how to effectively capture and understand all of the health data that is available today will be most successful. It is becoming a business imperative and competitive advantage. If your organization understands how to use data in sophisticated ways you can not only impact people's health and wellness and improve the quality of care, but you can optimize the workflow to create efficiencies and reduce costs," says Stoakes.

"There's a wave of innovation happening in healthcare because of the digital revolution. We are seeing sensors, mobile platforms, tablets, connected devices, genetics, and smart phones all collecting and capturing health data. As a result we are seeing the need for all of this data to be understood and analysed. Healthcare analytics is becoming an essential component to healthcare now it's not only industry that needs to understand and analyse all of this data, but people also want to understand how it impacts them personally. Healthcare analytics can help people and organizations make sense of all of the data," adds Stoakes.

"Healthcare analytics is an information management approach which derives insights from data to address important questions. There are many potential use cases for BDA in health care. BDA can be used to: help researchers find causes of, and treatments for diseases; actively monitor patients so clinicians are alerted to the potential for an adverse event before it occurs; and personalize care so precious resources as-





sociated with a treatment are not administered to a patient who cannot benefit from the intervention," notes Stoakes.

There are several functional areas where healthcare enterprises deploy healthcare analytics. "The IT department keeps a check on new technologies being setup in the hospital while keeping in mind the best available options in the industry. The finance department monitors revenues and margin performance by service line, by department, by facility and at the enterprise level, the operational team to measure performance against strategic institutional initiatives. The quality department monitors quality across multiple locations and service lines and also on the quality of drugs / medicines that are coming in for the treatment. The operations team tracks financial goals in terms of growth, profitability, key controllable expenses and return on net assets, aggregate profitability and operational data from multiple silos across the organization to deliver dashboards and scorecards to care providers and management," says Sanchit Vir Gogia, chief analyst and CEO, Greyhound Research.

Indian Success Stories

India's wait is of course over. Many experts believe that the app created by PHFI, is an example of the type of predictive analytics model that other players can emulate. "One of the successful models of healthcare analytics in India is the app called the KGB ('Kooda, Gandagi, Badboo' meaning garbage, dirt, bad smell) developed by the Public Health Foundation of India. This app uses social networking platforms to improve sanitation and hygiene in urban areas. People can post pictures of garbage or overflowing gutters on any social media platform. Where it gets interesting, is how the data is channelled to a central database and forwarded to health authorities. Based on the number of pictures from a single neighbourhood, they can predict the outbreak of vector-bone diseases and initiate some action to combat the outbreak before it actually unleashes itself within the community," adds Gaurav Vohra.

Even government initiatives like Aarogyasri Health Care Trust has lately been in news due to its partnership with SAS. "Aarogyasri

Health Care Trust is a government initiative offering health insurance schemes to Below Poverty Line families for treating catastrophic illness. They have partnered with SAS to leverage the claims, financial and clinical data they collect and improve lead times, prevent fraud, recognize disease trends and forecast budgets and funds needed," notes Gaurav Vohra.

Ask Srinivas Tadigadapa from Intel about what makes India and the rest of the world go gaga about analytics and he will tell you diversity is responsible for the interest.

"Healthcare Analytics will have numerous application scenarios in the medical industry. The most practical application of big data technology lies in management and services of resident health record data — meaning the management of personal full-life-cycle medical/health data. From the perspective of doctors and health administrators, full-life-cycle health record retrieval is of practical significance. For example, for patients with chronic diseases, previous pathogenesis changes and treatment processes play a helpful role in assisting doctor's diagnosis and treatment. Data of allergic history and adverse reactions also play a positive role in avoiding malpractice and medical negligence. Statistics of and analysis on mass medical and health data provide a more scientific basis for management decision making and supervision implementation. Traditional clinical research are based on sample survey, while Overall Framework of Regional Medical Big data offers promising opportunities in the future when applied to clinical diagnosis, scientific research, public health decision making by governments, and individual health management," says Tadigadapa.

The integration of all this data is key, and this calls for greater collaboration among the IT departments of healthcare organizations, care practitioners and claims processing experts.

Home-Grown Solutions

Among the experts who want to discuss about Indian analytics solutions providers, Bija Health is very popular. Founded in 2007 with a vision to be the leading provider of secondary data to healthcare industry from emerging markets, it is the only provider of such rich, refined and high quality datasets in diverse therapeutic areas.

In a sense, healthcare is a focus industry for a lot of the major technology companies and innovations are happening in the areas of curative and preventive care. For example, in the area of curative care, the SAP Genome Analyzer supports researchers with gene analytics, while in the area of preventive healthcare, SAP Health Central is a solution for analytics on population health data with program planning and monitoring capabilities. Similarly, numerous start-ups and corporate entities have recognized this sector for thrust in innovation and development and the technology industry is exploring the untapped potential in this area.

"Healthcare analytics has gathered credible interest and appreciation from various state governments in India as a result of which a large scale pilot was launched in a Northern state in India to prove the capability of this new domain. The pilot was conducted by SAP in association with National Rural Health Mission to demonstrate the healthcare analytic capability of SAP Health Central. The pilot spanned over 3 months and required screening of over 65,000 children by 10 Health teams. The process of screening included disease profiling of the screened children to recognize epidemics and identify the focus regions for further initiatives. The analytics provided deep insight into the disease patterns in the regions where the pilot was conducted," says Puneet Gupta.

