



**app CODIFICO: Teaching game for health coding.**  
**Didactical app to develop health coding capabilities for health professionals.**

Sandra Milena Agudelo-Londoño HISM, MSc  
Posgraduates Programs in Health Administration  
Pontificia Universidad Javeriana

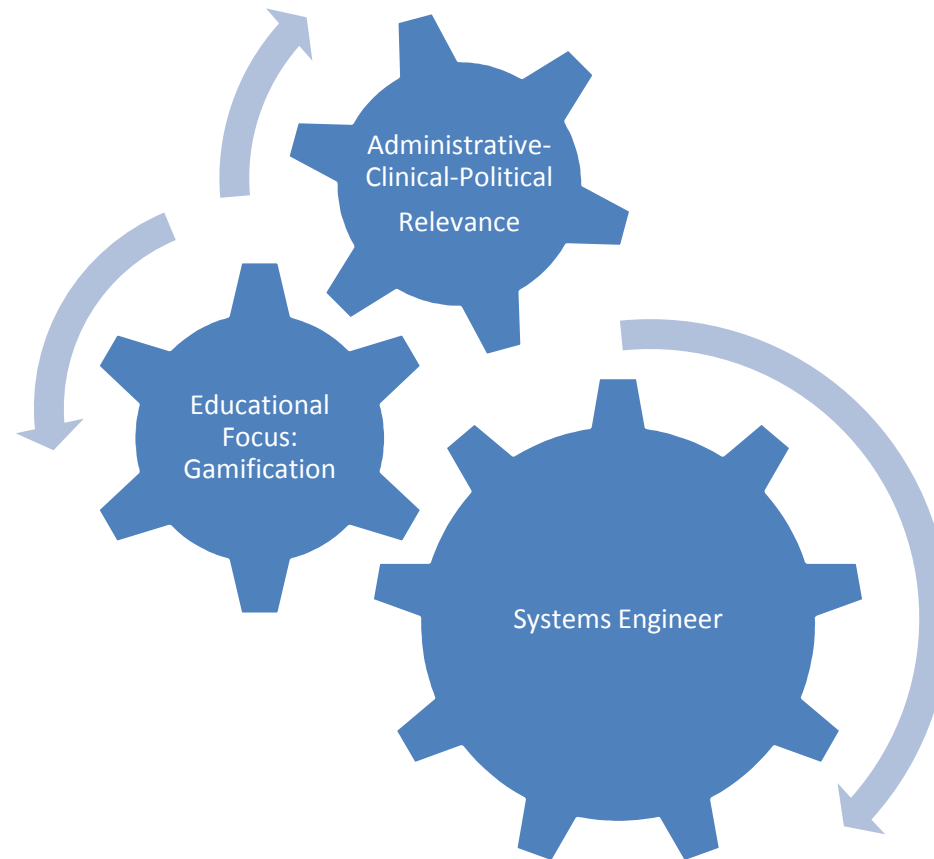


Pontificia Universidad  
**JAVERIANA**  
Bogotá

APP CODIFICO

# Interdisciplinary Academic Team

Our majors areas of work are:



*app*

APP CODIFICO



Pontificia Universidad  
**JAVERIANA**  
Bogotá

# Problem



## Colombian Health system

Based on regulated competency structure  
Resources are public-Administration is private  
Lack of Information= corruption + inefficiency  
IPS-EPS fragmentation of data.

