Mobile Applications Architecture and Challenges for e-Health and e-Education

Republic of Lebanon
Telecommunications
Regulatory Authority

SAMENA Conference

Beyond Connectivity 2010

Beirut, 29 April 2010

SAMENA
TELECOMMUNICATIONS COUNCIL

Dr. Imad Y. Hoballah
Commissioner, Board Member
Head of Telecommunications Technologies Unit
Telecommunications Regulatory Authority (TRA), Lebanon

Contents

- Benefits of e-Health and e-Education
- Enablers for e-Heath and e-Education applications (infrastructure, regulatory framework, etc.)
- Challenges of mobile applications
- Architecture of mobile e-Health applications
- Architecture of mobile e-Education applications
- Evolving business models for mobile applications
- Summary

Benefits of e-Health and e-Education

The use of advanced communications technologies, such as the Internet, portable, wireless and other sophisticated devices to support *health care and education* delivery:

Entails a fundamental redesign of ***health care and education*** processes based on the use and integration of mobile and communication technologies at all levels

Provides learner more autonomy and flexibility especially in distance learning

Enables intelligent personalized information and provides patients with the opportunity to take a leading role in their own healthcare process

Improves the efficiency, effectiveness, cost and quality of, and access to medical and learning services

Infrastructure for e-Heath and e-Education applications

The availability of **national broadband networks** that integrate the delivery of healthcare and learning information serves as a "**catalyst for the standardization and integration of the various widely dispersed computerized systems that are currently used within the sector**"

Applications

- Tele - Consulting
- Tele - Treatment
- Tele - Surgery
- Tele - Monitoring
- Distance Learning
- Centra Symposium
- LearnLinc

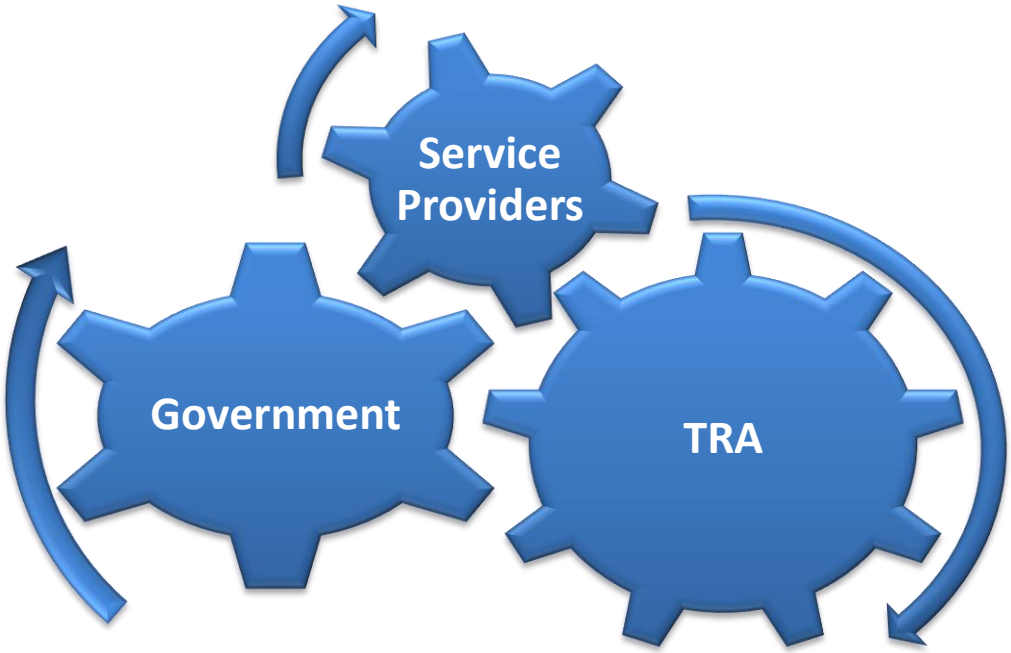
Requirements

- Low Bandwidth (Narrowband)
- Broadband (High Bandwidth), Fiber Optic / x DSL Technologies

