The Abdus Salam
International Centre for Theoretical Physics

United Nations
Educational, Scientific and
Cultural Organization

IAEA
International Atomic Energy Agency

2342-2

Scientific m-Learning

4 - 7 June 2012

m-Learning Tools and Applications

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m-Learning Tools and Applications

Scientific m-learning @ ICTP , Italy

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Mobile & Wireless Learning

- Mobile = Wireless
- Wireless ≠ Mobile (not always)
- M-learning is always mobile and wireless.
- E-learning can be wireless but not mobile

Smart ☺ Phones

- Combines PDA and Mobile Connectivity.
- Supports Office Applications
- WLAN, UMTS, High Resolution Camera
- GPS, Accelerometer, Compass
- Large Display, High End Processor, Memory and long lasting battery.

The Revolution ..

- Psion Organizer II
- 8 bit processor
- 9V Battery
- OPL – Language
- Memory Extensions, plug-ins
- Birth of Symbian

1984

2012

History of Smartphone

- 1994 : IBM Simon
- First “Smartphone”
- PIM, Data Communication

History

Psion Series 5. Source: mobile2day.de

- 1997: Psion Series 5 (EPOC 32 bit multitasking OS)
- 1998: Symbian Ltd. is founded
- 2000: First Symbian OS phone: Ericsson R380

Ericsson R380

The First Nokia Smartphones

- 2001 : Nokia 7650
- GPRS : HSCSD
- Light – Proximity Sensor
- Symbian OS !
- Nokia N95 (March 07)
- Having almost all features

S60 and UIQ

- **S60 (Series 60)**
  - Developed by Nokia
  - Licensed to other manufacturers
  - Optimized for one-handed use

UIQ

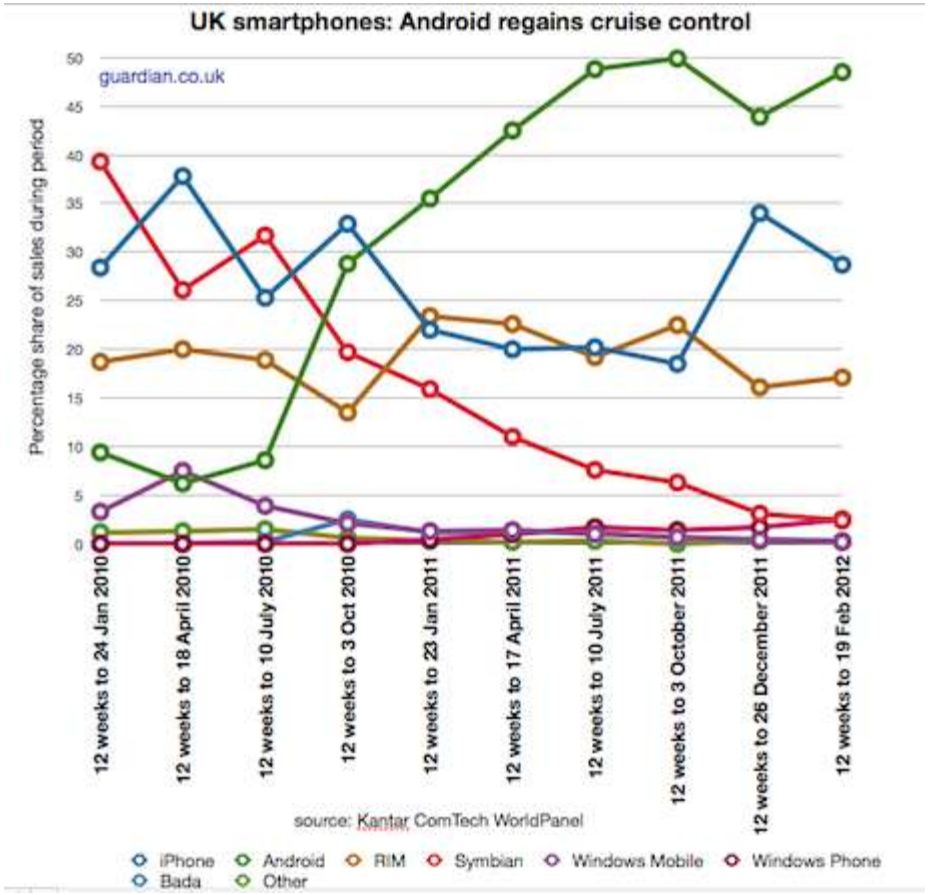
- Has just been bought by SonyEricsson
- Mainly touch screen interface (+ combinations)


mobica
myspace
Imagination
TapRoot
T··Mobile·
gemalto
TELECA
SYMSOURCE
OMRON
Bank of America
TietoEnator
NOKIA
symbian
SanDisk
L&T Infotech
sesca
docomo
ST ERICSSON
Atelier
OPERA
ARM
KTF
Sony Ericsson
fiander
SYMBIAN
digia
SIRF
SoftBank
freescale
at&t
Aplix
TRANGO
IXONOS
SHARP
COMARCH
FUJITSU
BROADCOM
ACRODEA
INNOPATH
scalado
FUJISOFT
plusmo
WIPRO
BRYCEN Co.,Ltd.
Xenient
sasken
redbend
SAMSUNG
HUAWEI
VISA
RENESAS
INTRINSYC
virtualLogix
QUALCOMM
vodafone
AOL
cell telecom

Know your target-know your device

- Better to develop apps for the market dominant devices in order to reach maximum targets
- Comparison can be based on platform, manufacturer, functionalities
- Know your regional preferences also.