## Patient-Doctor interaction



Times/Schedules  
Health information systems  
EHR- Manual Health Record



## ICD 10

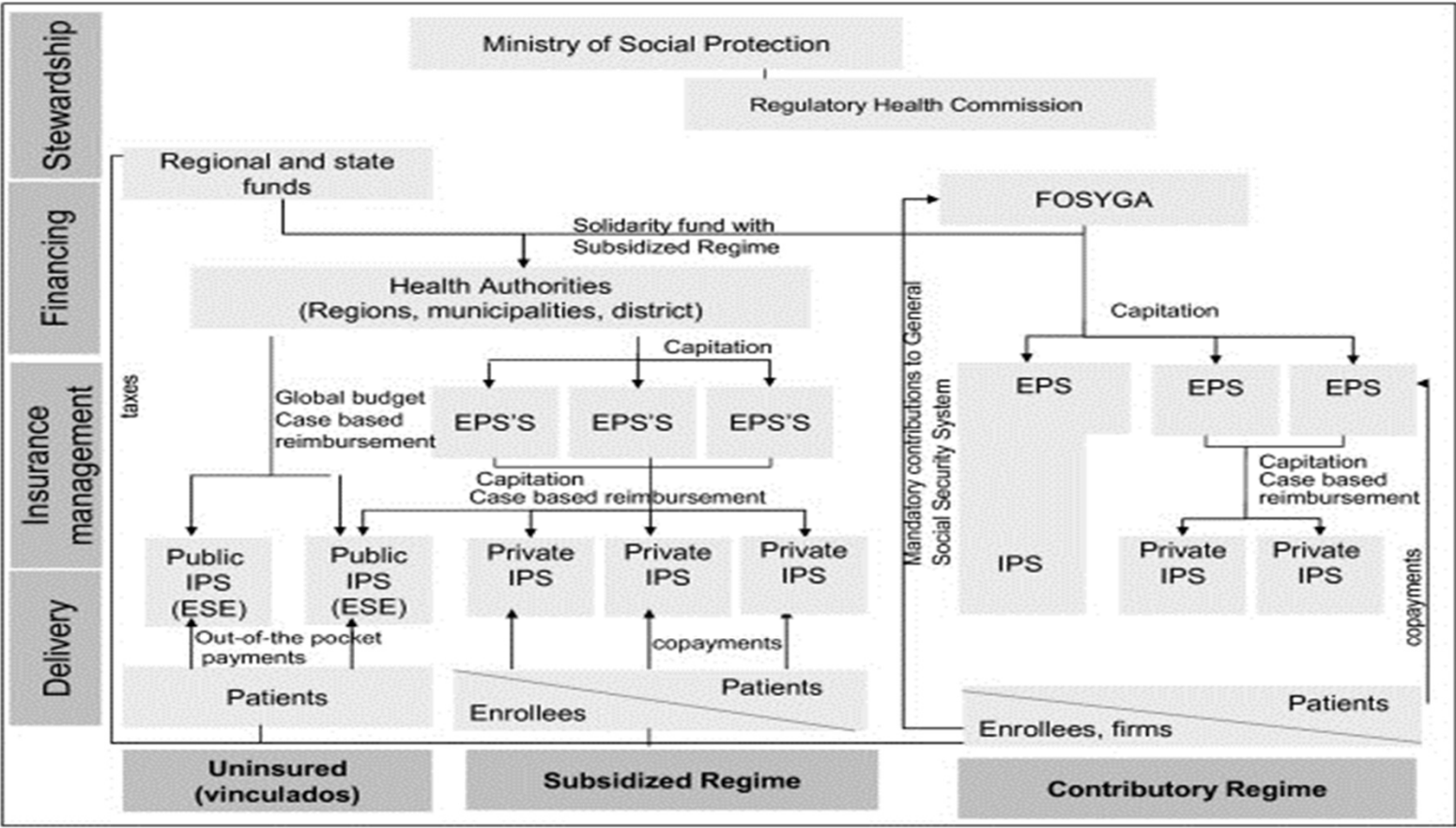
Procedures are more important than DX  
No focus on data quality, capacity and culture  
Other Colombian codes  
Perceived as a difficult coding system





# Colombian Health system

Based on regulated competency structure  
 Resources are public-Administration is private  
 Lack of Information= corruption + inefficiency  
 IPS-EPS fragmentation of data.



