



# Multimedia applications Services, platforms and technologies

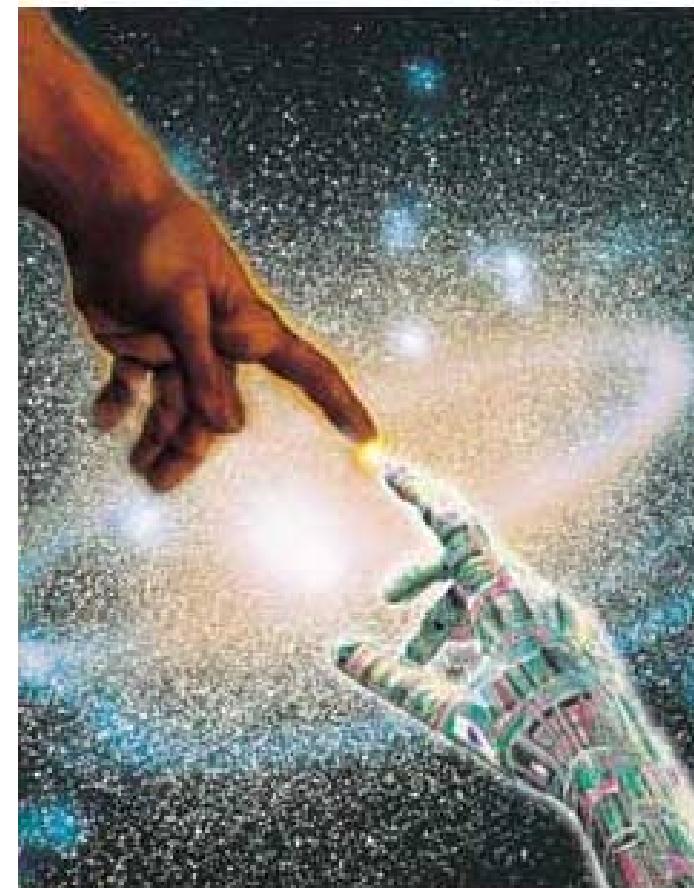




# ToC

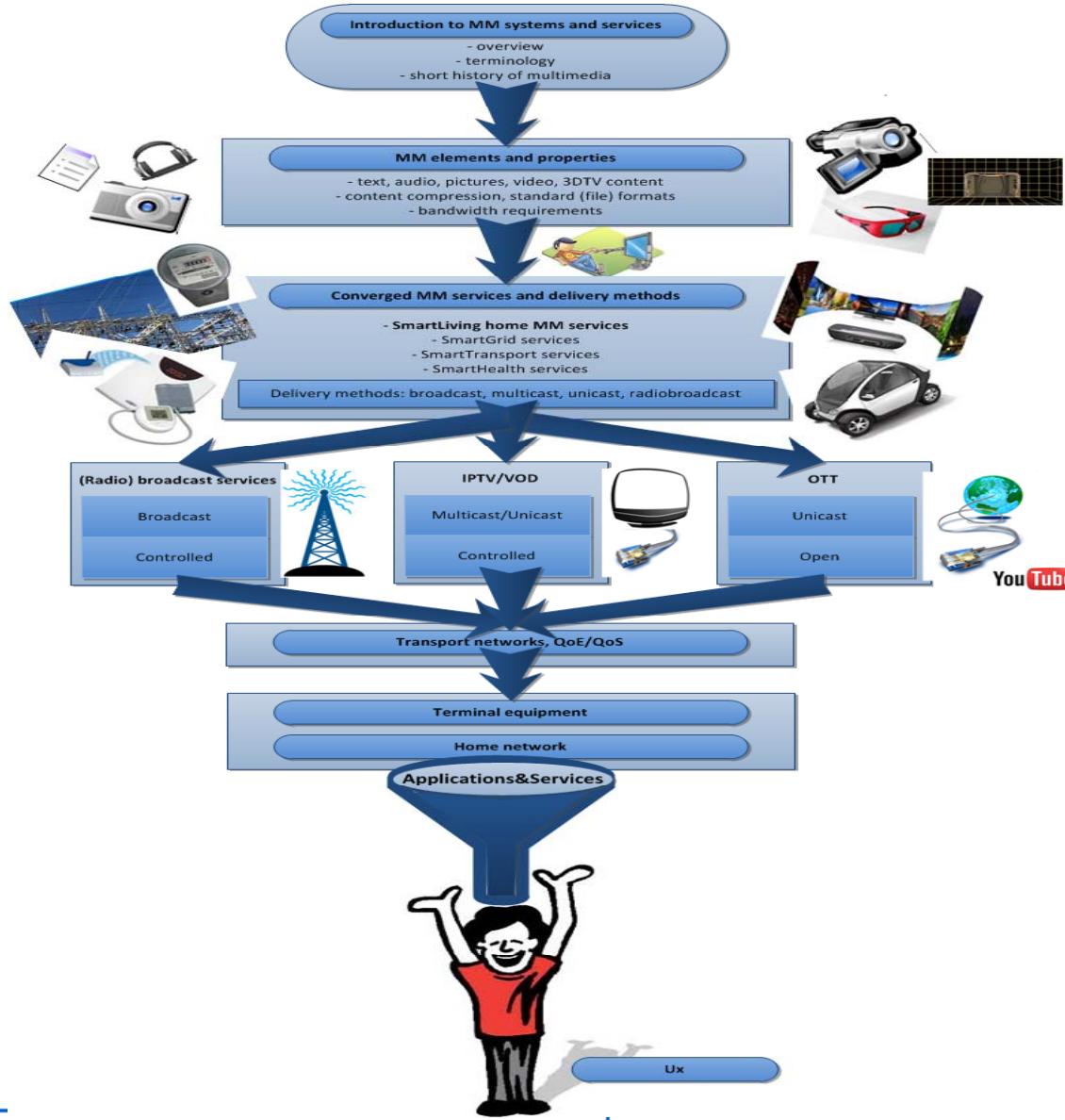
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- **Introduction**
- **Services**
  - Most wanted
  - What are the big ones up to?
- **Overview of platforms**
  - Mobile
  - smartTV
- **Development aspects**
  - Web technologies
  - Development ecosystem





# Big picture: from creation to consumption



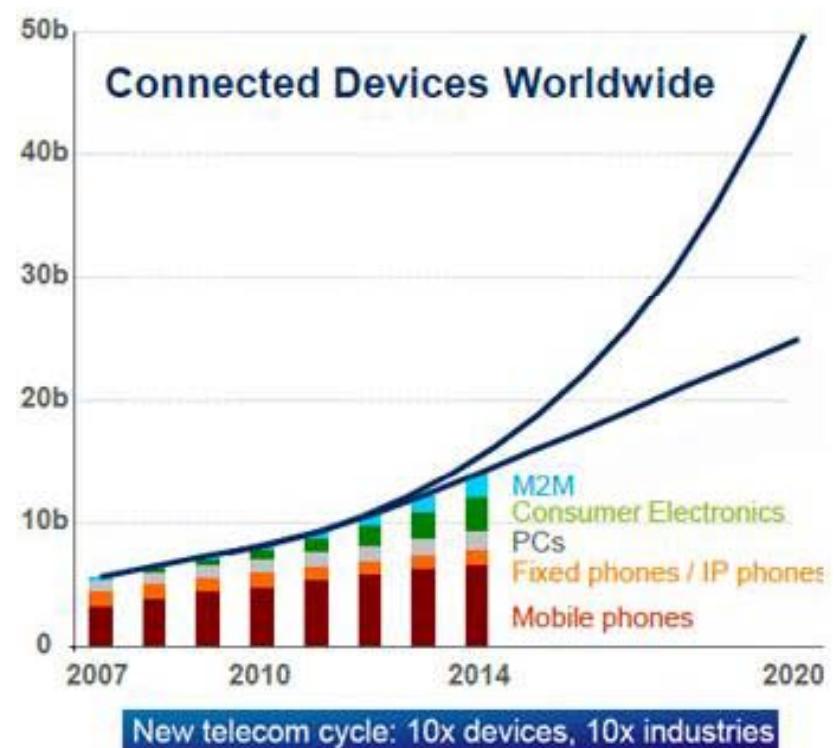


# A short introduction



# 2020 – 50 billion devices in Internet

- Internet of Things
- Machine2machine
- Future Internet
- NGN



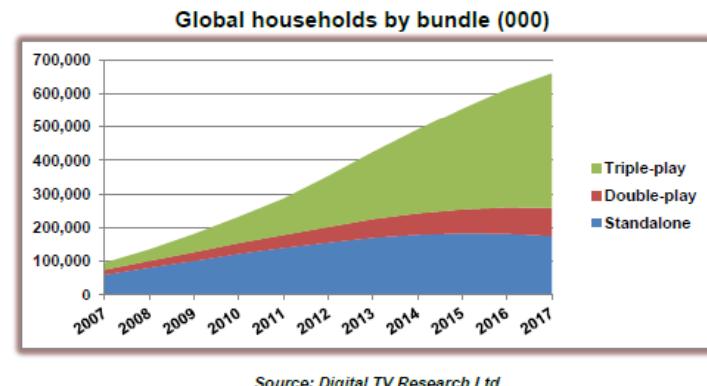
source: Ericsson Vision,  
2010

- Mobile devices will prevail → OTT



# OTT growth and forecasts

- **Smart TV** (source: GII – Global Information company)
  - 17 % of the entire OTT business = approx. 3,3 billion \$ until 2016
  - Major growth foreseen in 2015
- **Triple play is on the rise** (source : Digital TV research)
  - 400 million new subscribers worldwide (China almost 50%)
  - Mostly cable (66%), IPTV also on the rise
  - income : USA 59 billion \$, France and Germany 4 billion \$,...)
- **pay TV services (2011-2015)** (source : Digital TV research)
  - STB growth 17%
  - second screen device growth 400%





# (smart) TV

## Trends and services



# Current situation- (smart) TV

- Many devices , standards, manufacturers

Google  
Microsoft



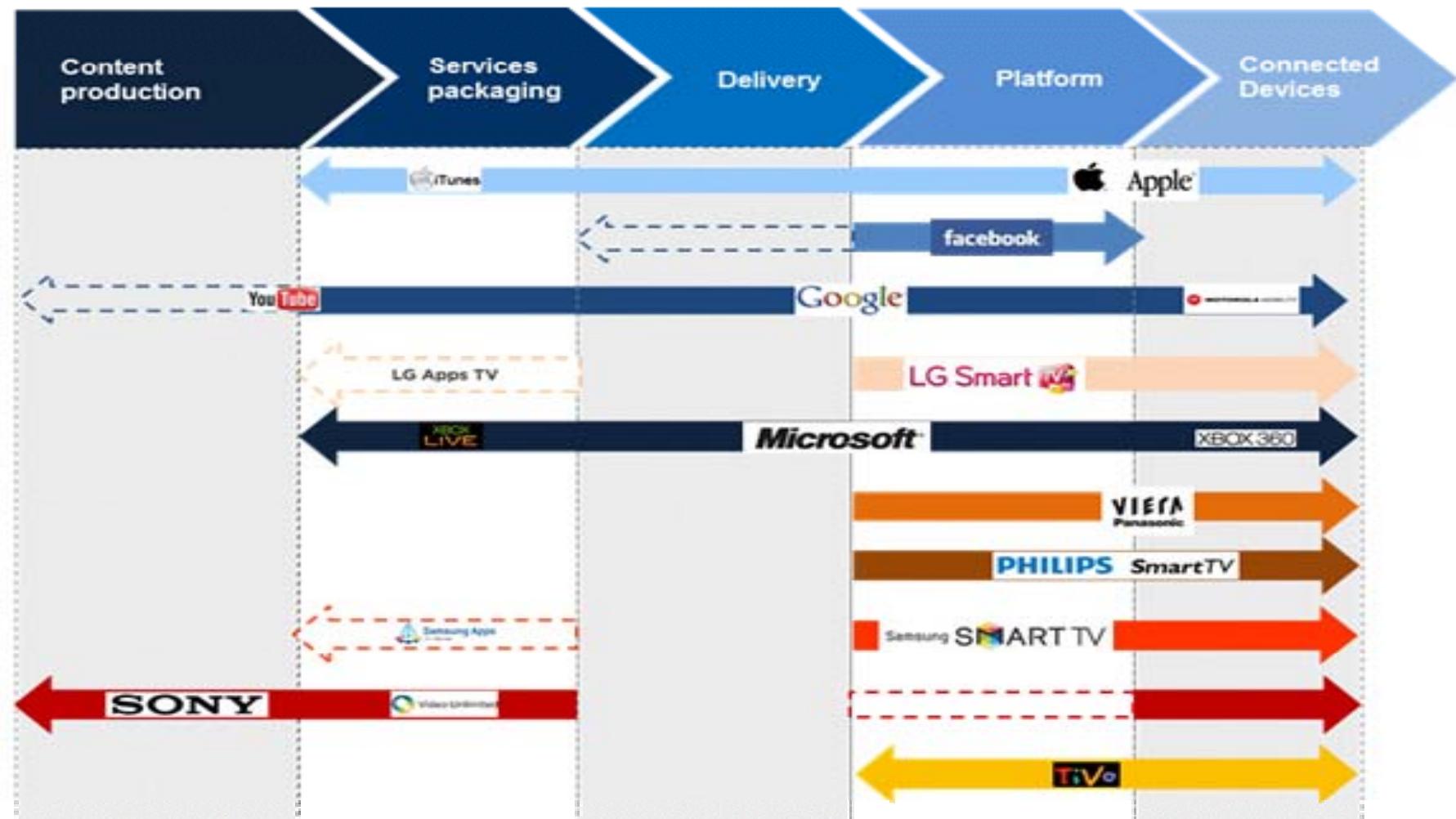
SONY  
PHILIPS



- Players from different fields are coming to MM “playground”
  - Content owners: (BBC, Sky,)
  - Device and OS manufacturers: Google, Apple, Samsung, Sony, Microsoft, Nintendo...
  - Others: Nagra Vision, Cisco, Intel...



