



Digitization Transforming Healthcare Research

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Digitization

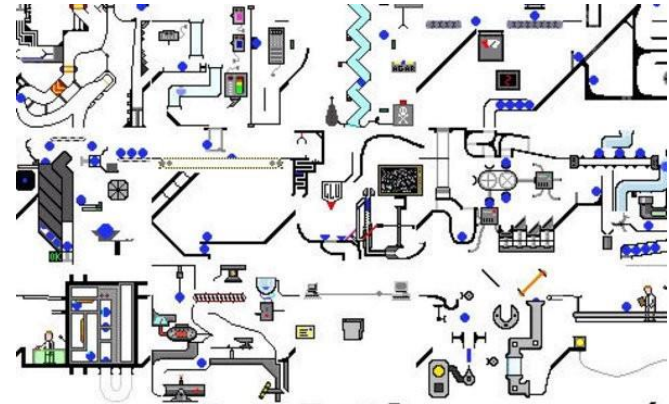
Latin: **digitus** = finger. In Spanish **dedo**

While the word started out in the mid-17th century, it's evolved from referring to digits, i.e., fingers, to numerical digits, entering the 20th century through the radio and recording technologies to the 1950's world of computers. There it chiefly referred to the discrete electric on/off signals represented as the 0's and 1's (digits!) of machine code.



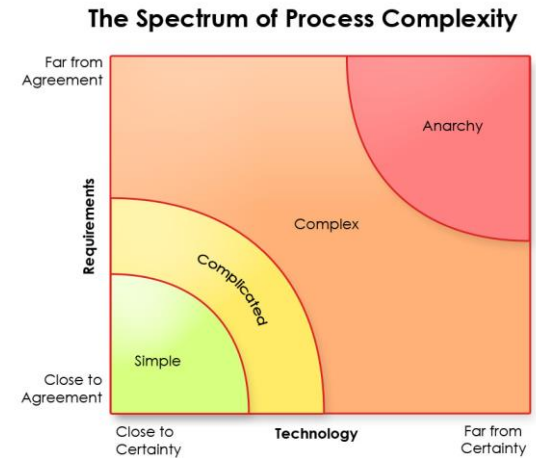
Challenges triggering Digitization

- **Too many manual processes**
- **Too many servers**
- **Too many applications**
- **Too many PCs to maintain and manage**
- **Mobility of devices is rapidly increasing**
- **Vast amount of Data with hidden potential**
- **Storage demands are increasing fast**
- **Highly specialized technical skills required**
- **Serious lack of redundancy**



Digitization Benefits

- **Simplification:** Removing “Too Many’s” to One or Some
- **Optimization:** Preservation of resources, Workflow changes
- **Insights:** Knowing the unknowns, Knowing it better, faster and accurate Investigation, Prediction and Action



Remember digitization affects your Infrastructure **in multiple ways**

- IT
- Staff
- Service Delivery
- Organisation Structure

YOU NEED A FRAMEWORK & ROI



Digitization for the Healthcare

Healthcare professionals want digital health services



Top 5 activities **health professionals** want to use digital technologies to help better support them to deliver health services

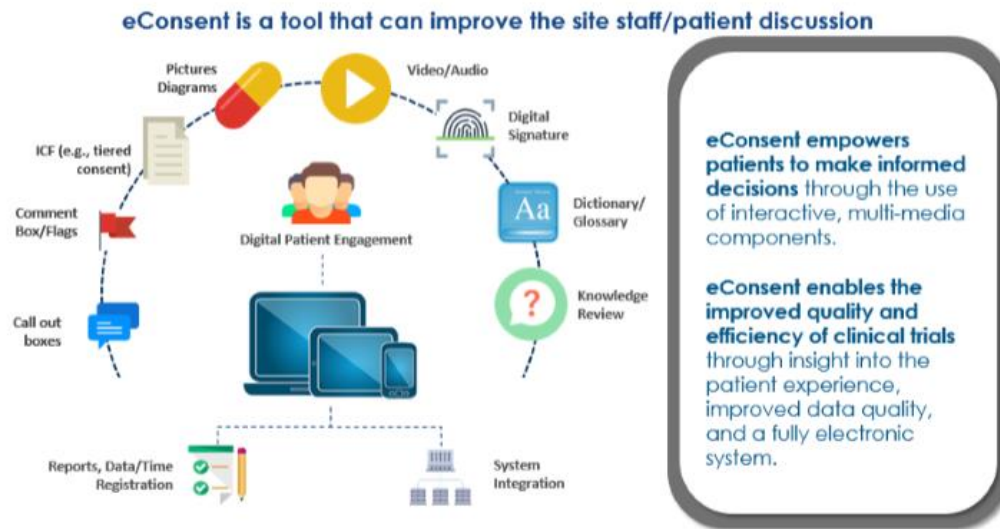
Activity	Currently using a computer, computer, smart phone or tablet %	Not using, but interested in using in using a computer, smart phone smart phone or tablet %	Not interested in using a computer, smart phone or tablet or tablet for this activity %
Sharing health records with my patients	25	59	7
Transferring prescriptions to the pharmacy	25	56	8
Providing interactive decision-making support	32	53	6
Communicating with patients before or after consultations consultations	33	49	7
Sharing health records with other practitioners	43	45	4