The model of managed competition in the Colombian healthcare system

APP CODIFICO

## ICD-10 Version:2015

- ▶ I Certain infectious and parasitic diseases
- ▶ II Neoplasms
- ▶ III Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism
- ▶ IV Endocrine, nutritional and metabolic diseases
- ▶ V Mental and behavioural disorders
- ▶ VI Diseases of the nervous system
- ▶ VII Diseases of the eye and adnexa
- ▶ VIII Diseases of the ear and mastoid process
- ▶ IX Diseases of the circulatory system
- ▶ X Diseases of the respiratory system
- ▶ XI Diseases of the digestive system
- ▶ XII Diseases of the skin and subcutaneous tissue
- ▶ XIII Diseases of the musculoskeletal system and connective tissue
- ▶ XIV Diseases of the genitourinary system
- ▶ XV Pregnancy, childbirth and the puerperium
- ▶ XVI Certain conditions originating in the perinatal period
- ▶ XVII Congenital malformations, deformations and chromosomal abnormalities
- ▶ XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified

## International Statistical Classification of Diseases and Related Health Problems (ICD-10)-2015-WHO Version for ;2015

### Chapter III Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50-D89)

**Excl.:** autoimmune disease (systemic) NOS ([M35.9](#))  
certain conditions originating in the perinatal period ([P00-P96](#))  
complications of pregnancy, childbirth and the puerperium ([O00-O99](#))  
congenital malformations, deformations and chromosomal abnormalities ([Q00-Q99](#))  
endocrine, nutritional and metabolic diseases ([E00-E90](#))  
human immunodeficiency virus [HIV] disease ([B20-B24](#))  
injury, poisoning and certain other consequences of external causes ([S00-T98](#))  
neoplasms ([C00-D48](#))  
symptoms, signs and abnormal clinical and laboratory findings, not elsewhere class

#### This chapter contains the following blocks:

- [D50-D53](#) Nutritional anaemias
- [D55-D59](#) Haemolytic anaemias
- [D60-D64](#) Aplastic and other anaemias
- [D65-D69](#) Coagulation defects, purpura and other haemorrhagic conditions
- [D70-D77](#) Other diseases of blood and blood-forming organs





# Theoretical aspects

- **Gamification (Iudificación)**

“The use of game design elements in non-game contexts”. Deterding S, 2011

- **Serious game.**

“While paidia (playing) describes free-form, expressive, improvisational behaviors and meanings, ludus (gaming), on the other side, characterizes rule-based playing with determined goals”. Caillois R, 2001.

- **Serious game in health and education.**

“Serious video games for health are designed to entertain players while attempting to modify some aspect of their health behavior. Behavior is a complex process influenced by multiple factors, often making it difficult to change”. Thompson D, 2010.

APP CODIFICO

# General Objective

- To design an educational mobile application (app CODIFICO) to generate diagnostic coding capabilities among medical staff in Colombia.



