The Current State of m-Health projects in Russia and in the World

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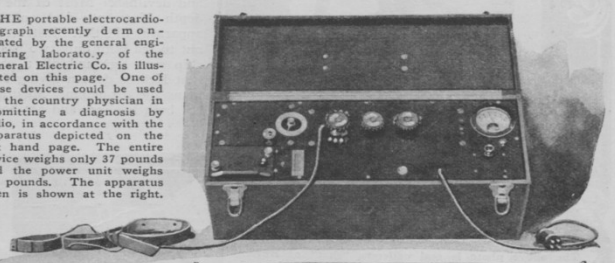
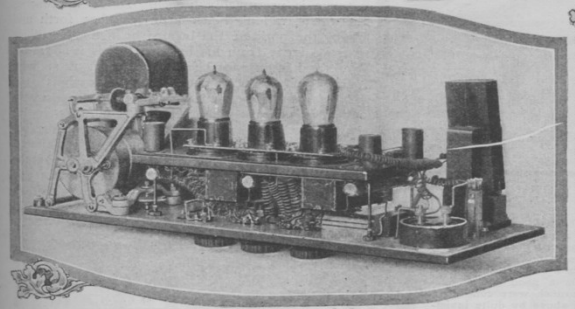
Petrozavodsk-2011

1925

Portable Electrocardiograph

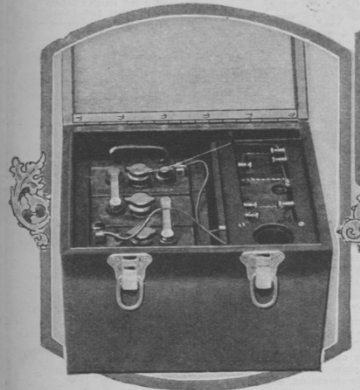
THE portable electrocardiograph recently demonstrated by the general engineering laboratory of the General Electric Co. is illustrated on this page. One of these devices could be used by the country physician in submitting a diagnosis by radio, in accordance with the apparatus depicted on the left hand page. The entire device weighs only 37 pounds and the power unit weighs 33 pounds. The apparatus open is shown at the right.





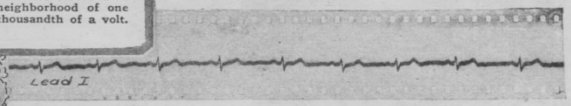
The photo above shows the portable electrocardiograph with the panel board inverted showing the vacuum tubes. In the old style cardiograph elaborate protection against vibration had to be made. Usually vibration-proof foundations were used for the mountings of these instruments. The fragile metal quartz thread used in the former apparatus is dispensed with in this construction.

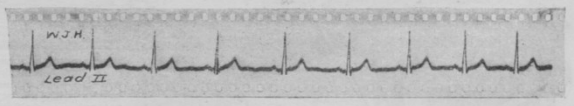
A patient having a cardiogram made is depicted in the above photo. Simple metal electrodes fastened to the arms and legs of the patient are used in place of the wet sponge electrodes formerly employed. The functioning of this instrument is not affected by skin resistance. The results could be transmitted by radio to a consulting physician, telephotographically.

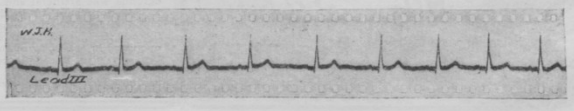


The power unit for the electrocardiograph is illustrated above. At the right are three typical cardiograms used for diagnosing different kinds of heart trouble taken with three different leads. They are caused by a spot of light acting on a moving film strip.

Contraction of the heart muscles is accompanied by or preceded by an electrical manifestation. This electrical change is amplified by vacuum tubes. The voltage before and after the heart beat is in the neighborhood of one one thousandth of a volt.







Garry Shannon, 2006

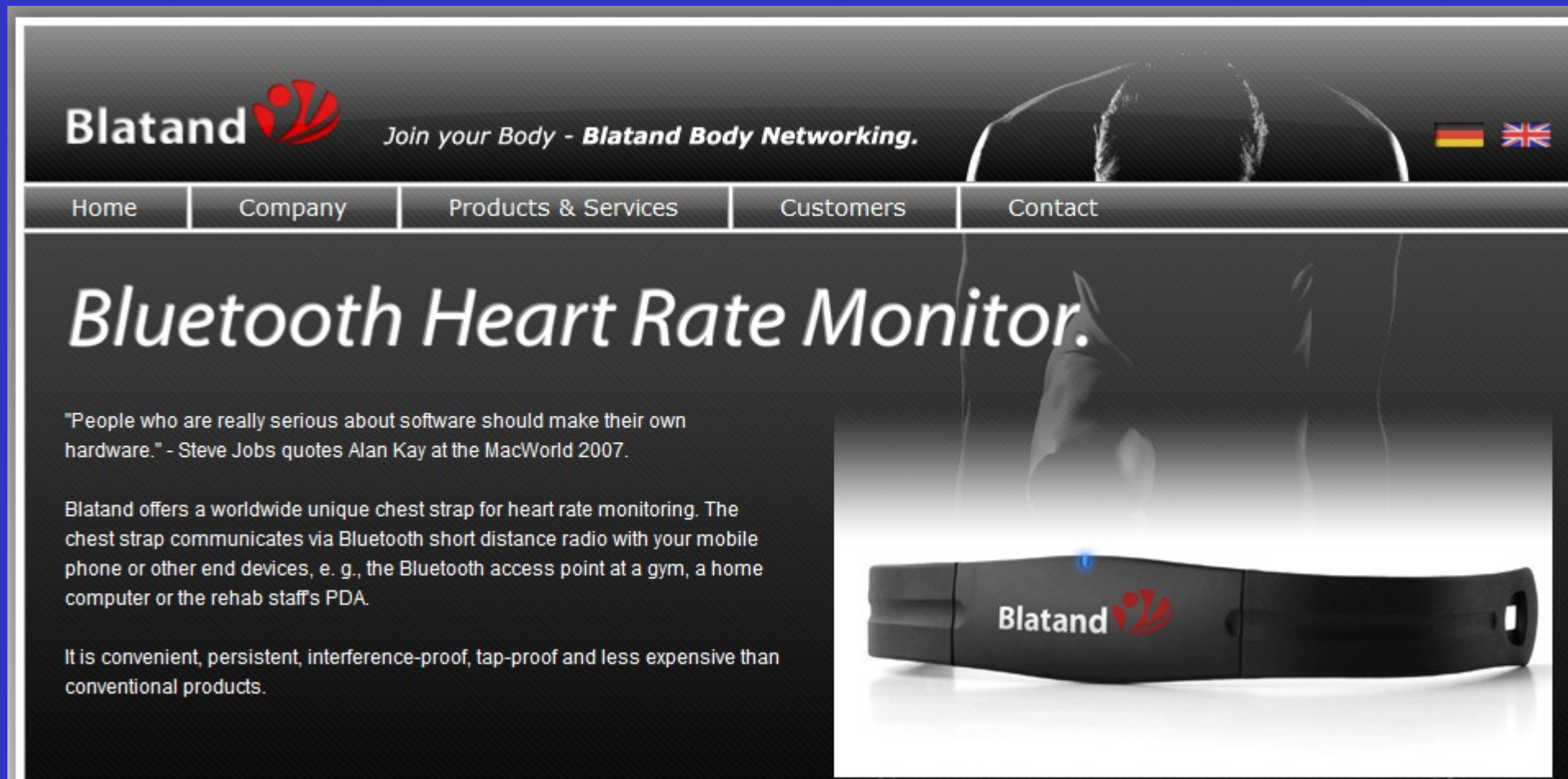
THE VISION

Radio News Magazine1924

The Radio Doctor – Maybe!

