

Health Technology Market Overview



Digital Health: 8 Sectors can be identified

- Medical Imaging Information Systems
- Health Information Systems (Clinical IT Systems)
- Wireless Sensors & Devices (Remote Patient Monitoring Devices)
- Genomics (Genetic testing)

Emerging areas with little reliable market data:

- Mobile Connectivity
- Social Networking
- Internet
- Data Universe

Medical Imaging Information Systems

Medical imaging information systems are used in hospitals and diagnostic imaging centers to store, retrieve, modify and forward images and information to hospital departments or imaging centers over a network. These systems include Picture Archiving and Communication Systems (PACS), Cardiology Information Systems (CIS) and Radiology Information Systems (RIS).

Cardiology Information Systems

Cardiology Information Systems (CIS) enables hospitals to report, review and analyze detailed clinical and operational information across a patient's cardiovascular continuum of care. It also provides all or some of the following features: order processing, image and ECG tracing storage, permanent patient history maintenance, transcription and distribution of results, clinical documentation, appointment scheduling and management reporting.

PACS

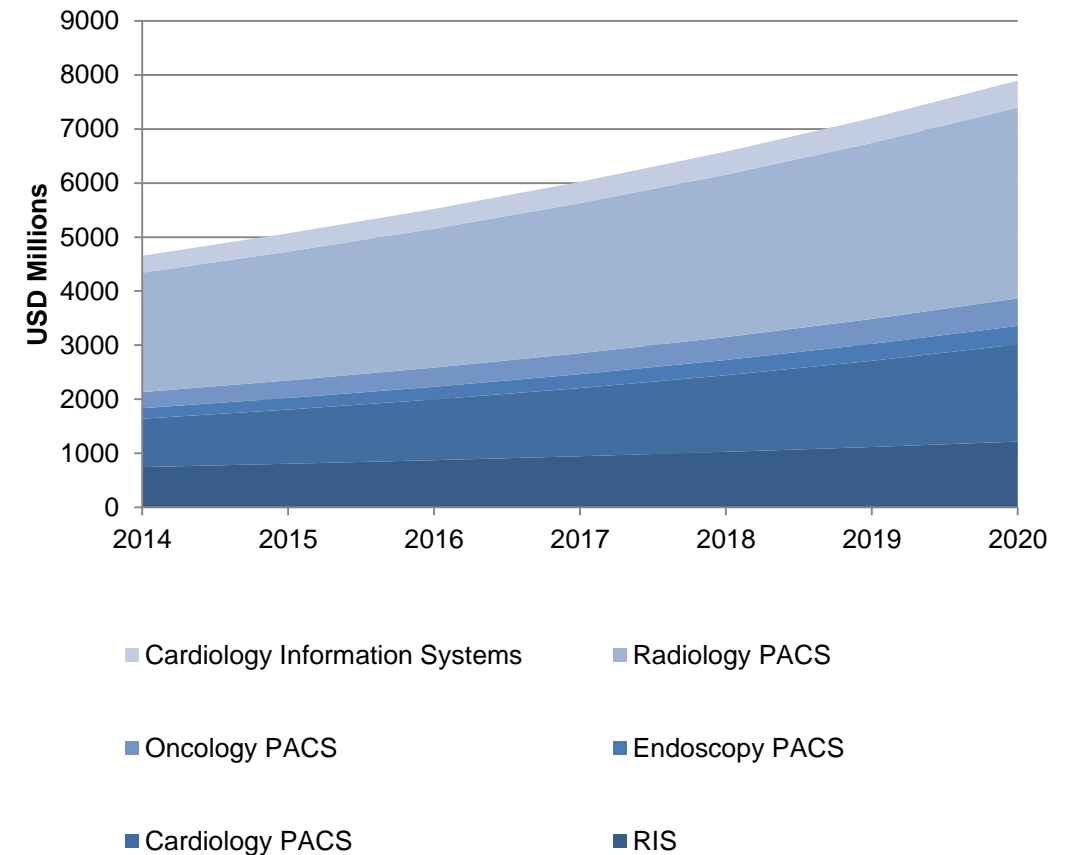
Picture Archiving and Communication Systems (PACS) are used in large hospitals and diagnostic imaging clinics to store, retrieve, modify and transmit patient digital images over a network to various hospital departments or to a different healthcare delivery organization within the network. It comprises a system of computers and servers used for the storage and retrieval of patient images.