## Positioning of Google and Sony in the Connected TV value chain



Source: IDATE – "Connected TV Watch Service"

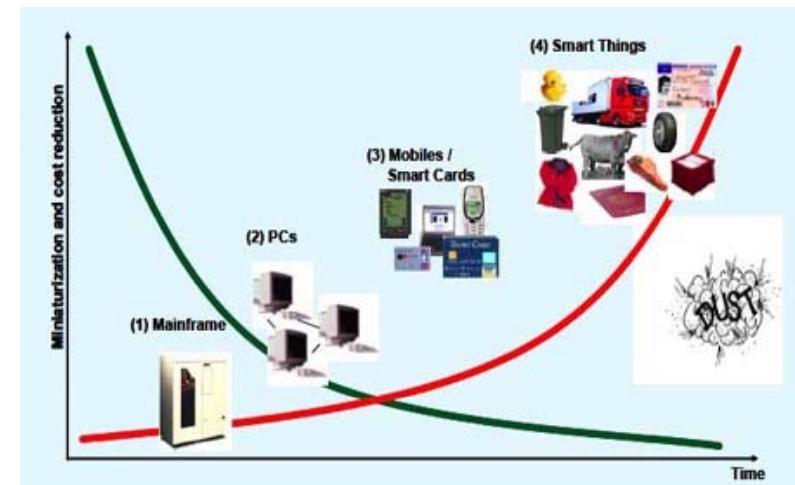


# Services

- “Classic” still most wanted
  - Entertainment and info (movies, sports, shows, music, news,...)
  - Personalisation!



- “Smart” sensor based solutions are on the rise
  - Energy efficiency
  - Smart home control
  - Medical solutions
  - ...





## Services (2)

- **Solutions are pretty similar**
  - 2nd screen!!!
  - Content consumption on all devices
  - Additional content to linear TV (behind the scenes, advertising,...)
  - Personalisation
- **Added value is user-friendliness and simplification of use**
  - Control and content access
  - Personalisation





# Most wanted services

- Second screen has become “the Holy grail”
- Access to all content on all devices (mobile, TV, tablets,...)
  - Regardless of the distribution mechanism: OTT, IPTV, broadcast
  - Catch-up TV!
- Remote control using mobiles and tablets
  - A remote
  - Content browsing on the tablet , content consumption on the TV
- Interactive user participation
  - Voting (quiz)
  - Event prediction (ex.: goals, winners,...)
  - Live comments for shows,...
  - ...



# Most wanted services (2)

## Content on demand (VoD)

- Old story, new technical approaches on all platforms
- Many providers (Netflix, Hulu, Amazon, sports,...)
  - Amazon is on the rise(17% → 22%, feb -sep)
  - Netflix in the lead, but dropping 84% → 82%
  - iTunes (16%), Hulu (8%),...
- Microsoft acquisition of Netflix?
- Coming: GooglePlay movies and music (nov. 2012)
- Channel4 sets up a VoD system(4oD)
  - Free but with ads
  - All devices(STB, iOS, Android,...)
  - 6 milion registered users
    - 50% of subscribed kids between 16 and 24!



amazon

hulu

iTunes

## Content recommendations

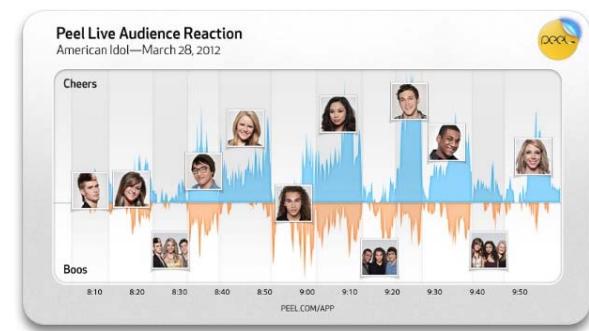
- By other users through FB, twitter
- System recommendations (personalisation)



# Most wanted services (3)

## ■ Additional content

- Catch-up TV
- “Behind the scenes”
- Recipes, tourist destinations
- Interactive adds related to the events on the screen
- Linking of related sites (wiki)
- ...
- Example: Forecasting of the dead in the Walking Dead series ☺
  - 20% of viewers have installed the 2nd screen app Walking Dead





# Most wanted services (4)

## ■ Extinction of linear TV?

- Linearna TV is being watched more than ever
- VoD is also on the rise



## ■ Social networks

- Usage depends on age and culture
- USA 60% , GB 86% of viewers use tablets while watching TV
  - Not in a second screen fashion
  - Most are using Facebook, Twitter, wikipedia, games

Viri:

- GFK media efficiency panel 2011 (20000 uporabnikov)
- RedBee media (2000 uporabnikov),
- Nielsen mobile study 2012



## 2nd screen: a good example 😊

- Cinergy
- **Similar solution by Gracenote**
  - Philips' audio fingerprinting technology
- **Useful for any service**
  - Additional info, interactive participation, target advertising, ...



# Advertising – new approaches

## ■ Old story

- First TV add : 1.7.1941, Bulova watches, 9\$ for 9 sek, before a baseball match
- <http://www.youtube.com/watch?v=lsjc2uDi1OI>

## ■ Trend

- 2nd screen advertising
- Personalised advertising, game based advertising
- Much easier interaction as on a TV screen
- Moving from “push” to “pull” model
- Requires a good connection between TV content and 2nd screen content
  - From technological perspective
  - From consumption perspective



# Advertising – new approaches (2)

## ■ Example:

- Magic Ruby for “Sons of Anarchy”:
  - Advertising and sales of items from the show (clothes, eye glasses, motorbikes,...)
  - Information about actors in the series
  - Cooking recipes for food
  - Synchronises with the current show on the air (audio finger-printing)





## Mobile services



# Mobile internet

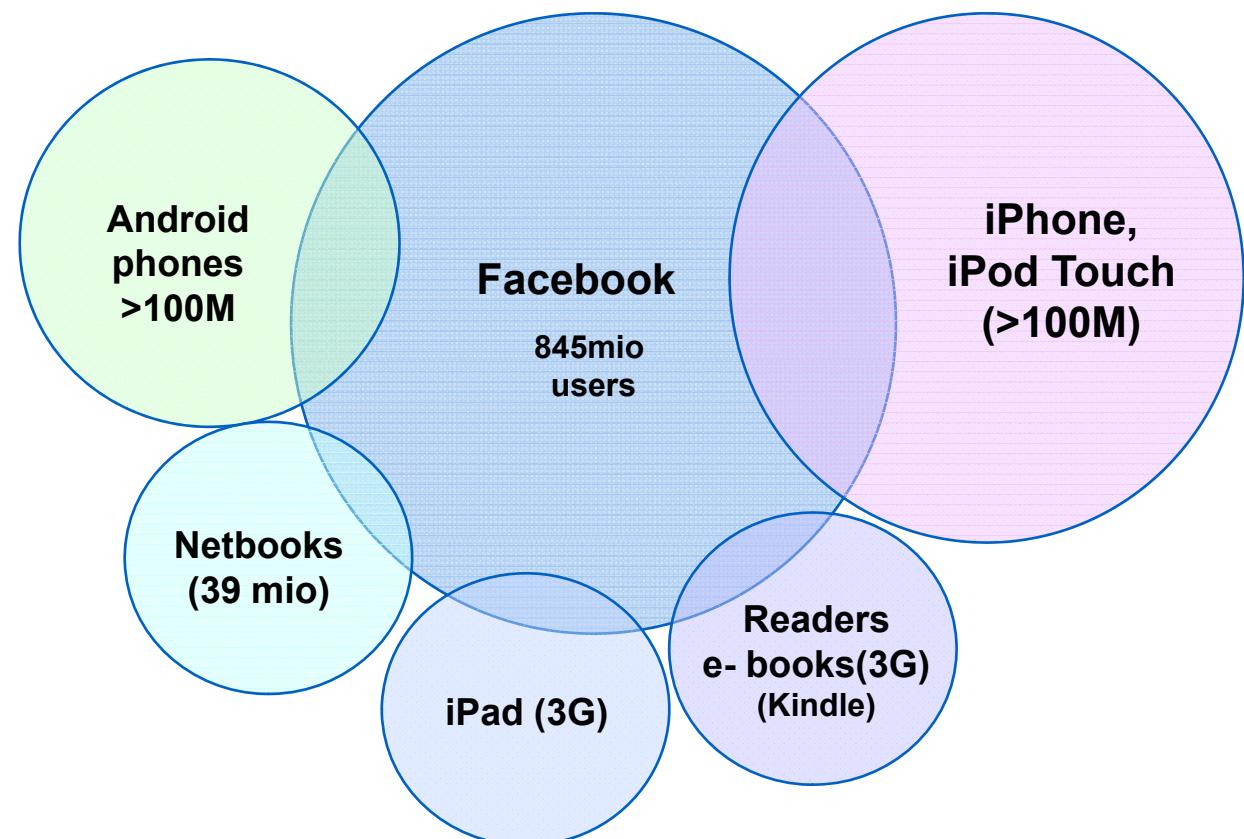
- **Full web browsers**
- **Rich HTML5 web apps**
- **Flash**
  - Demanding for low performance mobile devices
  - Existing flash apps not adapted for touch interaction
  - Not supported on iOS
  - Only partially supported on Android
    - No support on 4.1 and higher
- **The future: HTML5**
  - Support for HW access (accelerometer, camera, NFC, etc)
  - WebGL (3D games and apps)



# Mobilne sociale networks

## ■ Unified communication

- Location aware (GPS/WiFi/Cell ID)
- Facebook, twitter apps for iPhone, iPad, Android
- +adapted web sites





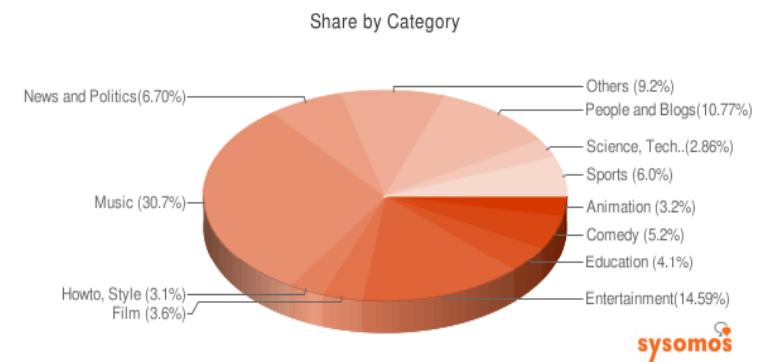
# YouTube ( 2011)



- **More than 3 billion hours watched per month**
  - **1000 billion watched in 2011**
  - **25% from mobile devices**
- **72 hours of new videos uploaded every minute!**
- **Content formats**
  - **HD 480p, 720p, 1080p (1920x1080), 4k**
  - **Do 24MB (200 Mbit) for each minute of video**

## About Uploading

- Capture and Upload in High Definition!
- Upload up to 10 videos at a time
- **Best video formats for YouTube**
- Up to 2 GB in size.





# NFC services

- 2011 first Android phones with NFC
- Google makes deals with Mastercard
  - Mobile payments
- Touch as new interaction mode
  - Social network Foursquare: NFC check-in
  - Google Placemarks





# Augmented reality

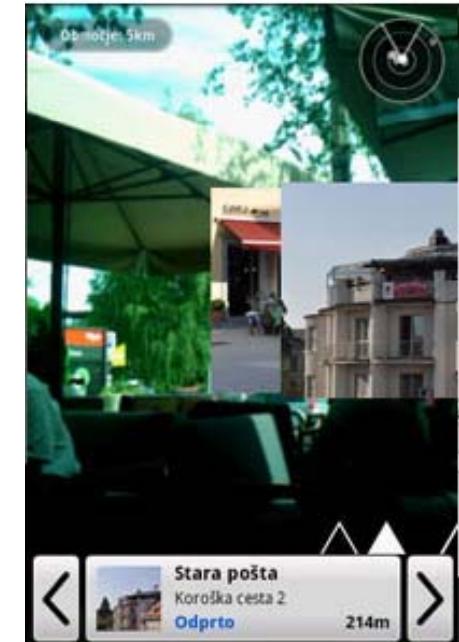
- Enhancement to real world with data on screen (overlay)
  - GPS + compass + gyroscope + camera
- iPhone and Android apps
  - Augmented SDK for development (only Android)





# Examples

- Odpiralni časi (opening hours)
- Layar





# LTFE + BicikeLj

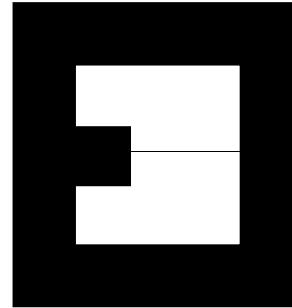
- Layar layer with realtime data about BicikeLj stations in Ljubljana (rent-a-bicycle)
  - Android, iPhone and Nokia





## Augmented reality (2)

- Different approach: image processing
- typically: Open CV framework
  - Open Source Computer Vision framework
- ex: Sven Bomwollen
  - Visual marker
  - App