Why Telecom Infrastructure

- To Support Interactive Voice Communication (PSTN, Internet)
- To Support Voice & Video Communication
- To Exchange Pictures and Large Volumes of Data

Strong collaboration between the TRA, Public Entities and Service Providers is crucial to successful implementation of e-Health and e- Education mobile applications



According to telecom law 431 article 5 (1-K) , **"the TRA is responsible to assist educational and health care institutions in the implementation of their programs by the use of telecommunications services"**

Thus, **TRA regulatory framework** is to encourage and facilitate the investments in, and the development of, telecom infrastructure for e-Health and e-Education at affordable prices for the customers possibly through new reference offer similar to the ISPs.

TRA's role

- Ensure the availability of sufficient radio spectrum allocated for broadband (high bandwidth) mobile e-Health and e- Education applications
- Define spectrum requirements for mobile short range devices
- Assist educational and health care institutions in fulfilling their needs in terms of implementing e-Education and e-Health applications as mandated by Telecom Law 431
- Issue Service Provider licenses including spectrum licenses for telecom infrastructure and services necessary for medical and learning mobile applications
- Specify recommendations for the provision of secure telecom infrastructure used by mobile applications
- Ensure that mobile devices comply with the "Human EMF Exposure Limit Regulation" and the "Type Approval Regulation" for RTTE equipment

Government and Service Provider's role

Government

- Must integrate e-Health and e-Education in its polices and growth initiatives starting with the telecom policy paper and Governmental Declaration "Al Bayan Al Wizari"
- Can play a coordinator role in the process of adopting e-Health and e-Education mobile applications between the private sector and concerned ministries, mainly:
  - **OMSAR**
  - **Ministry of Health**
  - **Ministry of Education**
  - **Ministry of Telecommunications**

Service Providers

- Provide telecom infrastructure for mobile e-Health and e-Education at affordable prices for the customers
- Implement an adequate level of cyber security safeguards and measures
- Comply with the official regulations and policies

Mobile Applications Challenges & Limitations

One issue that became clear is that mobile learning is not just about learning using portable devices, but learning across contexts.

Mobile learning is not something that people do; MOBILE learning is what people do