The crucial success of the product attracted appreciation from many including the Mission Director of NRHM who said that the solution will help efficiently manage Rashtriya Bal Swasthya Karyakram (Government Rural Child Health Mission), which covers the health check-up of every child enrolled in government managed and government aided schools. "Using SAP HANA and Aadhaar, it is now possible to uniquely identify every child, track their health status and manage the program efficiently. The solution will give real time analytics and reports on the health status of the 1.5 million students in the state,"

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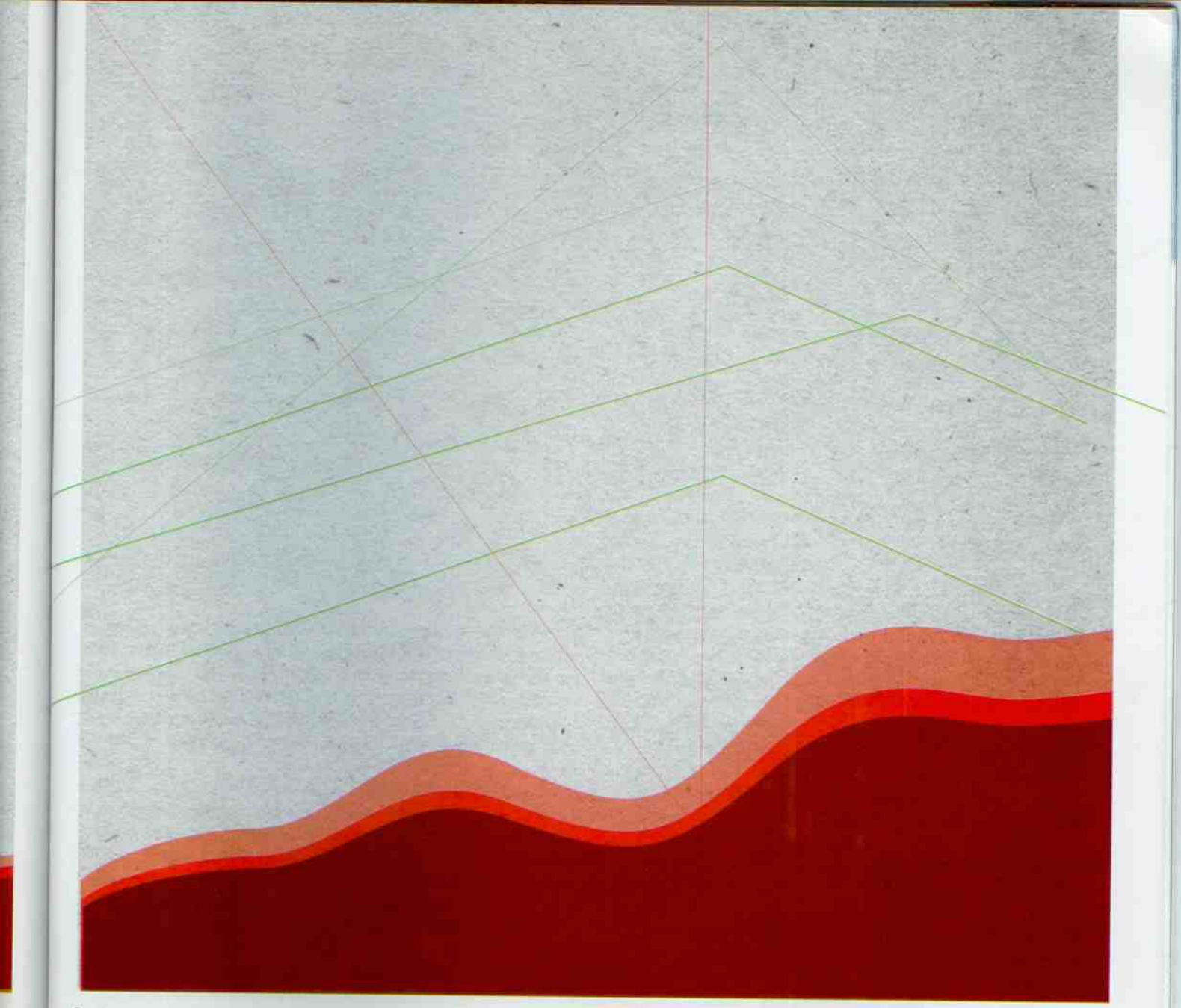
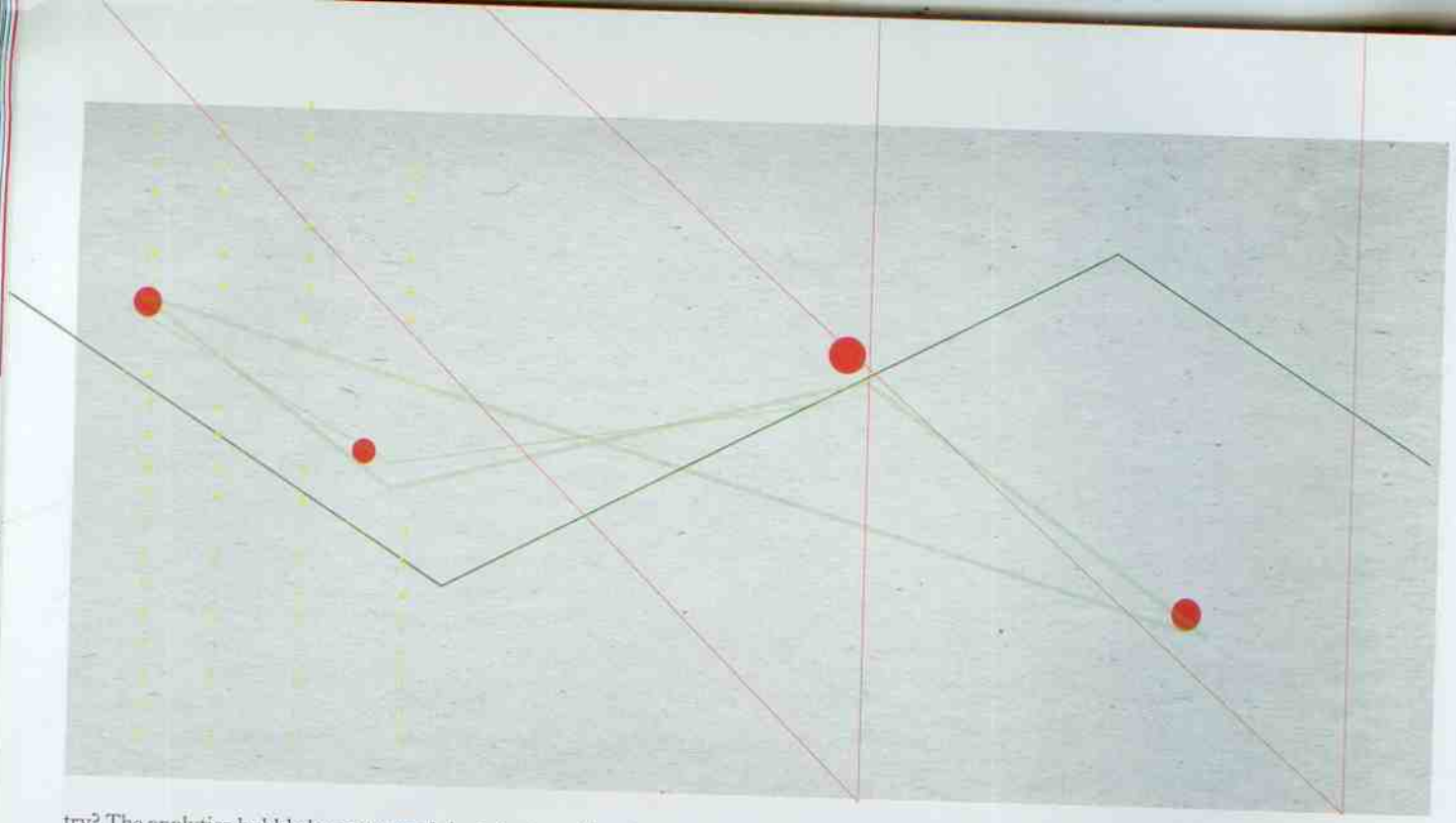