# Educational applications

- Portable device is ideal for a classroom
- Battery capacity sufficient for an entire day of usage



Elements



Google Earth



# LTFE: Coome

No SIM 5:03 PM 96%

Top Computer Science Bioinformatics **LTFE ICT Academy**

**Lost in Translation from Genes to Organisms**  
Jukka Jernvall  
June 2006

**Game theoretic models in molecular biology**  
Tommi Jaakkola  
June 2006

**Kernel Methods in Computational Biology**  
Jean-Philippe Vert  
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**Protein Subcellular Localization Prediction Based on Compartmentalization**  
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Kristaan Pelckmans  
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Vipul Kashyap  
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**Razvoj PHP aplikacij v okolju Eclipse in sistem za nadzor različic kode Subversion**  
Marko Štamcar  
July 2008

<http://videolectures.net>

Marko Štamcar <marko@stamcar.com>

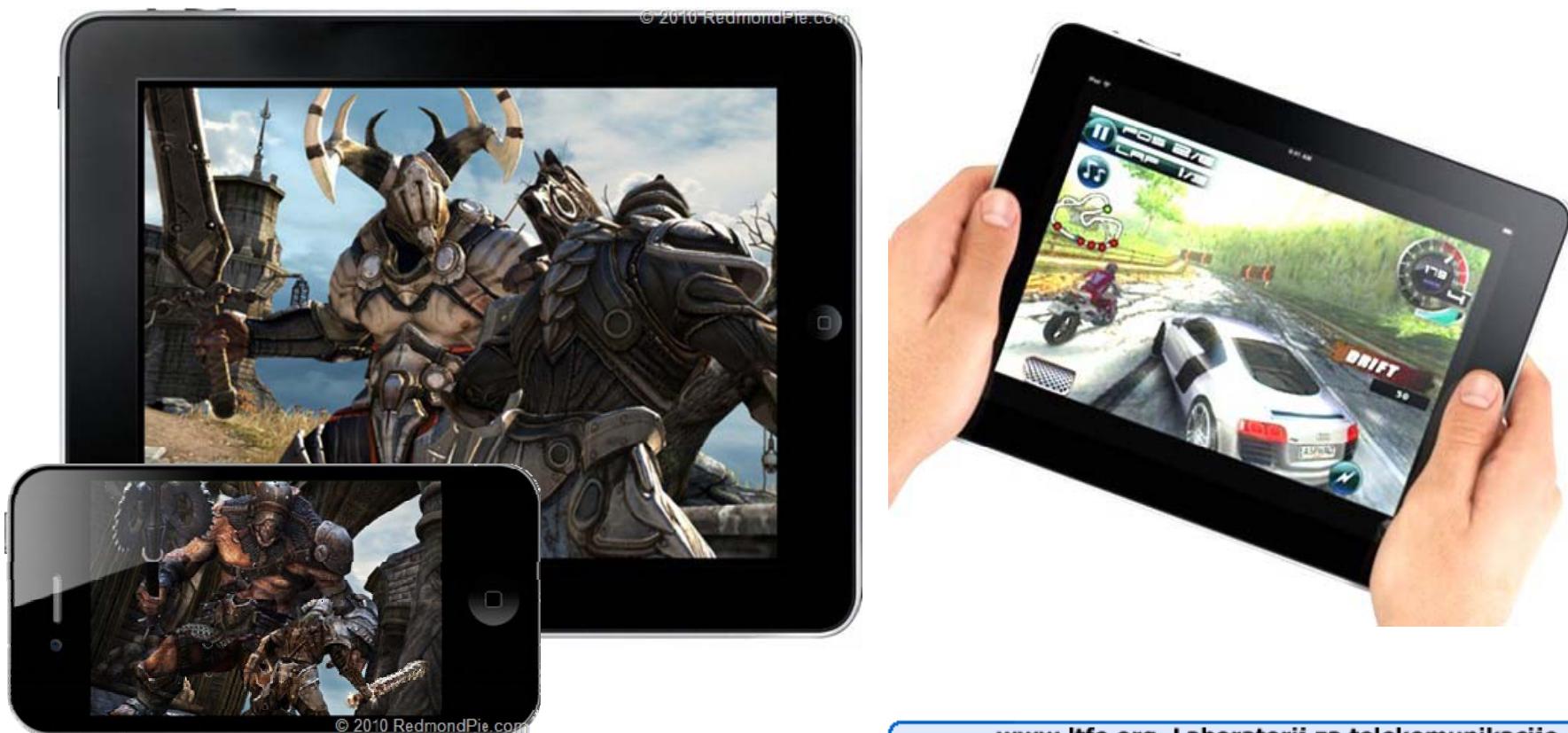
**ECLIPSE IN SUBVERSION**

Categories Search My Lectures History



# Games

- High processing and graphical power of devices
- 3D games are possible
  - New interaction modes (turning of the device)





# Angry Birds

- Extremely successfull



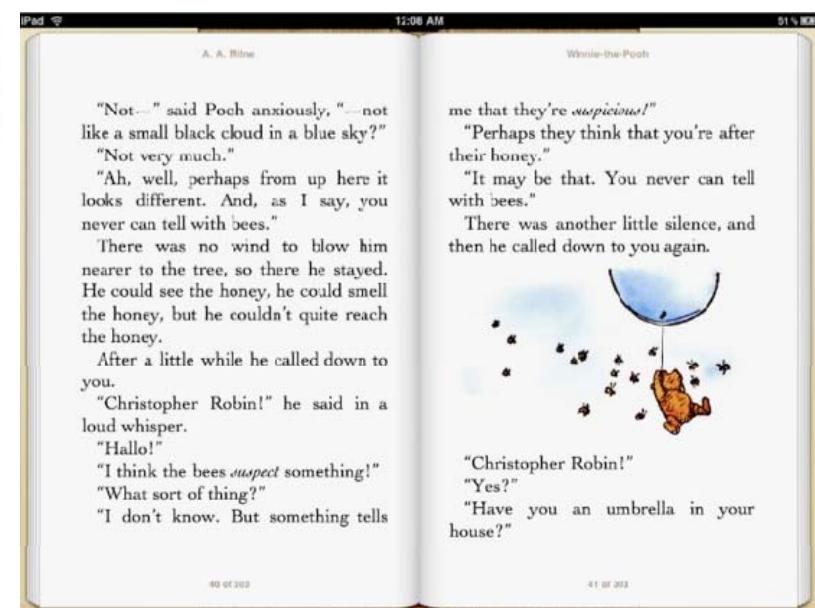
- Success → merchandise (plush toys)
- Coming soon: A Disney movie
- OpenGL → WebGL
  - Simple porting between platforms
  - <http://chrome.angrybirds.com/>





# Book readers

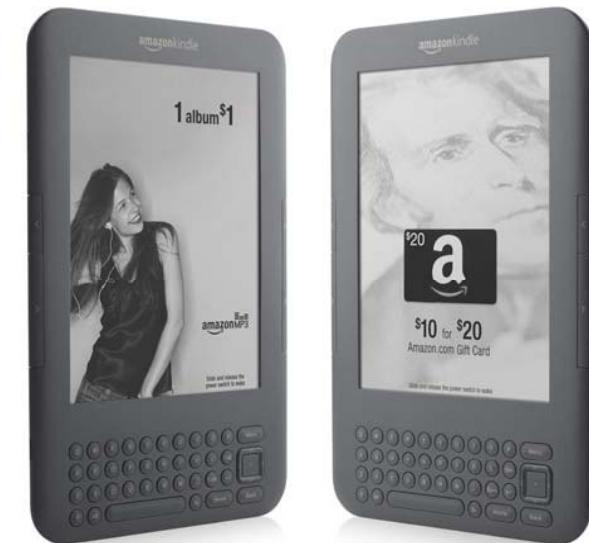
- eBooks (ex. Kindle for iPhone, Android, iPad...)
- PDF or ePUB formats
- Synchronisation between user's devices
- Built-in dictionary, notes and bookmarks





# Amazon

- **Sale of Kindle books has surpassed sales of all printed books**
  - Since April 1 2011, for every 100 print books Amazon.com has sold, it has sold 105 Kindle books.
  - This includes sales of hardcover and paperback books by Amazon where there is no Kindle edition. Free Kindle books are excluded and if included would make the number even higher.
- **New ad-supported Kindles even cheaper**
  - For \$25 discount the device shows a commercial logo when turned off





# Electronic magazines

- Mobile devices are a new opportunity for publishing
- Purpose built apps ex..
  - The Daily (rich app with video , animations,...)
  - Delo (standard PDF)
  - Mercedes magazine





# Audio fingerprinting

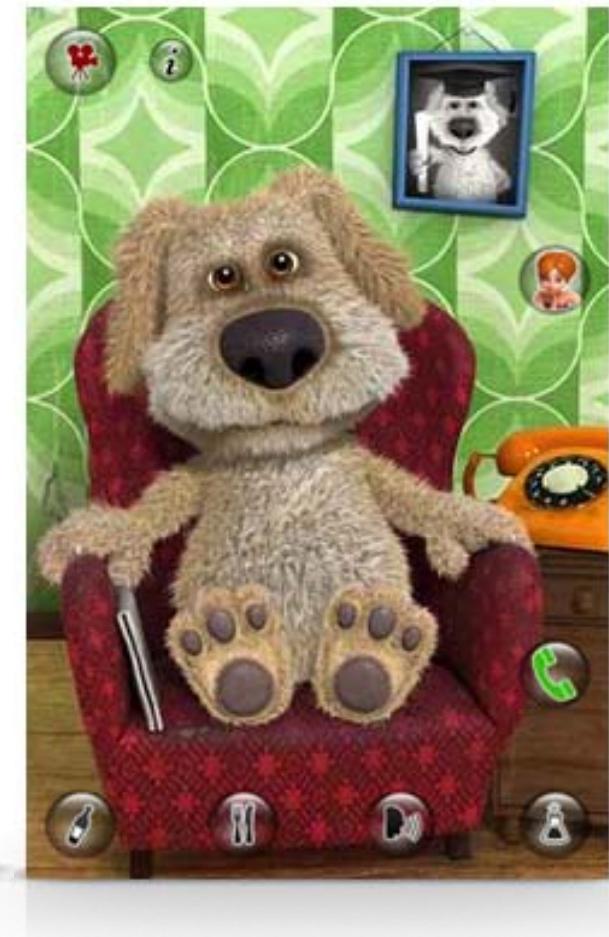
- Music recognition apps
  - Shazam
  - SoundHound





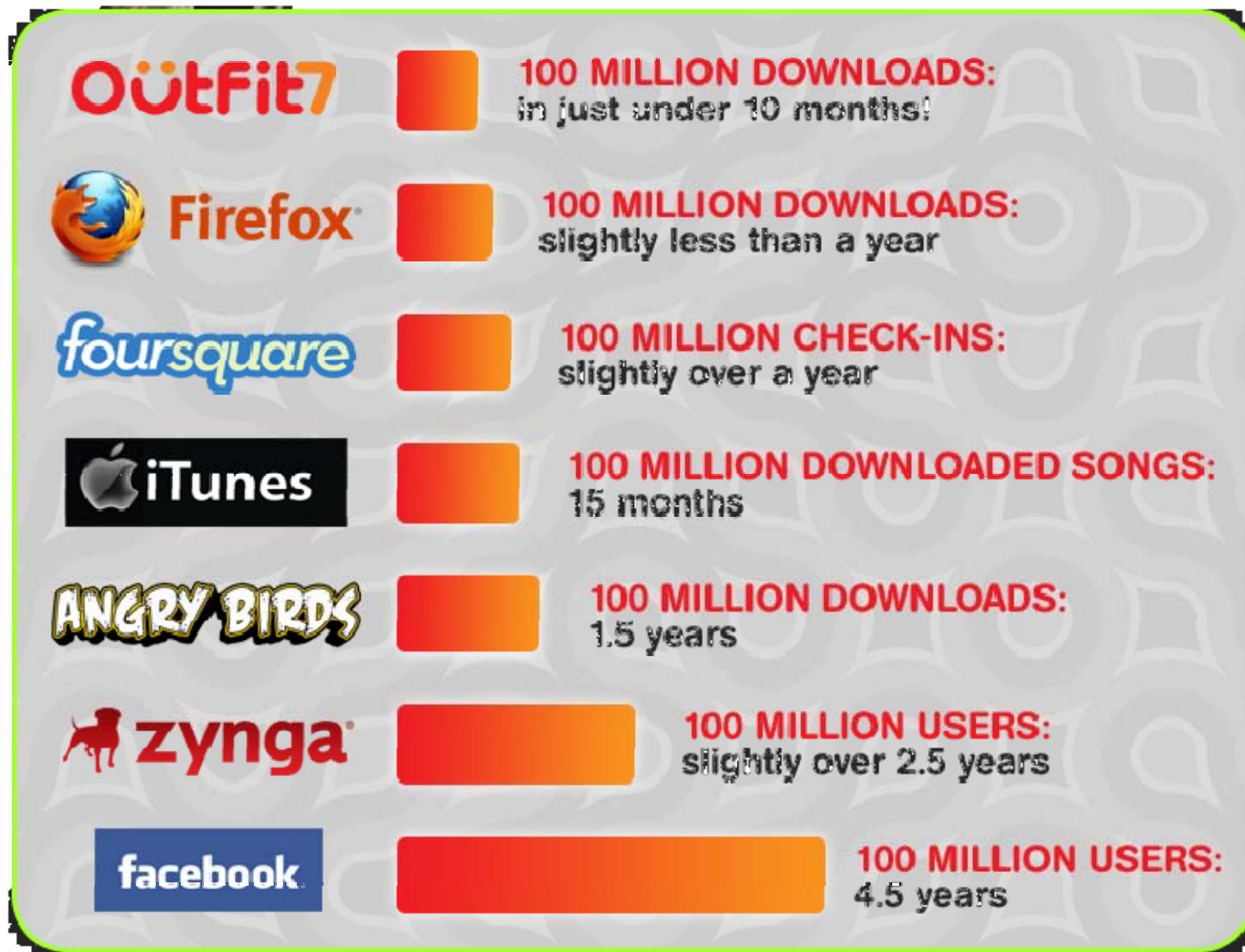
# Outfit7 – portfolio

- >20 apps, all with the same functionality 😊





# Outfit7: 100M apps put in context





# Toshl

- ThirdFrameStudios
- Personal costs tracking
  - Combines mobile app and “cloud” storage