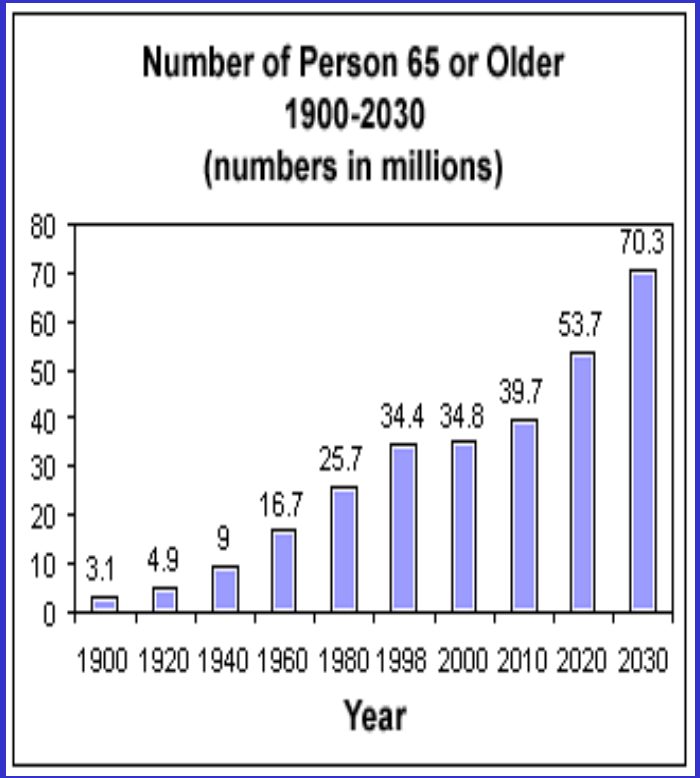
Finally a Reality in 2011

Нагрудный ремешок для мониторинга ЧСС

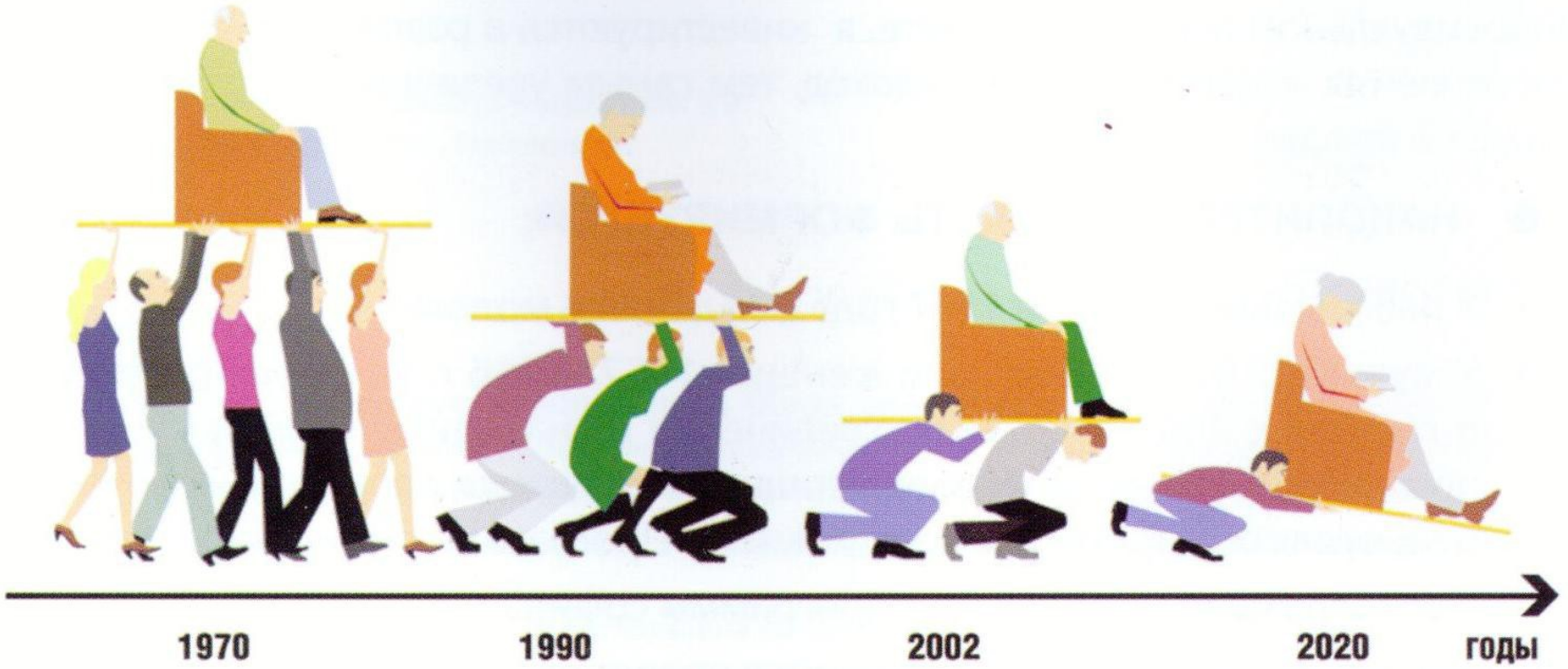


WIRELESS HEALTH MONITORING MARKET

- Ageing population
- Obesity and Diabetes epidemic
- Growing interest in “wellness”
  - In the US alone
    - More than 61.8 million with cardiovascular disease
    - More than 2 million diagnosed with atrial fibrillation (AF) have a 5-6 fold increased likelihood of stroke, > expected to double by 2050
    - Over 31.8 million health club members across 18,203 clubs
  - Potential market
    >US$5 Billion for wireless health monitoring products



Соотношение трудоспособного населения и пенсионеров



Именно поэтому в 2002 году в нашей стране стартовала пенсионная реформа,

eHealth For Urgent Public Health Challenges

Najeeb Al-Shorbaji

Director, Knowledge Management and Sharing

WHO/HQ Geneva

World Health Organization

Introduction

- **mHealth** is the use of mobile communication technologies as an integral part of healthcare delivery.
- **mHealth** is part of eHealth and therefore it carries all of its promises and concerns-plus. mHealth has to be part of an architecture and not another silo in the eHealth arena.
- **Mobile phone** is one of the fastest growing telecommunication infrastructure at both national and global levels. ITU predicts an estimate of 4.6 billion subscriptions globally by end of 2009. It is expected that 45 % of traffic on mobile networks will be data.
- **mHealth** aims to improve healthcare delivery through eCare, eServices, eSurveillance and eLearning.

Call For Presentations - 2010 mHealth Summit Inbox | X

The Foundation for the National Institutes of Health to me show details 22 May (2 days ago)

mHealthSummit

A Public-Private Partnership of the Foundation for the National Institutes of Health

November 8-10, 2010 • WASHINGTON, DC

Walter E. Washington Convention Center

Call For Presentations Now Open!

Abstract Submission Deadline: July 1, 2010 - 11:59 PM EST

The 2010 mHealth Summit will bring together leaders enabling cutting-edge research, evidenced based practice and innovative policy solutions to advance the benefits mobile technology can bring to the health and wellbeing of developed and developing world populations.

We are seeking abstracts for Presentations from the Public and Private Sectors that highlight ground-breaking health research, information and communication technologies, systems architecture and global partnerships that leverage mobile technology to improve global health outcomes.

Additionally, we are seeking Research Technology Demonstrations. Relevant technologies include: Mobile Phones, Smart Phones, Mobile Phone Apps, Global Positioning Systems (GPS), Personal Digital Assistants (PDAs), Mobile Electronic Sensors (e.g., Accelerometers), Portable Physiological Sensors (e.g., Ambulatory Glucose Monitors), Mobile Environmental Sensors, Integrated Mobile Devices, and other Wireless Technologies.