RIS

A RIS is used in hospitals and diagnostic imaging clinics for patient registration, scheduling, tracking, result reporting and image tracking. In large hospitals, it is integrated with Hospital Information Systems (HIS) and PACS to expedite and improve patient care. This segment includes standalone RIS solutions.

Well established and growing, dominated by PACS systems.
Teleradiology offers increased opportunity

SubSegment	CAGR 06-13 (%)	CAGR 13-20 (%)	CAGR 06-20 (%)
RIS	3	8.5	5.7
PACS	5.6	9.4	7.5
Cardiology PACS	12	12.3	12.1
Endoscopy PACS	9.2	9.9	9.5
Oncology PACS	10.8	9.2	10
Radiology PACS	3	8.1	5.5
Cardiology Information Systems	6.7	7.9	7.3



Clinical IT Systems

Clinical IT Systems include software and system applications used in the clinical departments of healthcare delivery organizations such as hospitals, clinics and emergency centers. It is a comprehensive, integrated information system designed to manage the clinical aspects. This market category includes a variety of integrated software applications such as electronic medical records, clinical decision support systems, pharmacy information systems, emergency department information systems, perinatal information systems, perioperative information systems and laboratory information systems. They are used to streamline clinical work, thereby improving the quality of patient care. This category does not include financial and administrative information systems.

Electronic Medical Records

Electronic Medical Records (EMR) are used to store and share patient information between healthcare organizations. It ensures easy access to patient information, and reduces the likelihood of errors and associated costs, thereby improving quality of care.

Emergency Department Information Systems

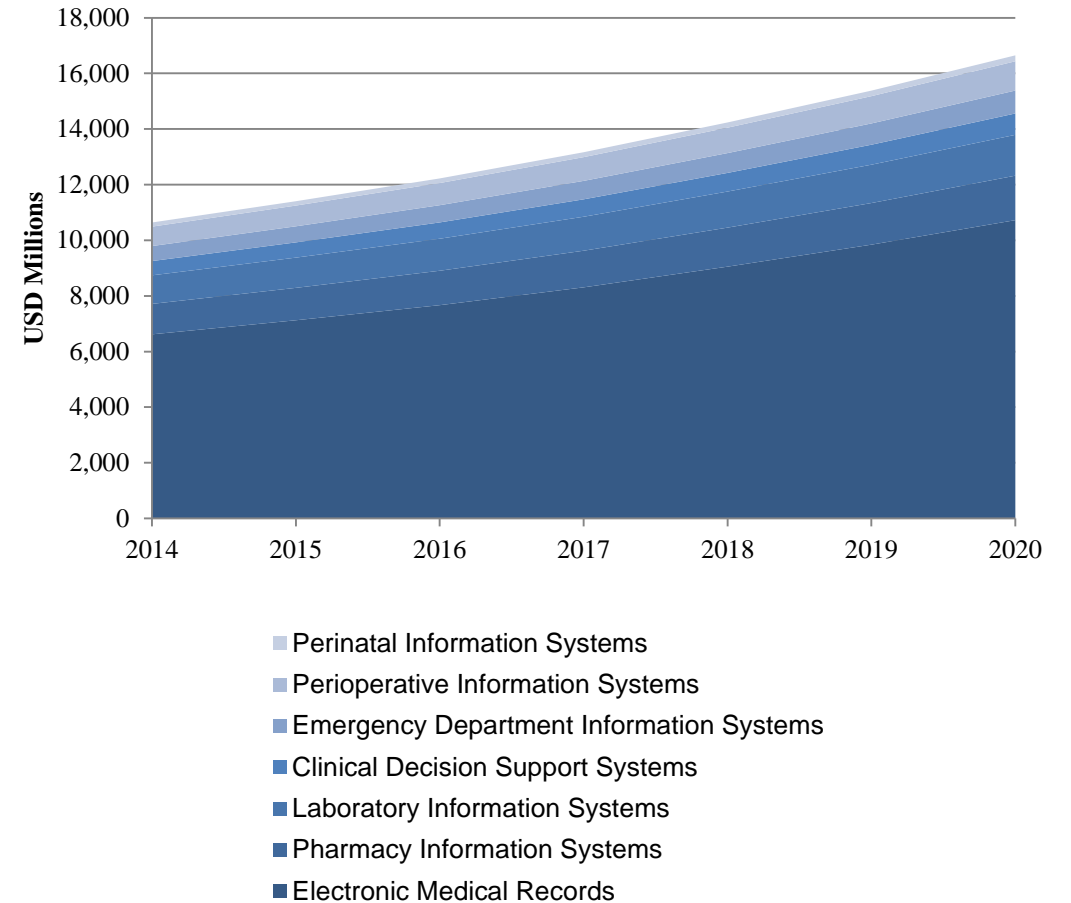
Emergency Department Information Systems (EDIS) are designed to manage information and expedite each phase of the patient flow and patient documentation process.