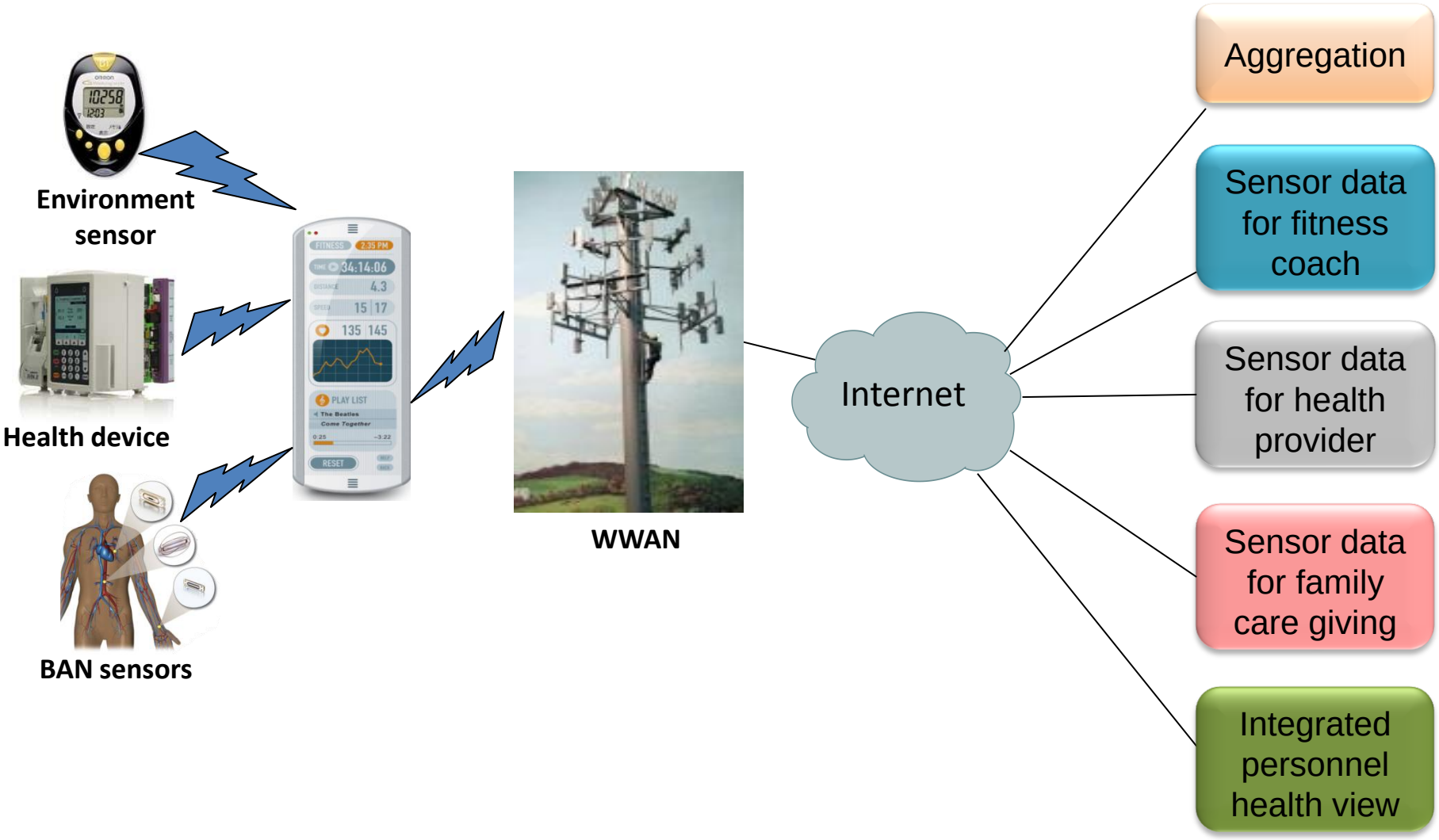
Technical

- Small screen and key size
- Local mobility, limited mobility and interrupted mobility
- Slow connectivity of the internet
- Limited Performance, in terms of processor capability, available memory, storage space and battery life