mHealthSummit

TECHNOLOGY • BUSINESS • RESEARCH • POLICY

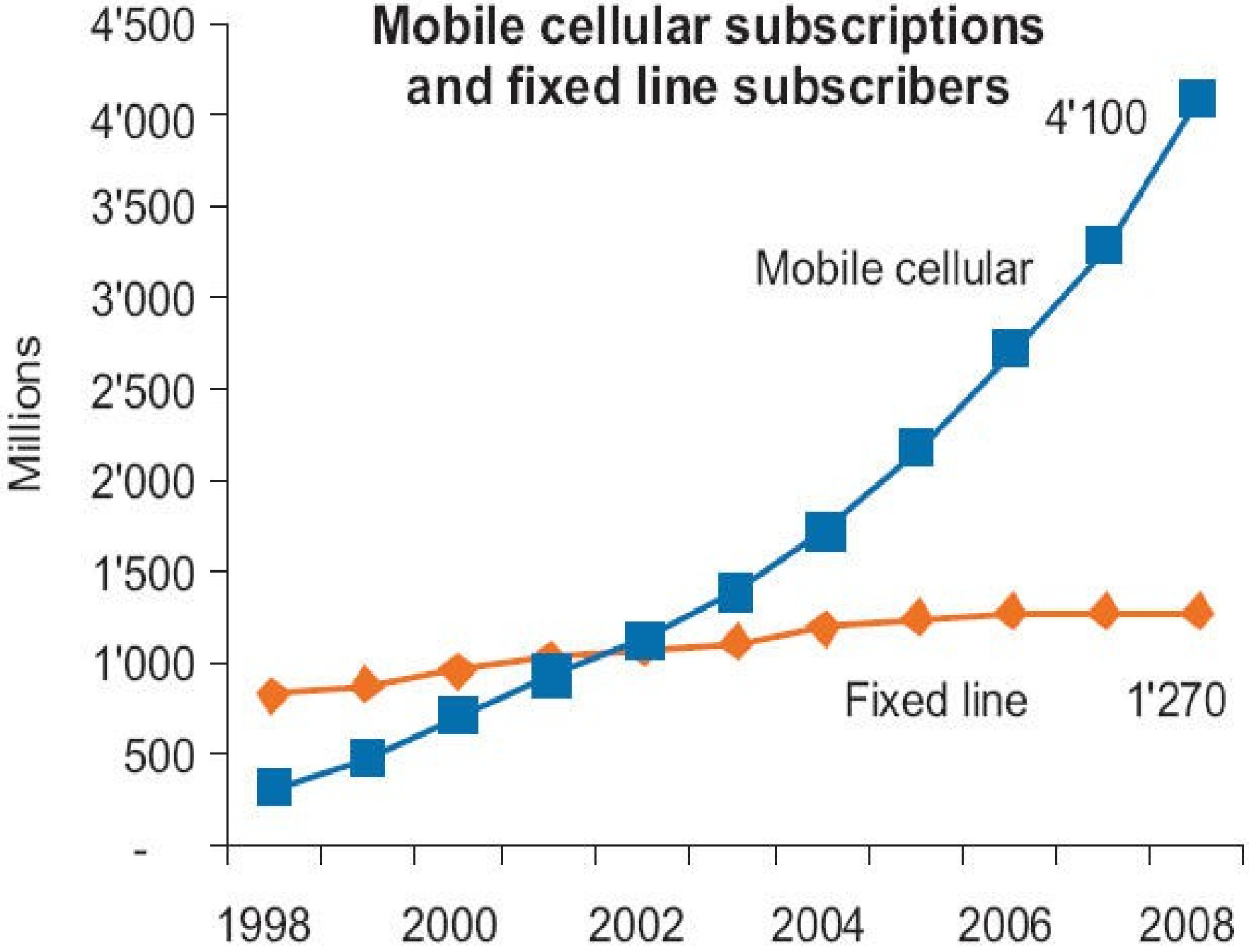
December 5–7, 2011

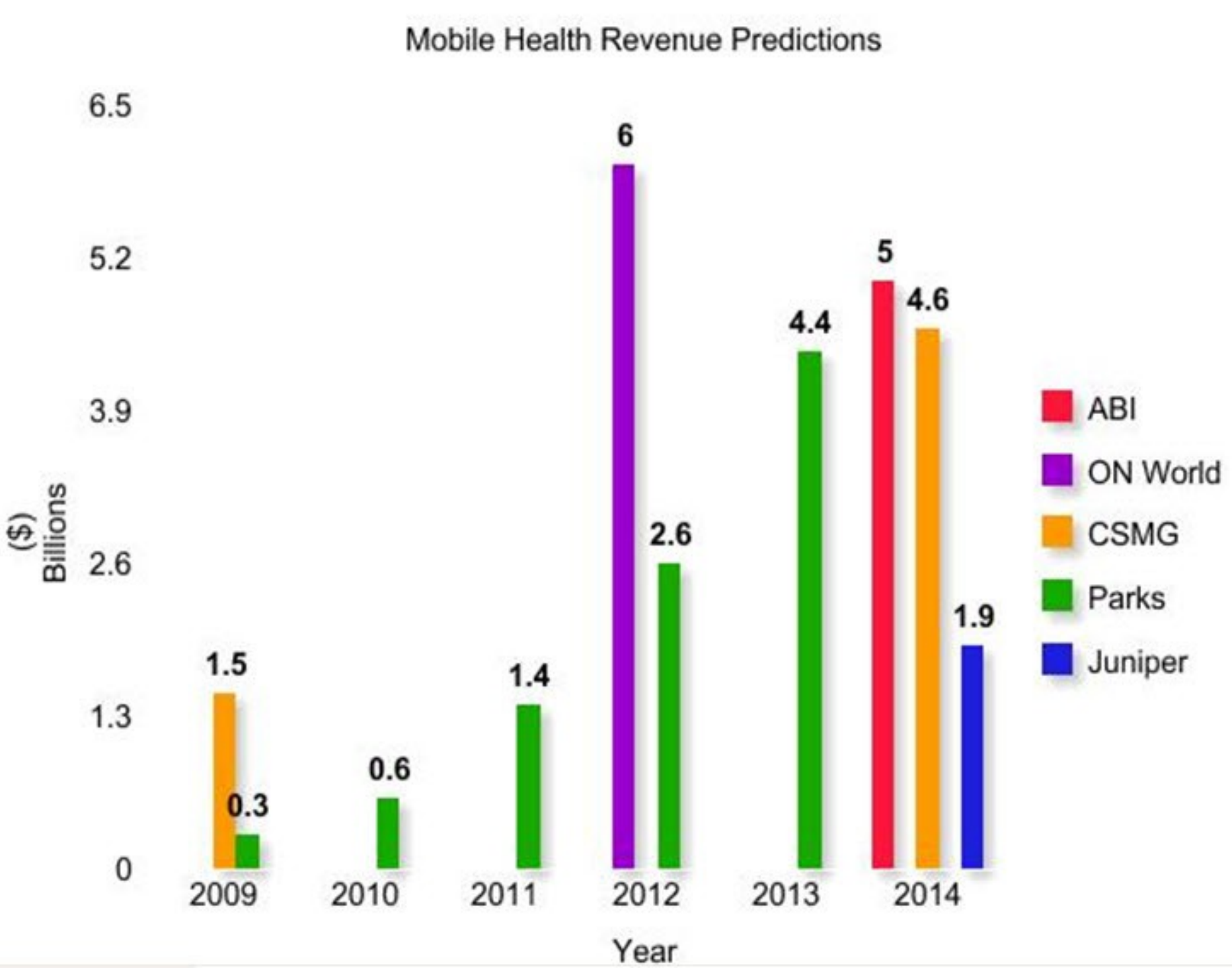
The Gaylord National Resort
and Convention Center
National Harbor, Washington, DC Area

Shaping the Future of mHealth

Where Technology, Business, Research and Policy Connect.

The largest event of its kind, the 3rd annual **mHealth Summit** brings together leaders in government, the private sector, industry, academia, providers and not-for-profit organizations from across the mHealth ecosystem to advance collaboration in the use of wireless technology to improve health outcomes in the United States and abroad. **More**

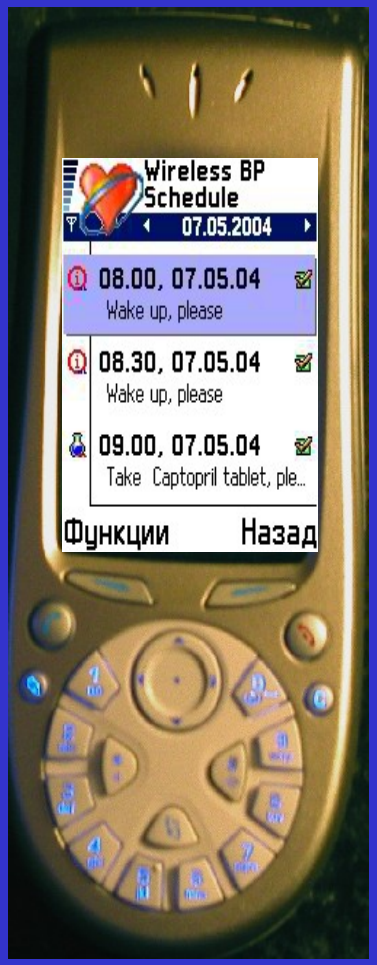

Mobile cellular subscriptions
and fixed line subscribers
4'500
4'000
3'500
3'000
2'500
2'000
1'500
1'000
500
-
Millions
1998
2000
2002
2004
2006
2008
4'100
Mobile cellular
Fixed line
1'270


Mobile Health Revenue Predictions
6.5
5.2
3.9
2.6
1.3
0
($) Billions
1.5
0.3
0.6
1.4
6
2.6
4.4
5
4.6
1.9
2009
2010
2011
2012
2013
2014
Year
ABI
ON World
CSMG
Parks
Juniper

Wireless Technologies for Remote Health Monitoring

- Wireless Real-Time Cardio Monitor(2G/3G)
  - Real-Time Information from Cardio Monitoring Systems
  - Oriented to open market: Patients, Relatives, Aged, Medical Staff
    - Estimating heart rate, blood pressure
    - Forecasting and Warning of the possible dangers and critical states
    - Transmit information in real-time to relatives and/or medical staff
    - Communication using 2G/3G cell networks, WiMAX, LTE etc.
    - Simple and user-friendly devices