Pharmacy Information Systems

Pharmacy Information Systems (PHIS) are applications designed to address a pharmacy's operational, clinical and management needs.

Long established EMR systems dominate

Segment	CAGR 06-13 (%)	CAGR 13-20 (%)	CAGR 06-20 (%)
Electronic Medical Records	10.2	8.5	9.4
Pharmacy Information Systems	11	6.5	8.7
Laboratory Information Systems	5.5	6.1	5.8
Clinical Decision Support Systems	7.6	7	7.3
Emergency Department Information Systems	8.7	7.3	8
Perioperative Information Systems	7.3	7.1	7.2
Perinatal Information Systems	6.2	6.3	6.3



Remote Patient Monitoring

The remote patient monitoring devices are used to retrieve and transmit data through a wireless system to a monitoring station or a physician's office for further analysis and interpretation. This category includes revenues generated from sale of transmitters also called Gateways for implantable and external remote patient monitoring devices. It excludes the revenues generated through sale of peripheral devices, patient data processing applications and equipments, applications which integrate data with EMR's. Revenues generated from yearly service maintenance contracts and data transmission charges are also excluded. This category includes two segments external remote patient monitoring devices and implantable remote patient monitoring devices.

External Remote Patient Monitoring Devices

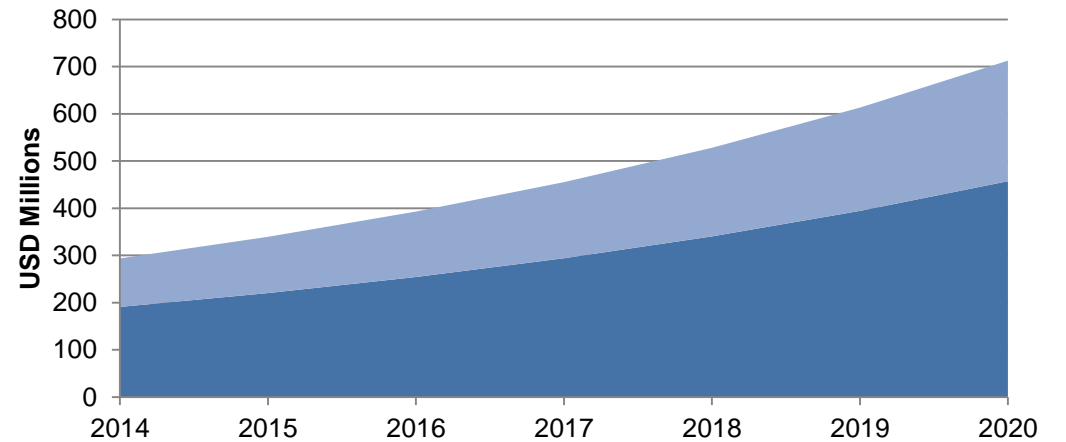
External remote patient monitoring devices retrieves the data from the external measurement device (like glucose meters, blood pressure monitors, pulse oximeters, weight scales, ECG) and transmit it, through a wireless system to a monitoring station or a physician's office for further analysis and interpretation. This segment includes the external module or transmitter which receives the data from the external measurement devices. One external remote patient monitoring device consists of one external module or transmitter.

Implantable Remote Patient Monitoring Devices

Implantable remote patient monitoring devices retrieve the data from the implantable sensor and transmit it, through a wireless system to a monitoring station or a physician's office for further analysis and interpretation. This segment includes the external module or transmitter which receives the data only from the implantable sensors used for arrhythmia and heart failure management. One implantable remote patient monitoring device consists of one external module or transmitter.