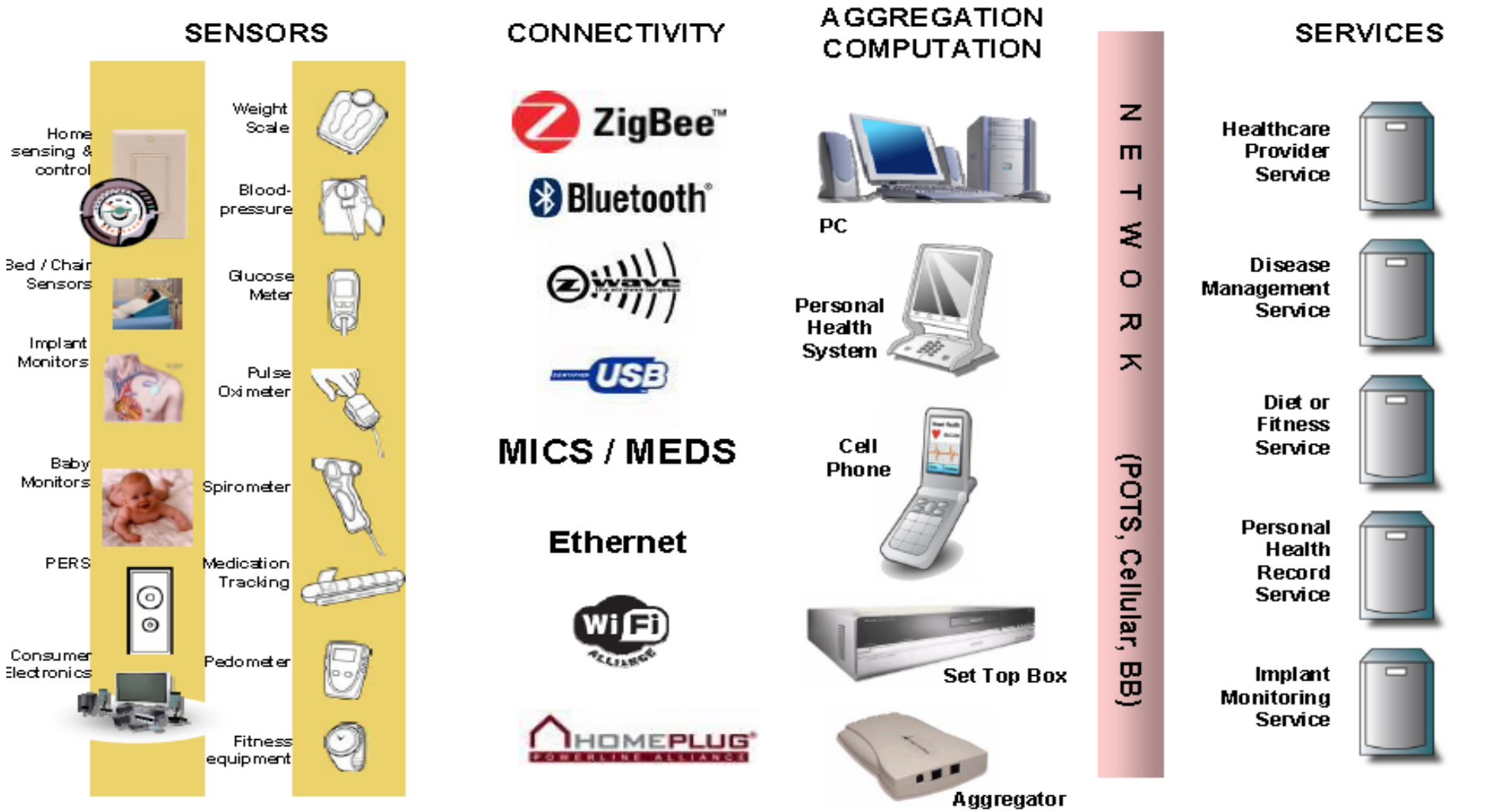
Social and Educational

- Speed of info/rumor delivery
- Tracking of results and proper use of this information
- How to assess e - Education and e - Health on mobile devices
- Mobile roaming is still expensive especially from abroad