# Specific Objectives

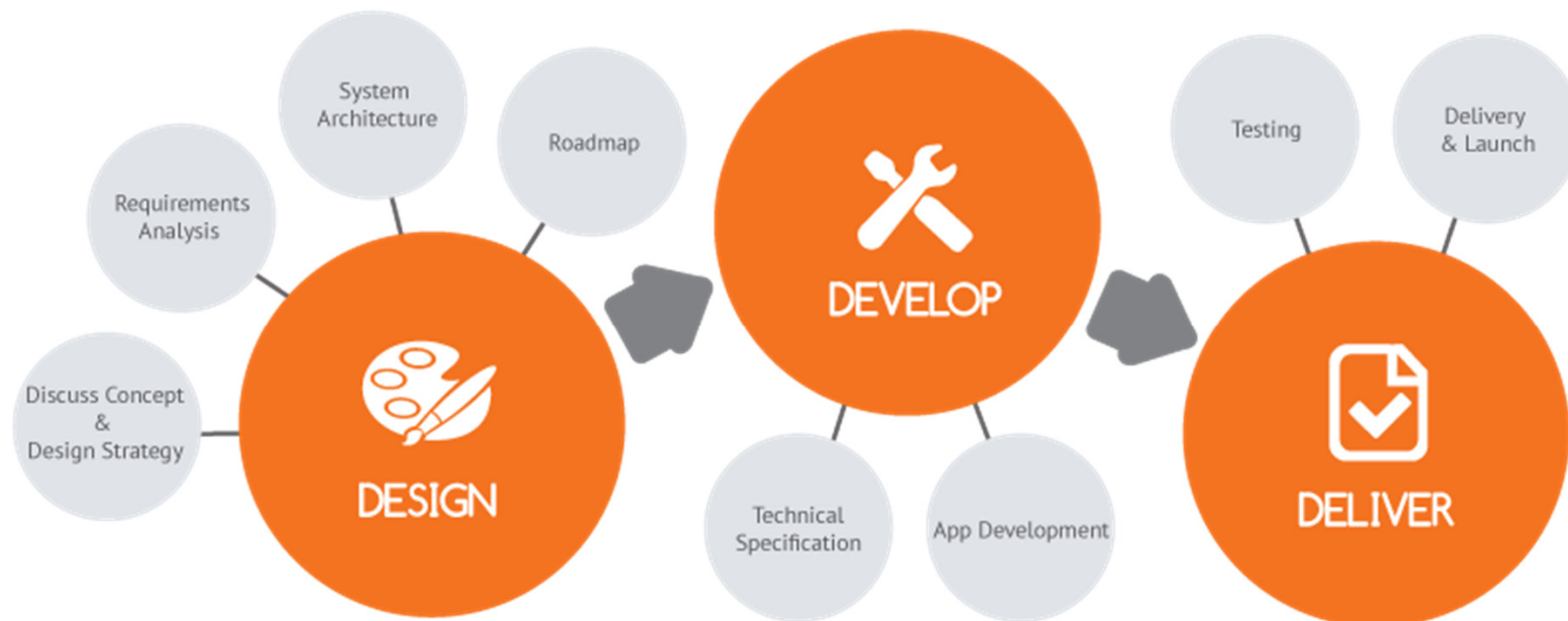
- To build a tree of diagnosis decisions with selected diseases.
- To Build clinical cases and diagnostic ramifications by age and sex of the selected patients (script of the game).
- To Design logical and physical architecture of the mobile app (design).
- To Test the app performance on a small scale with doctors and medical students (pilot).
- To Evaluate the effectiveness of the application to build capabilities in the registry of diagnosis (evaluation).
- To Setting the app to launch it in the educational market at the initial version of Android online store.