Blood Pressure Monitoring



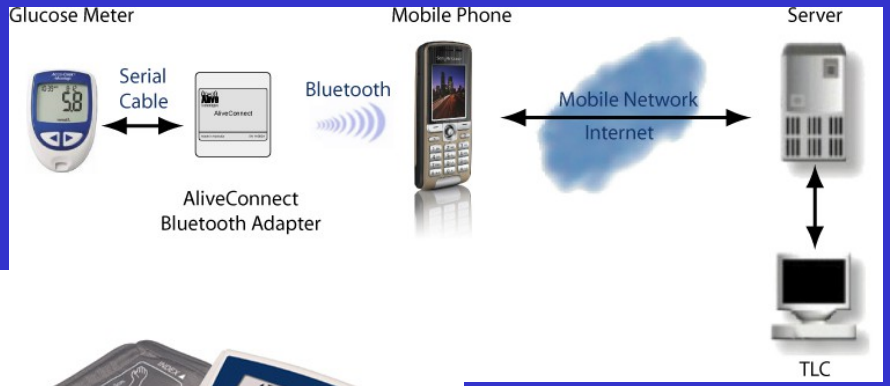
Audio and Visual Remindings

Remindings on Pills

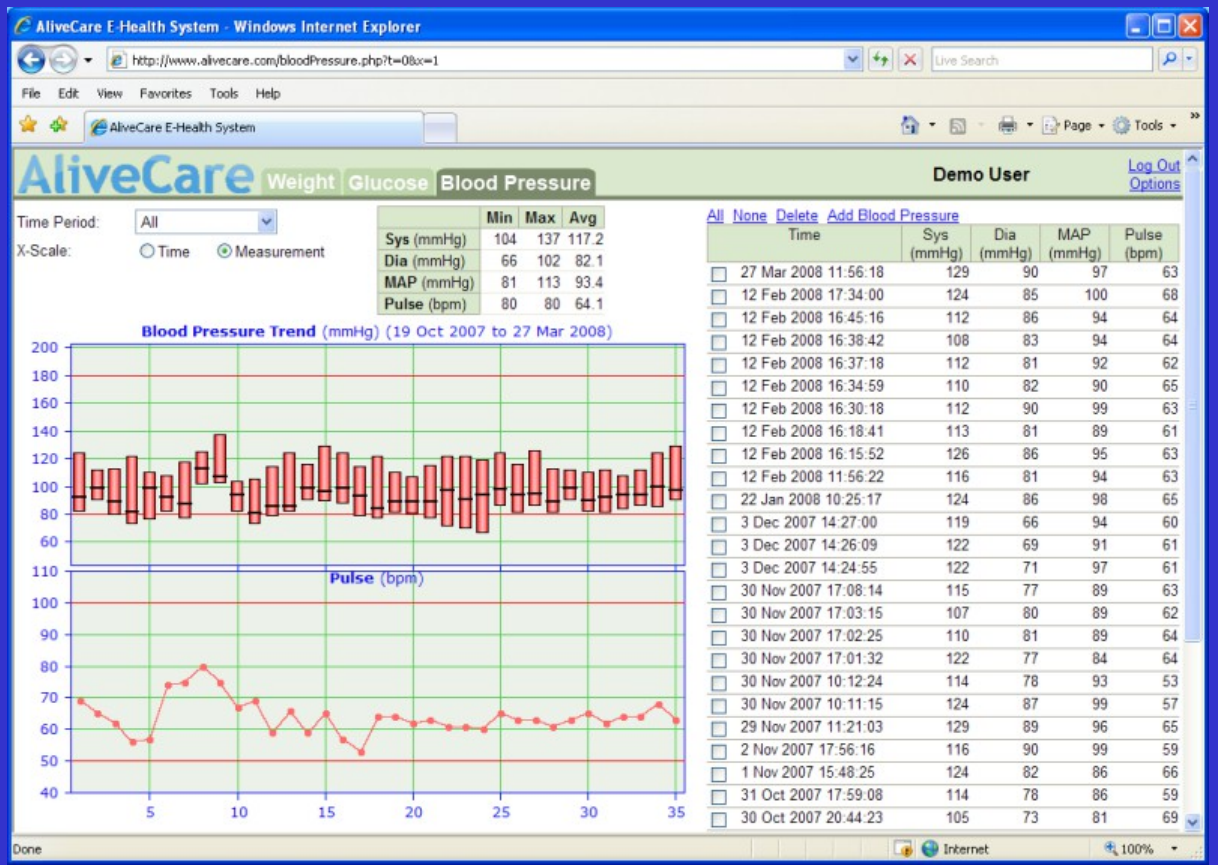
Physician's access to Patient data on Server

Programs are developed for different mobile operating systems (Symbian, Android, Windows Mobile, W7, MAEMO, MeGo, etc.)

AliveCare



Automatically records weight, blood pressure and blood glucose via Bluetooth to online Personal Health Record (PHR)
-integrates with Microsoft HealthVault and Google Health



Nonin Onyx 2 9560 Bluetooth Wireless Finger Pulse Oximeter with FREE case!!

WORKS WITH Microsoft® HealthVault™

NONIN

NONIN PureSAT® | SpO2

9560 Onyx II

The first wireless fingertip pulse oximeter

Oximetry Unplugged – Revolutionizing Disease Management With the increased need for remote disease management, there is an opportunity to provide oximetry monitoring solutions to simplify the exchange of secure information.

Glucose level monitoring

Alive Technologies

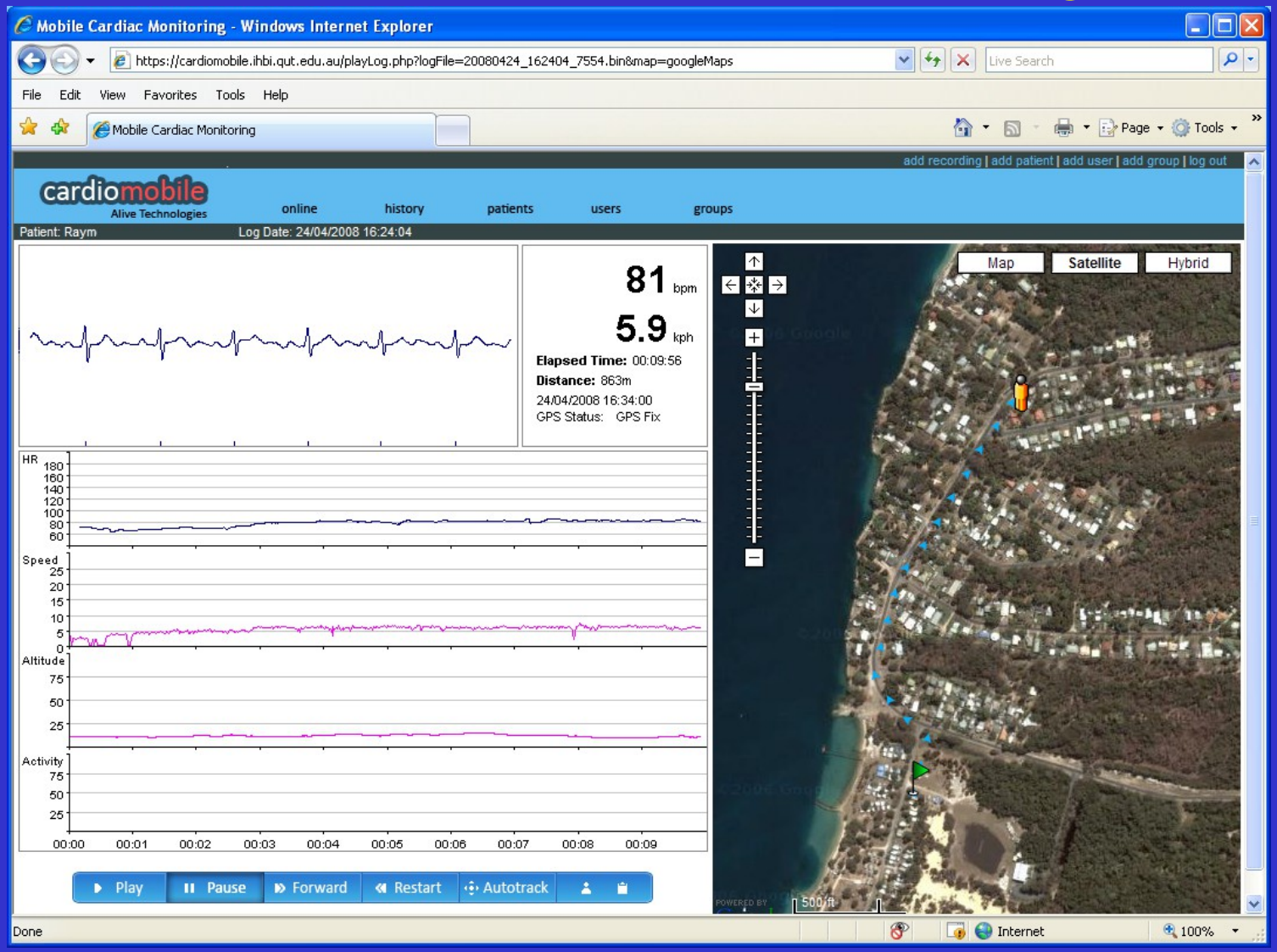
Mobile Cardiac Monitoring

Bluetooth® ECG and Activity Monitor

Applications

- Cardiac Rehab
- Cardiovascular Screening
- Home Monitoring
- Disease Management
- Atrial Fibrillation Screening
- Mobile Telemedicine
- Activity Monitoring
- Falls Monitoring
- Fitness Monitoring
- Sports Training