Market Share-UK Smartphone



Some Comparisons

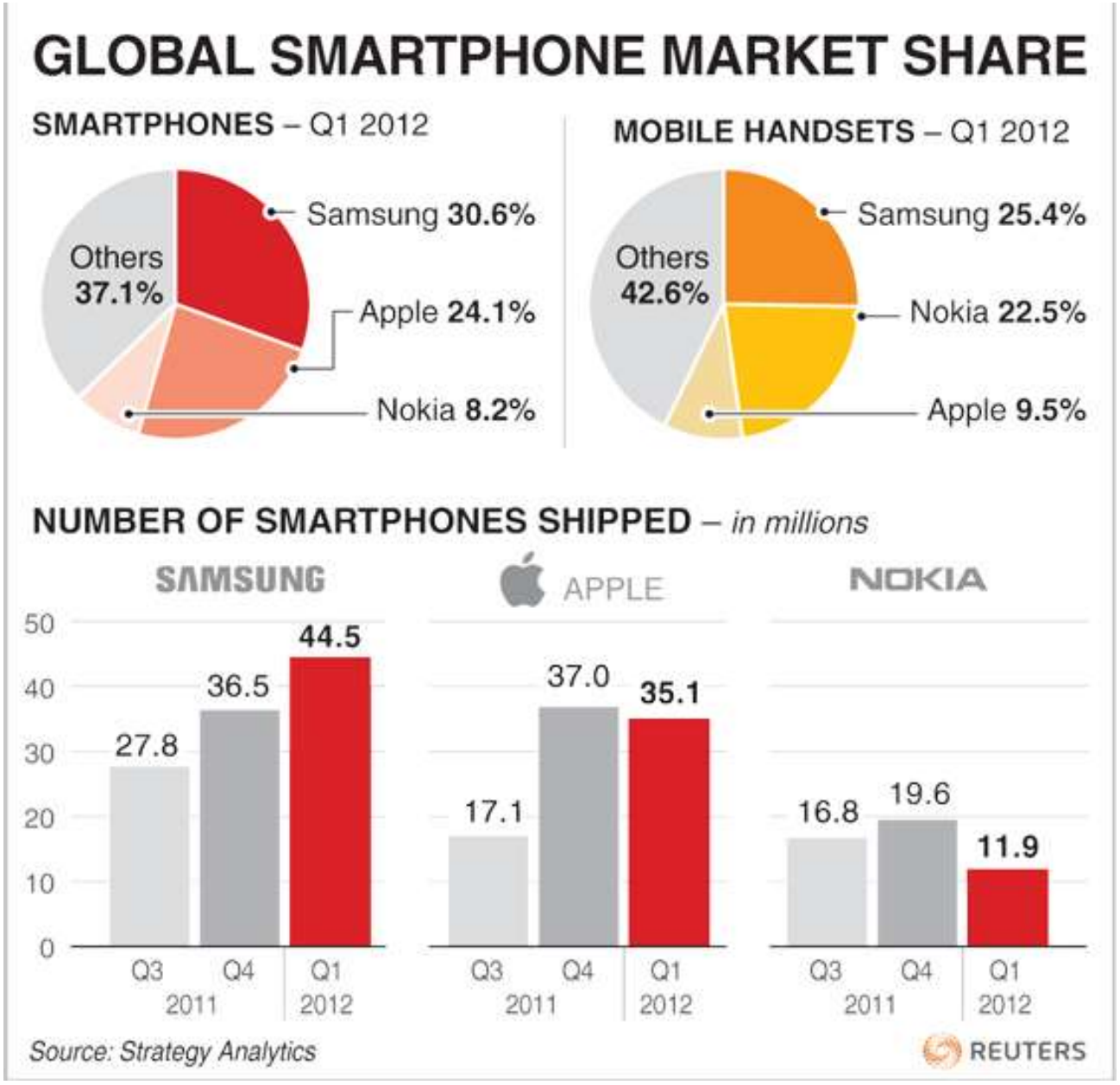
Sources: Reuters and Gartner

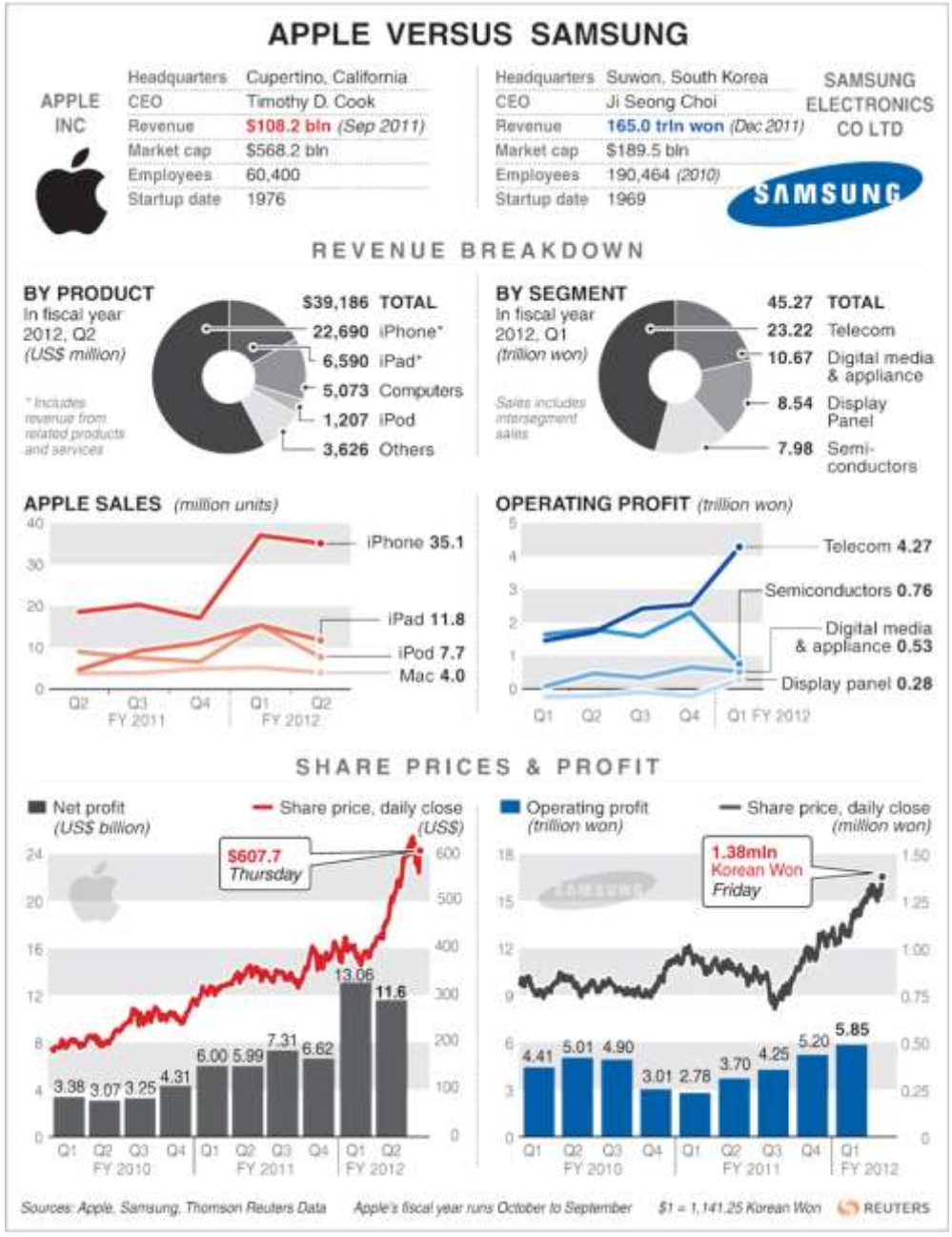
SMARTPHONE COMPARISON

Specs	Apple iPhone 4S	Nokia Lumia 800	Samsung Galaxy S III	Motorola Droid Razr	HTC Sensation XL
Display	3.5 inch Retina 960 x 640 p	3.7 inch AMOLED 800 x 480 p	4.8 inch, 1,280 x 720 p HD Super AMOLED	4.3 inch, 960 x 540 p Super AMOLED Adv.	4.7 inch, WVGA 800 x 480 p
Depth	9.3 mm	12.1 mm	8.6 mm	7.1 mm	9.9 mm
Weight	140 g	142 g	133 g	133 g	162.5 g
Processor	Dual-core A5 chip	1.4 GHz single-core	1.2 GHz dual-core	1.2 GHz dual-core	1.5 GHz single-core
Operating System	iOS 5	Windows Phone 7.5 Mango	Android 4.0 Ice Cream Sandwich	Android 2.3.5 Gingerbread	Android 2.3.5 Gingerbread
Memory	1 GB	512 MB	Not available	1 GB	768 MB
Camera	8 MP rear, VGA front	8 MP	8 MP rear, 1.9 MP front	8 MP rear, 1.3 MP front	8 MP rear, 1.3 MP front
Video	HD (1080p) up to 30 fps	HD (1280p) 30 fps	HD (1080p)	HD (1080p)	HD (720p)
Storage	16GB / 32GB / 64GB	16GB	16GB / 32GB	16GB	16GB, 32GB
Battery	8 h (3G talk time) 6 h (3G internet) 200 h (standby)	1,450 mAh 9.5 h (3G talk time) 335 h (standby)	2,100 mAh	1,780 mAh	1,600 mAh 6h 50min (3G talk time) 460 h (3G standby)
Features	Siri, iCloud	Free navigation service	S Voice, face recognition	Ultra thin	Beats Audio technology
Launch	Oct. 14, 2011	Oct. 26, 2011	End-May, 2012	Nov 11, 2011	Nov 2011

Source: Manufacturer websites

REUTERS


GLOBAL SMARTPHONE MARKET SHARE
SMARTPHONES – Q1 2012
Others 37.1%
Samsung 30.6%
Apple 24.1%
Nokia 8.2%
MOBILE HANDSETS – Q1 2012
Others 42.6%
Samsung 25.4%
Nokia 22.5%
Apple 9.5%
NUMBER OF SMARTPHONES SHIPPED – in millions
SAMSUNG
APPLE
NOKIA
50
40
30
20
10
0
27.8
36.5
44.5
17.1
37.0
35.1
16.8
19.6
11.9
Q3 Q4 Q1
2011 2012
Source: Strategy Analytics
REUTERS


APPLE VERSUS SAMSUNG
APPLE INC
Headquarters Cupertino, California
CEO Timothy D. Cook
Revenue $108.2 bln (Sep 2011)
Market cap $568.2 bln
Employees 60,400
Startup date 1976
SAMSUNG ELECTRONICS CO LTD
Headquarters Suwon, South Korea
CEO Ji Seong Choi
Revenue 165.0 trln won (Dec 2011)
Market cap $189.5 bln
Employees 190,464 (2010)
Startup date 1969
SAMSUNG
REVENUE BREAKDOWN
BY PRODUCT
In fiscal year 2012, Q2
(US$ million)
* Includes revenue from related products and services
$39,186 TOTAL
22,690 iPhone*
6,590 iPad*
5,073 Computers
1,207 iPod
3,626 Others
BY SEGMENT
In fiscal year 2012, Q1
(trillion won)
Sales includes intersegment sales
45.27 TOTAL
23.22 Telecom
10.67 Digital media & appliance
8.54 Display Panel
7.98 Semi-conductors
APPLE SALES (million units)
iPhone 35.1
iPad 11.8
iPod 7.7
Mac 4.0
Q2 Q3 Q4 Q1 Q2
FY 2011 FY 2012
OPERATING PROFIT (trillion won)
Telecom 4.27
Semiconductors 0.76
Digital media & appliance 0.53
Display panel 0.28
Q1 Q2 Q3 Q4 Q1 FY 2012
SHARE PRICES & PROFIT
Net profit (US$ billion)
Share price, daily close (US$)
$607.7 Thursday
3.38 3.07 3.25 4.31 6.00 5.99 7.31 6.62 13.06 11.6
Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2
FY 2010 FY 2011 FY 2012
Operating profit (trillion won)
Share price, daily close (million won)
1.38mln Korean Won Friday
4.41 5.01 4.90 3.01 2.78 3.70 4.25 5.20 5.85
Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1
FY 2010 FY 2011 FY 2012
Sources: Apple, Samsung, Thomson Reuters Data
Apple's fiscal year runs October to September
$1 = 1,141.25 Korean Won
REUTERS

TABLETS COMPARED

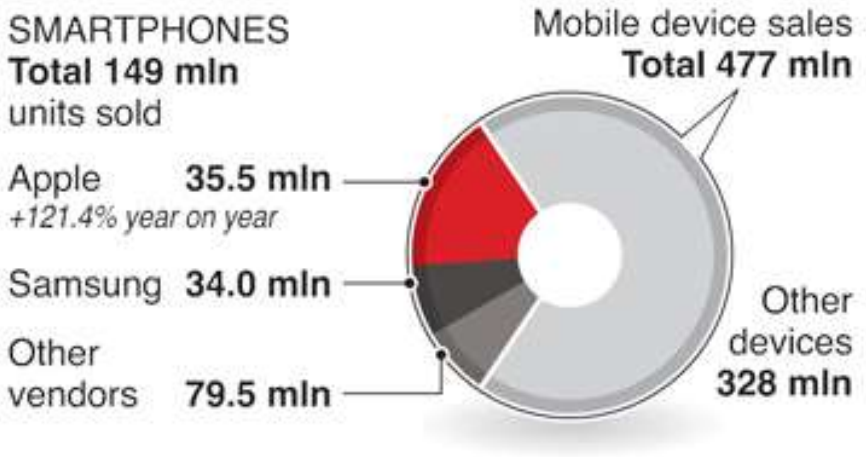
Specs	Apple – The new iPad	Samsung Galaxy Tab 10.1	Motorola Droid Xyboard	Kindle Fire
Display	9.7 inch	10.1 inch	10.1 inch	7 inch
Resolution	2048 x 1536 pixels	1280 x 800 pixels	1280 x 800 pixels	1024 x 600 pixels
Storage	16, 32, 64 GB	16, 32, 64 GB	16, 32, 64 GB	8 GB
Camera	5 megapixels rear VGA camera front	3 megapixels rear, 2 megapixels front	5 megapixels rear, 1.3 megapixels front	no camera
Processor	Dual core	1 Ghz dual core	1.2 Ghz dual core	1 Ghz dual core
Network connections	Wi-Fi only, Wi-Fi plus 4G LTE	4G LTE, Wi-Fi, Bluetooth	4G LTE, Wi-Fi, Bluetooth, acts as a mobile hotspot for up to 8 devices	Wi-Fi only
Size (mm)	241.2 x 185.7 x 9.4	246.2 x 170.4 x 10.9	253.9 x 173.6 x 8.8	119.4 x 190.5 x 11.4
Weight	652g, 662g *(Wi-Fi + 4G)*	565g	603g	414g
Price US$	$500 to $829	$499.99 to $629.99	$429.99 to $729.99	$199

Sources: Apple, Samsung, Motorola, Amazon

REUTERS

SMARTPHONE SALES

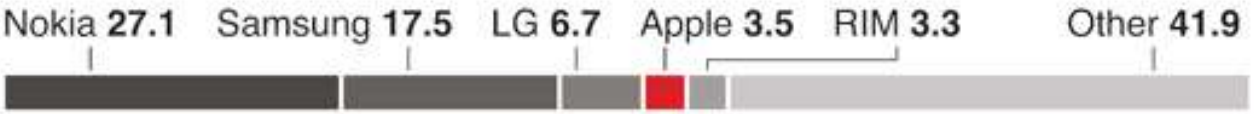
Worldwide smartphone sales to end users soared to 149 million units in the fourth quarter of 2011. Apple had an exceptional fourth quarter, selling 35.5 million units, and became the world's largest smartphone vendor