Gupta says.

A similar initiative recently took place in Karnataka. Along with the government of Karnataka, Intel successfully implemented a joint tele-medicine initiative at the Angodu Primary Health Care center and Harihara Taluk Hospital. Srinivas Tadigadapa says that the objective of the project was to pave the way for the extension of healthcare benefits to the rural population of Karnataka. "The health centres in this pilot program were furnished with equipment including audio and video transmission to send patients' records to be transmitted to the specialist Narayana Hrudayalaya Hospital, Bangalore. Besides analysing patient data including ECGs, Narayana Hrudayalaya which is a premier cardiology hospital also provided consultation to the patients of the health centres. Over 1,900 ECGs have been referred to the Narayana Hrudayalaya from tele-health projects across Rui Baramati in Maharashtra, Tindivanam in Tamil Nadu and Angodu in Karnataka," adds Tadigadapa.

Lately, there is also a palpable buzz about healthcare information management outsourcing. "The most obvious advantage is that IT service providers that specialize in the delivery of healthcare information management systems can perform those functions much more efficiently than a standalone IT department in a hospital, thus reducing and controlling operating costs. With new technologies, there is always a learning curve and many hospitals may not be in a position to hire and train inside IT staff. An outsourcing partnership ensures availability of needed skill sets, particularly important during times of technological change. Outsourcing information management will help hospitals to gain access to world-class technological capabilities of IT service providers and take advantage of the domain expertise they accumulated from their past experiences in providing such industry solutions.As a risk-sharing partner, the IT service provider could introduce best-practice solutions to the healthcare organization, resulting in improved service levels—not only in IT, but throughout the organization. Other benefits include predictable pricing over the long term as well as flexibility in ramping up and ramping down resource levels. It will also allow hospitals to free up their internal resources to concentrate on their core business: providing healthcare services," says Bipin Thomas, president of UST Global Health Group.

But what's happening in the private healthcare sector of the coun-



try? The analytics bubble has presented the industry with a burst of energy and a completely new set of challenges. Most respond to the analytics debate with a mix of enthusiasm and hope. Says Chandra Sekhar, executive director of Global Hospitals Group, "Organizations have no choice but use analytics in some way or the other in their various decision making processes. It is important to figure out how analytics can be used in the various day to day activities of a hospital."

Currently, information privacy concerns are the single biggest obstacle to big data adoption in healthcare.

Vishnu Bhat, Senior Vice President and Global Head-Cloud, Infosys

Interestingly, physicians have been using analytics for clinical practice for some time. What's important is that it's being used for non-clinical areas by healthcare enterprises to drive efficiency and understand the consumption patterns. Various parameters like average length of stay, patient satisfaction are monitored carefully by organizations. "The turnaround rate is faster, when the duration of stay is shorter. Competition has increased in the for-profit tertiary care segment of healthcare industry. So there is a major focus on capturing and bench marking data," says Chandra Sekhar.