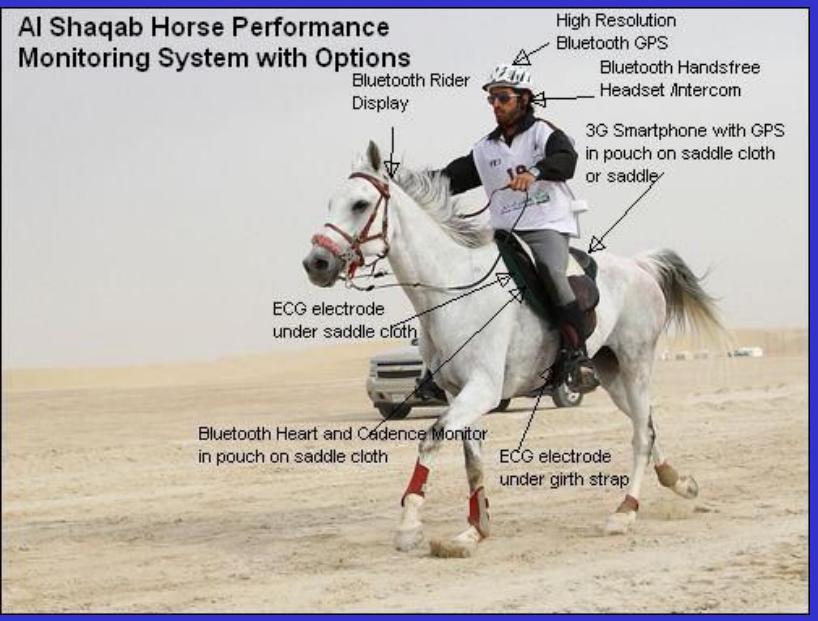
Cardiomobile
Remote Exercise Monitoring



AliveSport
Sports Performance Monitoring

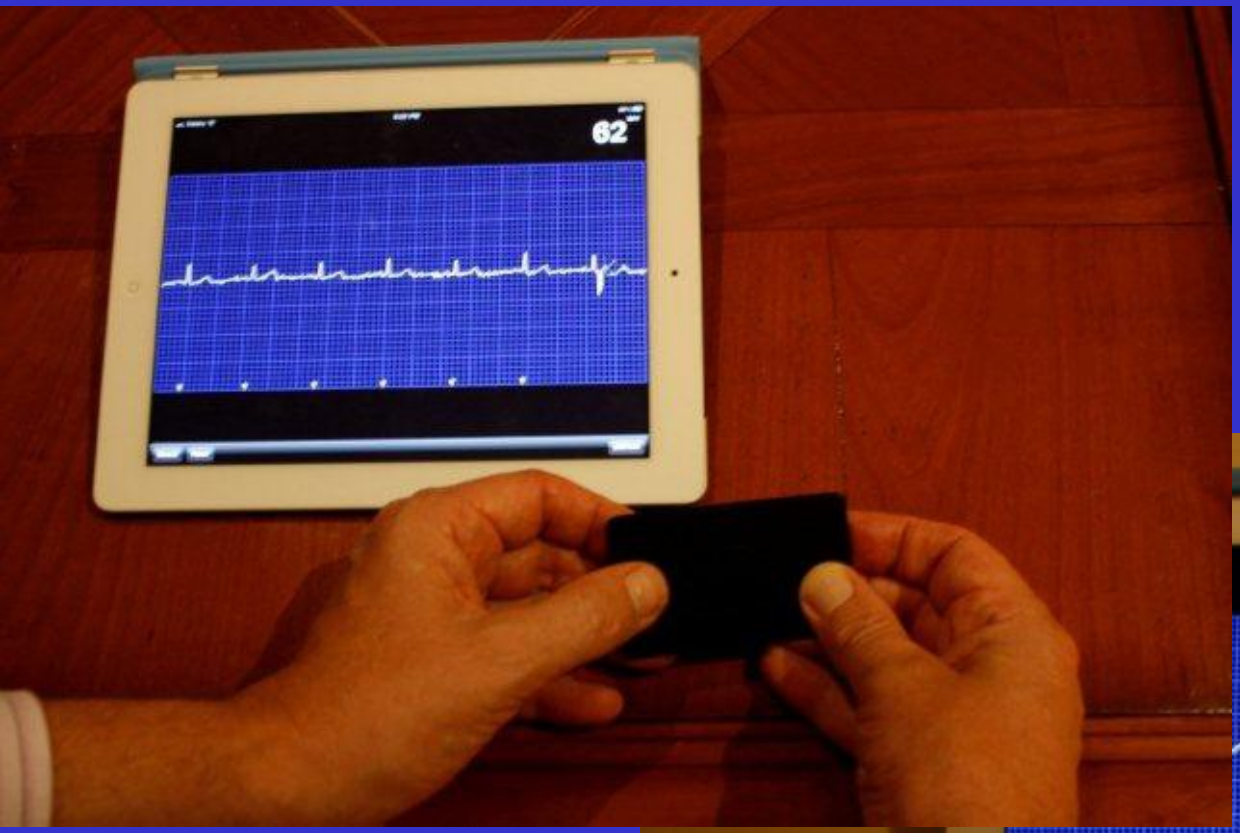
www.alivesport.com

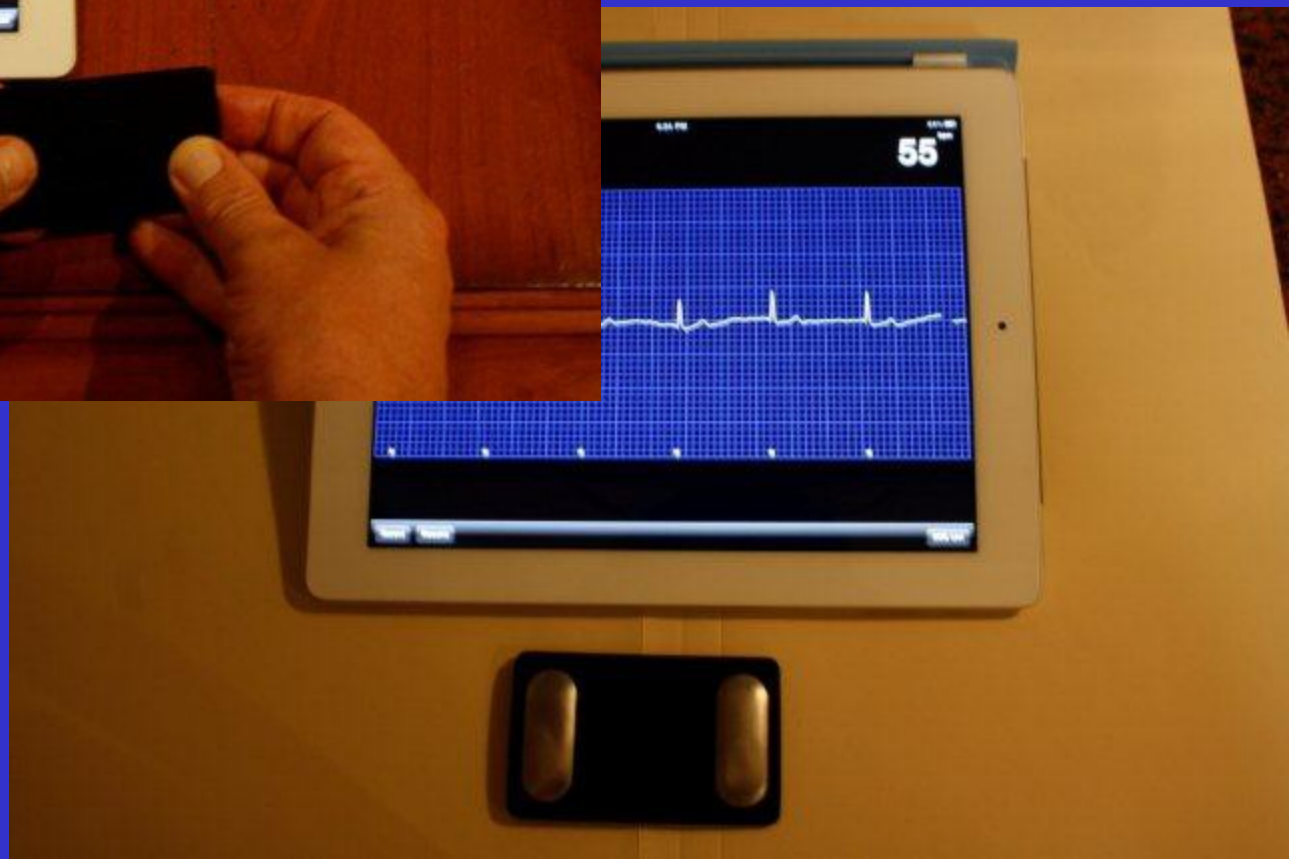
Alive Equine Performance Monitoring System