Digitization and Mobility

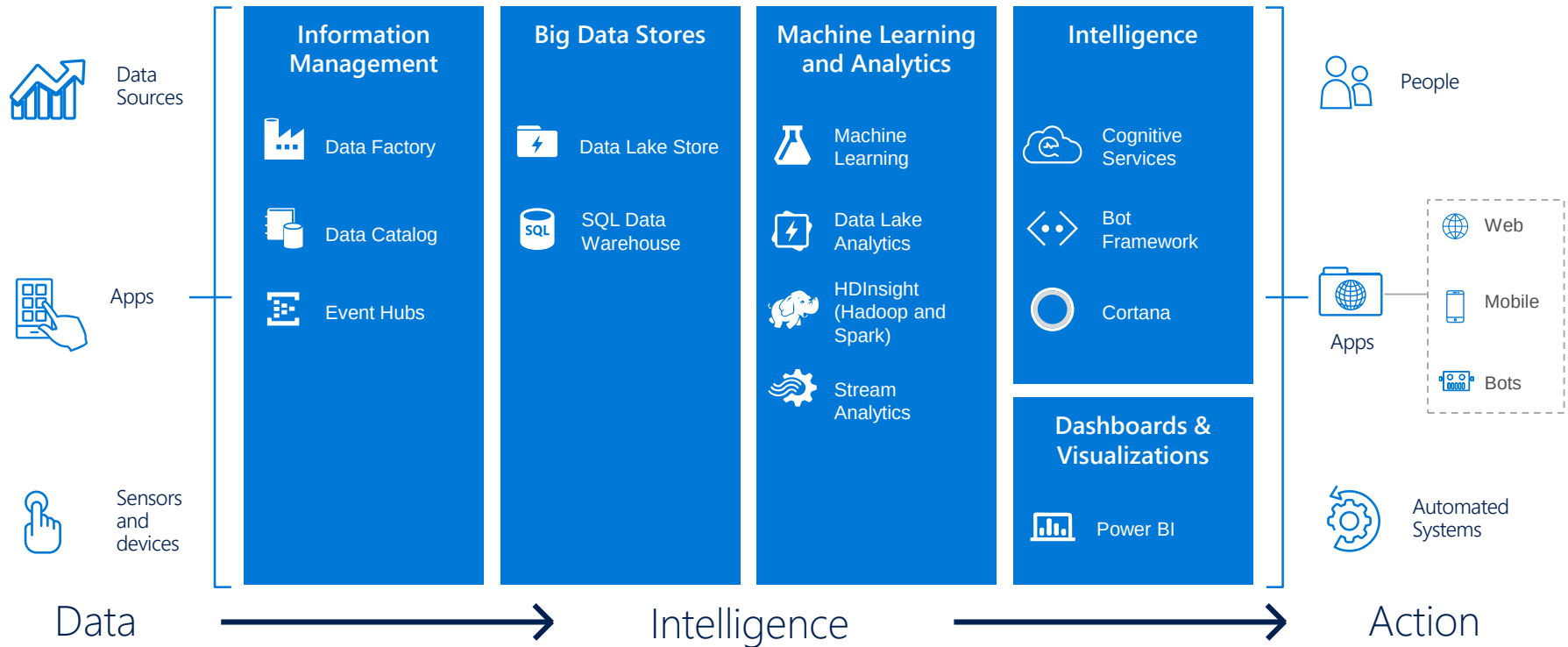
e-Consent

mHealth and connected devices are also a more recent phenomena to collect data more real-time and by engaging patients is also driven by digitization

Facial recognition and mobile technologies help in taking your medications as prescribed, making follow up doctor visits, or prescription refills enabling better drug compliance