The iPhone 4s was announced on Oct. 4, 2011

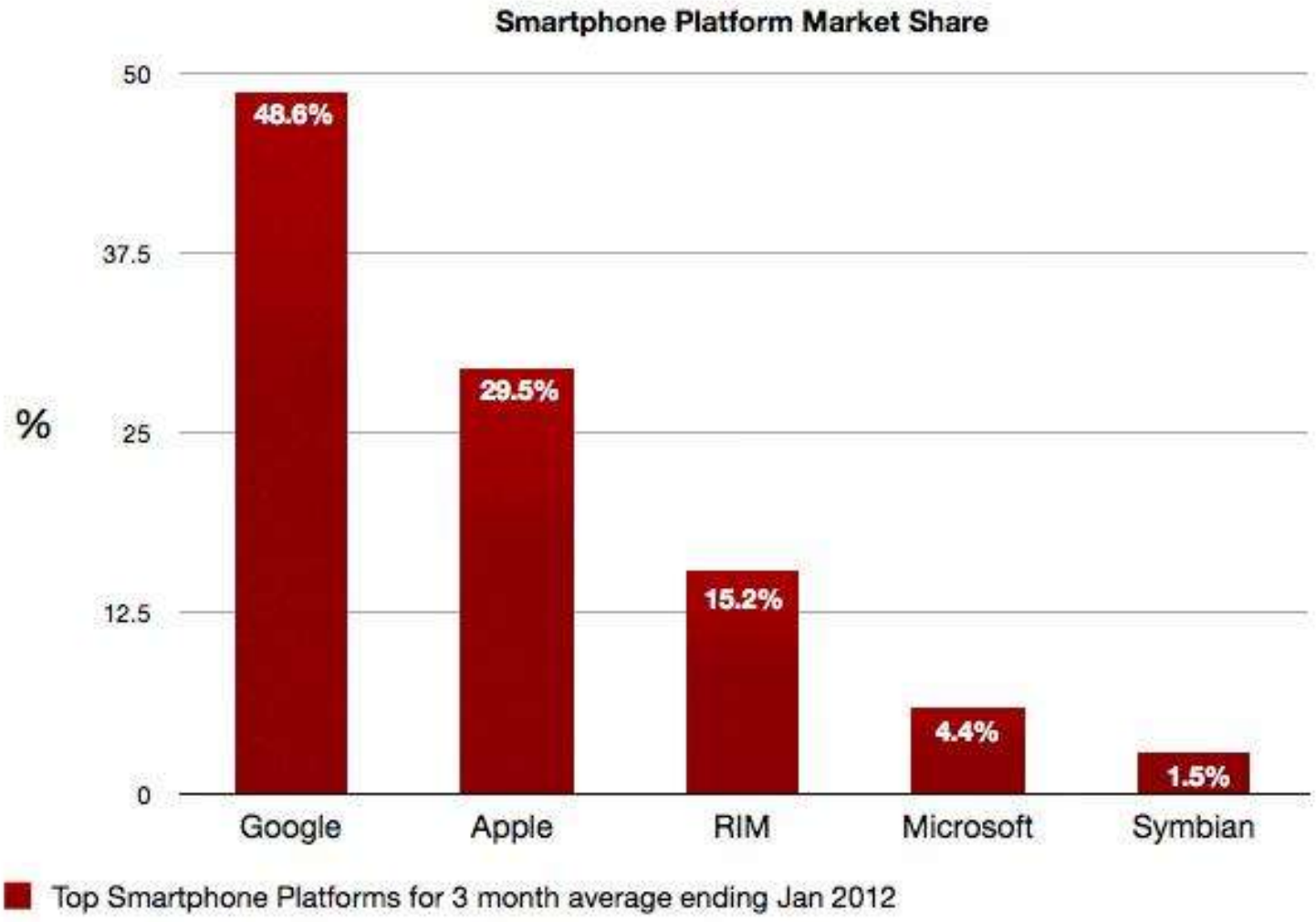
OPERATING SYSTEM MARKET SHARE — %

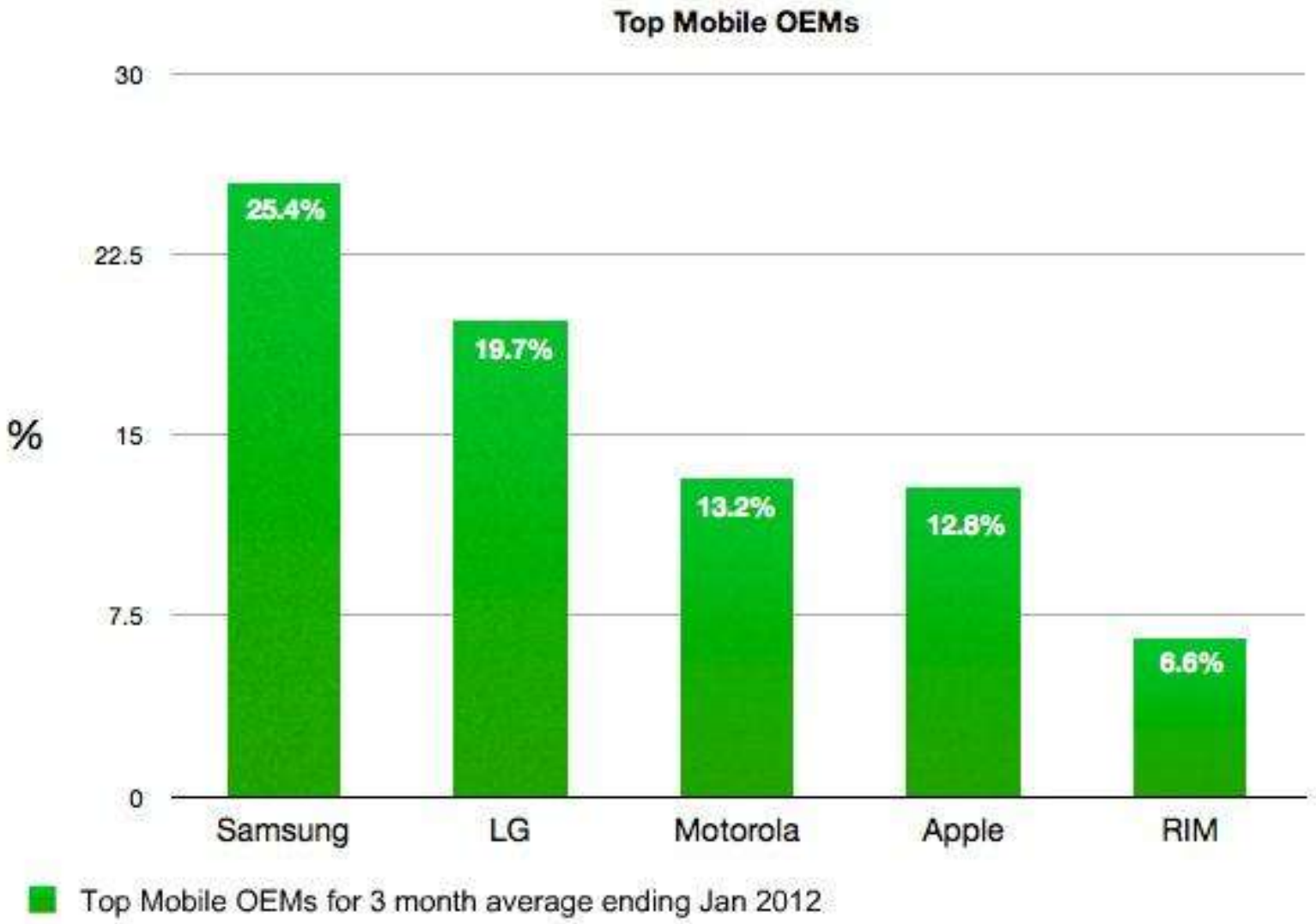
VENDOR MARKET SHARE — ALL MOBILE DEVICES %



Source: Gartner

REUTERS


Smartphone Platform Market Share
50
37.5
25
12.5
0
%
48.6%
29.5%
15.2%
4.4%
1.5%
Google
Apple
RIM
Microsoft
Symbian
Top Smartphone Platforms for 3 month average ending Jan 2012


Top Mobile OEMs
30
22.5
15
7.5
0
%
25.4%
19.7%
13.2%
12.8%
6.6%
Samsung
LG
Motorola
Apple
RIM
Top Mobile OEMs for 3 month average ending Jan 2012

Tablet Forecast by Gartner

Tablet Sales Volume Projection

OS	2011	2012	2013	2016
iOS	39,998	72,988	99,553	169,652
Android	17,292	37,878	61,684	137,657
Microsoft	-	4,863	14,547	43,648
QNX	807	2,643	6,036	17,836
Others	1,919	510	637	464
Total	60,016	118,882	182,457	369,257

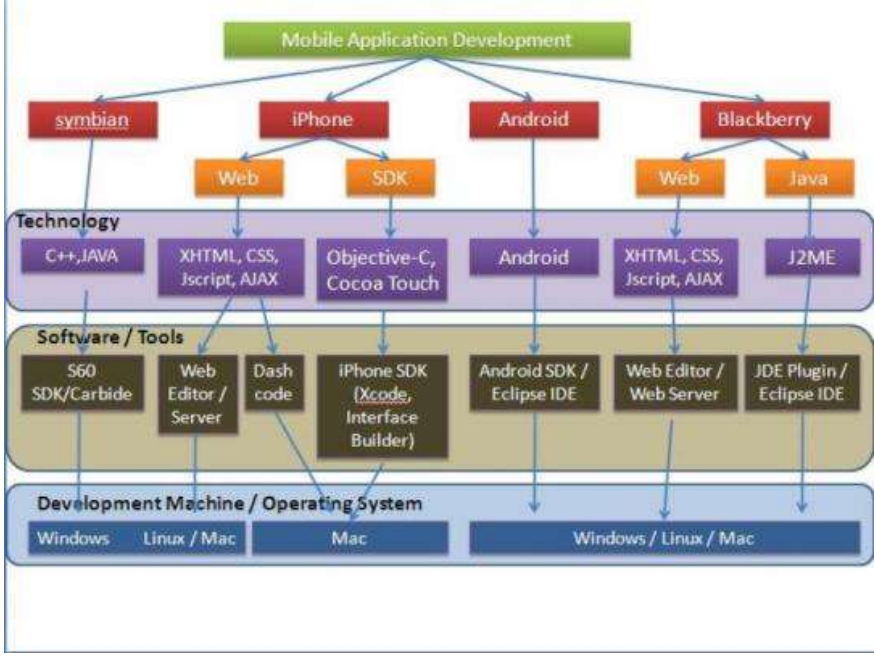
Tablet Market Share Projection

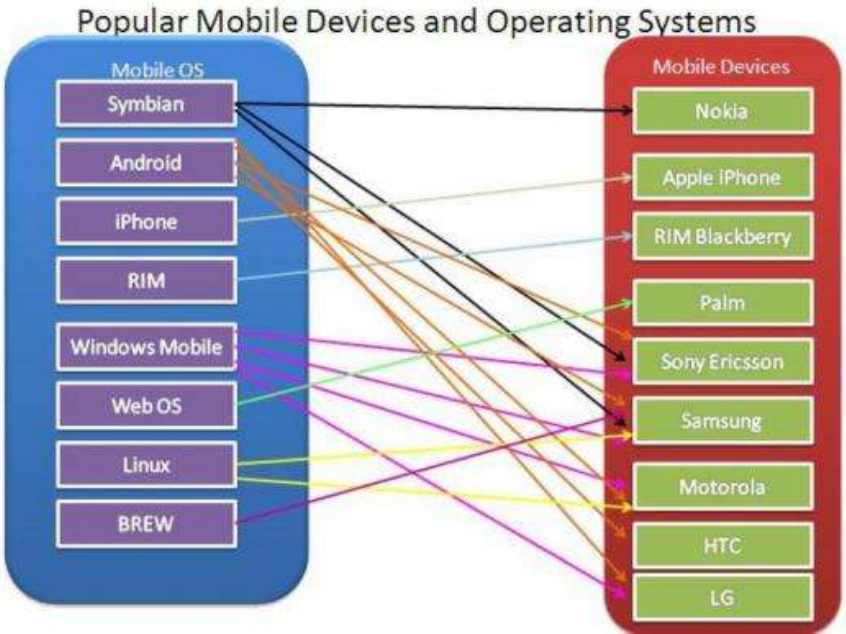
OS	2011	2012	2013	2016
iOS	67%	61%	55%	46%
Android	29%	32%	34%	37%
Microsoft	0%	4%	8%	12%
QNX	1%	2%	3%	5%
Others	3%	0%	0%	0%
Total	100%	100%	100%	100%