He also stresses that even that organizations might not be deploying advanced data management tools, they use home-grown solutions and applications to identify factors affecting their promotional campaigns, customer turn out as well as ROI on various new technologies and devices. "Even though cost is a concern, recovery is much more than investment. Managers would soon identify that data management will become a differentiating factor," says Chandra Sekhar.

However, he admits that a CXO would think twice before investing in an expensive solution. "I would definitely look at direct impact on patient care and would not invest in something which is really expensive."

Even the western players are concerned about the cost involved in implementing analytics, notes experts. "While there is high awareness and great interest in analytics, budget constraint is a major roadblock for enterprises. Therefore, delay in implementation is seen in general in this sector. Basic reporting using descriptive statistics is fast becoming common but use of advanced analytics like predictive modelling is still very limited," says Unity Stoakes.

Challenges

There are of course, challenges in implementing analytics in an enterprise. At one level, executives find it difficult to place an analytics function in an organization. IT department often holds the responsibility for Enterprise Data Warehouse (EDW). However, other departments like Finance and Clinical leadership requires it to support business decisions.

"Currently, information privacy concerns are the single biggest obstacle to big data adoption in healthcare. Another is the absence of an analytics solution powerful enough to gather massive volumes of largely unstructured health data, perform complex analyses quickly, and trigger meaningful – read life-saving – action in real-time. A 2011 estimate placed the sectoral data volume at about 150 exabytes, increasing by 1.2 to 2.4 exabytes every year. And healthcare providers routinely discard up to 90 percent of generated data. Almost 80 percent of the data, comprising doctor's notes, scans and surgery feeds, is unstructured and

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Chandra Sekhar, executive director of Global Hospitals Group

The awareness and willingness to implement analytics is already seen with even small to medium level healthcare enterprises

therefore beyond the purview of conventional data analytic tools and technologies. To make things worse, data is scattered around in proprietary silos belonging to healthcare providers, insurers, pharmaceutical companies, ancillary service providers and other medical institutions," says Vishu Bhat, Senior Vice President and Global Head-Cloud, Infosys.

From an Electronics Healthcare Records (EHR) perspective to date, IT is focused on capturing that data. They take and then transpose what's on a medical record into an electronic format. Ideally, the data that is captured should be analyzed to help the hospitals make quicker decisions and not just for basic patient records.

"The biggest challenges are non-standardized data structures for health records and low technology adoption due to lack of awareness and limited infrastructure," reveals Puneet Gupta from SAP Labs. "The upside is that the Government has already realized these challenges and is working on Meta Data Standards for health records and is also implementing Hospital Management Information Systems and Electronic Medical Records systems in all government hospitals," adds Gupta.

Further, in their search for data, several senior executives are often forced to work around fragmented data and inefficient processes to get the information they need to be effective. Despite multiple discussions, control and ownership can often be a highly political issue. Decision making has never been a problem, but leaders often make decisions with in their own area of responsibility based on personal intuition and consensus due to lack of access. Despite the awareness about benefits of HA, senior management has often relied on strong leaders who could implement behavioural change in the organization.

"Expenditure on health by the government continues to be very low. Still, in the public sector, it is not considered as an investment towards health, but rather viewed as a dead loss," fumes Badal Bordia, principal, technology consulting at Advaiya Solutions. "There are concerns regarding ethical practices of health care services, medical negligence of patients, commercialization of medicine, and incompetence towards advancing technology. People themselves lack the awareness about keeping records about their health issues. In case of minor health issues (like headache, stomach pain etc.) once the treatment is over, most people tend to dump the records, which are hard to find. This leads to an incomplete health profile of individuals." He sums up his disillusionment: "Currently there is no centralized way to identify the patients, and track the history of health records for any patients in India."

Cultural barriers apart, senior executives also lament about the lack of clarity regarding roles and responsibilities. "The biggest challenge is the availability of digitized data, interoperability and integration

With specific reference to India, analytics can help in sharing the best treatment plan in a geography with low doctor penetration.

Srinivas Tadigadapa, Director- Enterprise Solutions, Intel South Asia

The biggest advantage of using analytics is that it allows the manager to make data backed decisions.