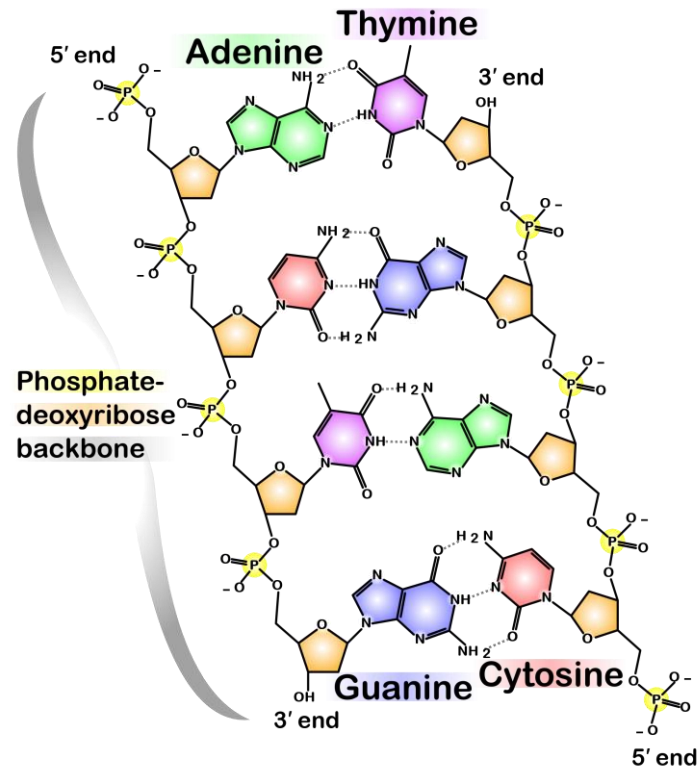


Cloud, IOT and Big-Data

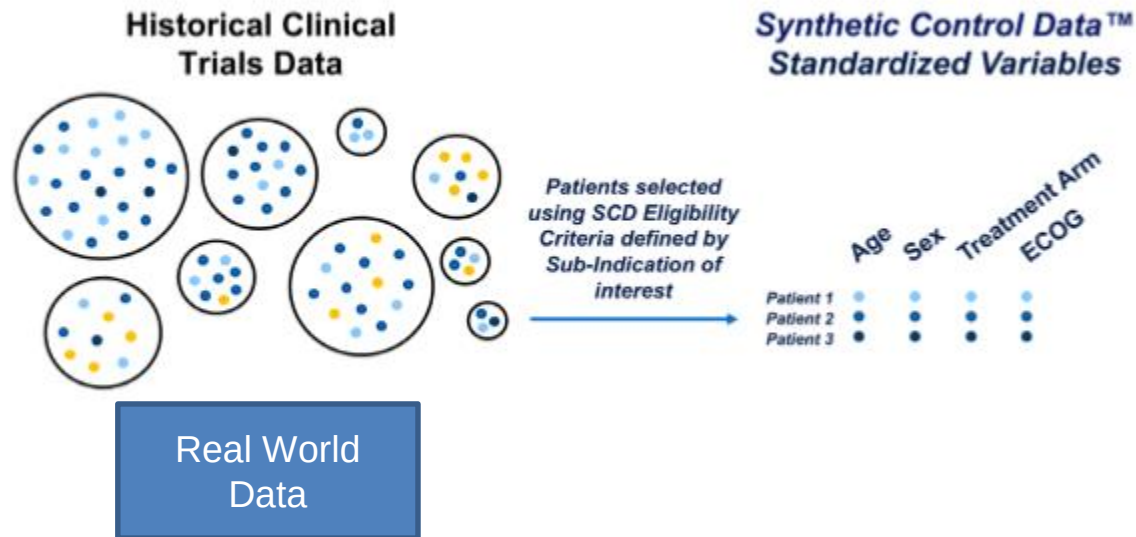


Machine Learning for Precision Medicine

ML recognizes patterns in genetic DNA databases. Searching through documented mutations and disease patterns for therapeutic purposes, AI correlates disease to drugs for a more precise and timely targeted treatment and popularized as Precision Medicine.



Real World Data & Synthetic Control Arms



Synthetic (External) Control Arms is a powerful combination of Real-World Data, AI technologies, data science, and clinical, epidemiological and unstructured data abstraction expertise, enabling studies in even the rarest cancers and smallest patient populations.

Application of Real World Data for SCA

RWD Discovery

Rapid assessment of specific patient cohorts to inform SCA and treatment arm designs;
Use of unstructured data search and unsupervised/ semi-supervised AI tools.

Cohort Selection

Data science and clinical expert evaluation of alternative cohorts to inform study and protocol design.



Study Design

Finalization of study design, statistical analysis plan, regulatory consultations, and resulting SCA requirements.