# Other apps

- Music instruments
- Camera + video -> video editing
- Remote desktop and terminal
- Word, Powerpoint, Excel
  
- A long list...
- Most of the apps are developed by 3rd party developers
  - Also increases value of the platform



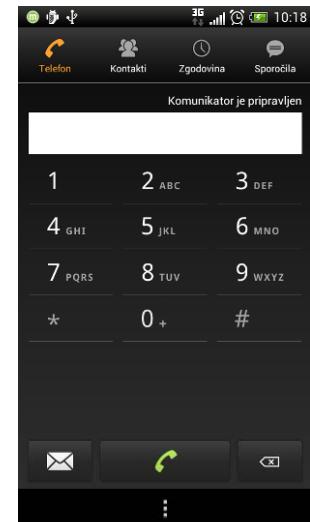


# Other apps - LTFE (2)

## ■ RTV SLO Live



## ■ Mobitel Voip Komunikator





**What are the big-ones up to?  
(smart TV&mobile )**



# Microsoft

- XBOX as central home platform
  - Games
  - OTT content!!!
- Users can access over 200.000 movies, shows...
  - Netflix, BBC iPlayer, HBO, Hulu, sport1, sky, Canal+,...
- Users spend more time watching movies than playing games!

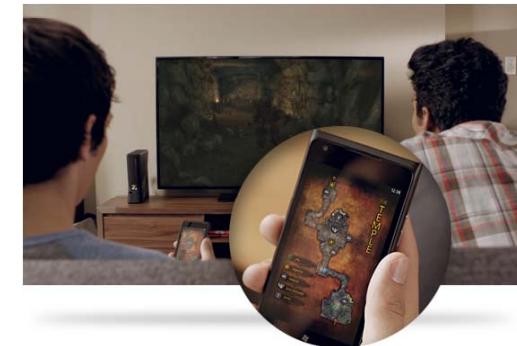




# Microsoft (2)

## ■ Hot topics:

- Connecting other devices with XBOX and content streaming-XBoxSmartGlass
  - As a remote, content consumption, additional content, VoD,....



- Gesture and voice control - huge success in child game Sesame street
- Windows 8
  - Over the top content included
    - Netflix, YouTube,....



# Samsung

- **Smart TV**
  - 1/3 share in smart TV market!!!
  - % of internet connected devices is growing (2010 – 15%, 2011 – 50%)
- **OTT content repository**
  - Netflix, Hulu, YouTube, ESPN, MLB, Blockbuster,...
- **Hot topics:**
  - Gesture and voice control
  - User recognition
  - <http://www.samsung.com/us/2012-smart-tv/#navigation>





# Google

## ■ Google TV

- First version a failure
- New version on the market (July 2012 GB, August Germany, September France...)



## ■ OTT content

- Netflix, HBO, CartoonNetwork, YouTube, Nascar, Vimeo, DailyMOTion, TuneIn, FoxNews...

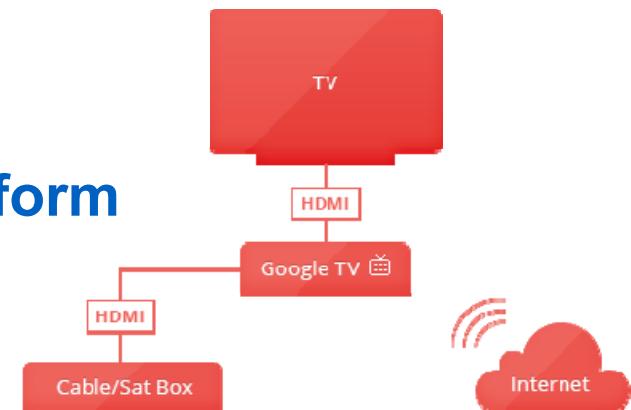
## ■ Apps, games,...

## ■ Linear content through Google TV platform

- Indexing and recording

## ■ Hot topics:

- Search?





# Google glass

- **Eyeglasses with a camera and a display**
  - Voice controlled
  - Internet access, video-chat, virtual reality...
  - Android OS
  - 1500\$ price for developers
- **Market version in 2014?**



- <http://www.google.com/glass/start/how-it-feels/>



# Apple

- **Apple TV**
  - Apple style: well designed and simple to use
  - 3rd generation
- **OTT content:**
  - Netflix, Hulu, YouTubre, NBA, MLB, NHL, Wall street journall, iTunes
- **Hot topics:**
  - Simple to use remote
    - Also with iPhone, iPad,...





# Apple (2)

## ■ Connectivity with other apple devices:

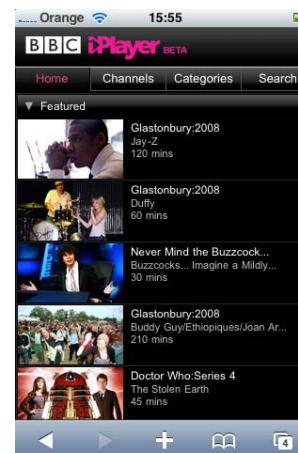
- AirPlay: content or screen transfer from other devices, dual screen (at home)
- iCloud: consumption of bought content on all Apple devices (anywhere)





# BBC

- “The” broadcaster ☺
  - Top content
- High investment in content distribution technologies
  - iPlayer: accessible on most platforms (PC (50%), mobiles, tablets, smart TV, STB, games consoles)
    - Pogodbe s proizvajalci STB oz. distributerji vsebin (Virgin, Freesat, Sky Go, BT Vision,...)
  - Linear content as well as on demand
- Usage growth (in 2012):
  - PC 14%
  - Mobile: 140%
  - Tablets: 580% (iPad)
  - Smart TV: > 1000%





## BBC (2)

- Trend: additional content for most interesting shows (“red button”)
  - Additional AV content
    - Major events (additional content for Olympic games,...)
    - Live shows with people in studios (“behind the stage”,...)
  - Use interactivity
    - voting, participation in a quiz ,...





# Nintendo

## ■ Nintendo Tvii

- Nintendo U as a remote and second screen device
    - Knows TV models and can connect with them
    - Knows cable operators and shows EPG
    - Interactive sports apps- stats
  - Netflix, Hulu, Amazon, sports channels ,...
    - On device or over DLNA onTV
  - Control and content access from TiVo box
  - And games of course ☺
- 
- User experience? ☹





# Sony

## ■ PlayStation

- Basically games
- Movies and TV series
  - Most Netflix content is sold on PS3, more than on PCs

## ■ Cross-platform

- Start a game on PS3 continue on PS Vita
- PS Move: motion based control
  - Same story in a slightly different way



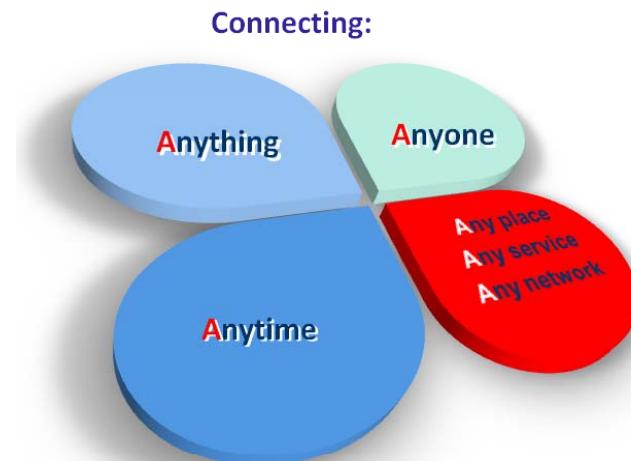


## Senzorske storitve (vse platforme)



# Internet of Things (IoT)

- An increasing number of data sources are available over internet
- All we need are devices and sensors and automatisation of data processing
- Numerous fields of usage
  - Traffic, environment, medicine, energy.... anything ☺
- Data accessible on any device, even on TV ☺





# Sensors

- Sensor is a device transforming physical quantity into a electrical signal
- Advancement in technology
  - Technological solutions are getting smaller and cheaper
  - They are also getting more accurate
- Nowadays almost any sensors are available:
  - Light, temperature, humidity, air pressure
  - Wind speed and direction, precipitation, sun and UV lights
  - Gas concentration(CO, CH<sub>4</sub>, C<sub>4</sub>H<sub>10</sub> CO<sub>2</sub>, NO)
  - Radioactivity, vibrations, IR movement
  - GPS, magnetometer, camera, microphone, proximity sensors
  - Heart rate, sugar blood levels, pH, accelerometer





# Sensor platforms

- **More than a sensor**
  - “glue” connecting sensor in a bigger system
- **Embedded platforms on the rise**
  - CPU, RAM and communication interfaces
  - RaspberryPi (PC for 30 EUR)
  - Popular platform Arduino (cheap and simply programmable)
- **Possible integration into a modem, STB,...**



Arduino

+



Ethernet  
shield

=



Sensor platform



# Ecology and pollution

- Past: small number of specialized stations for measurement
  - ARSO: 20 locations with publicly available data
  - The entire city just one value
- Today: commercially acceptable solutions
  - Less accuracy but geographically widespread
  - Ex. : Air Quality Egg
    - CO<sub>2</sub>, NO, humidity and temperature
    - Approx: \$70





# Smart energy

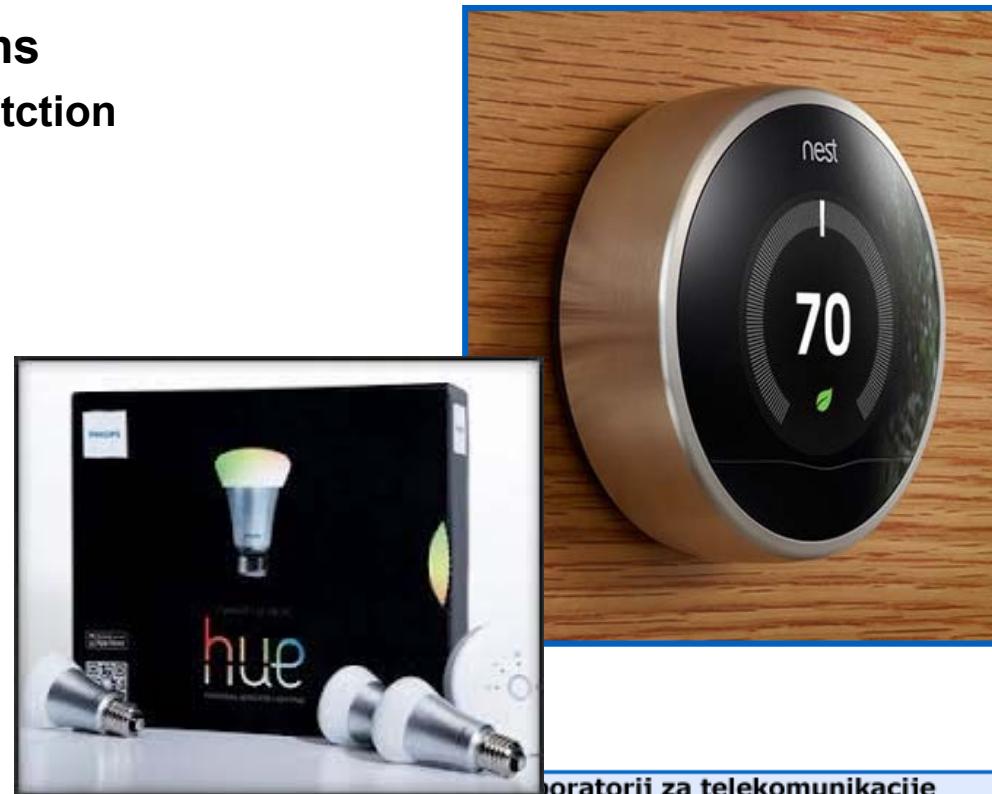
- **Smart metering**
  - Connected meters
  - Energy consumption monitoring
  - Prediction of needs
- **Allows for**
  - Better network planning with prediction of consumption
  - Cheaper energy
  - Feedback motivates user for lower consumption
- **Monitoring of energy consumptions on all devices**
  - Mobiles, TV,...