Architecture of mobile e-Health applications



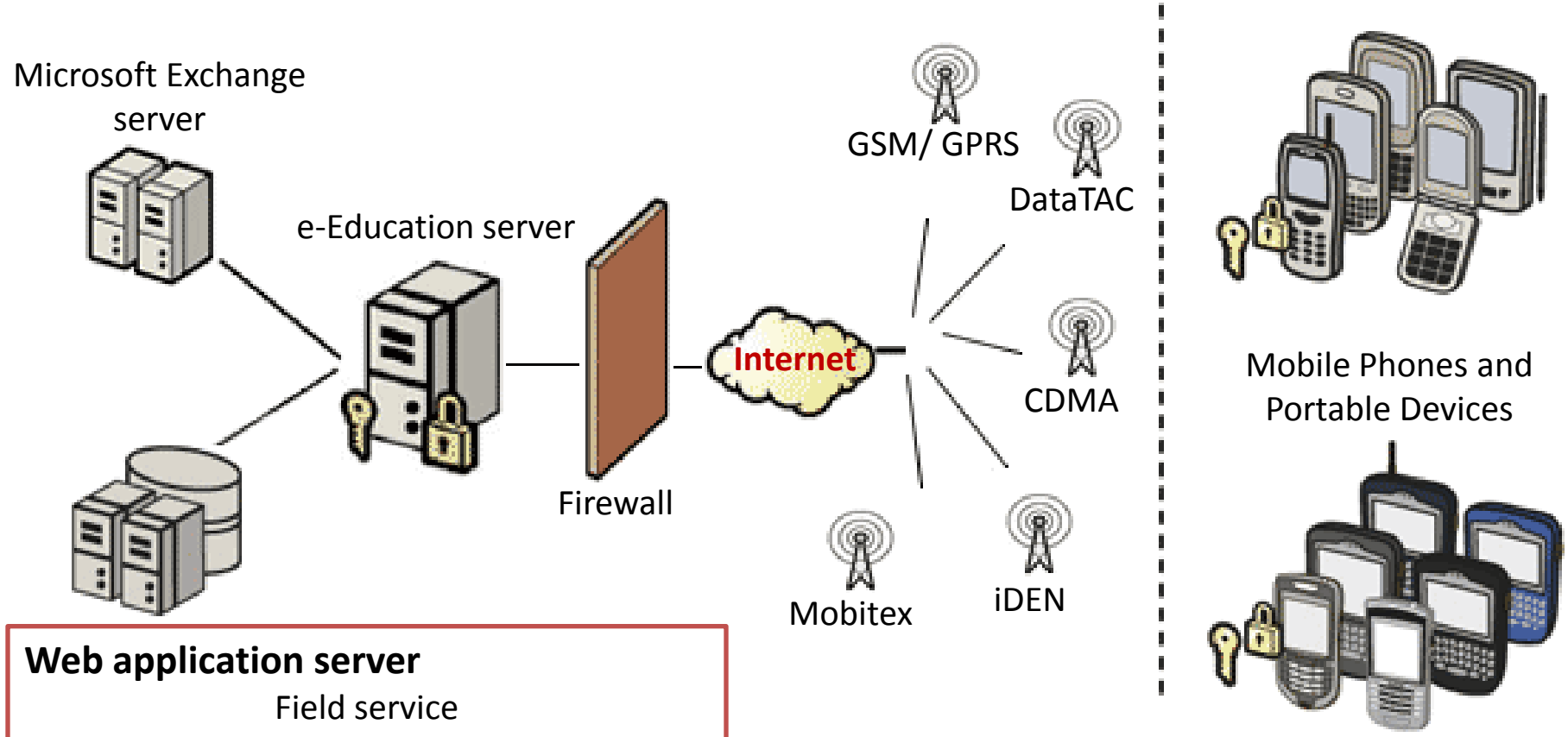
Wireless Sensors and Connectivity Used for E-Health



Architecture of mobile e-education applications

Multiple Types of Data

Multiple Wireless Networks



Web application server

Field service
Enhanced messaging
Field data collection
Microsoft office (Outlook, World, Excel, etc)

Evolving business models for mobile applications

Web based

- Security and privacy
- Variety of Applications and services
- High performance in terms of processor, capacity storage and Memory
- Dynamic and reliable
- Interoperability

Mobile handsets

- Resource Constraints
- Not controlled/ regulated
- Limited Memory
- Limited Performance in terms of processor and battery life

The trend is to adopt the web based model solutions as they carter for the limited memory and processing power of many mobile devices.

Technology neutrality ➡ ***Let the market decide***

The need for workflow efficiency is the main motivation for the **adoption of a multi-layer, web-based architecture**

Documentation support service

View and report service

Security and Authentication Support service

User Layer

IP Net

Web server

SMS, MMS server

WAP gateway

Data access and update service

Health / Education support service

Patient/ student record support service

Middle Layer

Logon DB

Health DB

Education DB

Patient DB

Student DB

Database Layer

Summary

- ✓ Mobile applications enable:
  1. Intelligent personalized information and empowers patients to take a leading role in their own healthcare and education process
  2. Mobility of the learners in the sense that learning contents are accessible virtually from anywhere (Home, Taxi, abroad, etc)

- ✓ TRAs play a great role in the availability of the infrastructure, security and safety measures required for the proper implementation of mobile applications

- ✓ The trend is towards a Web-based business model for e-Health and e-Education mobile applications. However, being a technology-agnostic regulator, the TRA lets the market decide