Gaurav Vohra, CEO of Jigsaw Academy

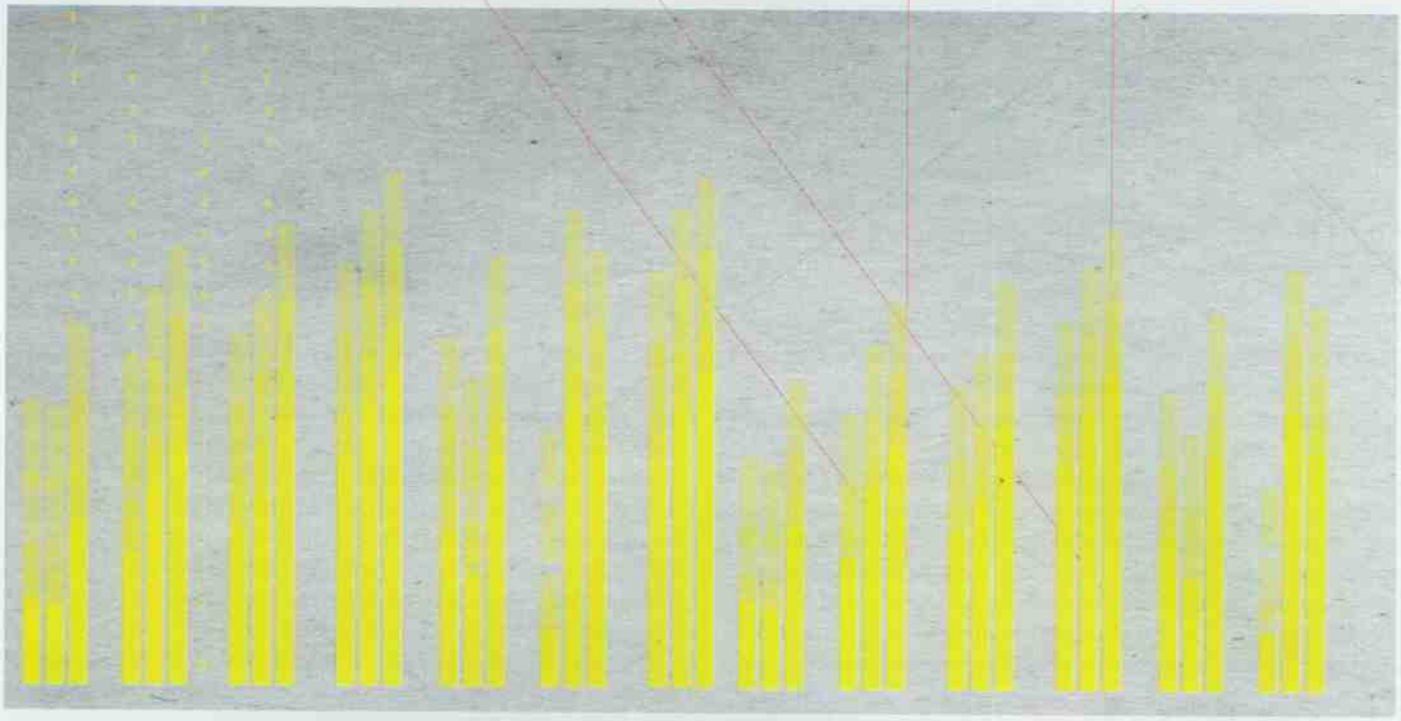
of disparate systems. Also, the benefits of analytics need to be made known to the healthcare eco system to enable optimum growth and application of the technology in relevant scenarios," says Srinivas Tadigapada. Several organizations realized that the winning formula requires elements like well -defined priorities and roles. They also bemoan the fact that addressing questions regarding project prioritization, manpower and outcome involves multiple departments and conflicting priorities. "The lack of formal decision-making protocols often lead to stalled projects, substandard results and unsatisfied analytics customers," states the whitepaper of an IT vendor.

There's also another disturbing aspect. India does not have a large number of analysts because the market is not as big as it should be. Consulting firm McKinsey estimates that India would need two lakh data scientists in the next few years. Job portals such as HeadHonchos.com and Naukri.com too feel that data analytics and cloud computing will be the top picks in 2014 for students.

Basic reporting using descriptive statistics is fast becoming common but use of advanced analytics like predictive modelling is still very limited

Recruiting staff with required skill set is also not an easy task. "Many providers are struggling to recruit and retain experienced managers and analysts who possess the combination of health care domain specialization, data mining knowledge, and experience with the vast array of analytics tools and methodologies. This resource constraint can apply to business and clinical departments as well as the IT organization where it is important to have access to the data architects, programmers, and analysts who can work effectively with end users. Conversely, functional departments face similar challenges in that the individuals who possess the specific skills and domain knowledge are often busy with their existing responsibilities," highlights the white paper. Gaurav Vohra, CEO of Jigsaw Academy elaborates: "We would say the biggest challenge is trained healthcare analytics professionals. To be able to implement analytics initiatives, well trained analytics professionals are needed and at the moment India has a shortage of trained analysts. Also not only do they need data analysts but all managers need to be data savvy, so as to be able to understand and implement the insights that the analysts bring to them."

Puneet Gupta also tends to agree. "The value of analytics is directly related to the significance of derived insights. To derive meaningful insights from analytics, it is important to have professionals who understand the healthcare industry and can analyse the data in the right manner. Such professionals are limited. But over time, as more and more decisions will be made based on healthcare, the number of such trained personnel will also increase. This is only possible by having an active collaboration with healthcare providers. However, the noteworthy point in analytics is that visualization of acquired data allows it to be understood very easily even by people who are not highly trained



in health sciences. The industry has recognized the need for trained professionals in key positions but ease of use and interpretation allows wide based utilization and implementation of analytics driven insights," says Gupta.

But won't the scarcity of trained professionals lead to high cost in the market? The enthusiastic experts don't think so. "The healthcare industry in India is expected to touch $280 billion by 2020 and backed by this growth, you will see the industry develop their capabilities and many personnel develop data analytics skills," says Tadigadapa.

Experts also predict that if progress is made towards initiatives such as EHR, integration of data will become a challenge. It's a tricky task to integrated information from National Health Information Network, Health Information Exchanges, Health Information Organizations (HIO) s and regional health information organizations (RHIO).

Further, not many leaders understand the difference between processes like traditional data warehousing and other business intelligence tools (BI). Some point that there are important distinctions and sufficient differentiating values between the different methodologies, architectures that covert raw data in to meaningful information.