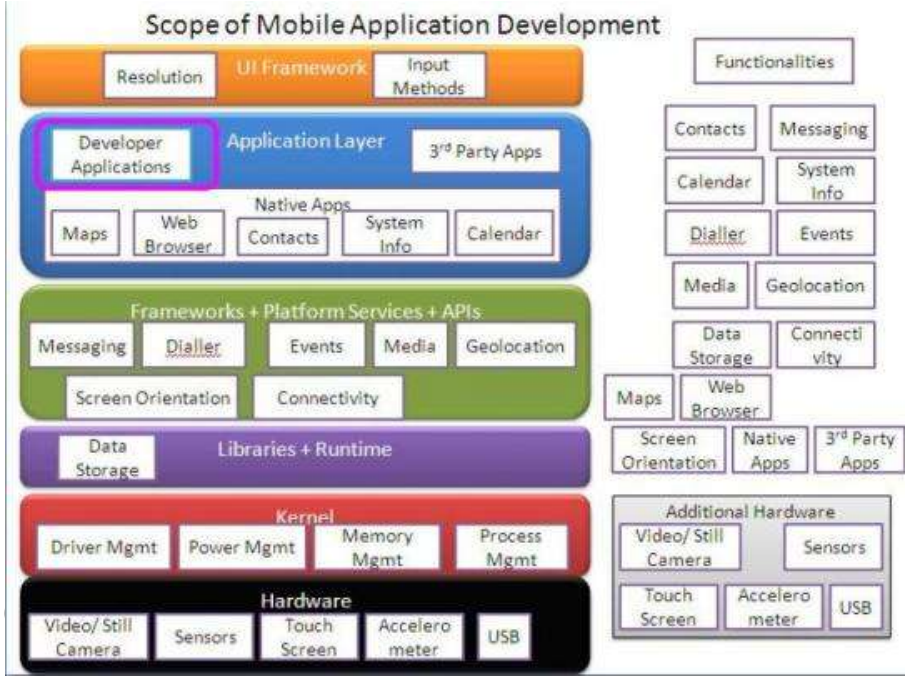
Not a War of Devices

- It is not a war of Devices but It is the war of Ecosystems.
- You are the best judge to decide the mobile device for m-learning platform.
- Developing countries focuses on low cost device based platforms
- Developed countries targets high end phones.


Mobile Ecosystem
USER INTERFACE
SMS
MMS
APPLICATION
WEB
DEVICE OPERATING SYSTEM
HSDPA+
3G
CAMERA
BLUETOOTH
DEVICES
WIFI
VIDEO
AUDIO
TEXT
PORTALS
CARRIERS
SOFTWARE DEVELOPERS
DEVICE MANUFACTURERS
CONTENT LICENCEES
CONTENT AGGRAGATORS
CONTENT OWNERS

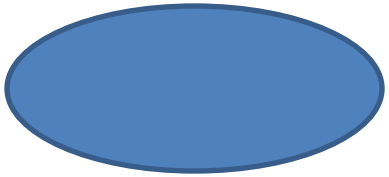

Mobile Application Development
symbian
iPhone
Android
Blackberry
Web
SDK
Web
Java
Technology
C++,JAVA
XHTML, CSS, Jscript, AJAX
Objective-C, Cocoa Touch
Android
XHTML, CSS, Jscript, AJAX
J2ME
Software / Tools
S60 SDK/Carbide
Web Editor / Server
Dash code
iPhone SDK (Xcode, Interface Builder)
Android SDK / Eclipse IDE
Web Editor / Web Server
JDE Plugin / Eclipse IDE
Development Machine / Operating System
Windows
Linux / Mac
Mac
Windows / Linux / Mac


Popular Mobile Devices and Operating Systems
Mobile OS
Symbian
Android
iPhone
RIM
Windows Mobile
Web OS
Linux
BREW
Mobile Devices
Nokia
Apple iPhone
RIM Blackberry
Palm
Sony Ericsson
Samsung
Motorola
HTC
LG


Scope of Mobile Application Development
Resolution
UI Framework
Input Methods
Developer Applications
Application Layer
3rd Party Apps
Native Apps
Maps
Web Browser
Contacts
System Info
Calendar
Frameworks + Platform Services + APIs
Messaging
Dialler
Events
Media
Geolocation
Screen Orientation
Connectivity
Data Storage
Libraries + Runtime
Kernel
Driver Mgmt
Power Mgmt
Memory Mgmt
Process Mgmt
Hardware
Video/ Still Camera
Sensors
Touch Screen
Accelero meter
USB
Functionalities
Contacts
Messaging
Calendar
System Info
Dialler
Events
Media
Geolocation
Data Storage
Connecti vity
Maps
Web Browser
Screen Orientation
Native Apps
3rd Party Apps
Additional Hardware
Video/ Still Camera
Sensors
Touch Screen
Accelero meter
USB

-learning

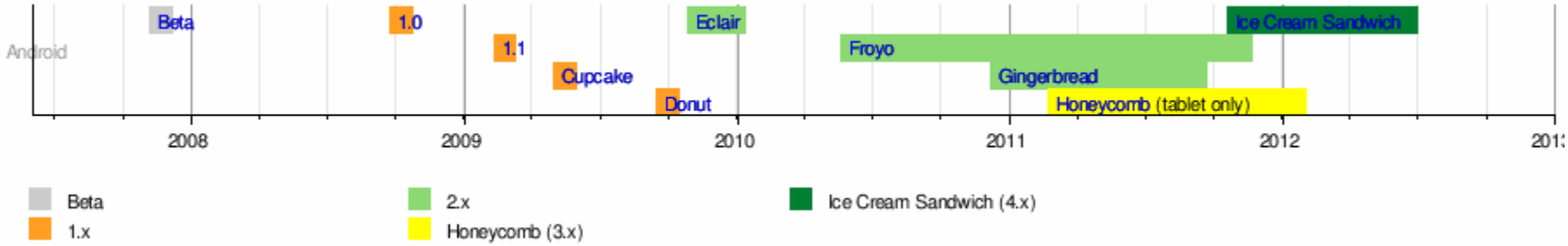
Open Handset Alliance



Joining date	Mobile operators	Software companies	Commercialisation companies	Semiconductor companies	Handset manufacturers
Founding members[7]	•KDDI Corporation •NTT DoCoMo •Sprint Nextel •T-Mobile •China Mobile •Telecom Italia •Telefónica	•Ascender Corporation •eBay •Google •LivingImage •Myriad •Nuance Communications •PacketVideo •SkyPop •SONiVOX	•Aplix •Noser Engineering •The Astonishing Tribe •Wind River Systems	•Audience •Broadcom Corporation •CSR Plc. (joined asSiRF) •Intel Corporation •Marvell Technology Group •Nvidia Corporation •Qualcomm •Synaptics •Texas Instruments	•HTC •LG •Sony •Motorola Mobility(joined as Motorola) •Samsung Electronics
December 2008[8]	•Vodafone •Softbank		•Borqs •Teleca	•AKM Semiconductor •ARM •Atheros Communications •ST-Ericsson (joined as Ericsson Mobile Platforms)	•ASUSTek •Garmin •Huawei Technologies •Sony Ericsson •Toshiba •Dell
May-June 2009	•China Unicom[9]	•SVOX[10]			•Acer[11]
September 2009				•MIPS Technologies[12]	
January 2010			•Sasken Communication Technologies Limited[13]		•ZTE Corporation[14]
May 2010		•NXP Software[15]			
July 2010		•Access[16]		•MediaTek[17]	
November 2010		•VisualOn[18]			
Unknown	•China Telecommunications Corporation •Telus[19] •Bouygues Telecom[19]	•Cooliris •MOTOYA Co., Ltd. •OMRON	•Accenture •L&T Infotech •SQLStar International Inc. •Wipro Technologies	•Cypress Semiconductor Corporation •Freescale Semiconductor •Gemalto •Renesas Electronics Corporation •Via Telecom	•Alcatel Mobile Phones •Compal Communications •Foxconn •Haier •Kyocera •Lenovo Mobile Communication Technology Ltd. •NEC •Sharp Corporation

Android Versions

- http://en.wikipedia.org/wiki/Android_version_history



What can these devices do for you?

Mobile Learning Possibilities

M-Learning is a subset of E-Learning

- M-learning is different tool in different country
- For developing countries it is THE only way to distance education
- For developed countries it is supplement to studies in different way

Ways of learning using m-learning

- As a Contextual tool
- As a Classroom tool
- As a Blended tool
- As a Distance learning tool

M-learning in Distance learning

- For distance education in developing countries
- As a supplement to distance learning in developed countries
- Flexible
- Time and Place does not matter
- Only way to access the information remotely

M-learning in Schools !

- Very useful in limited infrastructures
- Remote school areas
- Support for classroom activities
- Helpful in revising the studied material

Contextual m-learning

- Situated learning
- Access to information anywhere anytime, truly m-learning
- Informal way of learning

Power of m-learning

- Mobility
- Accessibility
- When needed learning
- Can add new technologies to learning
- Learner centric not the teacher centric

Mobility

- User has a choice of many powerful, light weight devices.
- Information at the finger tips (anytime anywhere, just in time)
- Flexible way for learning
- On top of mountain, bedroom, travelling, or when you have free time even….! ☺

Blended learning

- Mixing physical learning, e-learning and m-learning.
- Blending the tools and technologies and accessing by mobile devices.

M-learning drivers

- Communication technologies (connectivity)
- Mobile device manufacturers (Processing)
- Software developers (Interfaces and functionalities)
- Competitive market
- Growth of Internet
- Nationwide policies

Tool for people with disabilities

- M-learning has opened new era for people with disabilities

Power and Life Line

- Anywhere !
- Anytime !
- Anyone !
- Information
- Updated all time

Accessibility

- Based on the Internet and mobile user growth
- Based on the connectivity
- Data Speed
- Market competition

Hurdles in m-learning

- Technology
- Education systems
- Content
- Accessibility

Technology

- Processing power
- Display size
- Battery
- Connectivity
- Access to all information
- Different vendors no uniformity in platforms!

Content

- Huge content to be developed
- Still no standards for e-learning and m-learning
- E-learning transformation not effective
- Transformation from conventional pedagogical tools is different.

Organizational challenge

- Transformation to the system
- Reforms in technology and methods

Where we do m-learning

- SMS, MMS, Email
- Web content
- Voice content
- Mobile Applications
- Downloaded contents (video, documents)

Social challenge

- We need to forget the Model of “Teacher Centric” study
- We need to accept the “Learner Centric” concept
- We need to change the evaluation system
- Lacking of feel factor is the biggest social challenge
- Only self discipline

Business

- Complete Office-suites available
- Edit Office documents on your phone
- Plus: Adobe PDF Reader, …

Quickoffice Premier –
Quickoffice, Inc.

Email / BlackBerry

- **Symbian S60**
  - **IMAP** and **POP3** mailservers supported
  - Access to **BlackBerry** (you don‘t need a BlackBerry anymore)
  - **MS Exchange**, ActiveSync

Nokia E61

Internet Services

- **Example: Yahoo Go!**
  - Flickr, weather, news, sports, **push** email, …

Blogging

VoxBlog, Nokia

Nokia Lifeblog

- **Blogging supported**
  - Flickr, Vox
  - Nokia Lifeblog
  - ...

Music

- **Integrated music player**
  - Mp3, AAC, M4A, WMA
  - Not just one or two like some dedicated players
- Podcasting
- 3rd Party-Player (Ogg Vorbis, ...)

