

Open Platforms, Open Minds

# Open Platforms in the mobile devices industry

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# Agenda

- A view of the mobile industry today
- Various user scenarios bring a number of alternatives
- How open platforms can help address complexity
- Conclusions

# Market Overview

March 2006

**1.02 billion**  
Internet users  
globally



**2.2 billion**  
mobile subscriptions  
globally



# Hybrid operators invest in new technology and services

- Wireless and cable operator mergers a trend
  - SBC Communications acquires AT&T
  - AT&T is acquiring BellSouth
  - Verizon Communications acquired MCI
  - Telefónica acquired O2
  - NTL acquired Virgin Mobile
- Infusion of innovative new technologies
  - Cellular voice & data
  - Internet phone and data
  - High speed data, video, TV



Source: Business Week Online, 10/25/2006,  
the Economist 10/12/2006

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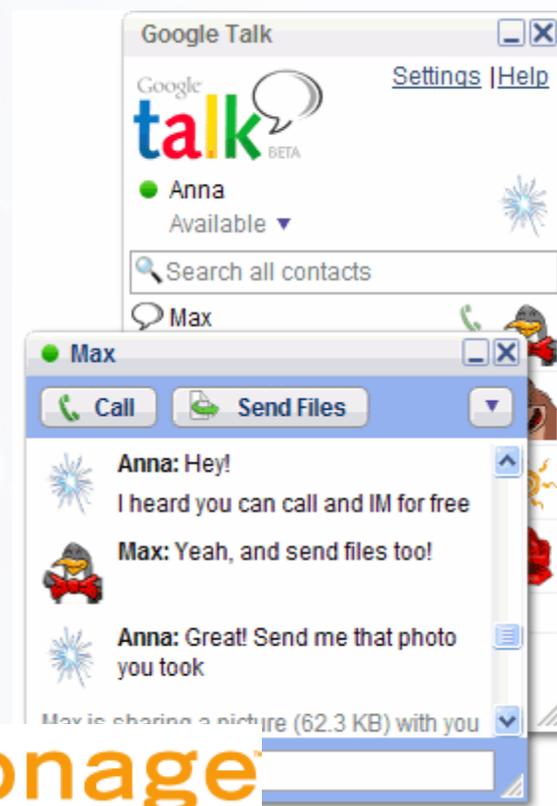
## ... and team up with media companies

- 29 Sky Mobile TV channels to 3 and Vodafone customers in the UK
- Sprint TV En Vivo, first spanish mobile TV service in the US
- 8 mobile TV channels to VTC Mobile in Vietnam
- CBS content from Verizon wireless
- CNBC Asia content from operators in Singapore, Malaysia, Hong Kong, Indonesia



## VoIP catches up with cellular voice

- 8 million Skype users worldwide
- VoIP is a less expensive technology than cable or cellular voice
- VoIP service is easy to set up
- Large international enterprises looking to VoIP to reduce calling costs
- Mobile operators have various strategies around VoIP



## VoIP services form communities

- Internet companies including Google, Yahoo!, AOL and Microsoft's MSN offer Internet call to complement their chat and email services for community members
- FON is a service formed by a community
  - Share your home WiFi with others
  - Get access to others' WiFi when on the move



# Communities can move big business



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# The iPod phenomenon

- iPod, October 2001, storing on hard disk
- iTunes media store, April 2003
- iPod Shuffle, January 2005, using flash memory
- iPod Nano, September 2005, color screen
- 5<sup>th</sup> Generation iPod, October 2005, video capable
- iTunes audio files use AAC format with added encryption based on FairPlay
- Only iPod can play FairPlay-encoded files
- Apple reserves the right to alter its DRM restrictions



Source: Wikipedia, November 20, 2006

# User generated content as operator ARPU maker



- Citizen journalism
- Mobile blogging
- Mobile photo sharing
- Chat and dating communities
- Video content communities
- Social networking communities
- Podcasting