# Methods

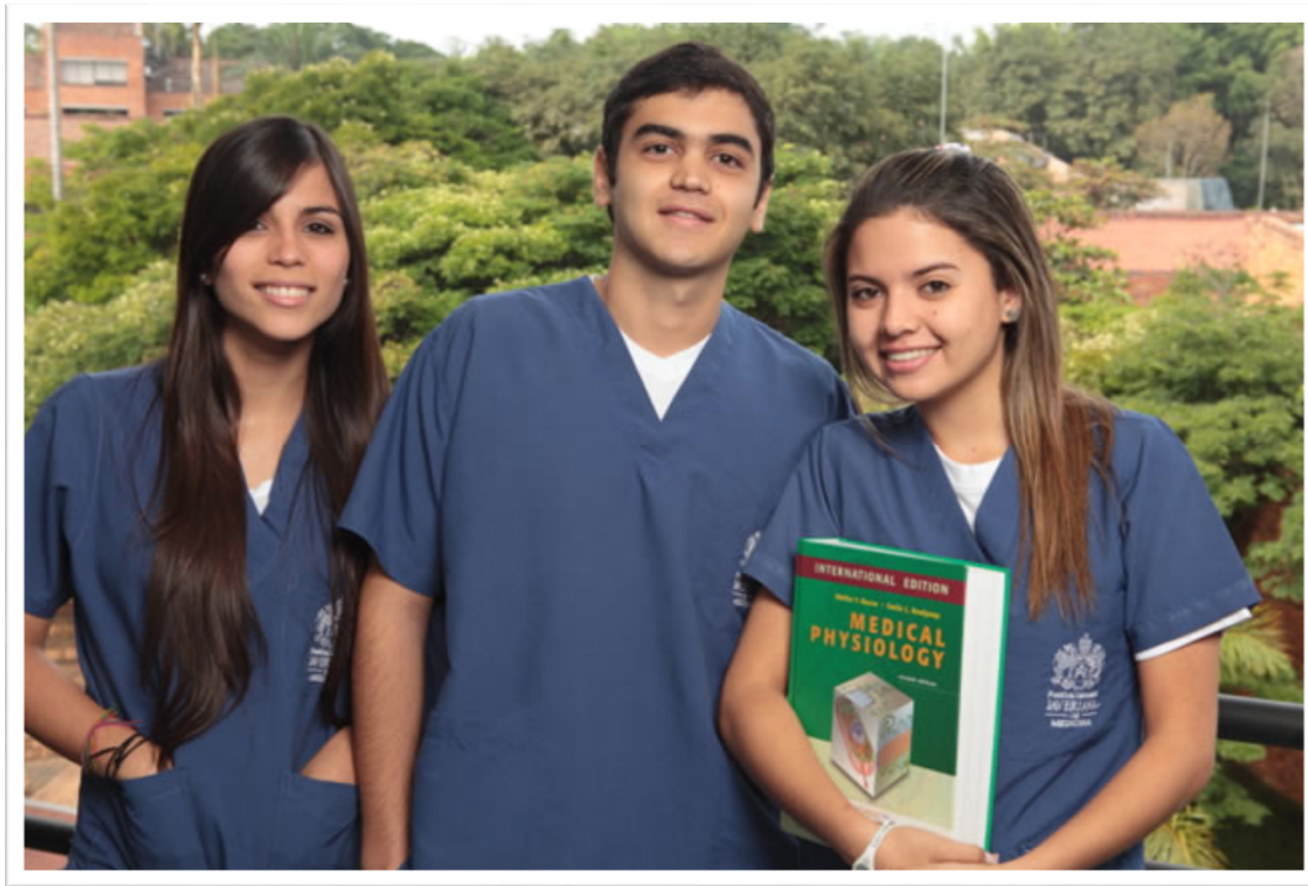
Applied research that uses mixed techniques and an interdisciplinary approach to solve the practical problem.

Design will be based on JAVA.