Still the most promising and growing market

Segment	CAGR 06-13 (%)	CAGR 13-20 (%)	CAGR 06-20 (%)
Implantable Remote Patient Monitoring Devices	15.9	15.6	15.8
External Remote Patient Monitoring Devices	17.4	16.3	16.9



- External Remote Patient Monitoring Devices
- Implantable Remote Patient Monitoring Devices

Existing genetic testing is supplanted by new Genomic technologies, enabling more efficient and extensive testing

Genetic Testing

Genetic testing reagents are used for the identification of specific syndrome present in an individual and can improve the accuracy of the diagnostic tests leading to a better treatment. Reagents used to perform acquired gene or chromosome alterations, inborn gene or chromosome alterations and other genetic tests have been tracked under this category.

Acquired Gene or Chromosome Alterations

Reagents which are used in genetic tests to detect cancer causing genes/related alterations like p53, k-ras, BRCA 1+2 etc.

Inborn Gene or Chromosome Alterations

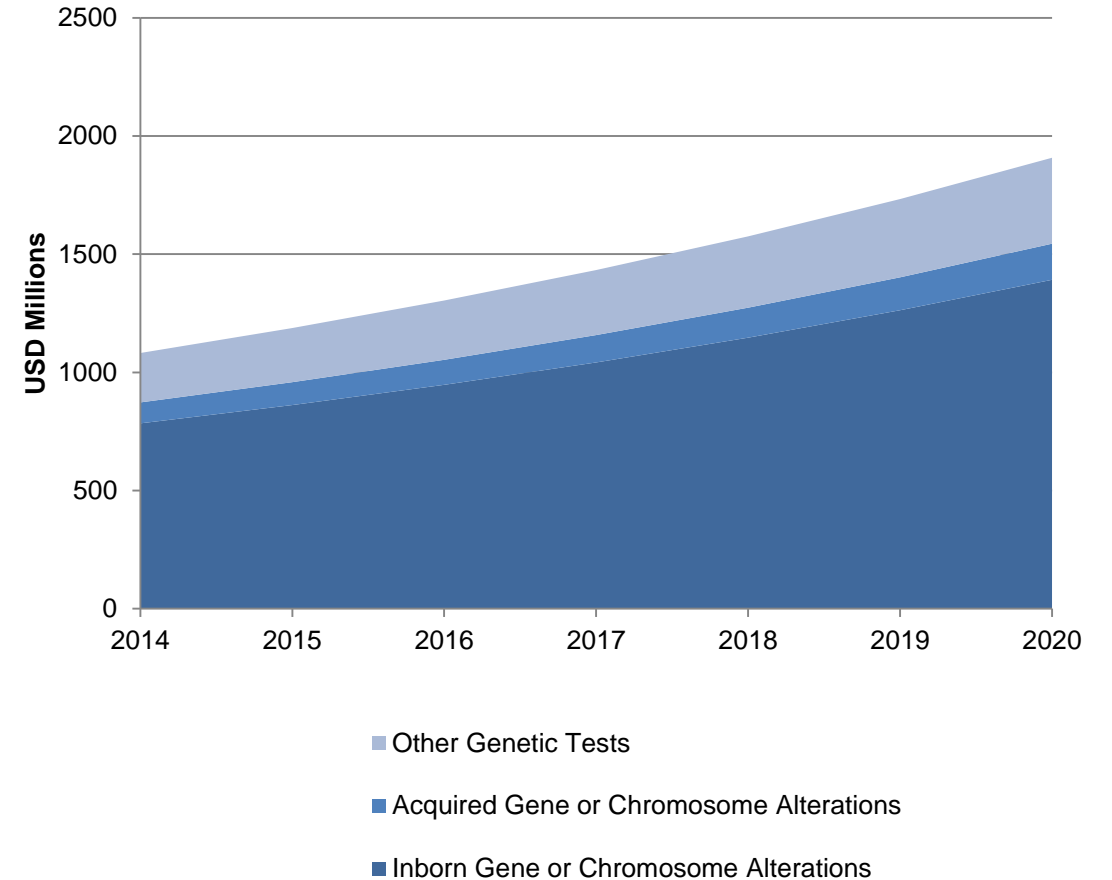
Genetic tests to detect monogenetic disorders (like Cystic Fibrosis, Haemochromatosis, Prothrombin Mutation etc), polygenetic disorders (like Asthma , Atherosclerosis, Diabetes, Hypertension, Osteoporosis, etc), chromosomal disorders (like Down's Syndrome, Edwards Syndrome etc), polymorphisms (like HLA-Typing etc).