SAFE
EXERCISE

AliveCor iPhone ECG


62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Общая схема решения

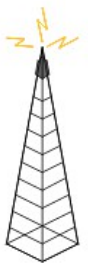
Измеритель Давления

Кардиодатчик

Глюкометр

Bluetooth

Телефон пациента



СОТОВЫЕ СЕТИ

Врач

Интернет

СЕРВЕР МОНИТОРИНГА

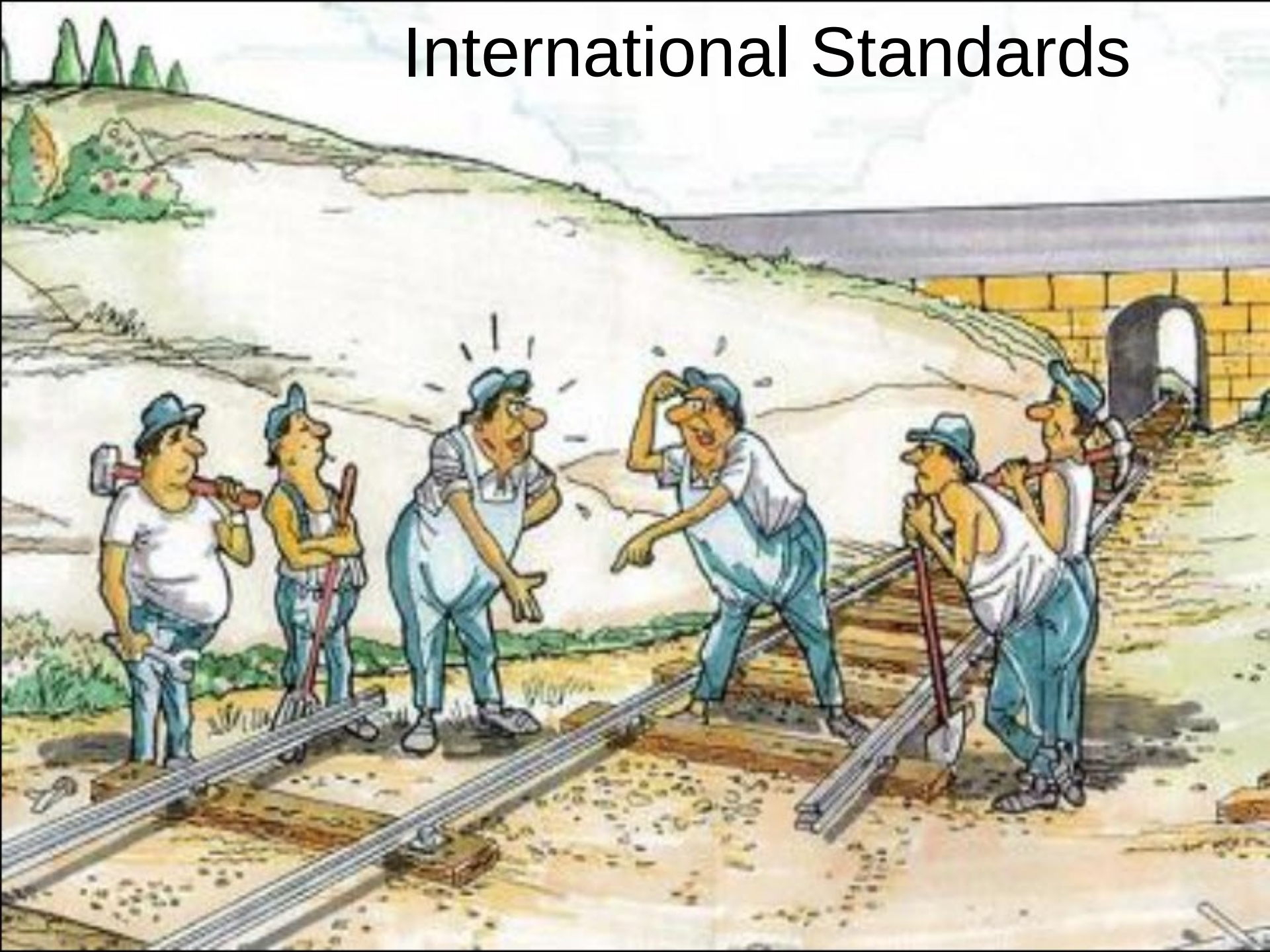
Стационарное рабочее место

Мед@рхив
Найди своего доктора!

Google health

Сервисы персональных медицинских карт

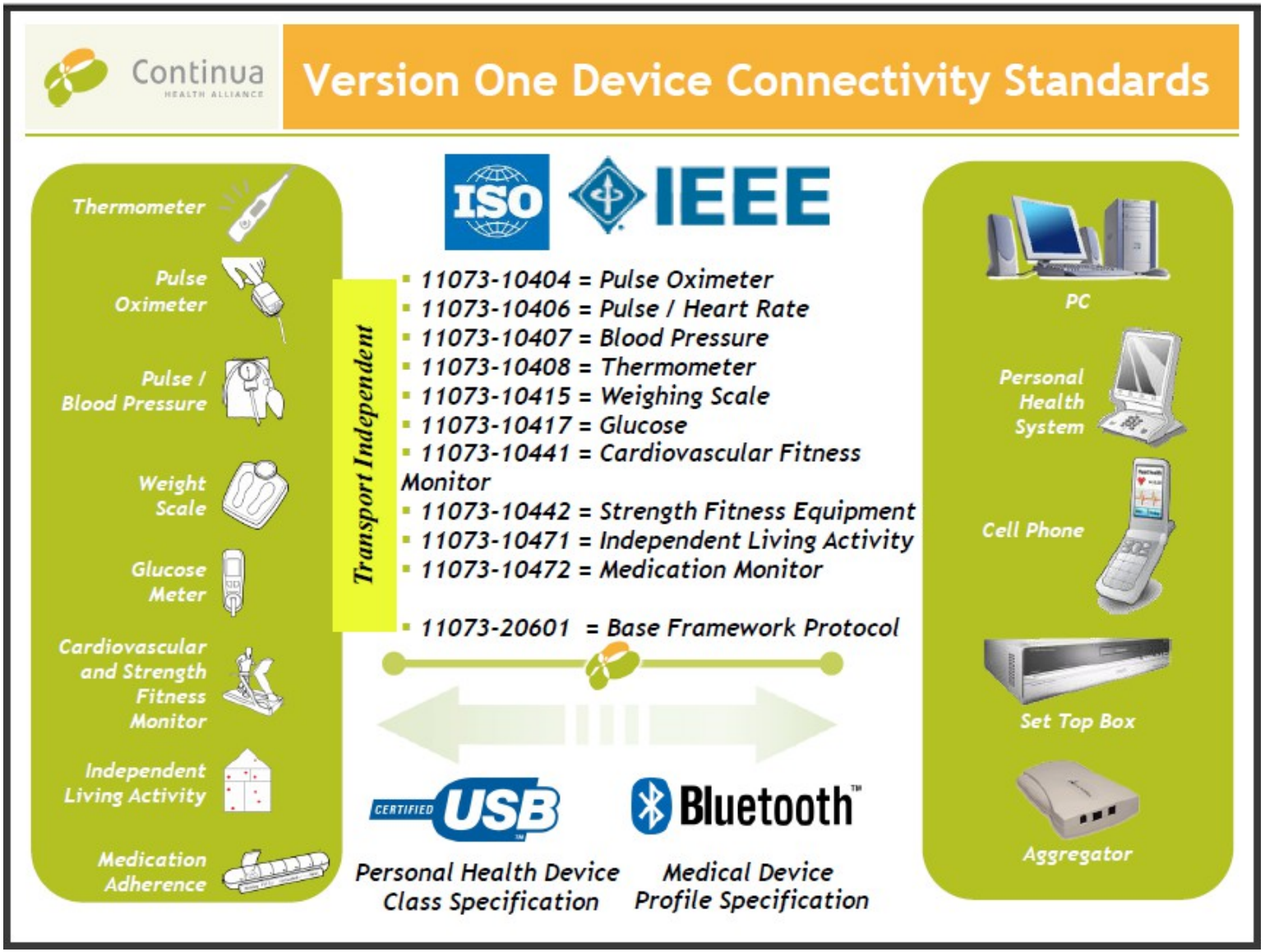
International Standards



STANDARDS FOR INTEROPERABILITY

- Bluetooth SIG Medical Device Working Group (MED WG)
  - Formed 2006
  - Currently 125 members representing 33 Companies
  - Developed *Bluetooth* Health Device Profile (HDP) approved in June 2008 by Bluetooth SIG and available for public download
  - New standard for *Bluetooth* low energy health and fitness devices
- Continua Health Alliance
  - Are companies dedicated to making personal tele-health a reality.
  - Developing design guidelines and product certification programs
  - Collaborating to address regulatory and cost issues for personal tele-health systems.
  - Have adopted *Bluetooth* HDP
  - ISO /IEEE 11073 standards

International standards for mobile health - Continua Allaince



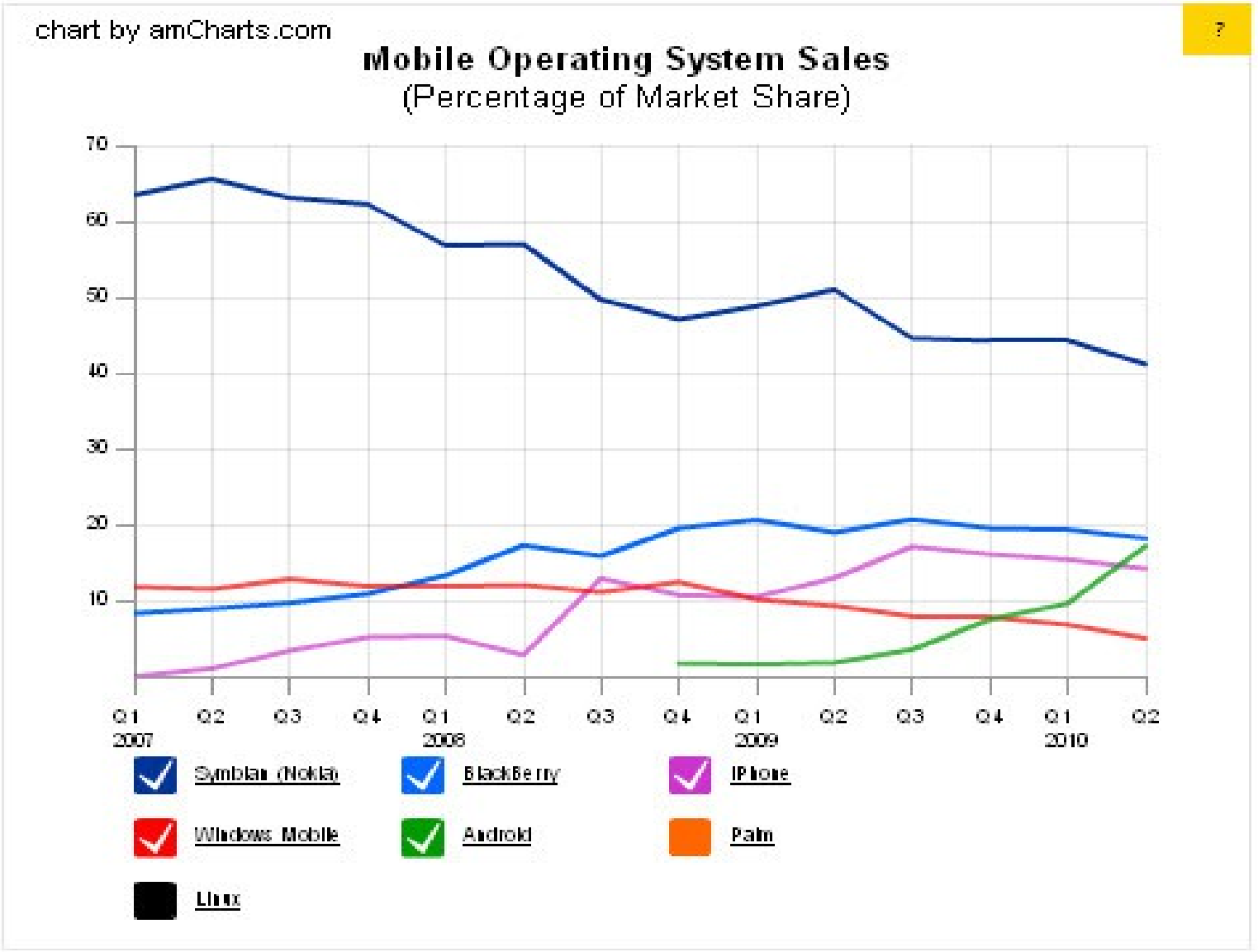
Economical benefits of remote patient monitoring (RPM)