Nokia Podcasting, Nokia

OggPlay

Nokia N91 Music Edition

eBooks

MobiPocket – MobiPocket.com

Video


DivX
-000:13
Paused
DivX
DivX Mobile Player, DivX.com
realPlayer
RealPlayer

Remote Control

- Control devices from your phone
  - Using Infrared (TV, HiFi, …)
  - Bluetooth (PowerPoint, Winamp, your whole PC, …)

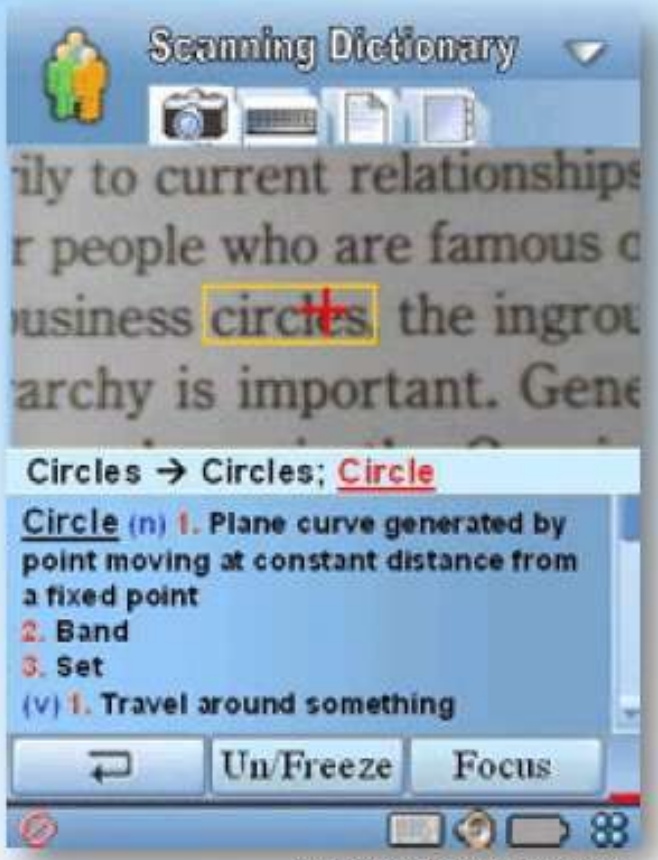
Total irRemote, Psiloc

ControlFreak, mtvoid

Business Card Reader

SonyEricsson P990 Business Card Reader, Image Copyright Esato

Dictionary



Scanning Dictionary, 3G Vision

- Point the camera at any word
- Automated detection + character recognition
- → Instant translation!
- Of course – traditional dictionaries:

SlovoEd, Paragon Technologie GmbH

Barcodes

- 2D-Barcodes can contain text/URLs
- Real time recognition

„2D barcodes will rule the earth.“

Entertainment

ScummVM

Day of the Tentacle, Monkey Island,
Simon the Sorcerer, ...
With sounds, music and speech!

Emulatoren

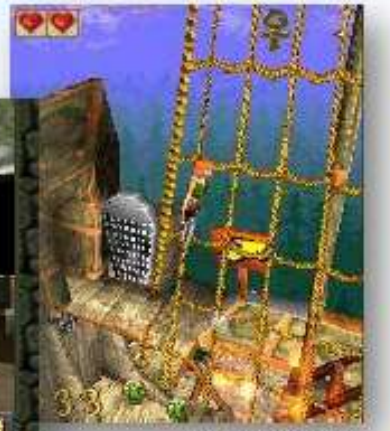
GameBoy, SNES,
GameGear, ...

3D Games

One – Who's Next?, Nokia

Asphalt Urban GT2, Gameloft

C2Doom, Markus Mertama



Pandemonium, Eidos Interactive

- **3D hardware acceleration**
- Even without that powerful enough to run:
  - Doom, Quake, Pandemonium

Augmented Gaming

Mozzies, Siemens Mobile

- First game: **„Mozzies“**
- Mosquitos fly around in the live camera picture
- Move your phone to target and shoot them
- Motion estimation through real-time image analysis

Sensors

- **Nokia 5500: Acceleration sensor**
  - Built-in training application with step counter
  - **Groove Labyrinth:** Move a marble through a labyrinth – through tilting your phone!

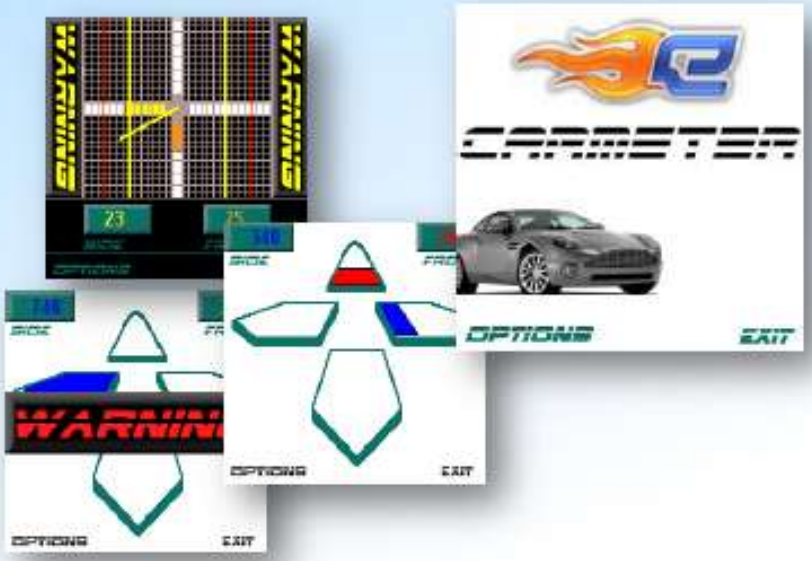
Groove Labyrinth, bit-side

Nokia 5500 Sport

Acceleration Sensor

Student projects, University of Applied Sciences, Hagenberg

- **Carmeter**
  - Displays your acceleration and drift in „g“
  - For SUVs: Calculates tilt

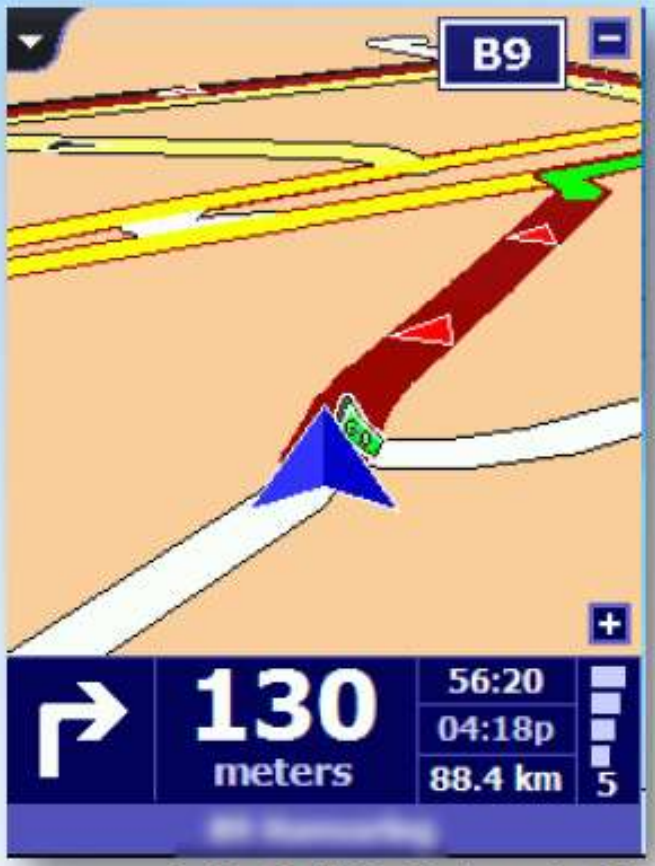


Carmeter (Alexander Erifiu, Mario Grammer, Martin Legath)

- **gBoarder**
  - For ultimate snowboard competitions
  - Counts your jumps, crashes, ...

gBoarder (Stefan Damm, Benjamin Gmeiner)

GPS navigation



TomTom Mobile, TomTom International BV

- Integrated GPS or external Bluetooth GPS module
- Traditional navigation software on your phone:
  - TomTom Mobile
  - Route66
  - Wayfinder
  - ...

Immersive GPS Software

ViewRanger, Augmentra Ltd.

- Augment your surroundings
- For hiking tours, …

Virtual Competitions

- Record race tracks with GPS (by car, running, ...)
- Automatically publish them through the Internet
- "Which race tracks are available in my surroundings?"

Creates new social possibilities

RealReplay, Mopius

Mobile Operating Systems

Is it a PC?

Contents

- **Mobile Phones: Market Share and Operating Systems**
  - Symbian OS
  - Android
  - Mac OS X (iPhone)
  - Others (Windows Mobile, BlackBerry, Palm, Linux)
  - Cross-platform: Java ME
- **Future**
  - Outlook and predictions

Mobile Requirements

- **Limited resources**
  - CPU: 220 – 370 MHz (ARM 9/ARM 11), 64-128 MB Ram
- **No hard disc**
  - Therefore no virtual (= "unlimited") memory
- **Power management**
  - Battery life, data safety in case of power loss is an issue
- **Compact**
  - Not much room for UI and the application itself
  - Reuse of common components important
- **Reliability**
  - Phone functionality always highest priority
  - "Always on"

Nokia E71


Sony Ericsson
Idou


Nokia 5800
XPressMusic

Nokia E90

Nokia UI Platforms: Series 40

- **Nokia Series 40 / 30 / 20**
  - No Symbian OS
  - For feature phones
    (!= smart phones)
  - No C++ development possible