*mobile app design process*



# Participants



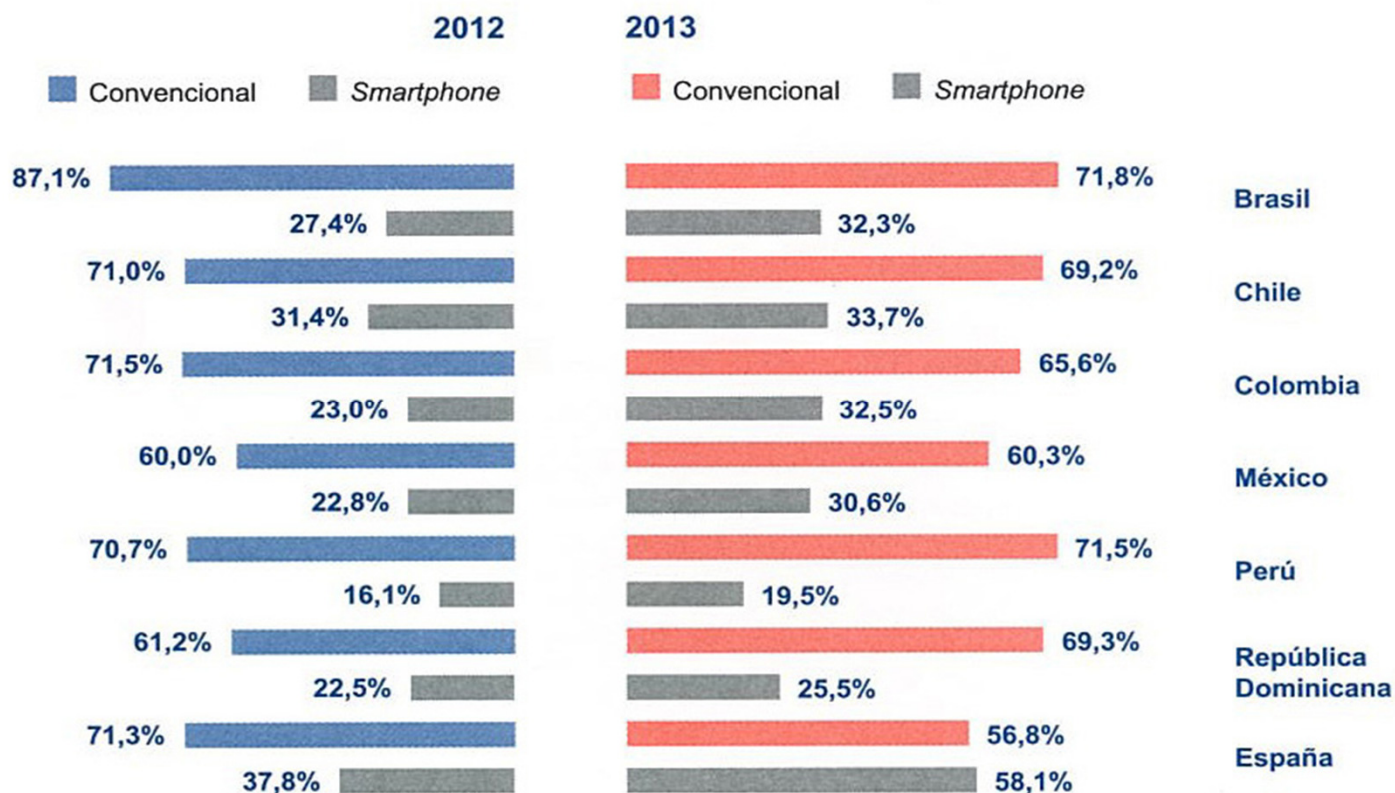
- **Undergraduate medical students**





Cellphone users 53'583.664.  
 Smartphones users 14'400.000  
 Colombia Population 48'320.000