Heart Failure Care Comparison:
RPM vs. Standard Care and Disease Management, Per Patient Per Year

	Management Cost	Average Readmissions	Cost of Readmissions‡‡	Gross Savings v. RPM	Net Savings v. RPM
RPM	$2,052 - Technology* $2,082 - Technology & DM†	0.552§	$5,632		
Disease Management	$750‡	1.116**	$11,387	$5,755	$3,703
Standard Care	0	1.320††	$13,468	$7,836	$5,034

New England Healthcare Institute, 2009
Remote Physiological Monitoring

Problem- too many mobile operating systems



Boston Scientific: *LATITUDE®*

BIOTRONIK: *Home Monitoring®*

Medtronic, Inc.: *CareLink®*

St. Jude Medical: *Merlin*

What to do in order to decrease traffic via cellular networks?

- To compress raw data on the phone
- To analyze raw data on the phone before transmitting to the healthcare provider
- To identify person, transmitting data

Enhanced Real-Time ECG Coder for Packetized Telecardiology Applications

Álvaro Alesanco, Salvador Olmos, *Member, IEEE*, Robert S. H. Istepanian, *Senior Member, IEEE*, and José García

***Abstract*—A new real-time compression method for electrocardiogram (ECG) signals has been developed based on the wavelet transform approach. The method is specifically adaptable for packetized telecardiology applications. The signal is segmented into beats and a beat template is subtracted from them, producing a residual signal. Beat templates and residual signals are coded with a wavelet expansion. Compression is achieved by selecting a subset of wavelet coefficients. The number of selected coefficients depends on a threshold which has different definitions depending on the operational mode of the coder. Compression performance has been tested using a subset of ECG records from MIT-BIH Arrhythmia database. This method has been designed for real-time packetized telecardiology scenarios both in wired and wireless environments.**

a heart attack in progress and preserving heart muscle function [5]. Although store-and-forward ECG transmission is also possible from the ambulance to the hospital, real-time ECG monitoring by a cardiologist in a hospital would be more convenient because it allows a reduction in the time needed for patient's evaluation once it arrives to the hospital. These effects are specially crucial in cases where the transportation time is long [6], [7].

During the last years, the increasing popularity of Internet has made that the TCP/IP protocol stack has been implemented in the network and transport layers in almost every communication network [8]. Wireless networks which formerly were imple-

Smart Phone-Based Automatic QT Interval Measurement

ET Lim, X Chen, CT Ho, ZK Tin, M Sankaranarayanan

Institute for Infocomm Research, Singapore

Abstract

A smart phone-based automatic QT interval measurement system was developed. The system can assist pharmaceutical company in QT prolongation assessment prior to new drug approval. The ECG signal is captured by wearable sensor and processed on the smart phone. The processed results are sent using cellular network to the internet server. Cardiologist can quickly analyze the results. It shortens the time for data collection. Besides, it is convenient for the test subjects as they do not need to visit the lab frequently.

prior to new drug approval. The smart phone receives ECG data from a wearable ECG sensor via Bluetooth connection and calculate the QT interval in real-time. The results are sent using cellular network to the internet server. Cardiologist can quickly access the data through internet browser. It shortens the time for data collection. Besides, it is convenient to the test subjects as they do not need to visit the lab frequently.