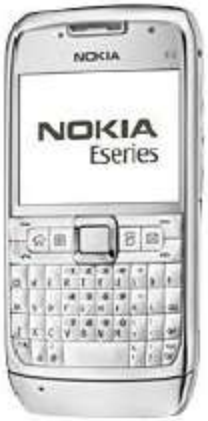
Nokia 6600 Slide

UI Platforms: S60

www.s60.com

Business


Nokia E66



Nokia E71

Nokia E90

High-End Multimedia


Nokia N96


Nokia N85


Samsung Omnia HD


Samsung INNOV8


SE Idou

Mass Market

Nokia 6121 Classic


Nokia 5800 XPressMusic

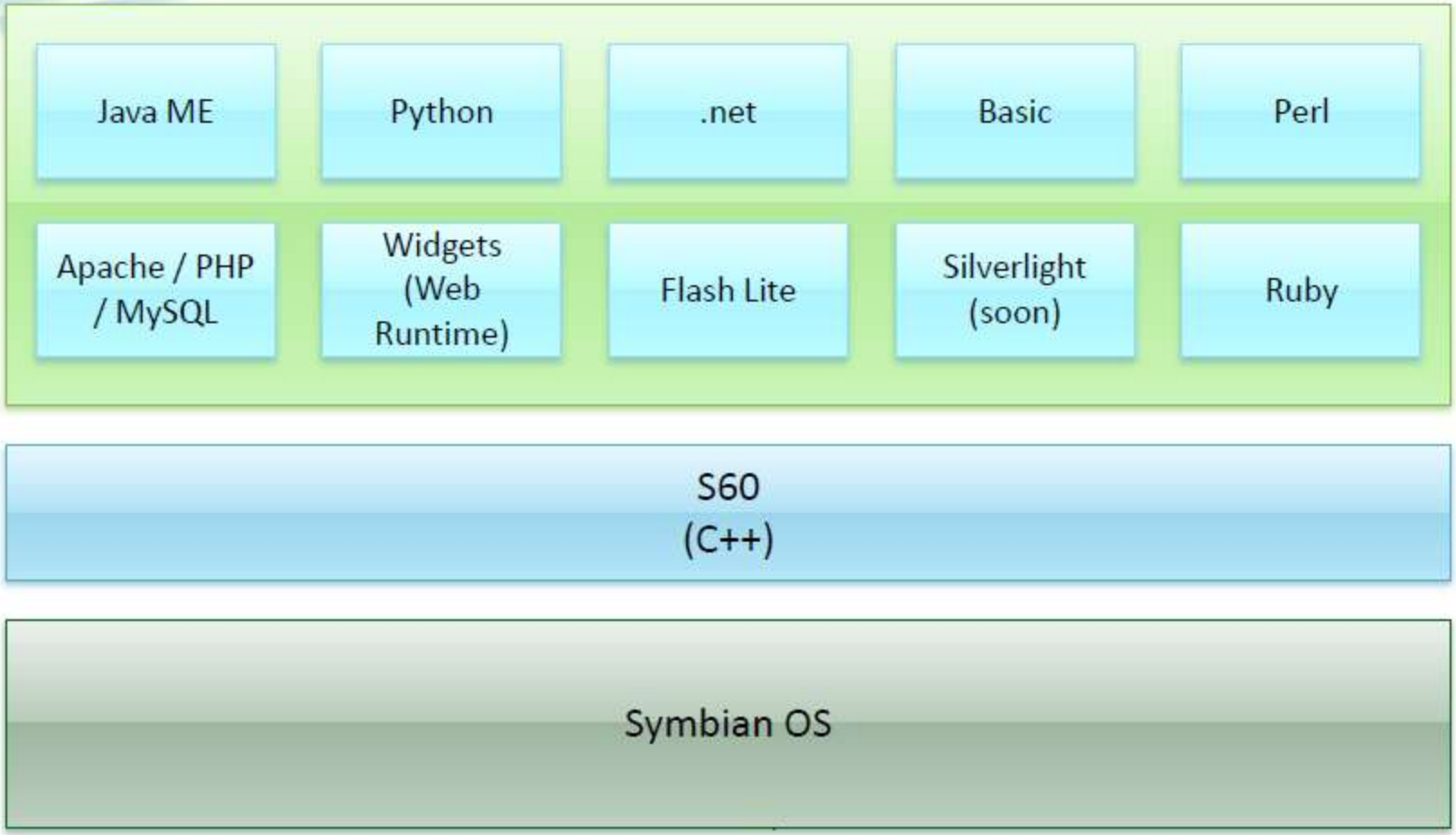

Nokia 6210 Navigator


Nokia 5500 Sport

Samsung i8910 (Omnia HD)

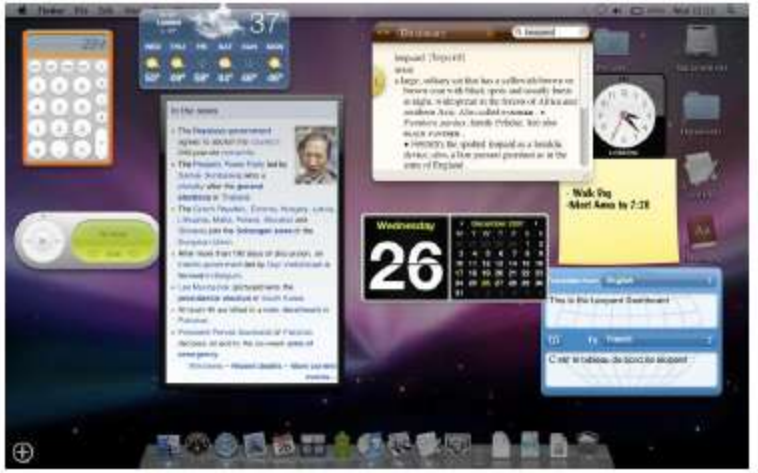
- **3.7“ capacitive touch screen**
  - AMOLED (640x360, 16 million colors)
- **Connectivity**
  - A-GPS, WLAN, UMTS, HSDPA
- **8 MPixel camera**
  - Face detection, smile shot, panorama, etc.
  - HD Video recording 720p
- **Multimedia**
  - RDS Radio, FM transmitter, 3.5 mm audio
  - MPEG4, DivX, H.263, H.264, etc.
- **Hardware**
  - 600 MHz, 3D graphics acceleration
  - Acceleration-, light-, proximity sensor, compass

Symbian OS: Development



Widgets

- Web sites often not suitable for small screens
- **Widgets are "local websites" on the device**
  - Rendered using browser
  - Fetch web data using AJAX (Web 2.0)
  - Look & feel like native applications
  - **But:** easy development with HTML & JavaScript



Apple iPhone

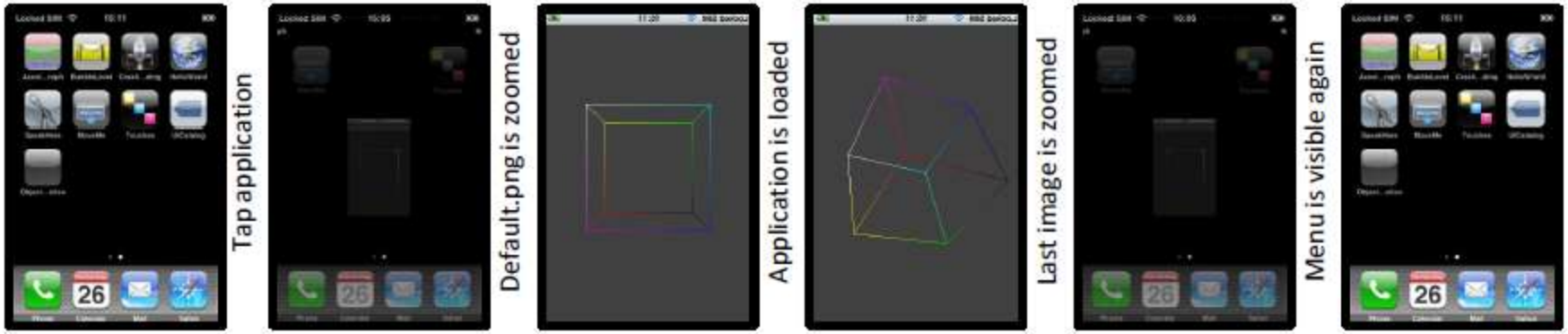
Mac OS X

Smartphone OS: Mac OS X (iPhone)

- **Based on OS X 10.5 (Leopard)**
  - Proprietary Unix-system by Apple
  - Devices:
    iPhone (3G) + iPod Touch
- **Development:**
  - Requires latest Mac
  - iTunes for Sync
  - ObjectiveC
  - Developer Certificate

iPhone Performance

- Mobile platforms: **tricks required** for impression of speed
  - **Application startup: animates a screenshot**
  - Gives application time to load
  - User doesn't notice it!



There's more!

Other Platforms

Smartphone OS: Windows Mobile

- **Based on Windows CE**
  - Windows variant for embedded devices
  - First for Pocket PCs (PDA)
  - Telephony integrated later
- **Windows Mobile**
  - Variant of Windows CE
  - Current version: 6.5

Sony Ericsson Xperia X1

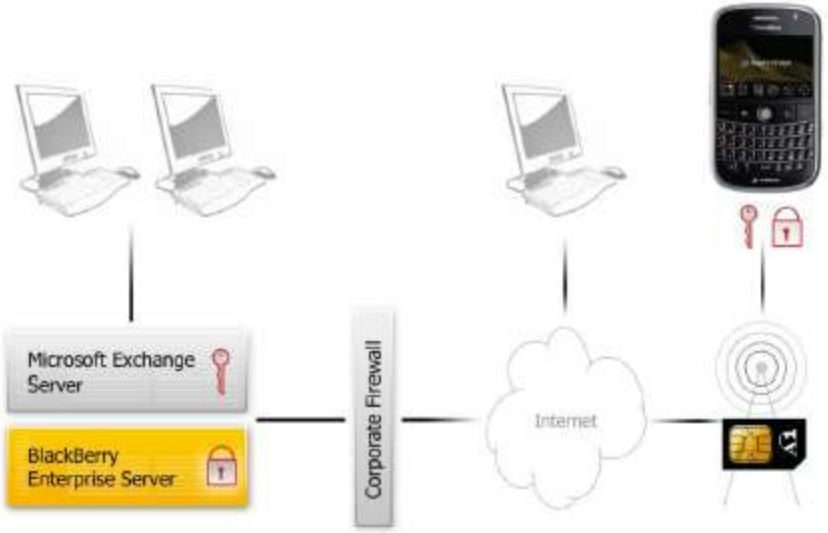
Windows Mobile: Development

- Often used for **industrial or business applications**
- Three development options:
  - **Win32-API**
    - Windows API in C
    - Native interface to the operating system
  - **MFC-API**
    - C/C++, Object-oriented
    - Extension of the Win32-API
  - **.NET Compact Framework**
    - Subset of the .NET Framework on the desktop
    - Most convenient way but application execution is slower than with other APIs

Windows Mobile 6.5

Smartphone (OS): RIM / Blackberry

- **Main focus: push email**
  - RIM provides backend services
  - Easy integration for companies
  - Remote management of devices
- **Smartphone?**
  - Only allows Java ME development for 3rd parties
  - Extensions for web services etc.



Smartphone OS: Palm OS / WebOS

- **Founded in 1991**
  - Own operating system (Palm OS)
  - Has been very popular
  - On the decline in the last few years
  - Palm even released some Windows Mobile devices

Palm webOS – Resurrection?

- **webOS**
  - Built on web technology
  - Application development with HTML, JavaScript, CSS
  - Mojo: JavaScript framework, access to UI, APIs and services
  - Multitasking support
- **First device**
  - Palm Pre (H1 2009)
  - High hopes, enthusiastic previews

webOS

Palm Pre

Mobile Linux

- **Openmoko**
  - Two free, open source Linux smartphones:
    - Neo 1973
    - Freerunner
  - **However:** not successful
  - **Latest headlines (April '09):**
    - Openmoko cancels development of 3rd phone

Openmoko Freerunner

LiMo Foundation

LiMo Foundation

- **Linux-based software platform**
  - Completely open (unlike Android)
  - Founded: January 2007
- **Only middleware OS** (no UI or content)
  - Main market: Asia
- http://www.limofoundation.org/

Current handset manufacturers (with released / announced phones)

Japanese Market

FOMA F903i

FOMA D703i

FOMA Raku-Raku Simple

FOMA F704i

FOMA D702iBCL

FOMA F904i

Features include: Mobile TV, contactless payment and access, fingerprint authentication, waterproof, scented phones, touchscreen-keypads, GPS, "simple" phones, eBooks, barcodes, text-to-speech / speech-to-text → http://www.youtube.com/watch?v=1xQVnny0LSg

Cross-Platform Development

- Only solution for cross-platform development:
  - **Java Platform, Micro Edition**
    (Java ME, formerly J2ME)
  - Small subset of Java SE (desktop) plus
    many specific extensions (JSRs)
  - **2.6 Billion Java-enabled phones**
    (8 out of 10 shipped in 2008)
  - Also used for Blu-Ray and Amazon Kindle 2

Java ME

Nokia N86 8MP

Java Technology	JSR 139 Connected Limited Device Configuration (CLDC) 1.1 JSR 118 MIDP 2.1 JSR 248 Mobile Service Architecture Subset for CLDC JSR 75 FileConnection and PIM API JSR 82 Java™ APIs for Bluetooth 1.1 JSR 135 Mobile Media API 1.1 JSR 172 J2ME™ Web Services Specification (RPC package) JSR 172 J2ME™ Web Services Specification (XML Parser package) JSR 177 Security and Trust Services API for J2ME™ (SATSA-CRYPTO package) JSR 177 Security and Trust Services API for J2ME™ (SATSA-PKI package) JSR 179 Location API for J2ME™ 1.0 JSR 180 SIP API for J2ME™ JSR 184 Mobile 3D Graphics API for J2ME™ 1.1 JSR 205 Wireless Messaging API 2.0 JSR 226 Scalable 2D Vector Graphics API for J2ME™ 1.1 JSR 234 Advanced Multimedia Supplements 1.0 (audio3d) JSR 234 Advanced Multimedia Supplements 1.0 (music) IAP Info API eSWT UI API 1.0.3 Nokia UI API 1.1