Study Execution

Study-specific abstraction, patient selection based on inclusion criteria, patient summaries for submissions, statistical analysis and regulatory presentations

Cloud-Based Patient-Reported Outcomes

Patient Care Monitor (PCM) seamlessly integrates into clinical practice workflows to create clinical utility and capture and act on patient-reported outcomes (PRO) in real time, from diagnosis through survivorship:

- Monitor and track patient symptoms at the point of care and in between visits with a *validated* Core Symptom Survey
- Export PRO data automatically to any EMR
- Receive real-time reports and alerts as changes occur in health status
- Help meet reporting requirements of organizations and alternative payment models such as QOPI, OCM, CoC and MIPS.
- Monitoring and tracking patient symptoms with the use of ePRO tools can improve clinical and quality outcomes, create quality metric reporting efficiencies, as well as reduce clinic burden and lower the cost of care



Artificial Intelligence Enabling Evidence based Medicine

AI technologies and models have rigorous mathematical and clinical validation across an array of use cases:

- Speed insights into narrowly defined and rare patient populations
- Allow rapid comparisons across cohorts
- Support and drive clinical research across the enterprise

Development of an artificial intelligence model to predict survival at specific time intervals for lung cancer patients.

http://abstracts.asco.org/239/AbstView_239_268103.html

Using Artificial Intelligence to Improve Capture of Metastatic Breast Cancer Status in Electronic Health Records



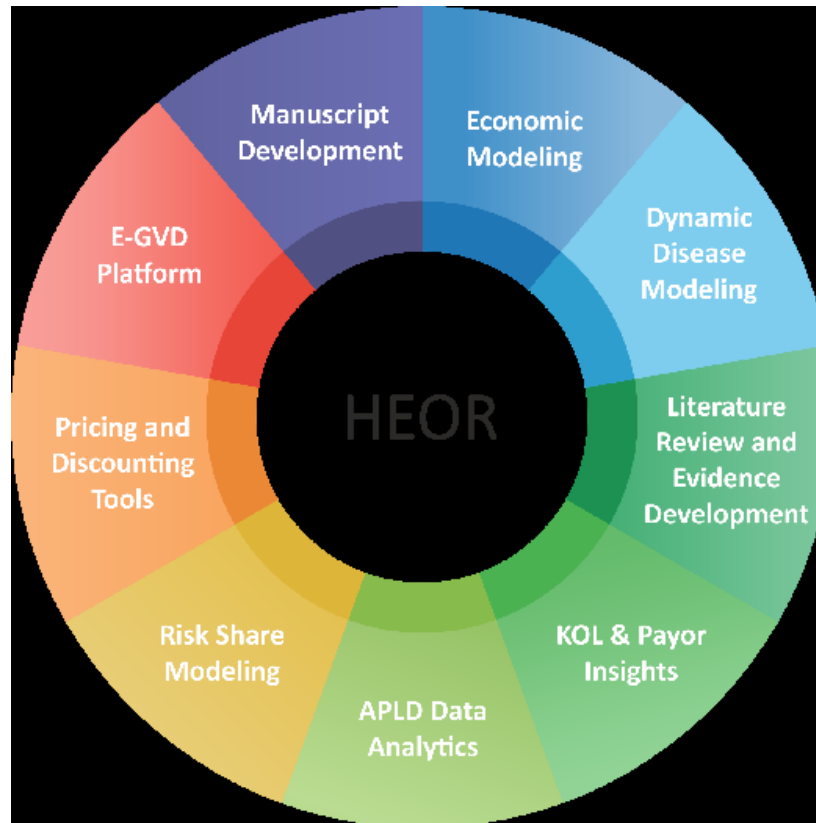
Digital Pill

The Food and Drug Administration has approved the [first digital pill](#) for the US which tracks if patients have taken their medication. The pill called Abilify My Cite, is fitted with a tiny ingestible sensor that communicates with a patch worn by the patient — the patch then transmits medication data to a smartphone app which the patient can voluntarily upload to a database for their doctor and other authorized persons to see. Abilify is a drug that treats schizophrenia, bipolar disorder, and is an add-on treatment for depression.



Proteus' digital pill: The sensor-embedded pill will be used to treat and monitor colorectal cancer patients receiving care

Outcome Based Research driven by Digitization



Automation and Analytics can enable centralized and harmonized processes to promote a model “Value” based medicine - **Value-Based Medicine (VBM)** as the practice of **medicine based** upon the patient-perceived **value** conferred by an intervention

Future of Medicine Research

Digital Transformation in Healthcare would be through

- Improving the Patient Experience through Precision medicine
- Leveraging Real-World Medical Data for driving Analytics based Actions
- System Integrations, Cloud movement and Interoperability
- A Game-Changing Capability of Telemedicine
- More Centralized Operations and Management through Automations

