



# DIGITAL HEALTHCARE ECOSYSTEM

– Uday Kiran Kotla, Ginni Jain

## Abstract

The healthcare industry across the globe is going through a wave of accelerated growth today. With global spending on healthcare services expected to rise by an average of 5.3 percent from 2014 – 2017, there is unprecedented pressure on everyone involved to meet ever-rising expectations. We at Infosys believe that though medical and scientific advancements cannot be unwarranted, it will be the upcoming digital offerings that would change the dynamics of the industry.

The healthcare services are highly data-driven, hence the next big disruption in the industry, from a technology front, lies in data-management. A patient's medical history, diagnostic information, and treatment pathway are just a few branches of the proverbial functional healthcare data tree. With the advent of wearable technology and the readiness of consumers to adopt them, this data will grow manifold. It is not unheard of for people to monitor

their heart rate, blood glucose, calories expended, and steps walked as they yearn for a healthier lifestyle. Wearables could produce a staggering amount of consumers' personal health data.

If this data is well-mined, it could help sector stakeholders manage concerns such as:

- Expanding access to healthcare
- Handling increased cases of chronic diseases

- Improving diagnostics
- Lowering health insurance premiums

This white paper focuses on how continuous innovation in the field of wearable technology when combined with big data analytics can be leveraged by enterprises to create offerings that hold greater value for consumers, healthcare providers and insurance companies.

## The three Ps of healthcare

Improved life expectancy, booming population, and easier access to healthcare services are undeniably the growth opportunities for the healthcare industry but they have downsides too:

- An increase in the number of people means increased demand for services

- Healthcare Providers (first P) face a tough time due to caregivers' shortage, scattered patient data, and infrastructure limitations
- A large chunk of treatment time is taken up by activities such as collecting clinical data, getting patient history, and

preliminary evaluation

If these activities, which depend solely on patient-generated data, could be taken away from the caregivers' bucket, and be obtained directly from the patient instead (in a guided and secure manner), it would greatly reduce the operational burden on providers.



Figure 1: Three Ps of healthcare

To make the task even easier, Patients (second P) are equally keen on managing their personal health data. Patients are conscious, technology savvy, and ready to dabble with emerging technology if it would help them drive their healthcare decisions. They want a transparent system that will satisfy their need for quality care.

But care is not the only thing on patients'

minds. They also struggle with rising healthcare costs, which are a concern for the Payers (third P) as well. Payers include the government and insurance companies

In 2012, US spent 17.2 percent of the GDP on healthcare. Implementation of the Affordable Care Act (ACA) and health insurance exchanges (HIX) in the US market are indicators of the need to substantially

restructure the healthcare market to cover more people at lower costs.

Ideas such as personalized healthcare plans (N=1) to bring down climbing health insurance premiums could bring about a new phase for the retail health insurance industry.

## Connecting the dots

The current healthcare system is based on a **curative care model**. In this model, the consumer notices the symptoms or falls sick, visits a doctor, and undergoes treatment. But here is an alternative scenario:

*Imagine you are having a busy week at work. You can feel that throbbing headache and uneasiness in the chest,*

*but you choose to ignore it. But an hour later, you get a call from your personal caregiver, explaining the gravity of the situation and requests you to visit the physician urgently.*

This one call from your personalized caregiver could very well be a lifesaver. Such a progression changes a healthcare

provider's business model from curative care to preventive care, which will purely be data-driven.

However, providers are not the only beneficiaries. *Figure 2* gives an overview of how various stakeholders could be tied in a digital healthcare ecosystem to create a blue-ocean strategy.