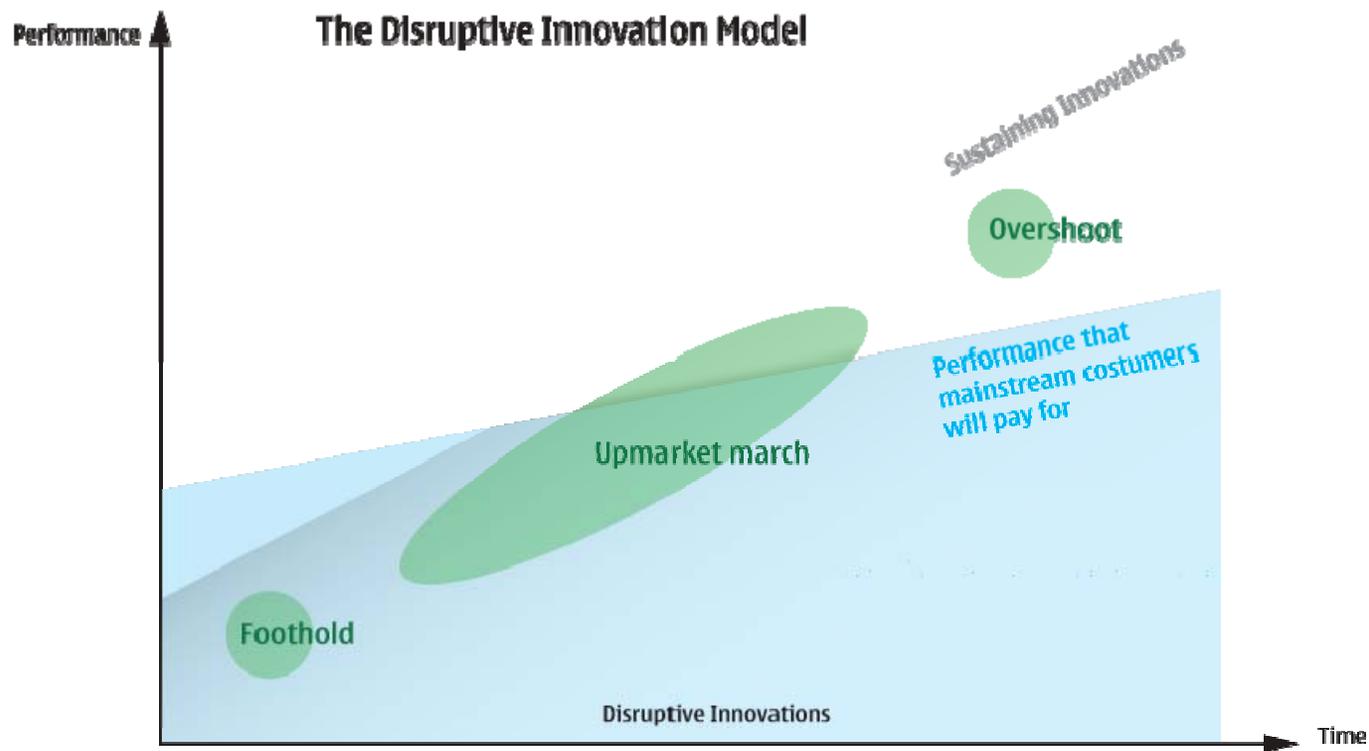
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# Invent-Standardize-Implement, or vice versa

- Different approaches to different situations:
  - Invent and implement in-house, invite others to adopt
  - Invent and implement with small group, invite others and standardize.
  - Implement and write the standard at the same time
  - Implement existing standard
- Most innovation happens in small teams
- Mass market support comes with a standard



# Not all disruptions prevail



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## Key Service Trends in 2006

- WEB 2.0 movement

### WEB 1

Self-publishing

Web sites

Browsing

Proprietary SW

Applications

Service fees

### WEB 2

→ Participation

→ Wikis, communities

→ Subscriptions

→ Freeware

→ Services

→ Free/sponsored

- Mobile 2.0 movement

**Photography**: Image and Video supporting good quality content creation

**Music**: multi-format support and digital library enhancing media creation

**TV**: Always-on access to TV services

**Games**: True connected gaming

**Internet**: WEB 2.0 support and Multiradio technologies

# Key Consumer Attitudes

EMOTIONAL  
ROLLER COASTER



THE NEW  
AMERICAN DREAM



ALL IN THE FAMILY



Y WORK



RAISING  
CONSCIOUSNESS



FINDING MY  
RELIGION



WE-VOLUTION



CREATIVE CLASS



MIX MASHED



ON THE RADAR



# Most Popular Online Services



## Top 100 Most Popular Feeds

- 1 [Slashdot](http://slashdot.org/index.rss)  
http://slashdot.org/index.rss
- 2 [ESPN.com](http://sports.espn.go.com/espn)  
http://sports.espn.go.com/espn
- 3 [CNET - News.com](http://news.com.com/2547-1)  
http://news.com.com/2547-1
- 4 [Fark.com](http://www.pluck.com/rss/fark)  
http://www.pluck.com/rss/fark
- 5 [Dilbert](http://dwt.net/tapestry/dilbert)  
http://dwt.net/tapestry/dilbert
- 6 [National Geographic News](http://news.nationalgeographic.com)  
http://news.nationalgeographic.com
- 7 [Gizmodo](http://www.gizmodo.com/index)  
http://www.gizmodo.com/index
- 8 [Blog Maverick](http://www.blogmaverick.com)  
http://www.blogmaverick.com
- 9 [BBC News | World News](http://news.bbc.co.uk/rss/news)  
http://news.bbc.co.uk/rss/news
- 10 [Gawker](http://www.gawker.com/index)  
http://www.gawker.com/index