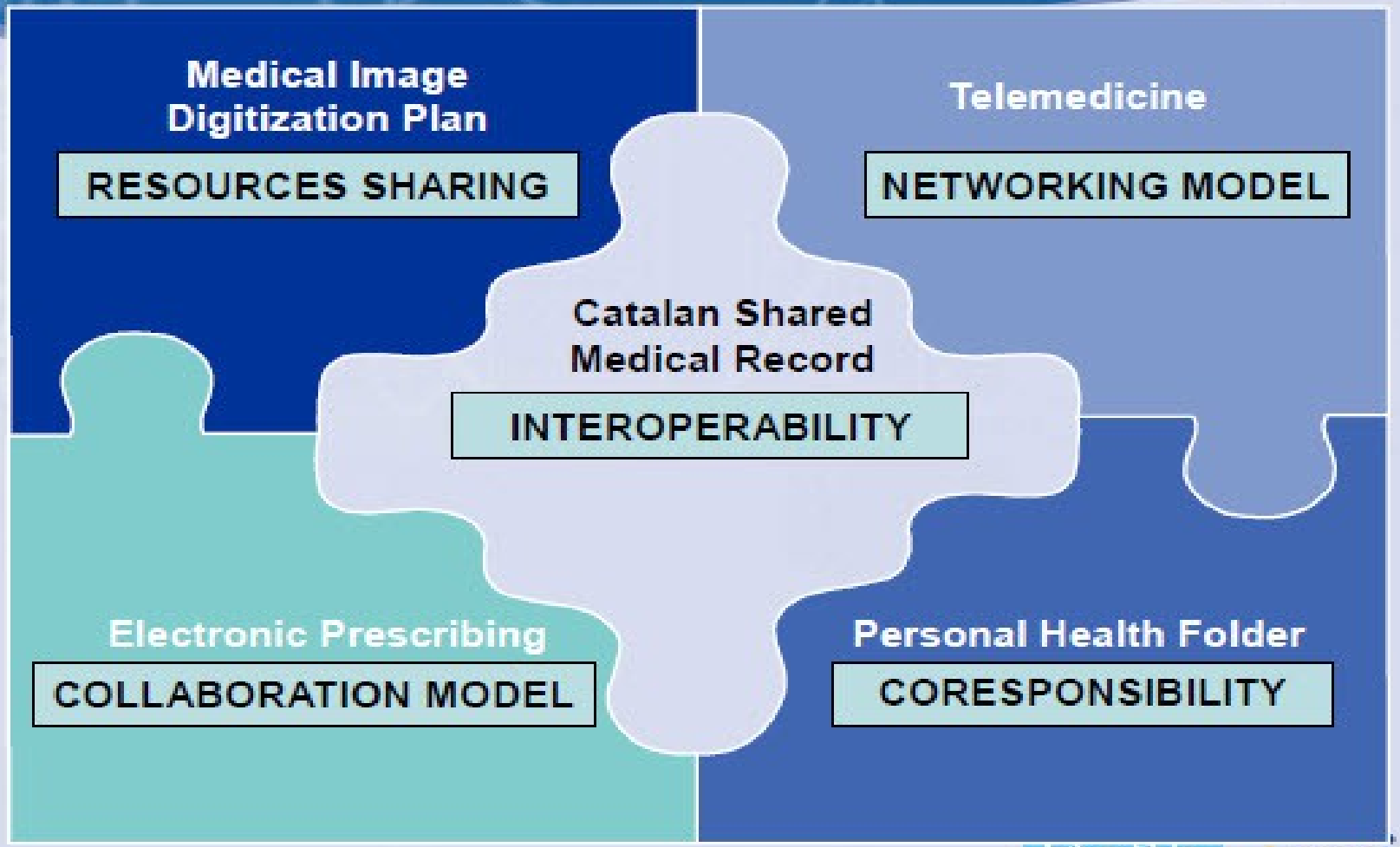
2. Methods

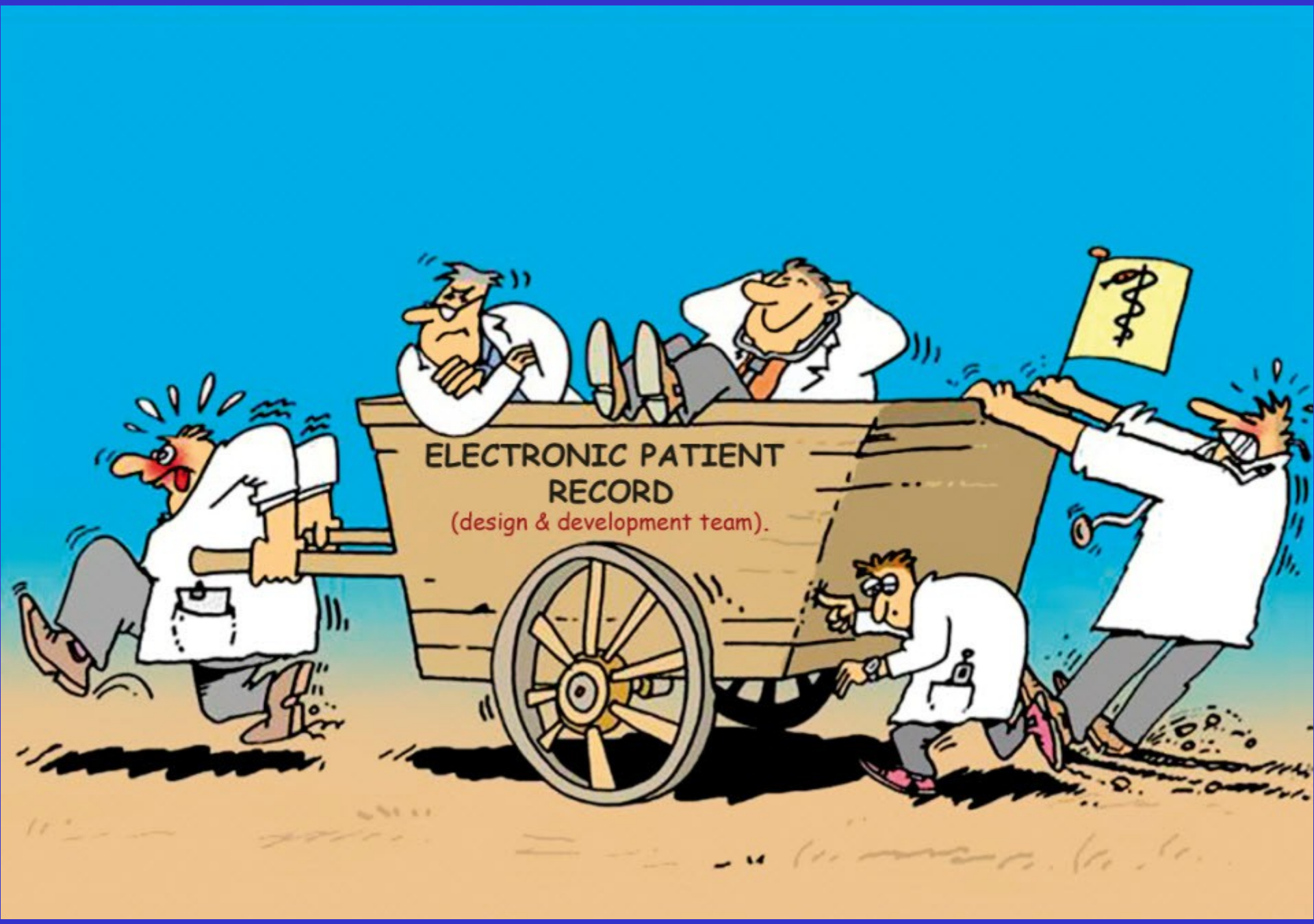
The embedded algorithm on smart phone first detects QRS complex using slope method [3]. Based on the

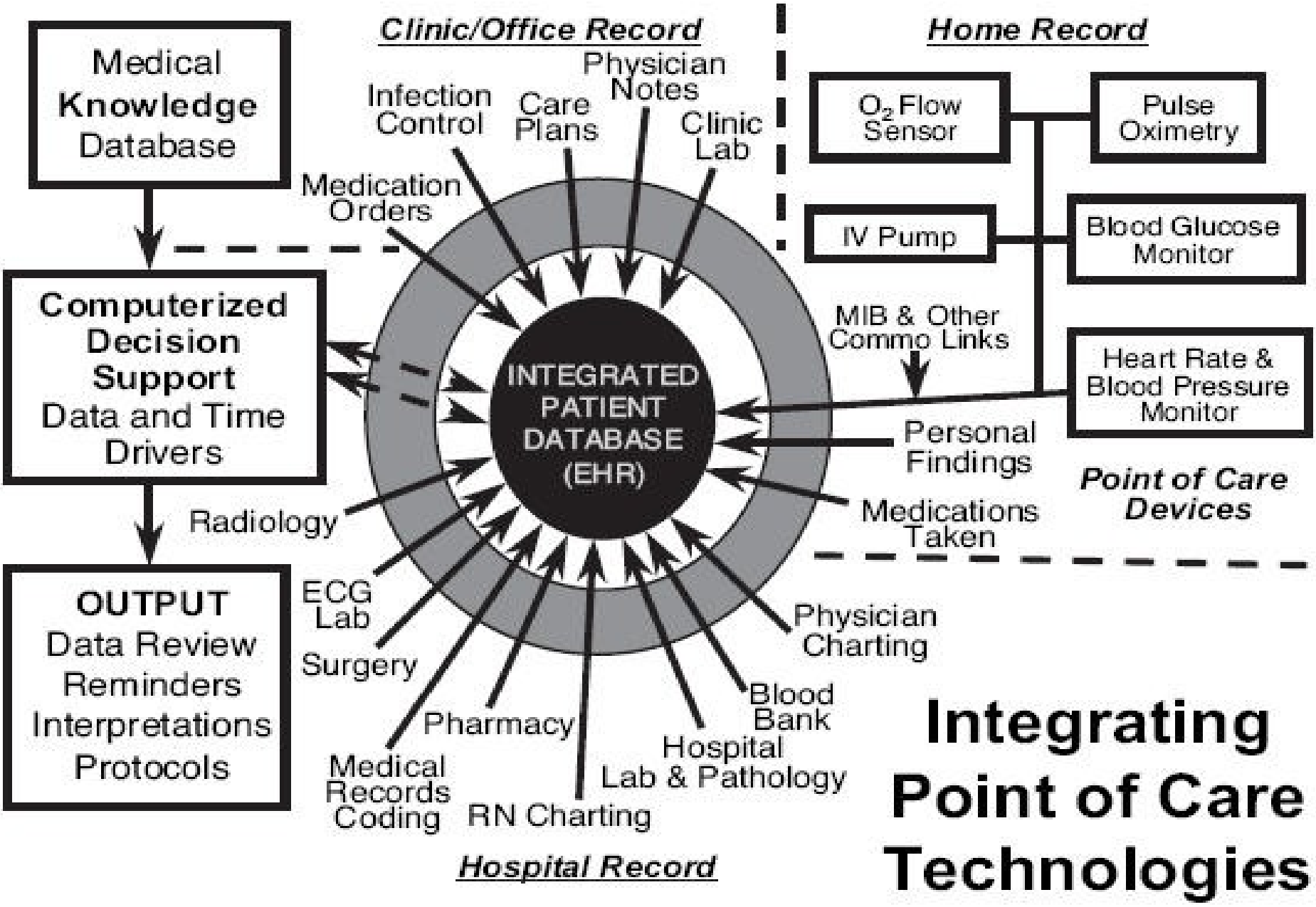
Computers in Cardiology 2007;34:645–648.

Analysis of ECG on a Smartphone

The ICT projects – GOVERNING CHARACTERISTICS




ELECTRONIC PATIENT
RECORD
(design & development team).


Medical Knowledge Database
Computerized Decision Support Data and Time Drivers
OUTPUT Data Review Reminders Interpretations Protocols
Clinic/Office Record
Home Record
Infection Control
Care Plans
Physician Notes
Clinic Lab
Medication Orders
INTEGRATED PATIENT DATABASE (EHR)
O2 Flow Sensor
Pulse Oximetry
IV Pump
Blood Glucose Monitor
MIB & Other Commo Links
Heart Rate & Blood Pressure Monitor
Personal Findings
Medications Taken
Point of Care Devices
Radiology
ECG Lab
Surgery
Pharmacy
Medical Records Coding
RN Charting
Hospital Lab & Pathology
Blood Bank
Physician Charting
Hospital Record
Integrating Point of Care Technologies

Main Players in Russia

- Ministry of Public Health – plans to install 10 000 mobile systems in 2011 and 15 000 in 2012 (ECG and BP monitoring)
- Schools of Medicine – Moscow State University, Krasnoyarsk ,Nizhny-Novgorod
- Technical Universities – Moscow, St. Petersburg, Krasnoyarsk
- Companies – Nokia, AND, Megafon, Alive Technologies, Private Medical Companies (Medsi, etc.)

CONCLUSIONS

mHealth technology

- enhancing health services and outcomes while controlling costs by helping people to better manage their own health.
- large market need
- opportunities for device manufacturers, healthcare providers and mobile carriers.

“What healthcare needs now is a daily dose of vitamin-M.”

From Healthcare IT News

Questions ?

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Skype ID: omedvedev