- **Main problem: Fragmentation**
  - Optional APIs defined in JSRs
    - Bluetooth
    - Location
    - Mobile 3D
    - Vector graphics
    - Mobile Media
    - File access
    - etc.
  - **Attempts to solve fragmentation progressing slowly**
    - Mobile Service Architecture
    - MIDP 3.0

JavaFX

- **JavaFX** (http://javafx.com)
  - New **UI libraries** (graphics, media, web services)
  - **Consistent experience** across mobile, desktop, browser, TV, etc
  - **Plus:** use any Java library in JavaFX
  - Integrated with Java Runtime
- **JavaFX Script**
  - Simple declarative language, easier to learn
  - e.g., for artists to change sprite animation, without needing software developer
  - Advantage to JavaScript / ActionScript: integration with Java – reuse any Java library

JavaFX Mobile

- **Runs on Java ME (plus Android)**
  - Mobile content with same tools as Java FX
- **Availability?**
  - JavaFX Mobile Runtime needs to be pre-installed on the phone
  - No phones released yet
  - Currently endorsed by: SonyEricsson, LG

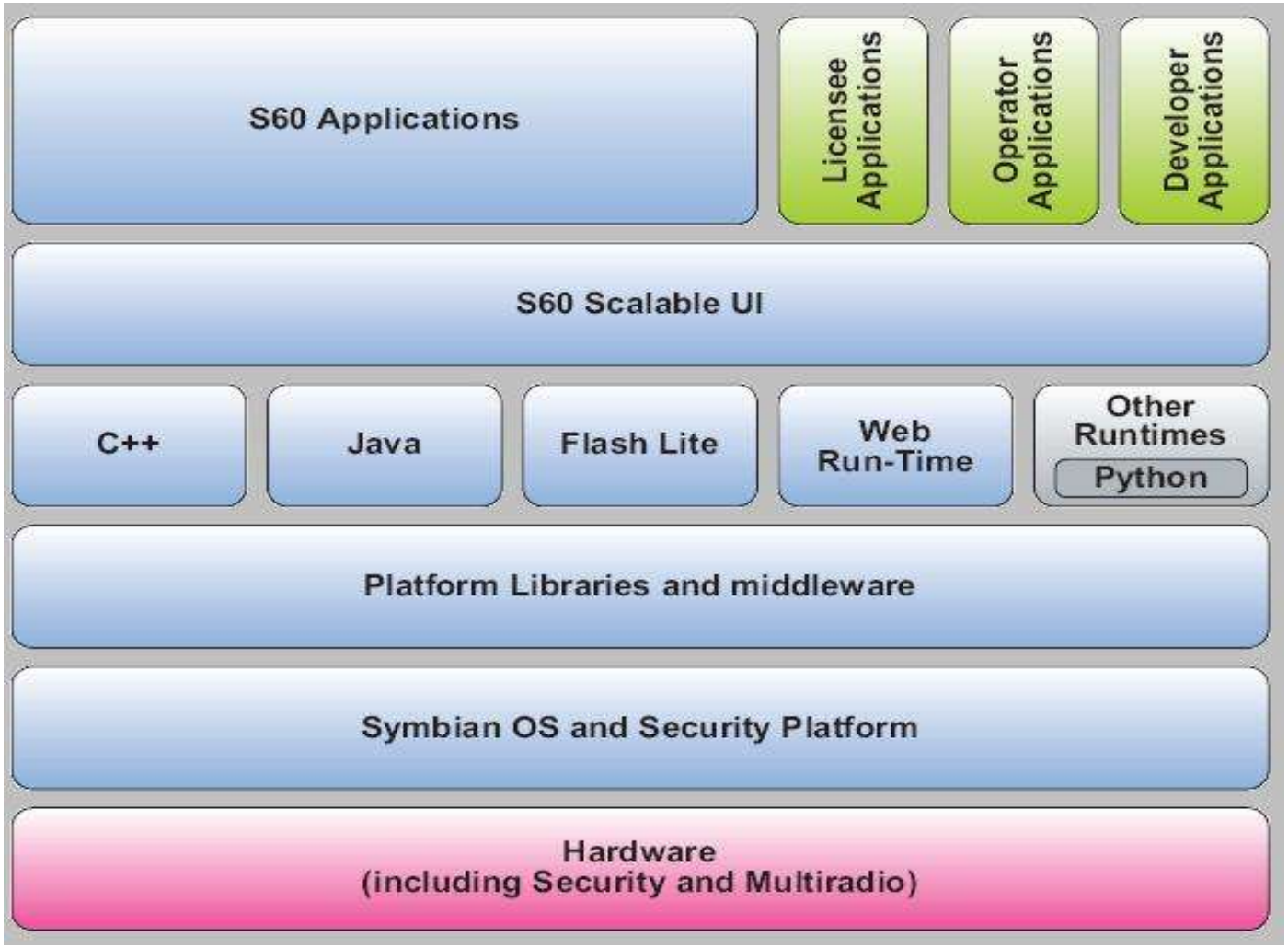
MEEGO

WINDOWS 8 MOBILE

Symbian OS…

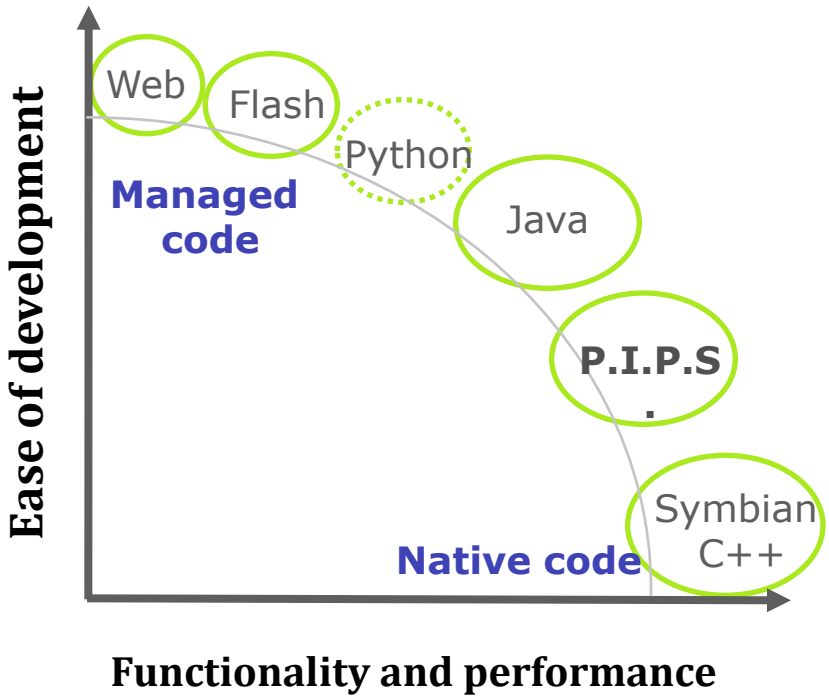
- **Operating System designed specially for mobile devices**
- **Runs on battery powered devices**
  - Has low power consumption
- **Designed for devices with limited memory**
- **Open operating System**
  - 3rd party developers can write applications
- **Reliable and Stable**
  - Applications can run for years without being closed
- **Object Oriented**
  - Provides a C++ API
- **Can run on multiple Platforms**

S60 Architecture



Symbian OS Language Support

- Symbian C++
- Java (J2ME)
- Flash Lite
- Runtimes
  - PythonS60
  - Ruby
- Open C
- Web Run Time

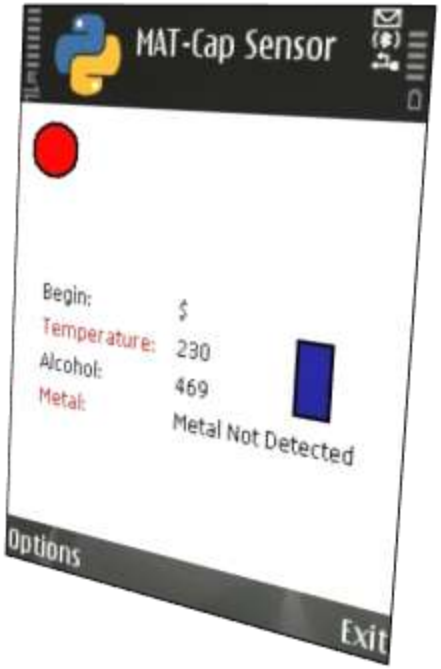


For better Applications … Better to know the Device Matrix

http://www.developer.nokia.com/Devices/Device_specifications/Comparison.xhtml?dev=Lumia_800,800C,Lumia_610,Lumia_900,110

Some Home Made Examples

ECO-SENSOR- 2008



CONCEPT DESCRIPTION

- The Application reads environmental data from the sensors and displays on the mobile screen and takes necessary action like alerting and logging.
- It gives details of humidly, temperature and Gas (alcohol/LPG) etc
- It can also be used as Breathalvzer for Alcohol.

It is innovative….!!

- It is a next generation mobile sensor prototype for the Eco-Challenge.

Benefits

- The external hardware is handy to wear on wrist or as a cap and can talk with mobile using Bluetooth and senses data in real time from sensors

Features

- Option to measure the real time temperature
- Measurement of Humidity
- Distance sensor
- Motion sensor
- Ultraviolet detection
- Pressure detection
- Environmental Gas analysis (Alcohol/LPG)

STATUS DEVELOPMENT

- 90% fully functional. Tested and works great
- It is Fully Open Source project
- Runs on S60 2nd and 3rd edition phones
- Uses external tiny hardware of sensor

ATM LOCATOR 2007

CONCEPT DESCRIPTION

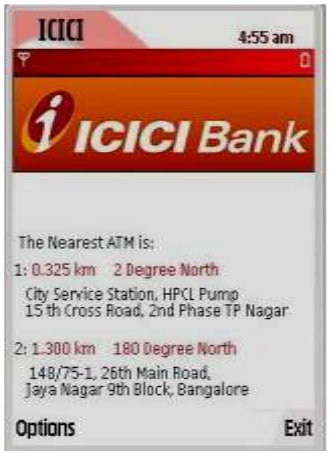
- Traveling in an unknown area or country always requires complete travel guide.
- It becomes very important to carry credit cards while traveling abroad.
- During the journey it becomes very difficult to find **NEAREST ATM** to get the money out of it.
- It does not use any Google data.

It is innovative….!!

- ATM Locator suggests totally innovative approach to find the location of the every ATM in the city with exact distance value and the angle of direction to proceed.
- The mobile application is dynamic and very fast to get the detailed distance and angle of ATMs during mobility.

Features

- Option to select bank to find ATM of that bank
- Lists two nearest ATMs
- Additionally shows location on the map too
- The detailed distance and angle of ATMs during mobility.



Benefits

- Supports every Indian banks, can be extended for every bank of World.
- It gives distance and angle with greater accuracy and can be used with internal – external GPS.

Supported Platforms

- It works on Nokia S60 and S40 Platforms
- Future development for supporting other platforms too.