Other Genetic Tests

Other genetic tests include pharmaco-genomics which include test related to cytochrome P450 (CYP 450). These tests can be by either individual tests or multiple tests which are conducted on micro-arrays.

Increased demand for genetic tests drives adoption of more efficient Exome and whole Genome sequencing through adoption of Next Generation Sequencing

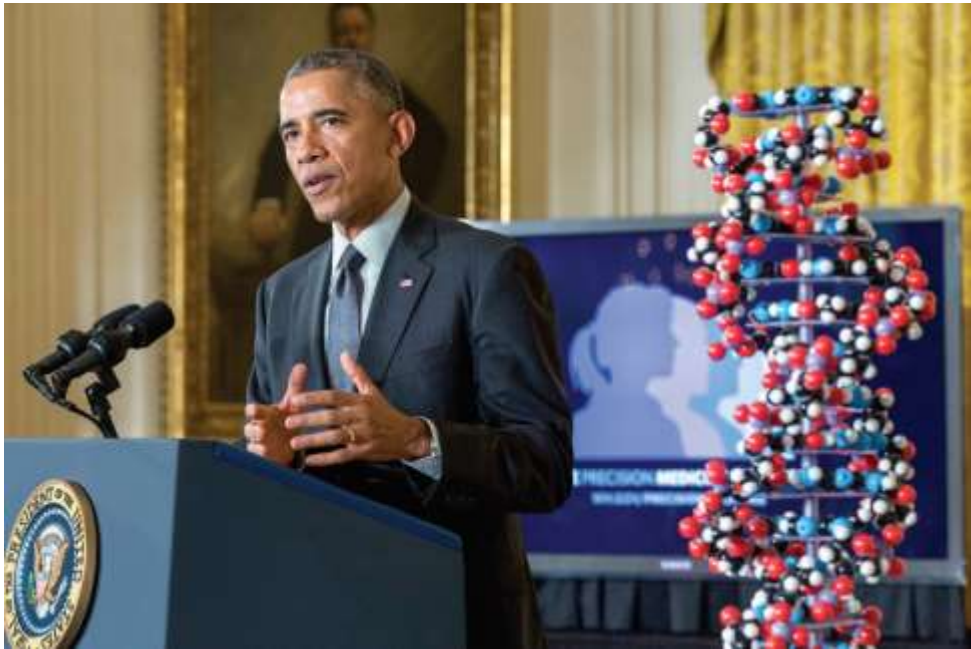
	CAGR 07-14 (%)	CAGR 14-21 (%)	CAGR 07-21 (%)
Inborn Gene or Chromosome Alterations	13.9	10.1	12.0
Acquired Gene or Chromosome Alterations	13.9	9.6	11.7
Other Genetic Tests	15.6	9.7	12.6



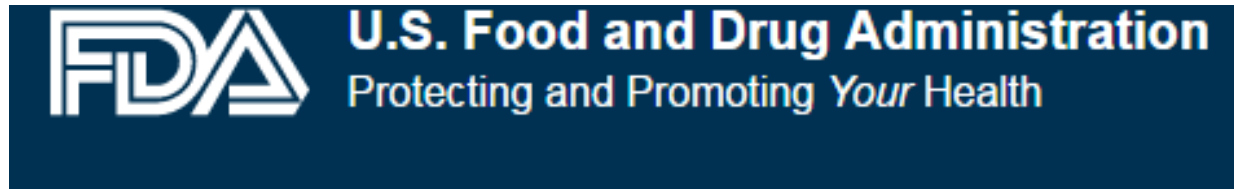
Where are health Technology Innovations Happening?



FDA is advancing a robust research agenda in regulatory science



Sharing the stage with a DNA double helix, U.S. President Barack Obama discusses the Precision Medicine Initiative.