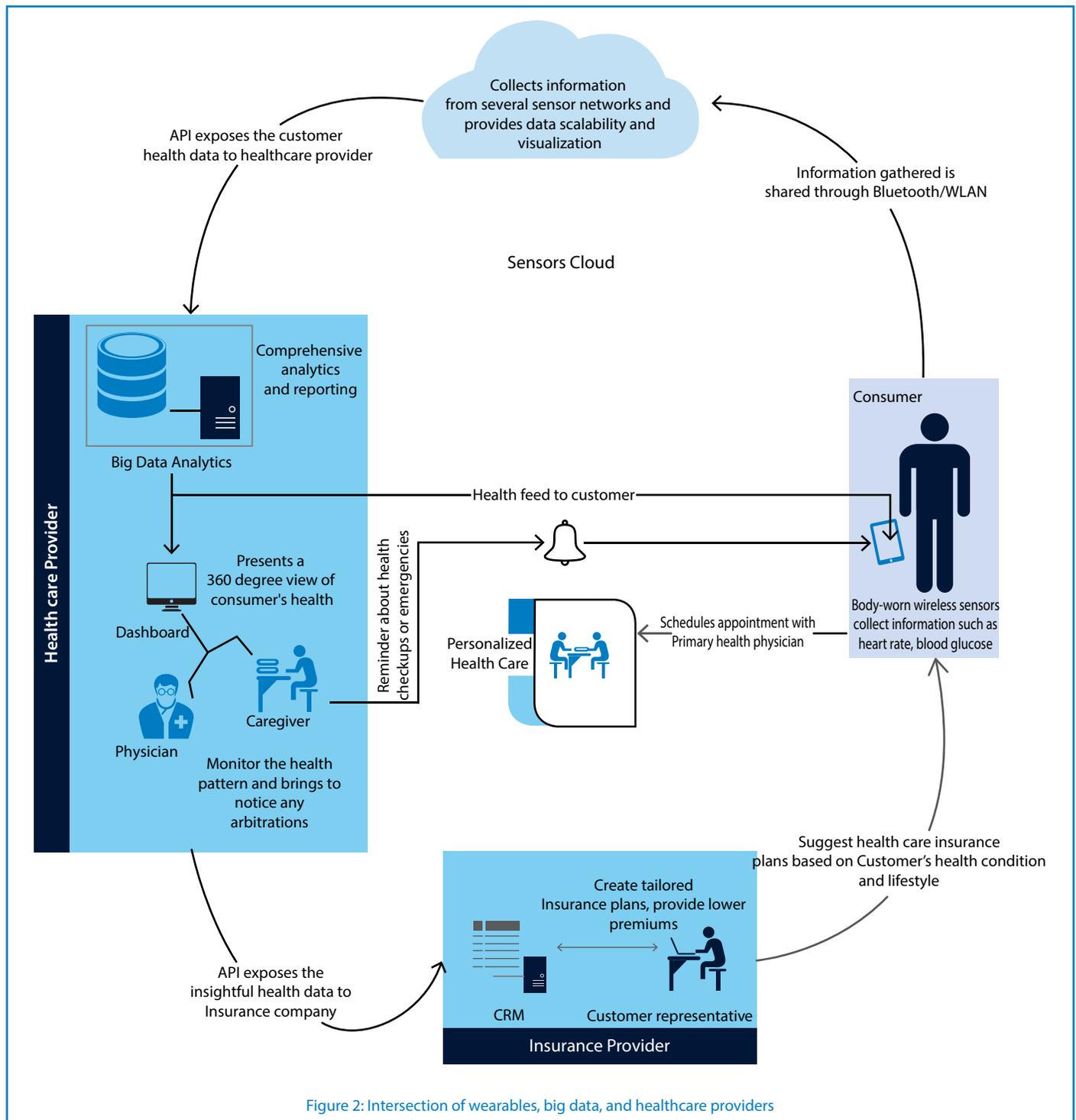


Figure 2: Intersection of wearables, big data, and healthcare providers

Some of the popular wearable health monitoring devices, such as sensors, fitness bands, and smart clothing are currently used to track activity and fitness levels. These devices could go beyond such benign information and collect data more specific to health conditions such as blood sugar, heart rate, and blood chemistry.

In a digital healthcare ecosystem, health data captured from these devices would be synced to a cloud infrastructure. These devices could:

- Either directly transmit the information to cloud storage
- Or use the consumer's mobile / tablet as an intermediary to transmit the data to a chief one-stop repository on the cloud

*To envisage the humongous amounts of data that will be generated, let's look at a hypothetical example of wearable tech adoption in the state of California, which has a population of 38 million (approximate). Considering a conservative adoption rate of 30 percent, an estimate of three devices per person, and a transaction every five minutes to the cloud – it would mean three billion transactions transmitting consumers' vital health statistics on to the cloud per day. Scale this figure to a global scale: It would reach a magnitude of hundreds of trillions.*

But raw and unstructured data is of no significance. The purpose of this data is fulfilled only when it is analyzed to garner

commercial benefits. This can be done by service-enabling the healthcare provider's systems through secure web services to allow access to this gold mine of data. They can perform big data analytics using a Hadoop cluster and generate actionable insights that caregivers can use.

For instance, the provider's systems perform preliminary evaluation on consumers' health data and bring to surface consumers-at-risk, who require immediate attention. These profiles then flash on the respective caregiver's dashboard, so that they can be attended to quickly.

