**Week 7: eHealth and Cloud**

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# eHealth and Cloud Computing

An eHealth system uses information and communication technologies (ICT), to enable both medical practitioners and their patients to gain insights into their total health. Many nations have implemented these systems with varying levels of success. This is due to their inherently complex nature as the medical facilities are politically and economically incentivized to be decentralized (Yang, et al., 2018).

## Core Subsystems

The three core subsystems to an eHealth system are (1) Electronic Medical Records (EMR); (2) Electronic Health Records (EHR); and (3) E-Prescription Services (ERX).

EMR systems address digitizing and storing medical information for regulatory compliance, sharing with authorized partner facilities, and simplifying record keeping. An EHR performs analytics, notifications, and patient dashboarding scenarios with the EMR data. ERX manages the treatment lifecycle such as refilling medications and billing insurance providers.

## Levels of Maturity

Stroetmann performed an analysis of fifty health care systems and loosely categorized them into different maturity levels. The levels are Patient Workflow Support Systems; Basic EHR-like Systems; Comprehensive, Complex Systems and Platforms; National Framework Systems with Common Components; and International Core Patient Data Exchange Services (Stroetmann, 2015).

# Reasons for Failure

## Scope Creep / Over commitment

Many eHealth systems have not acknowledged the existence of these levels and bitten off more than they can chew. Australia wasted over a billion dollars between 1999-2008 in failed systems that were meant to solve any issue that ever arose.

Then look at South Africa and Pakistan which focused on nationalized Patient Workflow Support Systems. Their solutions were narrow in scope-- handling only appointment scheduling and record storage. The patient experience was improved through reduced wait times, and the facility can focus on differentiating characteristics (Mandil, 2015) (Stroetmann, 2015).

## Too Much Tech Debt

Computer based medical records have been around since at least the 1950s, which has led to nearly 70 years of proprietary systems being deployed across the medical community. Each of these legacy systems requires a data format converter be created to connect them into modern eHealth ecosystems.

Australia disbanded their effort to catalog the requirements of these legacy systems after four years. Denmark took the opposite approach and mandated the support of open exchange protocols. They have also set a goal of only permitting four EMR systems on their national platform. For a country with 5.5 million residents this is easier to get agreement than across the 325 million Americans or 1.32 billion Indians.

## Insufficient Maintenance

The only thing more expensive than building an eHealth system is maintaining it afterwards. Nigeraia, Uganda, Libya, and other developing countries have not kept up with the infrastructure repairs

## Acceptance by End Users

If the doctors don’t like it you aint selling it. Ghana and the sociological challenges.

What is eHealth

* + Areas
  + Levels of Maturity
* Why do eHealth Systems Fail
  + Lack of commitment or funding
  + Over ambission, unrealistic timelines
  + Lack of maintenance
* Design considerations for building system in the cloud
  + Extensibility and Interopability
  + Security, Privacy, Encryption
  + Locality, wifi, iot, and connectivity