Providers and other stakeholders are using digital health in their efforts to:

- Reduce inefficiencies,
- Improve access,
- Reduce costs,
- Increase quality, and,
- Make medicine more personalized for patients.

The use of technologies such as smart phones, social networks and internet applications is not only changing the way we communicate, but is also providing innovative ways for us to monitor our health and well-being and giving us greater access to information.

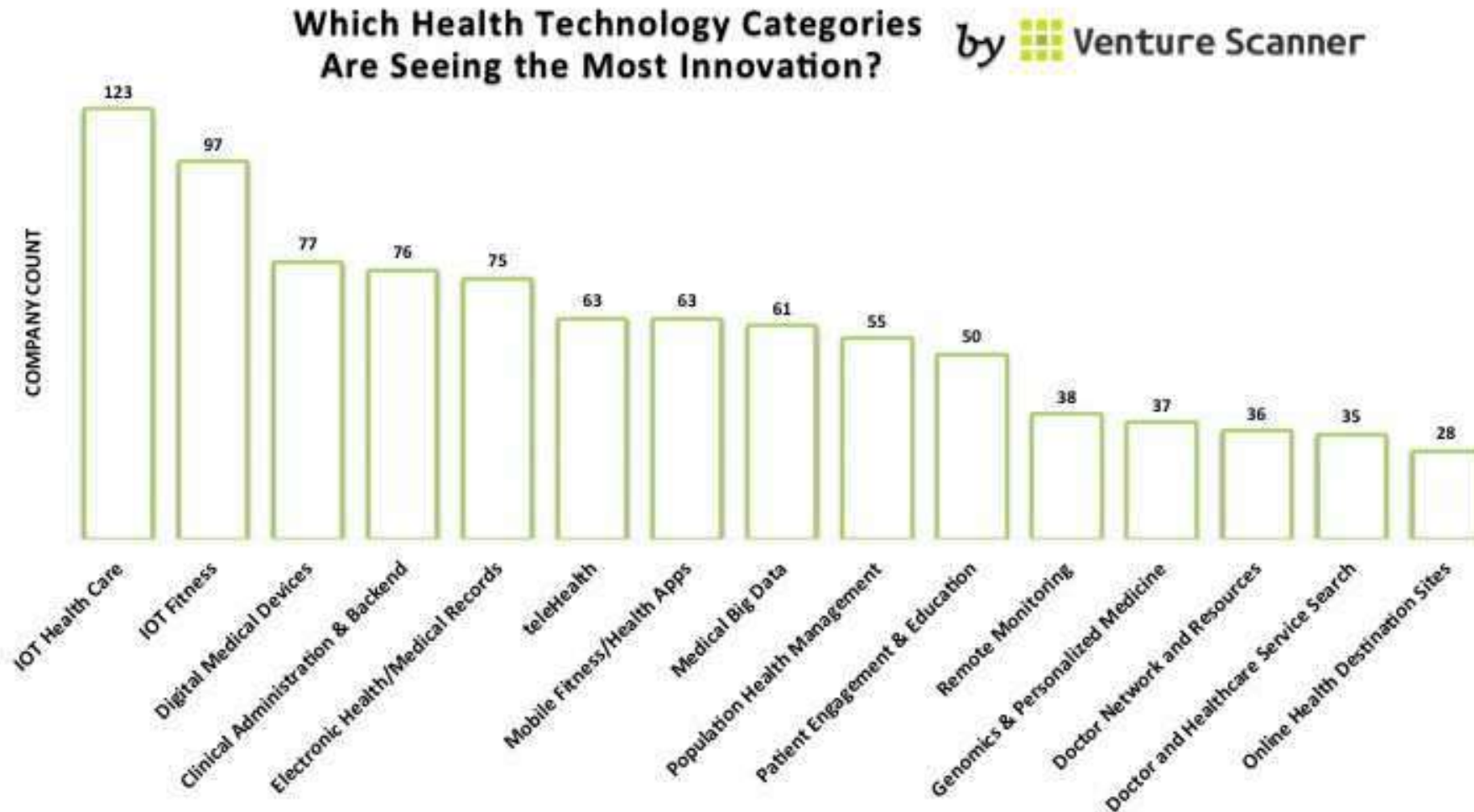
The average person is likely to generate more than one million gigabytes of health-related data in their lifetime. Equivalent to 300 million books.

