



# Contrasting Organizational Transformations in Non-Health and Healthcare - Implications for Digital Health

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## Introduction

What is digital health? The term is used frequently, and it can refer to different aspects of healthcare transformation. One way to bring clarity to this concept is to understand the nature of the transformation it supports in other organizations and relate it back to healthcare.

## Organizational Transformations through Digital Services

Organizations have been transforming the way value is created for customers ever since information technology (IT) entered the commercial marketplace in the 1970s. The early focus was on using IT to improve operational efficiency among functional units. With the introduction of personal computers (PCs), the focus shifted to improving the decision making of business managers. As database technologies and advanced software tools entered the marketplace in the 1980s, organizations looked to integrate inter-departmental unit operations to improve timeliness in responding to customer requests and to provide key information for decision making at the strategic level. With advances in communication technologies in the 1990s, organizations leveraged inter-organizational interactions with suppliers and partners to further reduce costs, improve collaborative design of products, and source some organizational activities to other firms with better capabilities and expertise. At the same time, with advances in enterprise resource planning tools, organizations started to leverage best processes/practices to redesign their internal operations for greater efficiencies and effectiveness. Throughout the last four decades of the 20th century, organizations used digital (or IT-enabled) services to transform themselves from within to create competitive value for customers. More importantly, these digital services were used to support the decision making of internal users or business managers.

With the introduction of Internet/Web at the beginning of the 21<sup>st</sup> century, organizational transformation started to focus on creating two types of values for customers: Value from the product and value by reducing the effort customers need to spend in making quality decisions in purchasing and using the product. The latter, in other words, is value from supporting customer decision making. The first phase of customer decision support focused on digital services to improve customer operations: purchasing, paying, and having products (and services) delivered to where they wanted. This led to the transformation of many of customer interfacing activities, such as sales, marketing, and distribution. The second phase of the customer decision support focused on digital services to improve the utility gained from products purchased by aligning customer criteria against product features prior to selecting a product to purchase. This began to transform both marketing and product configuration. The third phase of customer decision support involved developing digital services to track the customer experience with the product while it is in use. This began to transform organizational service and internal operations and supply chain. The goal is to enrich customer experience and the utility gained from the product so customers will return to purchase another product.

Each of these three phases of customer decision support are supported by digital services that leverage advances in technologies such as social media to share experiences, Internet of Things or sensors to track product use, and mobile apps and wireless technologies to support communication. More importantly, these digital services are informing organizations about customer activities and decisions (big data) and allowing them to use data science tools such as visualization and machine learning to gain insight into the value created or not created within a customer ecosystem. The organizations can in turn use design science tools

to tailor products so the value perceived is closest to the value created in order to enrich the customer experience and encourage repeat purchases. Given the rapid pace with which information technologies evolve, it will not be surprising if future digital services continue to broaden the customer experience beyond the utility a customer gains from a single or multiple product purchases, as well as the value they perceive with their community ecosystem.

### Healthcare Transformation Through Digital Services – Digital Health

The relationship between the physician and the patient is at the heart of healthcare in a hospital or a clinical setting. The early use of digital (or IT-enabled) services in healthcare was meant to support clinical decision making– the diagnosis of patient health conditions and the development of treatment plans. Similar to other organizations, IT advances have supported the integration of hospital operations using electronic medical records, the use of such integration of inter-departmental unit operations to create performance dashboards for executive decision making, and the development of data standards such as HL-7 to share patient information across hospitals and external care providers. With the increased need to reduce costs and bring care in closer proximity to patients, hospitals have started to shift some of their services to external facilities such as urgent care and ambulatory care centers, mini-clinics, and medical homes, as well as the patient home itself.

Interestingly, many of these healthcare transformations are occurring in the 21st century (somewhat later than what other non-healthcare organizations have seen in the last four decades of the 20th century). More importantly, these major transformations in hospitals are being developed to improve decision support for internal stakeholders (e.g. physicians and hospital executives), while the patient is interacting with the physician as an in-patient or out-patient. At the same time, patients as customers are asking for digital services to support the quality of their healthcare decision making purchases and gain the utility from the value in use of the treatment plans when they leave the hospital or clinic. The increasing availability of mobile and web services gives individuals access to health-related information, and the growing use of digital tools (apps, wearables, etc.) and knowledge platforms (portals, exchanges, etc.) allows them to share experiences and track their health status. In other words, healthcare is seeing a transformation in the provider ecosystem (within itself as they support clinical and executive decision making) as well as transformation needed in the patient ecosystem as customers are looking for decision support to gain value from the value created. Healthcare systems do not have the luxury of delaying the transformation needed to

support patient decision making, while they continue to transform the operations within their own provider ecosystem to create value for patients, as patient experiences and treatment adherence in the patient ecosystem have implications on healthcare costs and patient satisfaction.

Data generated from multiple sources, including genetic and social determinant data, and analysis tools such as statistics, visualization, and machine learning are being used to improve clinical decision support. In other words, data science internal to the hospital is enabling clinicians to use design science to tailor treatments to specific patients, often referred to as precision medicine. At the same time, data and design science are needed to support patient decision making outside a hospital setting. Data generated by patients, as they use digital services such as apps, wearables, portals, and exchanges, can be used to gather patient experiences and treatment adherence. The data science of this patient data, in combination with social determinant data, can provide insight into the patient value-in-use of the treatment plans. Design science can be used to improve care delivery outside the clinical setting and help bridge the gap between value created and value-in-use, often leveraging other members of the patient ecosystem (family members and social and community organizations, among others).

If digital health is the use of data and design science in support of decision making to improve healthcare, then digital health inside a clinical setting is supporting clinical decision making and is the responsibility of the hospital and the payer of this service. Similarly, digital health outside the hospital has to support patient decision making. However, unlike a single business supporting customer decision making in the purchase of their product, supporting decision making of patients outside a hospital as they seek to maintain a healthy living becomes the collective responsibility of many. These include payers for this care (insurers and/or government at large, patients and in some cases charitable organizations), social and community service organizations that are dedicated to address barriers patients have to seek this care, and city and community services that influence the broader quality of life indicators that influence health, such as access to food, housing, clean environment, transportation, jobs, recreation, and other social and community services. Hence, digital health outside the hospital to support patient decision making needs the collective will of many, including hospitals, to support communication of disparate data from various sources and coordination of activities of multiple stakeholders with shared goals to address the quality of healthy life challenges.