Accurate figures are difficult to come by in healthcare analytics as it is still in its birth pangs. But a major chunk of health data is expected to come from clinical data which includes clinical notes, documents and images. In fact, the urge of analysing publications, clinical references, genomic data, streamed data, business, organizational and external data is also gaining ground.

But then, there are an increasing number of people who are discovering an edge that the data analytics tools offer over traditional Business Intelligence tools. "In India, there are very few healthcare organisations who are using analytic as a business tool. Otherwise maximum number of organizations are using traditional system. But patient mix is different. More cash less patients are coming in to the system. Payers are taking advantage of it. They are now even defining the surgery cost. So if you want to survive by giving a best quality care with optimum cost you need to be disciplined in total cost of care .This process you cannot manage manually. You have to have a good IT –analytic system. Believe me in our case we have reduced 22% total cost of care by using analytic tool," says Prashant Pandey, director, medical services of Asian Institute of Medical Sciences, Faridabad.

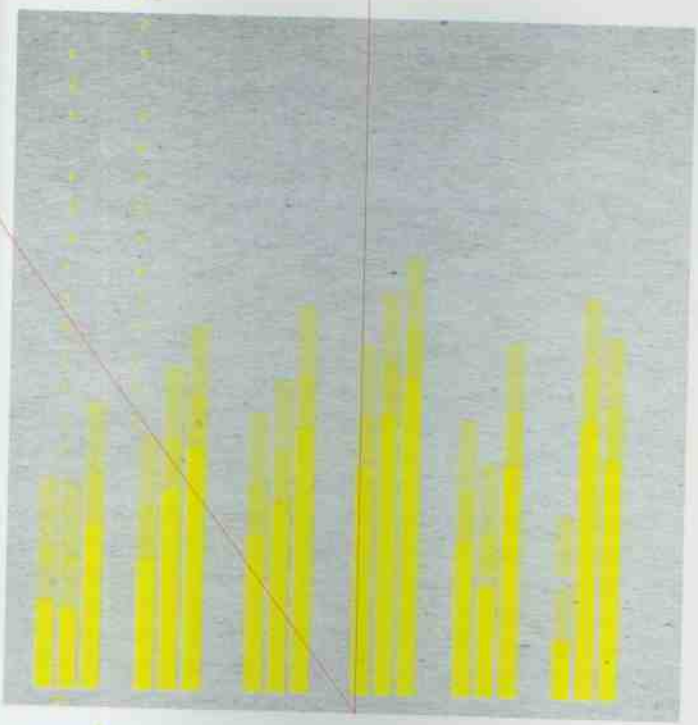
Under the new paradigm, says Anupam Pandey, director-purchase and administration of Asian Institute of Medical Sciences, Faridabad, successful healthcare organizations will be differentiated not by the existence of core transactional electronic system but by their ability to manage, integrate, analyze and leverage clinical, financials, claims and other biomedical information from across the enterprise. "We need to take advantages of this perfect storm of data by aggregating all the data generated by the multiple silos across the healthcare ecosystem. We believe healthcare analytics gives us the speed, quality and quantity in our business. It's proved in our case and we are growing by giving quality care," he says.

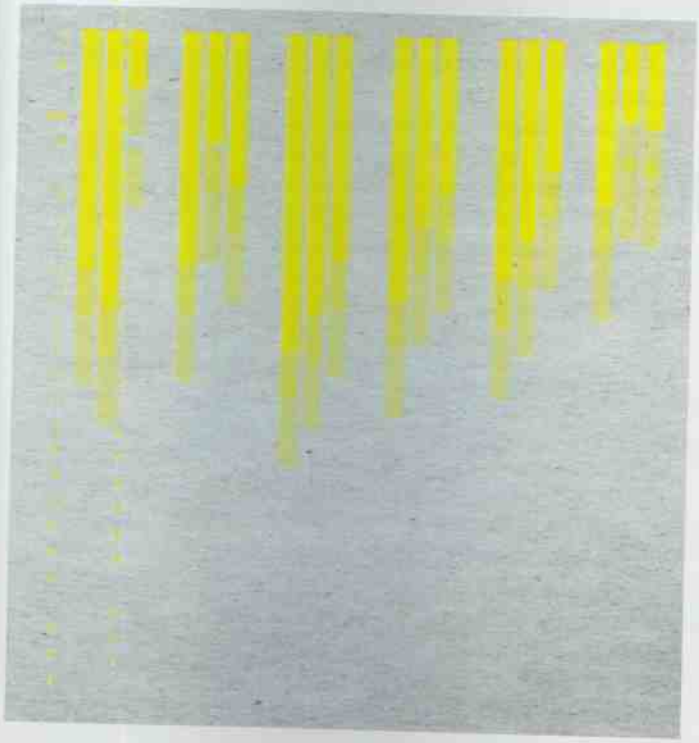
Data observers point out that those who want to dig down in to the data created by their organization must commit to valuing data as a strategic asset, making data part of their culture developing an understanding of the complete flow of data and acting up on the insights. They need to encourage and reward sharing of data and insights.

Says Srinvas Tadigadapa from Intel, "The opportunities that big data provides, health and life sciences organizations are not unique. There are lessons learned in other industries that can be applied to healthcare as well and can be leveraged as best practices. For instance, in the retail world, rapid processing of large quantities of consumer data, such as socio-demographics and point-of-sale buying patterns,

Healthcare analytics gives us the speed, quality and quantity in our business.