# Smart home

- **Automated processes in residential and business buildings**
  - Increased safety and comfort
  - Higher energy efficiency
- **Usage scenarios**
  - Cooling and heating systems
    - Inner/outer temperature detection
    - Open windows detection
    - User presence detection
  - Lights
    - IR presence sensors
    - Light sensors





# Medicine

- **Until recently not supported**
  - Doctors prescribe medicine of which they know little, to cure diseases of which they know less, in human beings of which they know nothing. —François-Marie Arouet Voltaire, about 250 years ago
  - Tradicionalno nepersonalizirana
- **A lot of interest by people**
  - 50% of Slovene population was looing for health related data (Q1 2012)
  - “only” 27% for watching Web TV (Vir: RIS)
- **Portable sensors are generating huge amounts of data**
  - before: 1 sample every  $n$  years
  - today: 10 samples a day
- **Many fields are covered**
  - Weight, activity, sleep, blood pressure, temperature, heart rate, blood sugar levels



# Medicina: sensors within a reach





# Wearable computing today

## ■ "I'm Watch" – wireless terminal

- Runs Android
- Touch screen and bluetooth z
- Apple is preparing a similar solution– iWatch
  - Bluetooth 4.0



## ■ Basis

- Fitness watch + data mining (5 sensors)
- Air temperature, skin temperature and conduction, accelerometer, heart rate
- Many other solutions



## ■ iPod Nano

- Touch screen
- iOS-like operating system



- Some time left?



# Mobile platforms



# Windows Mobile



- System based on platform Windows CE
- Closed environment
  - Costly development tools (Microsoft Visual Studio)
  - From 2009 includes services for app distribution
- Mobile GUI similar to PC based GUI
  - Microsoft Office Mobile, Outlook Mobile, Internet Explorer
  - VPN for business users
  - advantage: close integration with MS environment ( AD, Exchange)
- Last version: 6.5 (2010)
  - Replaced by Windows Phone 7





# Windows Phone 7

- Upgrade of Windows Mobile
- Completely new GUI
  - Adapted for a mobile device
  - koncept ploščic
  - interakcija s prstom (nič več stylusa)
- Rich media funkcionality
  - Zune player
  - Speech recognition
- Minimal HW requirements
  - Capacitive touch screen 480x800
  - 1GHz CPU, 256MB RAM
  - accelerometer, compass, light sensor, GPS
  - Separate buttons for search, start, back, sleep, camera





# Windows Phone 7

- **Development platform**
  - Silverlight (WP7 version) and
  - XNA platform (based on Xbox new architecture)
- **Development environment**
  - Visual Studio 2010 Express and Expression Blend (free)
- **Windows Phone Marketplace**
  - 60.000 apps (2012)  
(12.000 in 2011)
  - Also “trial”
  - Need approval
  - Microsoft takes 30%



apps for windows phone 7

These apps are compatible only with Windows Phone 7.  
Phone apps don't work on your computer and aren't compatible with other phones.  
Learn more about Windows Phone 7.

devices: WINDOWS PHONE, ZUNEHD  
genres: GAMES, ENTERTAINMENT, MUSIC & VIDEO, PHOTO, LIFESTYLE, NEWS & WEATHER, SPORTS, HEALTH & FITNESS, FINANCE, TRAVEL, NAVIGATION, SOCIAL, PRODUCTIVITY, TOOLS, BUSINESS, BOOKS & REFERENCE

XBOX LIVE:

we recommend:

top paid apps: 1. Parachute Panic 12/6/2010, 2. PAC-MAN™ 12/22/2010, 3. Fruit Ninja 12/4/2010, 4. Zombies!!! © 12/31/2010

top free apps: 1. YouTube 10/20/2010, 2. Facebook 10/19/2010, 3. Adobe® Reader® 10/20/2010, 4. Bubble Birds 1/15/2011



# Windows Phone 8 (RT)



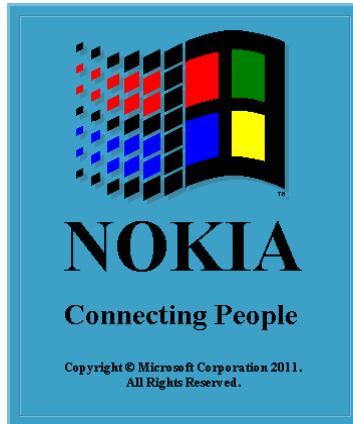
- Based on Windows 8 platform
  - Unfortunately quite different from previous platform (development)
- Support fo screens 1280x768
  - Similar GUI as WP7
- XBOX connectivity
  - music, video, podcasts
  - games: standalone or 2nd screen





# Cooperation: Nokia-Microsoft

- Mutual benefit
- Why not Nokia-Android?
  - Nokia would be “just another Android terminal”
  - Microsoft would have to target niche high-end devices and couldn’t compete with Google and Apple
  - Together they are 3rd major player
- Furious reaction of Nokia hardcore fans





# Apple Inc.



## Ecosystem

Mac computers



iPad



Apple TV



iTunes store



- Music
- Movies
- TV series
- Apps
- Newspapers
- Books



iPod Mp3 players



iPhone



# iPhone

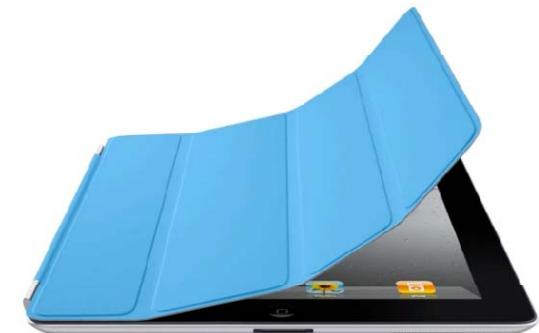
- **Presented in 2007**
  - Sceptical acceptance
  - “Apple has no experience”
  - Partially justified critics (poor radio, partially useful as phone)
- **Innovative GUI**
  - At first limited functionality (2G)
  - No MMS, vCard, no 3G and second camera
- **Current model (iPhone 5)**
  - GPS, accelerometer, compass, gyroscope, autofocus camera, bluetooth, voice recognition, text-to-speech, ActiveSync, VPN client
  - 960x640 screen, 512MB RAM, 800MHz CPU, 64GB Flash
- **Very clear product line**
  - Only 1 current model (little fragmentation)





# Apple iPad

- **Technical specs (iPad4)**
  - 1.4GHz CPU, 1GB RAM
  - WiFi, 3G, up to 128 GB flash memory
  - 2048x1536, 10" diagonal
  - GPS, accelerometer, bluetooth, compass
- **Same ecosystem as iPhone**
  - Can run same apps -2x magnified
  - Today >100.000 apps specially developed for iPad
- **Final result**
  - 15 MIO sold in first 9 month (end of 2010)
  - Best sold consumer device of all times





# Apple SDK

- **Development tool for iPhone apps**
  - One year after iPhone (2008)
  - Runs only on Macs
  - Phone simulator
- **SDK presents**
  - Programming environment for applications - Xcode (IDE)
  - A set of interfaces for access to device data and events
  - ex. multitouch, camera, location, accelerometer, recording and playback of audio and video, Core Animation, Core Graphics (Quartz)
- **App development**
  - Membership in development programme required (Apple developer): \$100 per year
  - Apple terms of service (TOS)
  - Every app is checked before release (problem!)



# App Store

- Free and paid apps
- Paid:
  - Apple takes 30% (most po \$0.99)
- Install over PC or web
- AppStore today
  - 800.000+ apps
  - sum >40.000.000.000 downloads
  - Apple gets an estimated \$1.8B a year  
(profit wasn't expected at first )
  - 60% of developers don't even cover development costs ☹
- A model to look up to!
  - Increases the usability of the device!
  - Android Marketplace, OVI store





# Android



- **Mobile OS based on Linux kernel**
  - Google and Open Handset Alliance
  - Fastest growing mobile platform
- **Mobile terminals**
  - HW requirements are specified
  - Connectivity: GSM/EDGE, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi
  - Touch screen, GPS, accelerometer, compass, gyroscope, NFC, camera





# Android Mobile terminals

- First terminal available in 2008
  - HTC Dream,
- A year later
  - 20 models available
- Today over 200 models of different manufacturers
  - HTC, Samsung, Huawei, Motorola, Acer, Dell, Lenovo, LG, Sony Ericsson, Philips
  - Google-branded Nexus One (HTC), Nexus S (Samsung)





# Samsung Galaxy Tab

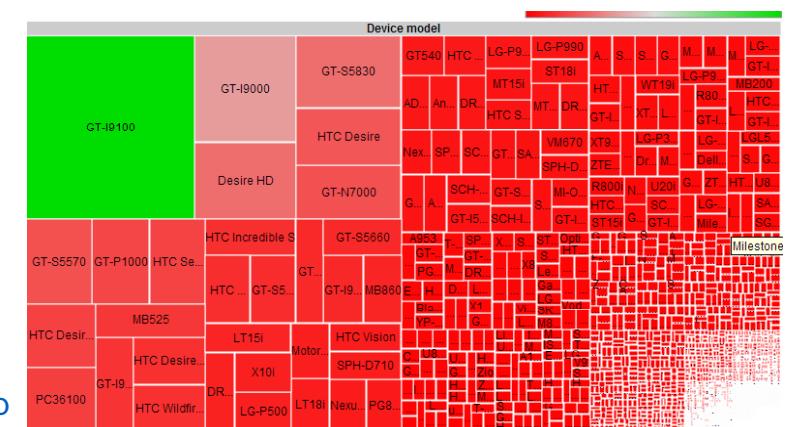
- **Technical specs (v2)**
  - 1GHz CPU, 512 MB RAM
  - WiFi, 3G, 32GB flash
  - 1200x800, 10" diagonal
  - GPS, accelerometer, 2 cameras, BT
- **Platform**
  - Android
  - Lack of real tablet designed apps
- **Business results**
  - 6 months after iPad
  - 2M pieces sold in 2010, >10M in 2011





# App development and distribution

- **Development in Java**
  - Well known tools (Eclipse IDE, ipd.)
- **Distribution through Android Marketplace**
  - App verification similar to Apple
  - Device settings relevant for app versions
- **Problems**
  - Fragmentation: Android is open → thousands of existing device verions
  - Every device provider adds it's own specifics to OS to make some diferenciation
    - Apps no longer work on all devices
    - Similar problem to J2ME



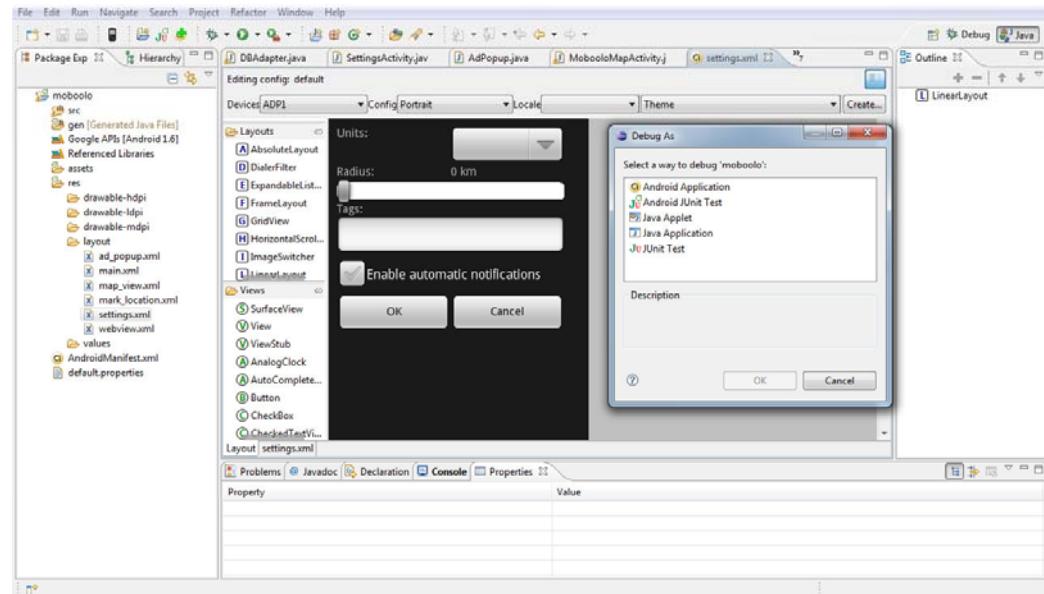
VIR: <http://opensignal.com/reports/fragmentation.php>



# Android – development and apps



- App distribution supported by Android Market
  - Anyone can participate, individuals or companies
  - Licencing is not necessary
- Development tools and libraries
  - Free (Eclipse, Android SDK) ☺
  - Available on all platforms (Windows, Linux, Mac)