IBM Watson Health

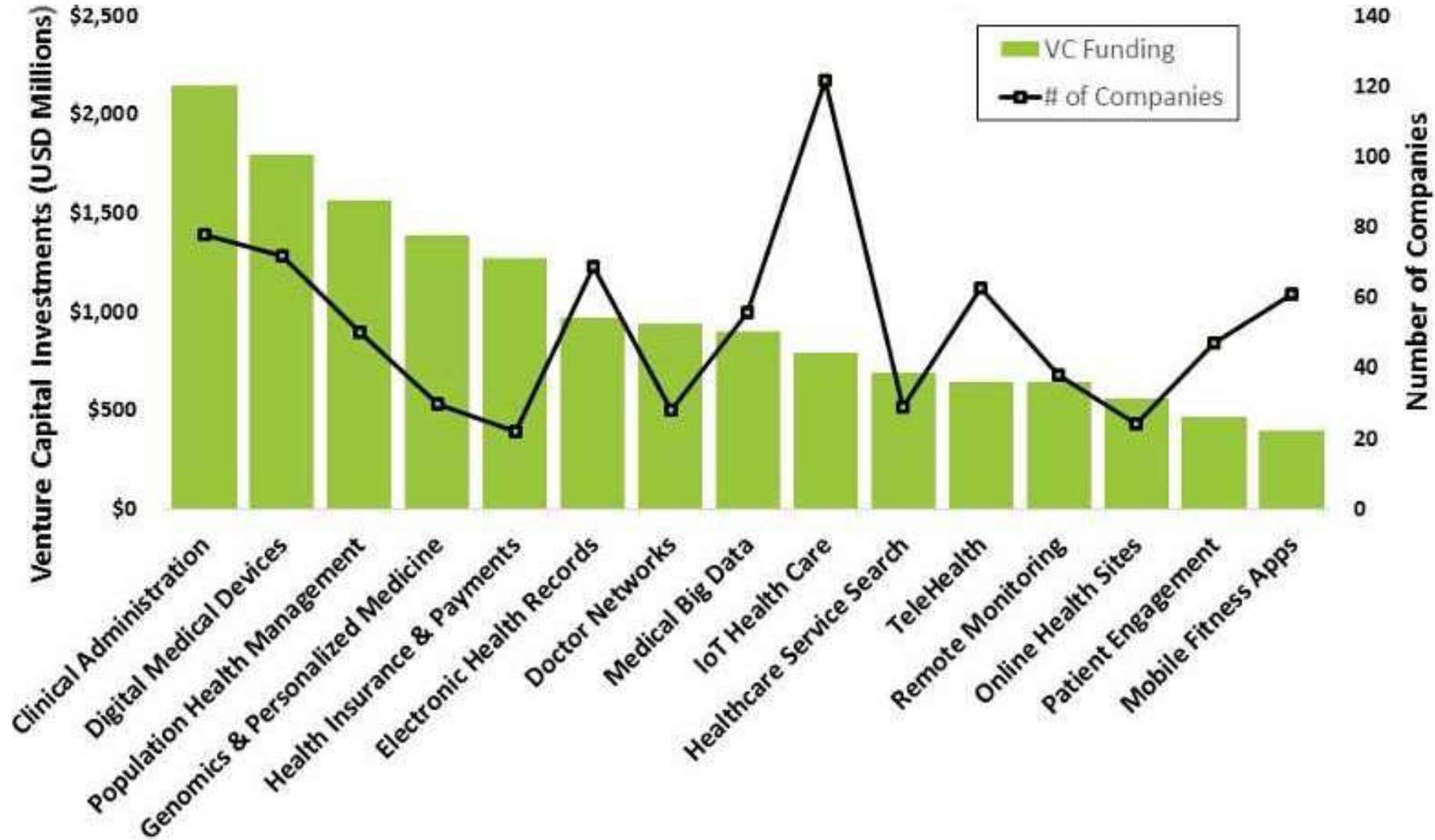
**1.000.000 gigabytes X
8 billion people connected to internet in 2020
= Humongous Data!**

Healthcare Startup Incubators and Accelerators

(number of companies per category)



Venture Investing in Health Technology



How Clusters can support digital health developments?

- What should Cluster managers do
- Examples
- Suggestions
- Past experience