Anupam Pandey, director- Purchase and administration, Asian Institute of Medical Sciences, Faridabad





can be used to provide tailored offers to consumers as well as to reposition and re-price their products for maximum impact. Similarly, global financial organizations have begun to take a more holistic view of risk and are looking to model dozens of scenarios in near real time. As the complexity of their portfolios increased, so did the need for increasingly sophisticated risk modeling. By leveraging high-performance analytics, large organizations have been able to see considerable change."

But is the Indian patient also turning more demanding? All evidence seems to suggest so. In trying to understand what patients expect from their healthcare providers, recently released study by the Boston Consulting Group is illuminating. A team from the Boston Consulting Group conducted an extensive research with Indian patients across the country to identify the factors that drive patient satisfaction in health care. The findings were based on interviews with nearly 1000 Indian patients who received care from the seven top Indian providers operating in 19 large cities throughout the country.

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According to the study, over the last decade, most Indian healthcare providers have concentrated on expanding infrastructure to reach more patients. But supply and demand are balancing out in an increasing number of urban markets and providers will have to focus more intently on improving patient satisfaction to maintain market share and growth.

The study states that many patients continue to see doctors with whom they have had a positive experience. But almost as many patients now rely on the Internet as rely on such recommendations. "Patients regularly check providers' websites to research facilities, and many search online for information about diseases and medical terms. Sites such as Ask4Healthcare.com enable patients to connect with medical experts online and review providers and doctors. Hospitals are moving to the Internet at an accelerating pace, hosting patient forums and allowing patients to make appointments online. The use of mobile services is expected to increase rapidly in India, and online recommendations are likely to become more important as a result," states the study.

And analytics might be exactly what the patient ordered. "Existing analytical techniques can be applied to the vast amount of existing patient and consumer data, which currently remains unanalyzed, to help gain a deeper understanding of outcomes using real-world data. Those resulting insights can be applied at the point of care in determining the most appropriate treatment plan for each individual. Ideally, physicians would be able to engage in shared decision making with their patients, to determine the most appropriate treatment option based on a combination of individual and population data. Care providers should be able to leverage the power of analytics to analyze an individual's medical data signature and compare that to insights gained from analysis of outcomes in large populations," says SrinivasTadigadapa.

Statistical and qualitative analysis of data provides insights on the patient which help providers effectively arrive at decisions which are most probable to help the patient. Says Puneet Gupta: "Regional analysis of public health data allows the government to focus their efforts on preventing or eradicating the most serious issues affecting a large number of people, thus bringing focus on the needs of the patient. Empowering the healthcare enterprise to serve the patients better is the underlying principle upon which innovations are built."

Where should a healthcare enterprise start?

What could be the best model for an Indian healthcare enterprise? Speaking with several experts, few factors emerged.

Most experts believe that a good data strategy is a culmination of a multi-pronged data management approach, which starts with defining

At the moment, I can say that analytics is here to stay, whether it is going to be a game changer or not, time will tell us"

Vinayak Deshpande, co-founder and director of MedicountsLife Sciences Pvt Limited

all the data sources of the enterprise. Analytics is driven by structured and unstructured data from various units of organization like clinical, operational and financial systems. Naturally, this involves taking an inventory of current and future potential data sources.

"World over, companies simply have not stored data as they didn't find it useful. This practice is true for the healthcare space as well. However, science is evolving where you can use very large data sets and also use both structured and unstructured data and make sense of it. Therefore the first thing that should be done is to store all data that comes your way, especially that now it's very cheap to store data," says Ritesh Bawri, founder of Quantta Analytics, an analytics company based out of Palo Alto, California.

The thumb rule is to determine what can be learned from each source and identify data sources which are underrepresented in the organization. In the current scenario, the inventory needs to be revisited as new data sources emerge every day. Unless, the inventory is kept current and accurate, it cannot provide the organization benefits.

That's not all. Established players also set data quality metrics and assess and improve the quality of sources. Studies indicate that new data sources need to be examined to assess data quality levels and determine corrective action. It makes perfect sense for the enterprise to compare data sources to established standards and track improvements. Date scientists also note that data must be converted to standardized formats.

Puneet Gupta has some interesting tales to tell. "It definitely is a game changer for the healthcare industry. Analytics will not only help health providers in decision making for cases on hand but will help improve the effectiveness of preventive healthcare by enabling efficient planning of public health initiatives. Currently, the globally expenditure on preventive healthcare is between one and three percent of the total expenditure on healthcare. Analytics, when applied in the right manner will result in a shift towards preventive healthcare by profiling people based on their current health index and the probability of them suffering from various diseases in the future. This will significantly bring down the total expenditure on healthcare by implementing effective preventive programs," says Gupta.

Integrating data sources is important too, because depending on the size of the data, enterprises might need high-performance analytics warehouse designed to handle huge data volumes and real-time queries.

Platform choices will depend on a number of factors, such as whether data is structured, unstructured or both; whether data is streaming or stored historically; or if reports or exploratory analysis will be required.

Organizations now believe that understanding their analytics requirements will help them define priorities and choose statistics. So as the data analysis gains momentum, so does basic reporting on data and predictive analytics.

"Globally, the implementation of new healthcare regulations and the availability of financial incentives are leading healthcare organizations to embrace a digital environment for healthcare information. With digital information, they can generate deep insights that can streamline clinical workflows, optimize care, strengthen doctor-patient relationships, cut costs, and improve outcomes," says Srinivas Tadigadapa.