# BlackBerry (RIM)

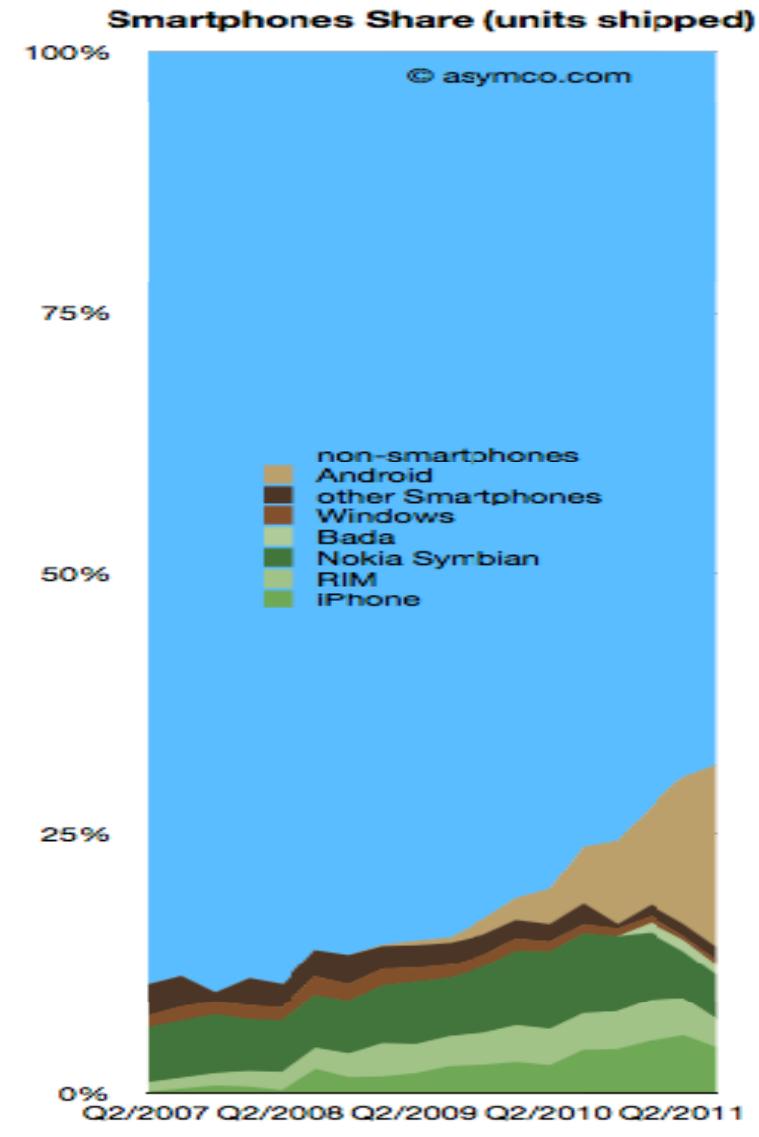
- Proprietary HW in SW
  - BlackBerry OS
  - SDK - Java, coming HTML5, ActionScript
- Strong market share by business users
  - Push e-mail from 2002
  - BlackBerry Messenger
  - Using own server-side
- BlackBerry Enterprise Server (BES)
  - Intermediary between mail servers and mobiles
  - Checks many mailboxes
  - Changes immediately communicated to the mobile
- Coming: BlackBerry 10
  - Touch screen (Z10), also with a keyboard (Q10)
  - Uncertain future





# Market share comparison

- All phones!
  - Including "dumbphones"

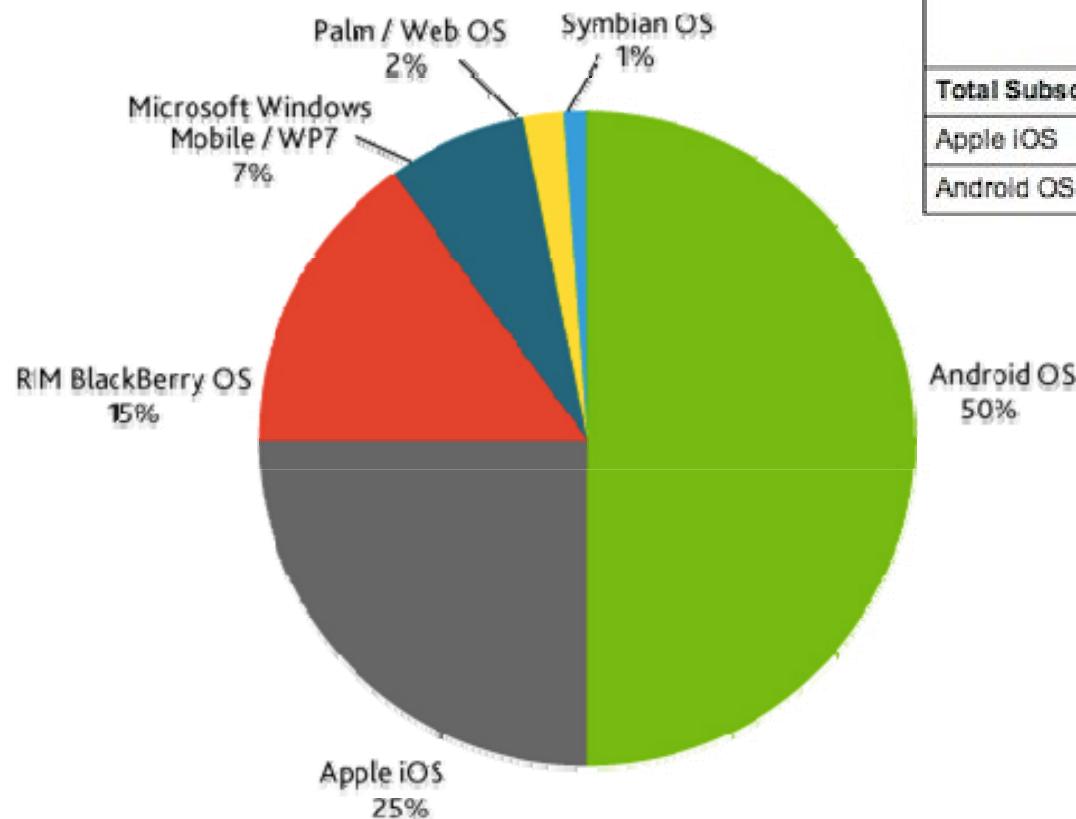




# War of platforms: Android vs. iOs

## Market share: 2011:

March '11, Nielsen Mobile Insights, National



Source: The Nielsen Company.

Apple iOS vs. Android OS Across Media Devices

3 Mo. Avg. Ending February 2011

Total U.S. Mobile Subscribers, Age 13+

Source: comScore MobiLens

	Total Installed Base (000)	Share (%) of Mobile Subscribers
Total Subscribers	234,000	100.0%
Apple iOS	37,868	16.2%
Android OS	23,763	10.2%

**Q1 2011: sold  
altogether 428 M mobiles  
100 M smartphones  
36 mio Android,  
28 mio Symbian,  
17 mio iOS**

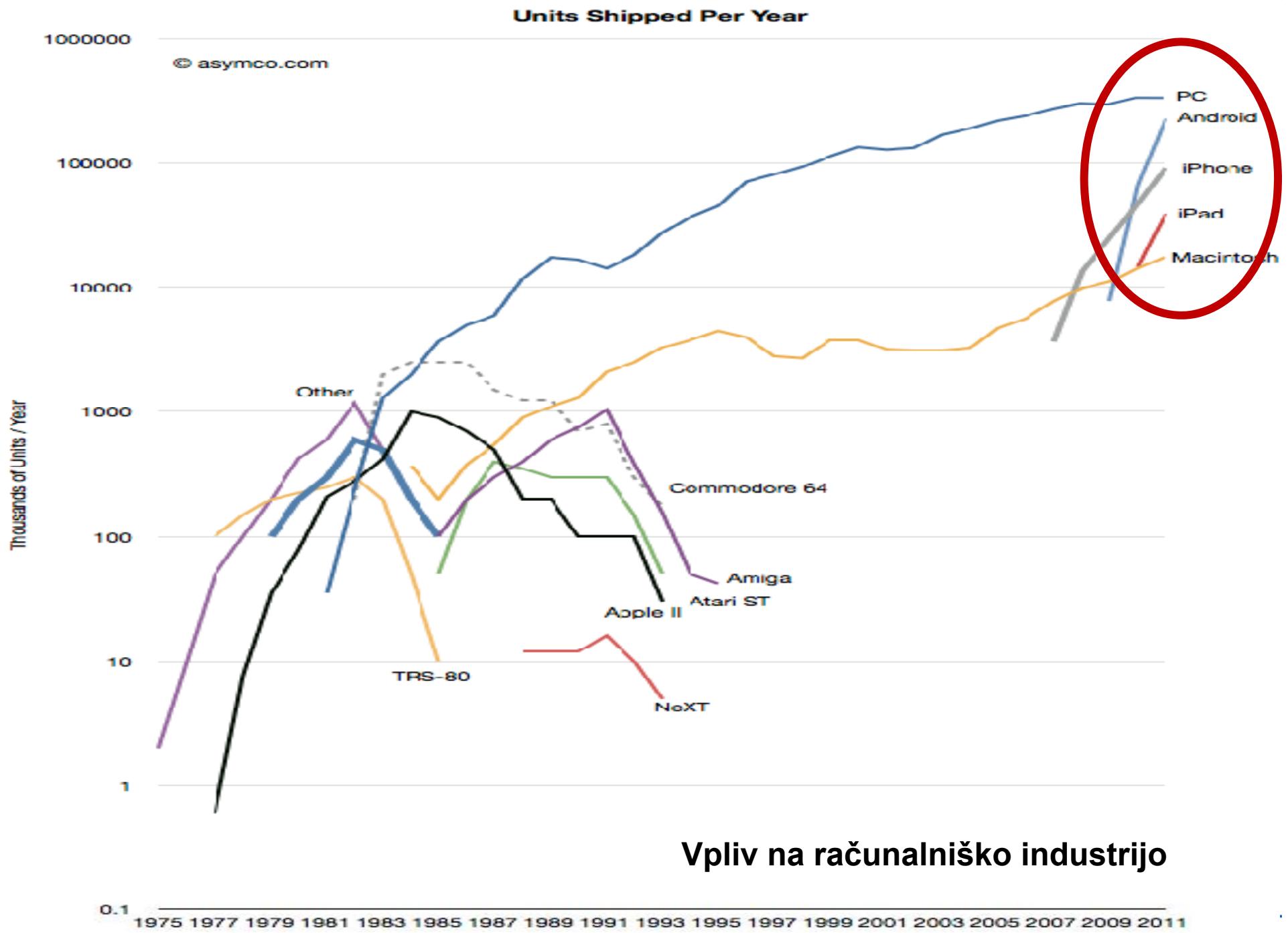
nielsen



# Comparison of profits

- Apple accounts for 50% of total profit [2011]







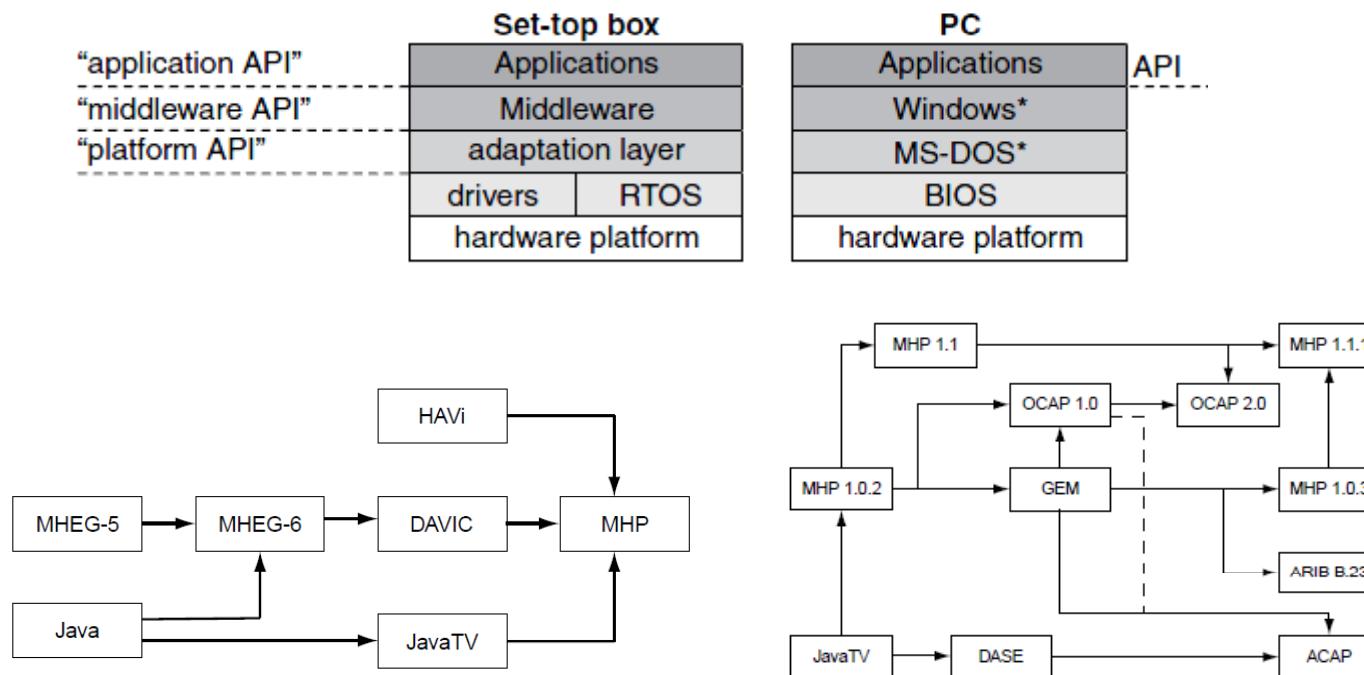
# smartTV platforms

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# Middleware

- **Middleware – proprietary**
  - OpenTV, MediaHighway, Microsoft TV, Liberate, PowerTV, NDS Core
- **Middleware – open standard**
  - MHEG, MHP, OCAP, ACAP, ARIB B23, Java TV, HbbTV





HbbTV

ETSI TS 102 796 v1.1.1 (2010-06)

Technical Specification

Hybrid Broadcast Broadband TV





# Specification HbbTV

- **HBBTV v1.5 (March 2012)**
  - <http://www.hbbtv.org/>
- **HbbTV is an open industry standard**
  - Združitev dveh ločenih tehnologij (Nemčija, Francija)
- **Standard prepared by the HbbTV consortium**
  - [www.hbbtv.org](http://www.hbbtv.org)
  - ANT, APS, Canal+, EBU, France Télévisions, IRT, OpenTV, Philips, Sony, Samsung
- **Many existing standards reused**
- **Country specific rules can be applied**
- **First HbbTV devices were available end of 2009 (in Germany)**
- **Official certification is underway**