Penetración de smartphones y teléfonos convencionales, 2012-2013



n = total por país ≈ 400

Fuente: Tecnom

# Methods

## ANDROID

### Mobile operative system

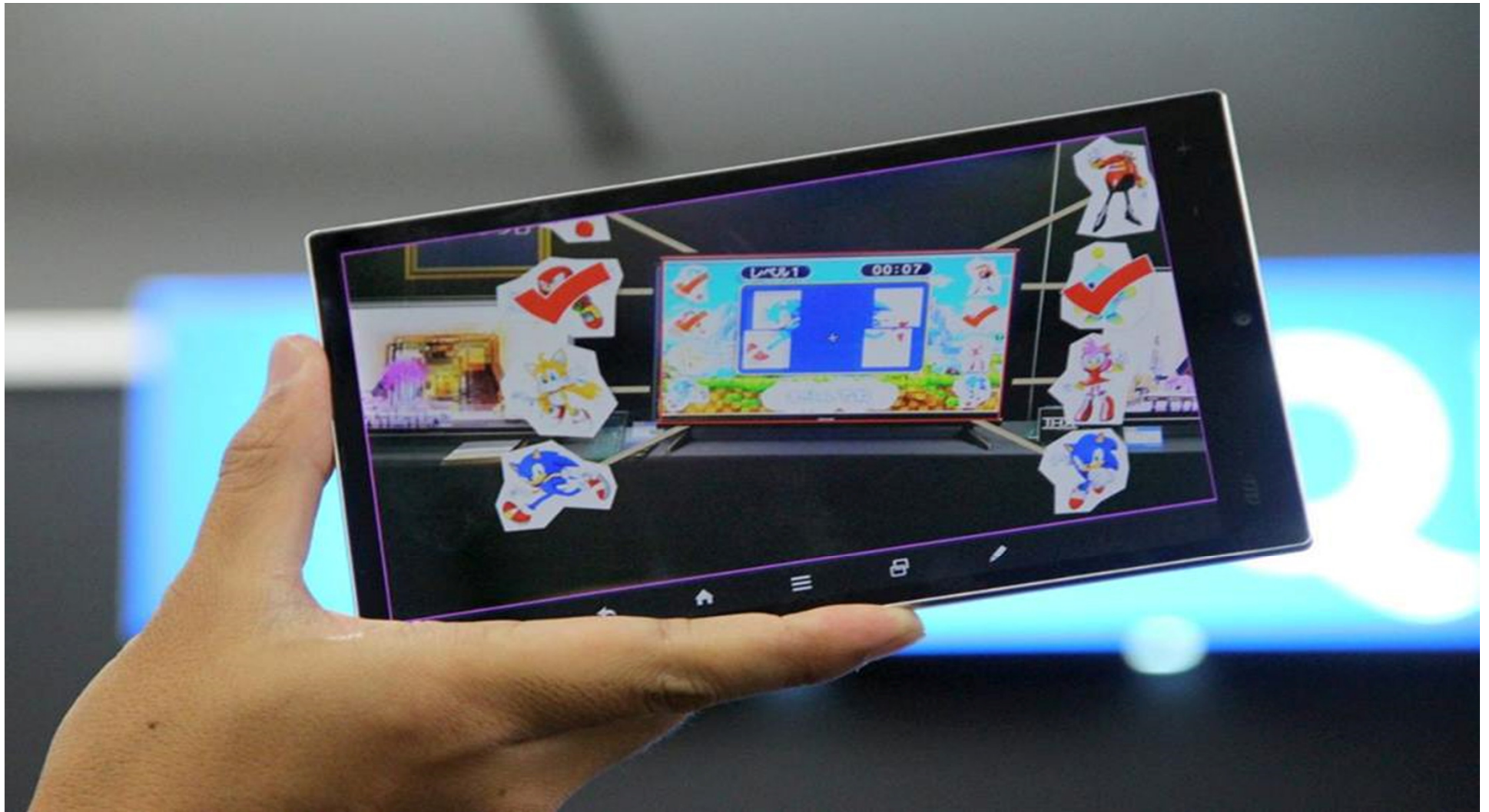


Pontificia Universidad  
**JAVERIANA**  
Bogotá

<http://appdesign.ie/mobile-web-app-development-software-design>

**APP CODIFICO**





The final product will be measured in terms of the app and how it helps to develop capabilities for diagnosis register according to the ICD 10.



# Ethical issues

- Software is not a patentable product, but must be registered with the National Directorate of Copyright.
  - Andean Decision 486 of 2000 and 351 of 1993.
  - Secondary sources for the clinical cases then NO RISK for patients.
  - Voluntary participation of students in pilot and test with informed consent.

# What are we doing now?

Working on clinical cases: diabetes, hypertension and kidney disease.

Starting a systematic review of app effectiveness' to develop capabilities.

Making arrangements with medical school for requirements elicitation. This is the practice of collecting the requirements of a system from users.



Available on the Android

App Store



# IT'S FREE



Pontificia Universidad  
**JAVERIANA**  
Bogotá

APP CODIFICO