Devotional Widget Krishna Darshan

CONCEPT DESCRIPTION

- **What does it do?**
  - This widget allows user to do Darshana of Lord Krishna from
  - ISCON temples located at places like Mumbai, Vrindavan, Delhi, US, Australia, Fiji, Italy.
  - Now God is with us anywhere anytime thanks to Nokia Widgets!!!
- **Benefits**
  - Once the location is selected user has to just do Darshana,
  - Images get refreshed automatically.

Features

- User has option to select the temples to see the live images from the temple

What is innovative

- It is an innovative approach to a devotional activity using mobile phones at any time any place globally

Status development

- 100% fully functional. Tested and works great
- Runs on S60 widget supported phones

Indian Hill Station Sunset-Sunrise Widget

CONCEPT DESCRIPTION

- **What does it do?**
  - Traveling in to any Hill station is a great time one can have.
  - Any hill station has beautiful attraction of Sun set or sunrise point.
  - Now Nokia mobile widget can help traveler to find out the sunset and sunrise time of any Indian Hill station for any date of Calendar.
- **Benefits**
  - User can get Sunrise and Sunset time of any Hill station
  - Actually the widget provides such time for any location of the world for any other place user has to enter the lat long to get the times

Features

- Option to select Hill stations of India
- Gives Sunrise and Sunset time of any location
- User can set the Alarm before an hour of sunset or sunrise time for any location so he can never miss it.

What is innovative

- Mobile is personal and alarm is more personal, during hill station visit it is very important that mobile can find the sunset or sunrise time

Status development

- 90% fully functional. Tested and works great
- Runs on S60 widget supported phones
- Beta stage

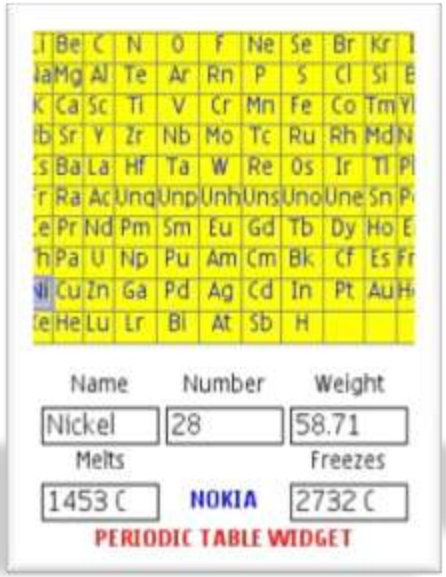
Educational Widget Periodic Table

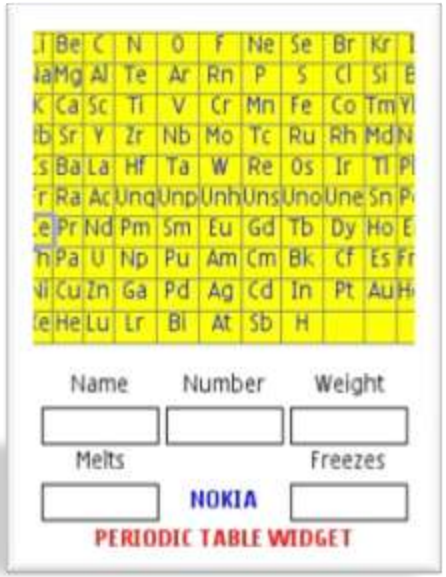
CONCEPT DESCRIPTION

- **What does it do?**
  - It calculates the properties of any Chemical element with and without web services. It asks for the Element name only and gives every details
- **Benefits**
  - Very helpful for people involved in Chemistry.
  - Can be used as Educational tool
  - Students can have handy utility to learn Periodic Table

Features

- From user requests it shows the Element details based on the Periodic Table, it shows details like Number, element name, atomic symbol, weight, boiling point, atomic radius, melting point, density etc





What is innovative

- It is an innovative approach to use web services for educational utility in mobile, Periodic table comes handy in the form of Widget

Status development

- 100% fully functional. Tested and works great
- Runs on S60 widget supported phones
- Beta stage

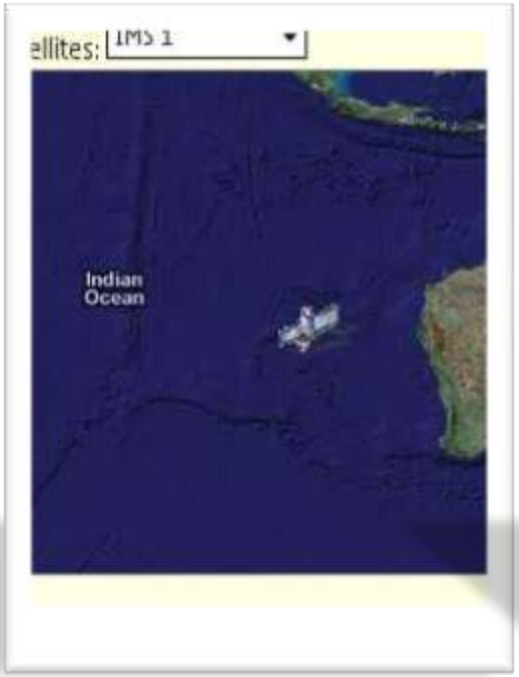
Indian Satellite Position Tracker

CONCEPT DESCRIPTION

- **What does it do?**
  - India has launched many satellites in last 34 years, Many of them are of INSAT series, Remote sensing (IRS), Experimental, weather etc.
  - Many of them are Geostationary, LEO and MEO, so some are steady and some are moving in its orbit.
  - Only ISRO can find the position of such satellites as they have earth stations to track them.
  - This Mobile Satellite Tracker uses TLE data provided by NASA and applying SGP4 algorithm to find its Latlong and showing them on Google map in real time
- **Benefits**
  - User can get track any Indian satellite in real time and can see the satellite moving on map in real time.
  - Scientists, hobbyist and researcher can track satellites

Features

- Option to select any Indian Satellite
- Gives real time position and movement on Google map in mobile
- Also displays the city name on top of which the satellite is moving



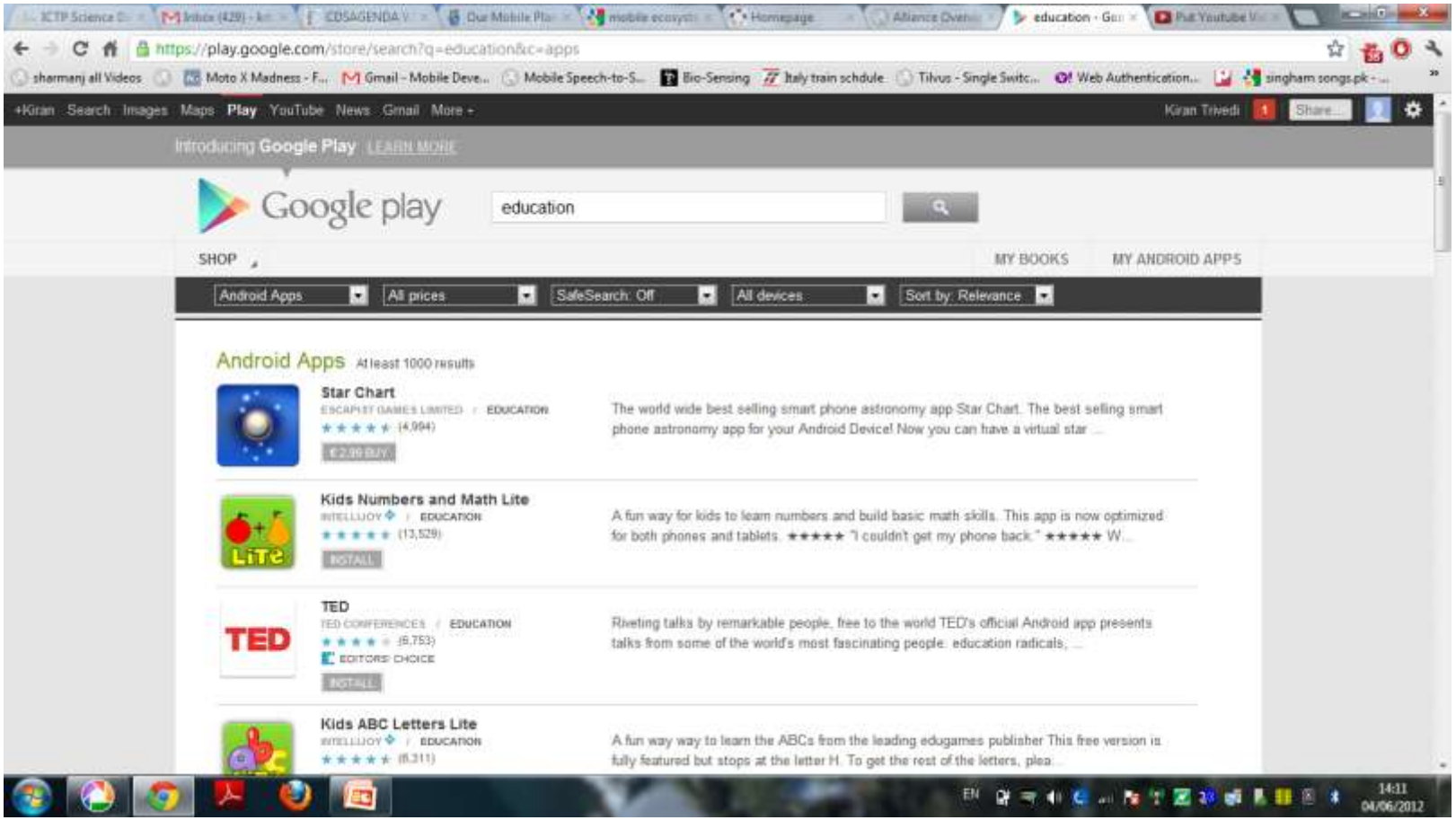
What is innovative

- Now it has handy and satellites are in our mobile to track

Status development

- 90% fully functional. Tested and works great
- Runs on S60 widget supported phones
- Beta stage

Google Play


https://play.google.com/store/search?q=education&c=apps
+Kiran Search Images Maps Play YouTube News Gmail More +
Kiran Trivedi
Introducing Google Play LEARN MORE
Google play
education
SHOP
MY BOOKS
MY ANDROID APPS
Android Apps
All prices
SafeSearch: Off
All devices
Sort by: Relevance
Android Apps At least 1000 results
Star Chart
EDUCATION
The world wide best selling smart phone astronomy app Star Chart. The best selling smart phone astronomy app for your Android Device! Now you can have a virtual star ...
Kids Numbers and Math Lite
EDUCATION
A fun way for kids to learn numbers and build basic math skills. This app is now optimized for both phones and tablets. ★★★★★ "I couldn't get my phone back." ★★★★★ W...
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Riveting talks by remarkable people, free to the world TED's official Android app presents talks from some of the world's most fascinating people: education radicals, ...
EDITORS' CHOICE
INSTALL
Kids ABC Letters Lite
EDUCATION
A fun way way to learn the ABCs from the leading edugames publisher This free version is fully featured but stops at the letter H. To get the rest of the letters, plea...
14:11
04/06/2012

Apple Store


3G
9:41 AM
Today
Now:
Lecture
Anatomy
Garth Palmer
1 assignment
00:57 left
Next:
Class
Spanish II
Main 26A
No assignments
4:03 PM
Home
Date with Jane
Romantic Cafe
No invitees
7:00 PM
14
Calendar
Assignments
Planner

Finally !

- The life time of Apps are very small
- User should turned back to the app after installation
- Only Super Apps get success in this
- Super Apps Examples are ??

A Single m-learning Super App?

Thank you!

- Krtrivedi@gmail.com