# HbbTV supported devices



**FINLUX GRUNDIG HUMAX**



**ITT**

**KENDO**



**LG**

**LOEWE.**

**MEDION®**



**Panasonic**

**SCOTT**



**SHARP**

**smart.**

**SONY**

**TechniSat**



**TECHWOOD**

**TELEFUNKEN**

**TELESTAR®**

**TOSHIBA**



**VANTAGE**



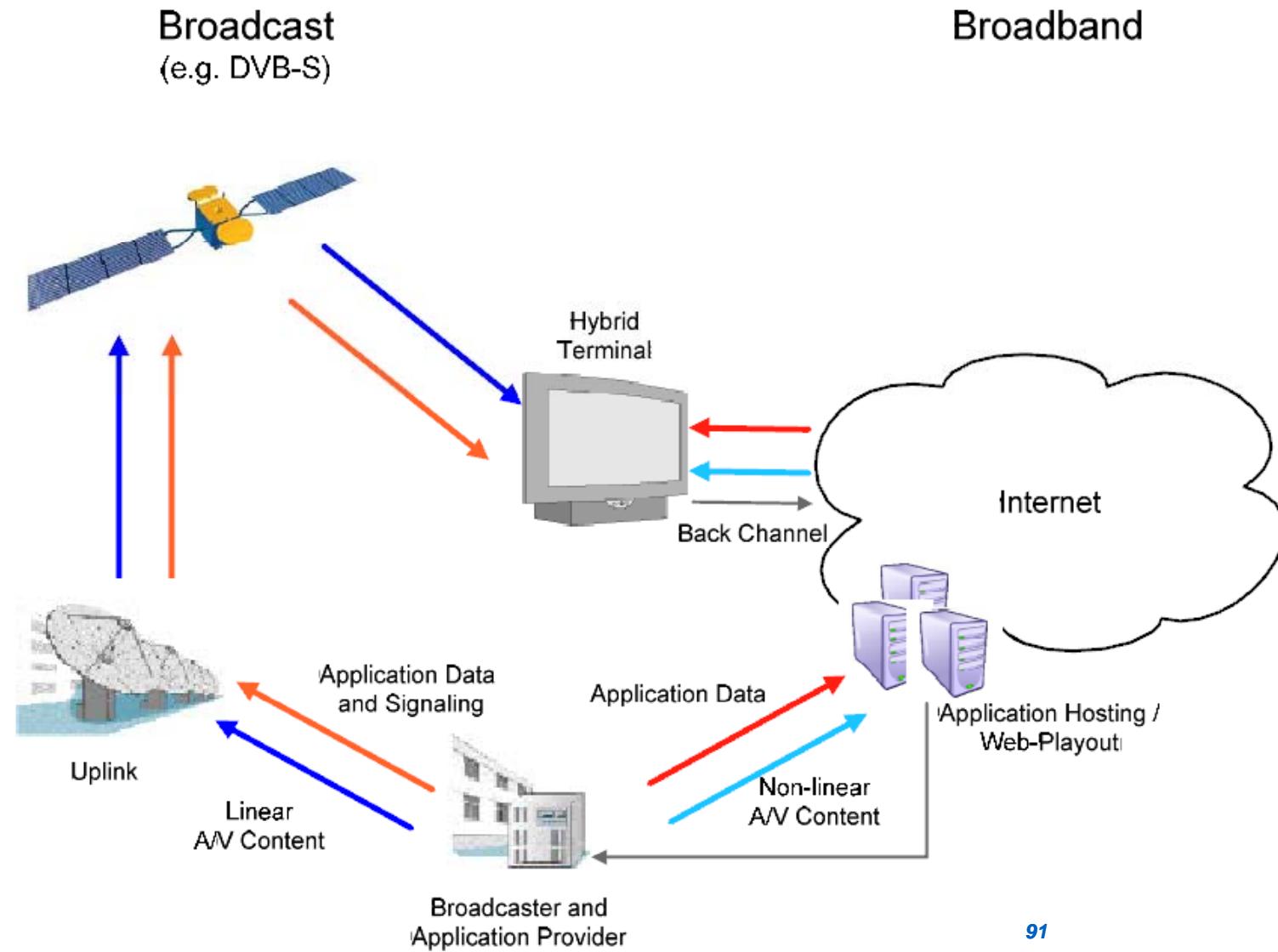


# Architecture

- **Broadcast:**
  - Transmittion of live TV, radio and data
  - Signaling of “broadcast-related” applications
  - Transmition of “broadcast-related” applications and data
  - Synchronistaion of application and broadcast TV/radio/data services
- **Broadband:**
  - Content on demand
  - Transmition of “broadcast-related” and “broadcast-independent” applications and coresponding data
  - Information exchange between servers and applications
  - Access to “broadcast-independent” applications

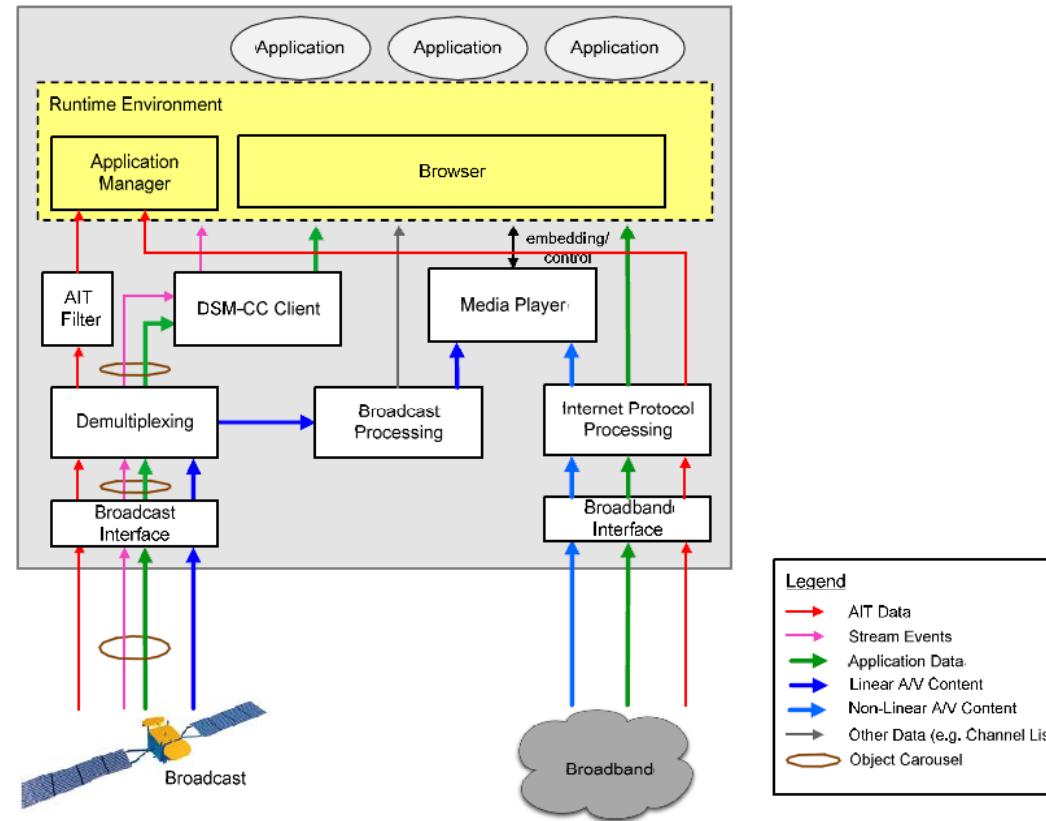


# Architecture





# Hybrid device (STB, IDTV)



Application Data:  
HTML 4, JavaScript, CSS, XML, multimedia files



■ Some time left?



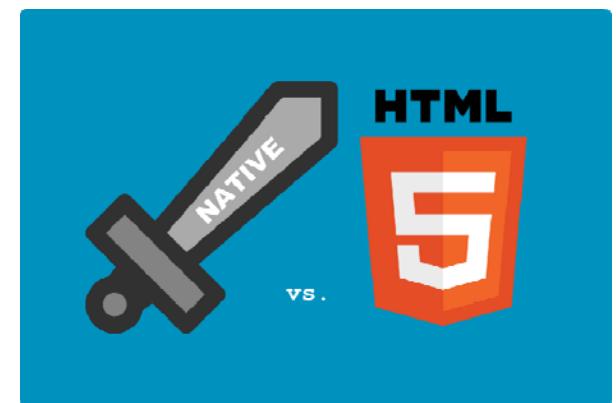
# Web technologies

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# Web evolution

- At first intended for scientific exchange of information
  - CERN
- Later on, growing with availability of bandwidth
  - Multimedia content
  - A growing number of web pages...
  - ...and users
  - Ever more performant HW  
(decoding of video, audio, 3D rendering)
- Today
  - Web page in a browser can replace a native app
  - On both mobiles and desktop
- Tommorow
  - Google Chrome OS instead of Windows?
  - Web based operating systems?





# Tehnologije

- Some web technologies are almost 20 years old
  - Most obvious one: HTTP
  - Some changes ahead: SPDY draft (Google)
- Nekatere so se razvijale počasi, v koraku s številom spletnih strani in uporabnikov
  - HTML 1.0 [1991] ... first web page
  - HTML 2.0 [1995] ... web has 10.000 web pages
  - HTML 3.2 [1997] ... web has 500.000 web pages
  - HTML 4.0 [1997] ... web has 1M web pages

... 10 year break, where development of plugins made up for lack of standardisation (Flash)

- HTML 5 [2008]
- Today [2013] ... web has billions of web pages



# Web is open

- **World wide web was always open**
  - An example to other systems
- **Anyone can add their own HW**
  - And by that physically extend the web
- **Anyone can add content**
  - And extend the web with new web pages
- **Openess**
  - All standards and protocols are known  
(published in ASCII/txt on the Web)
  - One can implement its own server without patent infringement
  - Or setup their web site
- **Certain components somewhat spoil the overall impression**
  - Proprietary technologies such as Adobe Flash
  - Standardisation of such technologies is under way, supported by the “Big-ones”



■ Some time left?



# **Web2.0 application technologies**

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# WEB 2.0 API

- “Write Applications not Code”
  - Basic building blocks are available
    - Open interfaces over HTTP/REST/SOAP
    - A set of supported libraries
  - Support for a number of programming languages
    - PHP
    - Javascript
    - Python
    - Java
    - .NET...
  - APIs allow for creation of Mashups



# WEB 2.0 API (2)

## ■ **Google API** (<http://code.google.com/more/>)

### ■ A number of APIs

- Search
- You TUBE
- Open Social
- Maps
- Earth
- Calendar
- Chart
- ...

## ■ **Facebook API** ([http://wiki.developers.facebook.com/index.php/Main\\_Page](http://wiki.developers.facebook.com/index.php/Main_Page))

### ■ Support for a number of functionalities

- Login/logout
- Adding textual and other notes:
  - Comments, notes, like, tags
- Upload and access to images and videos

### ■ Implemented on a server or as a standalone application



# WEB 2.0 API (3)

- **YouTube API** (<http://code.google.com/apis/youtube/overview.html>)
  - Problem
    - Storing and processing of video is demanding
      - High bandwidth, high storage requirements
  - YouTube API allows for simple use of YouTube infrastructure
    - Only parts can be used
    - Using application with APIs one can do the same and even more as YouTube portal users
    - Implementation of YouTube-like portals without storage and access problems
  - Basics
    - User registration
    - Basic and advanced search
    - Uploading and transcoding of videos
    - Serving of videos



# WEB 2.0 API (4)

## ■ YouTube API (2)

### ■ YouTube player

- Basic player with all options

  - Simple use (HTML Embed)

- Advanced player with reduced functionality (just video)

  - Player control implemented using Javascript

  - Customisable controls (graphics)

### ■ At what price?

- Standard YouTube player (embeded video)