The big question of course is the security of the data. Security issues could happen admit experts. So implementing security measures should be taken to protect their big data, associated hardware and software, clinical administrative information from internal and external risks. Security issues apart, a data lifecycle must also be established to ensure that appropriate decisions are made about retention, cost-effectiveness, reuse and auditing of historical or new data.

Yet another reason for growing confidence in analytics is cutting-edge technology advancements like in-memory databases that have enabled processing of massive data in real-time, allowing healthcare agencies to forecast and execute better. Perhaps the best impact of advanced computing such as analytics is that it can help enterprises remain competitive over a longer period of time while increasing effectiveness in their respective competencies through the use of analytics. Credible information in any domain and matching visualization of that information comprise modern analytics which can go a long way in enabling health enterprises perform better.

Running parallel to the benefits story is the low adoption rate in India. But there are certain companies in India which is taking advantage of analytics.

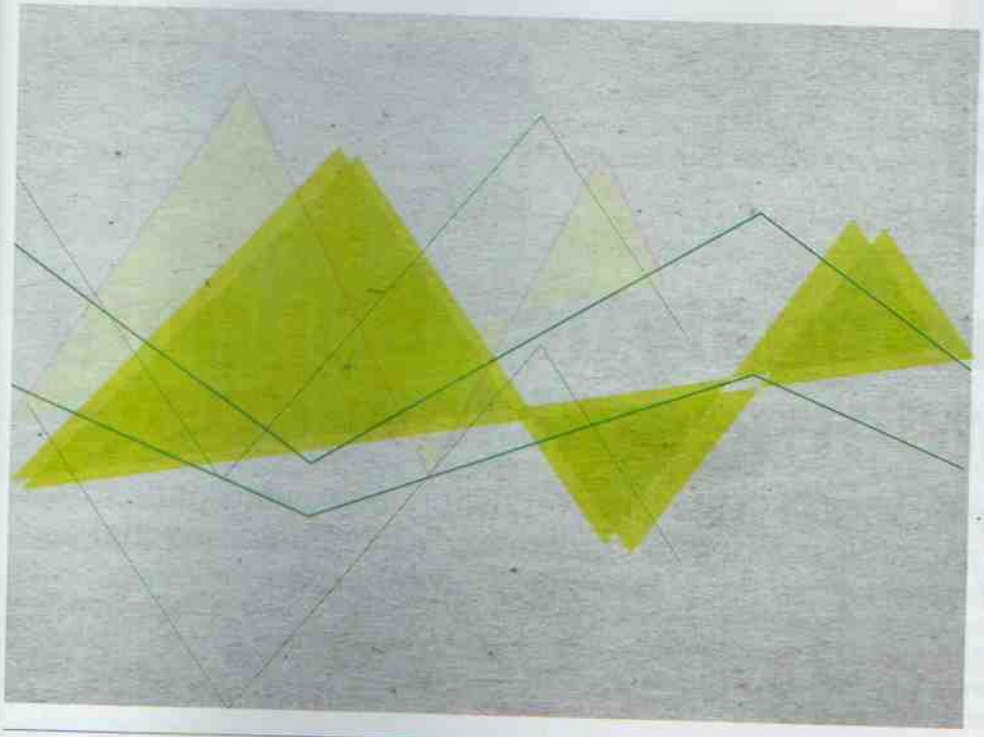
"The rate of adoption is very slow in India when compared to the West, because of the lack of resources in the market, and data analysis is a major issue. There are some companies in India taking advantage of analytics and in addition, there is rich ecosystem of analytics companies that are being set up in India and service global markets. This could help fuel the need for the domestic health sector because global best practices have been implemented here," says Srinivas Tadigadapa.

Puneet Gupta seconds his views. "Technology has recently taken an entrepreneurial turn with smaller entities contributing to a larger ecosystem of technological excellence. Smaller players in the case of healthcare analytics are being looked upon as major contributors to the success of this domain by being the source of innovative applications that can be used for healthcare analytics. Advancements in Mobile and Wearable technologies can be leveraged by smaller players to build more healthcare applications," says Gupta.

The biggest challenge is the availability of digitized data, interoperability and integration of disparate systems

Vinayak Deshpande, co-founder and director of Medicounts Life Sciences Pvt. Ltd., which offers data management solutions for healthcare enterprises, says that these are still early days for analytics in healthcare sector. "This sector is little slow in adopting analytics as compared to say financial sector. The awareness and willingness to implement analytics is already seen with even small to medium level healthcare enterprises. At the moment I can say that analytics is here to stay, whether it is going to be a game changer or not, time will tell us," says Deshpande.

Even though idea is catching steam, experts point that the concept is not understood completely by everyone. "The challenge is to convince senior managements of healthcare enterprises about long term benefits of analytics practice," says Deshpande. But how do solution providers handle smaller players? "The best way is to show case a proof of



concept. Since everybody is talking about analytics, it is about showing some insights with sample data. This helps smaller players to understand power of analytics and throws some light on ROI," says Deshpande.

He also adds that smart implementation of analytics will definitely lead to reduction in cost of patient care. "Enterprises need not invest in high end analytics technologies from day one. There are many high quality low-cost tools available in the market, and open source tools like 'R' can be implemented with minimal investment. In India, we have a good talent pool available to form data scientist team in an enterprise," concludes Deshpande.

So what does it take for Indian healthcare sector to traverse the distance from a novice to a data driven industry? The answer, say experts, may be quite simple. To value data and develop local and affordable analytical solutions before it's too late. HE