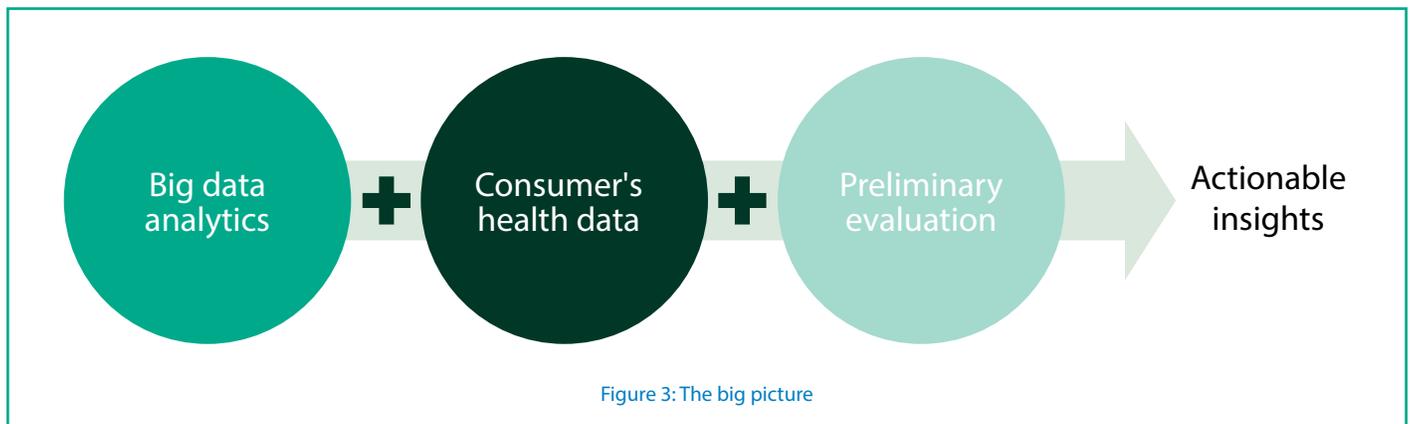


Figure 3: The big picture

Together with the current health context and the consumer's complete medical history and statistics in a single storehouse, the caregiver would be able to give consumer:

- Personalized healthcare assistance
- Improved preventive diagnosis
- Handle consumer's medical emergencies better
- Track how a treatment / therapy is helping a consumer

This **preventive care model** would bring a change in the manner the healthcare industry is accustomed to handling their consumers. Instead of a consumer coming to their door during an emergency, the healthcare system would take the initiative to alert the consumer of imminent health troubles and provide medical assistance at the right time.

To combat the acute shortage of caregivers, Internet of Things (IoT) enabled devices, in the future, could be leveraged for clinical care and to collect physiological statuses of hospitalized patients. This would serve two purposes:

- Error-free and continuous monitoring
- Automated processes to reduce dependency on caregivers

Palliative care for acute and chronic diseases and re-admission to hospitals due to negligence in post-treatment care takes up a large share of the provider's resources and costs the industry millions of dollars. In such setups, it is required to monitor the evolving condition of the patient's health dynamics. Developing technology to observe various illness-



specific parameters to get real-time health information about the patient, combined with tele-medicine could intensify the remote healthcare system.

Further, healthcare providers could share the processed data (via exposing APIs) with other sector participants such as insurance companies or consumers themselves. In the insurance industry, this personalized medical data could be leveraged to help insurers compute their insurance costs. An increased comprehension about the consumer's overall health and personal fitness levels could be the key to next-gen insurance premiums.

In the current market, insurance actuaries do the same but with lesser amounts of data. In such cases, the margin for error is higher. Having millions of users provide real-time personal health data is all what these actuaries could ask for. This could immensely improve the accuracy of this system. In the next phase, insurance providers could start offering tailor-made insurance plans, something unheard of today. The future isn't far when in the retail health insurance industry, the current trend of changing premium rates on a yearly basis would transform in to premium rates changing each day.

## Conclusion

"The nation should create a smart manufacturing infrastructure and approaches that let operators make real-time use of big data flows from fully instrumented plants", said the Ex-President of the United States, Barack Obama. The HITECH Act and HIPAA Act are just few of the other indicators of the emerging need to promote the meaningful use of electronic health data. In medical care, every bit of data is important and can be the difference between life and death.

An amalgamation of digital and healthcare services could provide the long-awaited personalized healthcare approach that would empower participating individuals to make informed decisions. These changes will lead to quality care, improved consumer satisfaction, and cost-effectiveness. Analogous to concerns that any industry faces while going through a phase of transformation, this venture too has its own set of troubles such as privacy issues, technology barriers and regulatory questions. The responsibility is now on the stakeholders of the healthcare ecosystem to collaborate and build a sustainable services model.



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## References

<sup>1</sup> World Healthcare Outlook, Economist Intelligence Unit, August 14, 2013

<sup>2</sup> Health Information Technology for Economic and Clinical Health

<sup>3</sup> Health Insurance Portability and Accountability Act

## About the authors



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Uday Kiran Kotla has over 18 years of experience working on digital enterprise platforms. He has lead multiple business transformation engagements for clients across domains such as retail, high-tech, and finance. His thought leadership, pragmatic approach, and passion for everything digital has helped Infosys define digital roadmaps for many of its clients. Uday's current area of interests include IoT and wearables.



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Ginni Jain has three years of consulting experience in telco and retail domains. She is an active follower of upcoming trends in the field of IoT, big data and related topics of interest.

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