- Advanced player with embedded YouTube logo

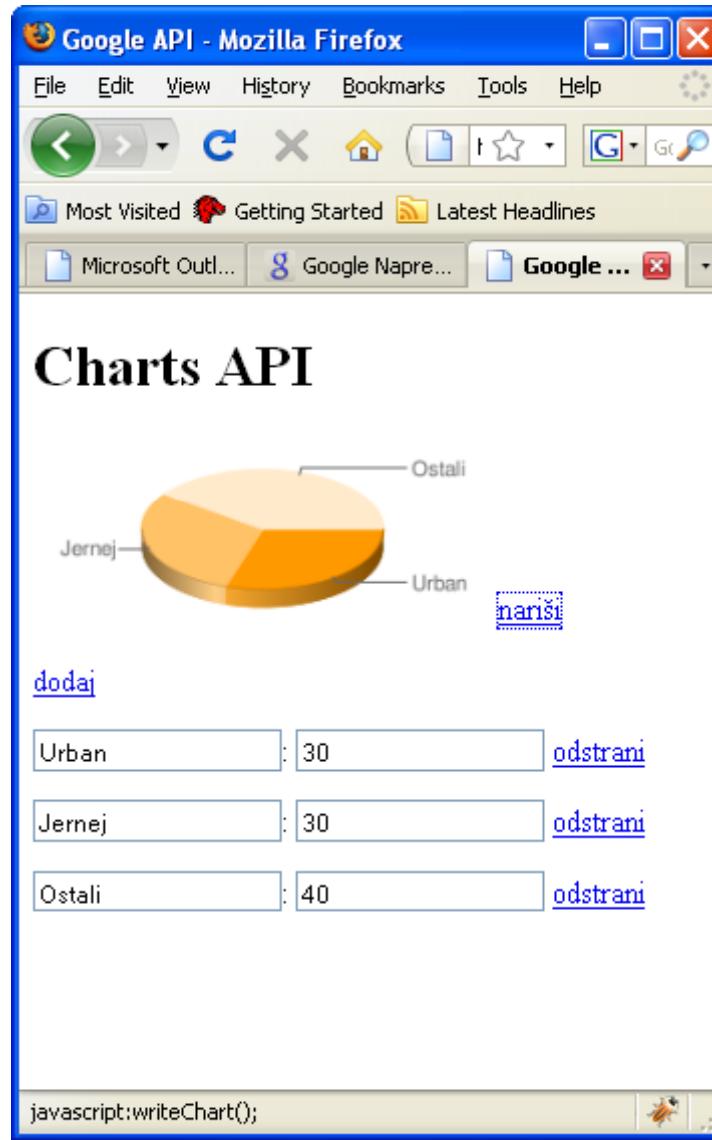
  - Not really annoying

- Dependent on Google



# Examples- Google Charts

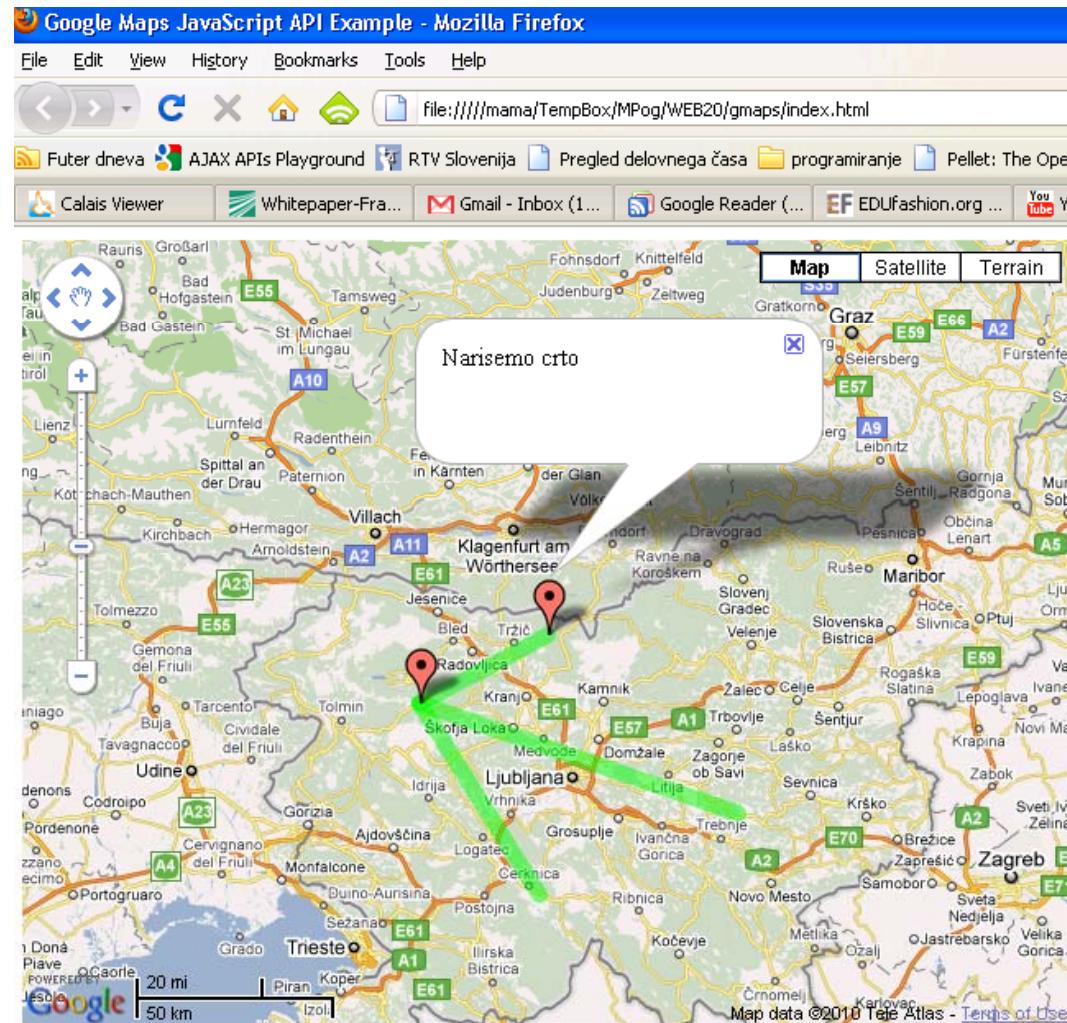
## Primer





# Examples- Google Maps

## Primer





# Application development - Ecosystem

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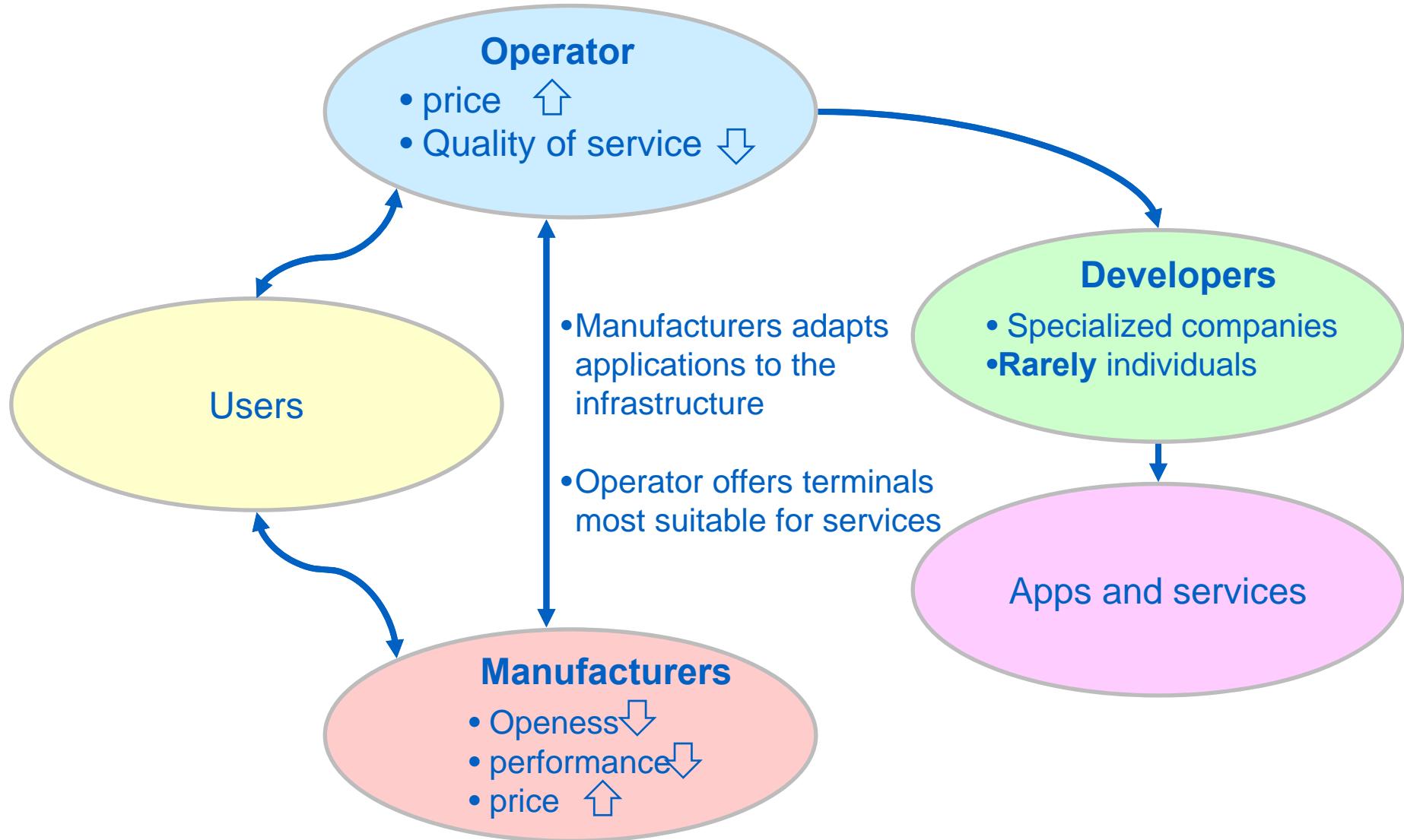


# SW development: past

- **Traditional environment**
  - Closed OS
  - Tedious app development
  - Limited HW capabilities
  - Expensive data links
  - No sensors on devices
- **Consequently:**
  - Low motivation for app development
  - Developers are mostly operators and device manufacturers
  - Poor documentation
  - Specialized knowledge needed  
(details, details,...)



# Ecosystem in the past



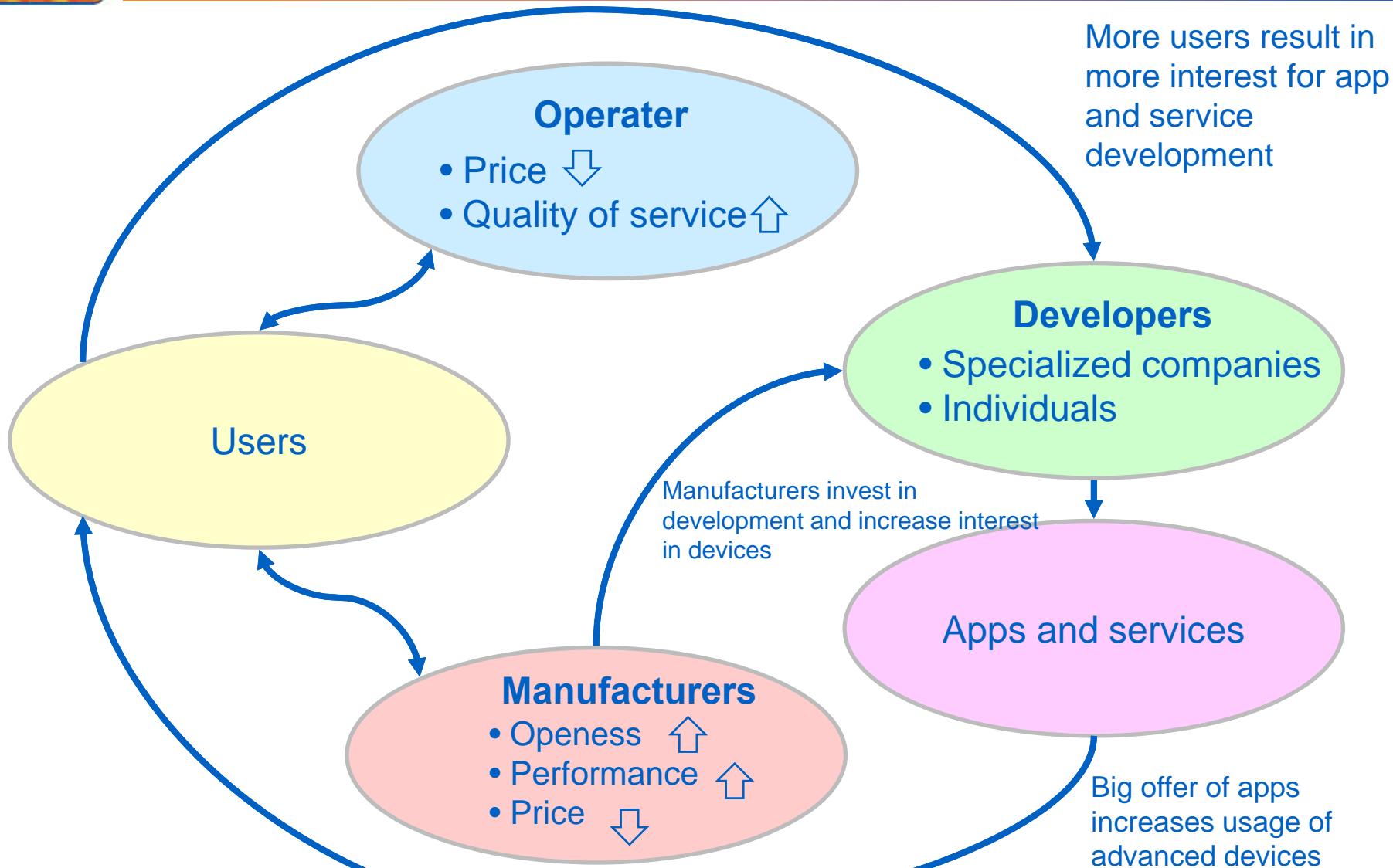


# SW development: today

- Trend and reality: open platforms
- Platform owner (Nokia, Microsoft, Google, Apple) opens the platform and offers development tools
  - Usually free of charge
- Developers over the world are developing the applications
  - And by that enrich the platform
  - Contribute some % from revenue to the platform owner
- Platform owner
  - makes% from app sales
  - Gets a more appealing and better platform
  - The latter attracts more users



# Ecosystem today





# Users

- **In the past**
- **High prices of devices and services → low interest**



- **Today**
- **Low prices mean affordable devices and services for everyone**
- **Usability**
  - Many useful apps and services
  - Dynamic way of life requires a lot of functionality





Hvala ☺

**BEING A GOOD  
PROGRAMMER  
IS 3% TALENT  
97% NOT BEING DISTRACTED  
BY THE INTERNET**