## Top Favored Blogs

[Boing Boing: A Directory of Wonderful Things](#)  
1,094 members have made this a Favorite

[43 Folders](#)  
778 members have made this a Favorite

[Techcrunch](#)  
744 members have made this a Favorite

[Lifehacker, the Productivity and Software Guide](#)  
622 members have made this a Favorite

[PostSecret](#)  
562 members have made this a Favorite

[100 Top Favored Blogs »](#)

## Top Searches & Tags

### Top Searches

1. [Ségolène Royal ...](#)
2. [Pool](#)
3. [Studivz](#)
4. [Zune](#)
5. [Borat](#)
6. [Reviewme](#)
7. [Video](#)
8. [Java](#)
9. [John Tierney](#)
10. [Valleywag](#)
11. [Myspace](#)
12. [Second Life](#)
13. [Google](#)
14. [Britney Spears](#)
15. [Youtube](#)

### Top Tags

- [Microsoft](#)
- [youtube](#)
- [Java](#)
- [Iraq](#)
- [zune](#)
- [iPod](#)
- [Democrats](#)
- [mp3](#)
- [web-20](#)
- [Shopping](#)
- [Bush](#)
- [rss2](#)
- [Christmas](#)
- [USA](#)
- [wordpress](#)

S »

## Top Blogs

[Engadget](#)  
26,109 blogs link here

[Boing Boing: A Directory of Wonderful Things](#)  
20,530 blogs link here

[Gizmodo, The Gadget Guide](#)  
14,621 blogs link here

[老徐 徐静蕾 新浪BLOG](#)  
14,417 blogs link here

[The Huffington Post](#)  
14,217 blogs link here

[100 Top Blogs »](#)

# Nokia Nseries was created to address evolution of the Internet



# Multimedia computing device N95

- WCDMA2100 (HSDPA), EGSM900, GSM850/1800/1900 MHz (EGPRS)
- Up to 160 MB\* internal dynamic memory
- Memory card slot supporting up to 2 GB microSD memory cards
- Conference call
- Push to talk (PoC)
- Speaker independent name dialing (SIND)
- Voice commands
- Voice recorder
- Talking ringtone
- Integrated hands-free speaker
- Concatenated SMS, picture messaging, SMS distribution
- MMS, automatic resizing of your megapixel images to fit screen size depending on the network)
- Predictive text input: support for all major languages including Latin American and Pacific
- Integrated wireless LAN (802.11 b/g)
- UPnP (Universal Plug and Play)
- Integrated Bluetooth wireless technology v.2.0
- USB 2.0 via Mini USB interface and mass storage class device support and drop functionality
- 3.5 mm stereo headphone plug and TV out support (PAL/NTSC)
- Nokia PC Suite connectivity with USB, Infrared and Bluetooth wireless technology
- Local synchronization of contacts and calendar to a compatible PC using compatible connection, Remote over-the-air synchronization
- Java MIDP 2.0, CLDC 1.1 (Connected Limited Device Configuration (J2ME))
- Personal Information Management (PIM), Advanced S60 PIM features including calendar, contacts, to-do list, and PIM printing



- Settings Wizard for easy configuration of e-mail, push to talk and video sharing.
- Up to 5 megapixel (2592 x 1944 pixels) camera, Carl Zeiss optics, Vario-Tessar lens, MPEG-4 VGA video capture of up to 30 fps
- Direct connection to compatible TV via Nokia Video Connectivity Cable (CA-44U, included in box) or wireless LAN/UPnP
- Call and video sharing support (WCDMA network services)
- Integrated flash
- Stereo microphone
- Photo album/blog: photo/video uploading from gallery
- Nokia Lifeblog 2.0 support
- Video and still image editors
- Movie director for automated video production
- Nokia XpressPrint solution, Transfer photos directly to compatible printer or kiosk
- Nokia XpressShare solution, Easy sharing of captured photos and videos directly from the gallery or straight after capture
- Nokia XpressTransfer solution, Transfer and organise photos and videos between your device and compatible PC
- Digital music player - supports MP3/AAC/AAC+/eAAC+/WMA/M4A with playlists and equalizer.
- OMA DRM 2.0 & WMDRM support for music
- Stereo FM radio (87.5-108MHz /76-90MHz) with Visual Radio support
- Built-in GPS
- E-mail
- Nokia Web Browser with Mini map
- Supported video formats : MPEG-4 , H.264/AVC , H.263/3GPP, RealVideo 8/9/10

# Connectivity methods increase

## Broadcast

>10km range: DVB-H

100m to 10km range: MBMS

## WAN Wide Area Network

>300m range: GSM, EDGE, cdma, WCDMA

## MAN Metropolitan Area Network

<500m range: WiMAX, HSDPA

## LAN Local Area Network

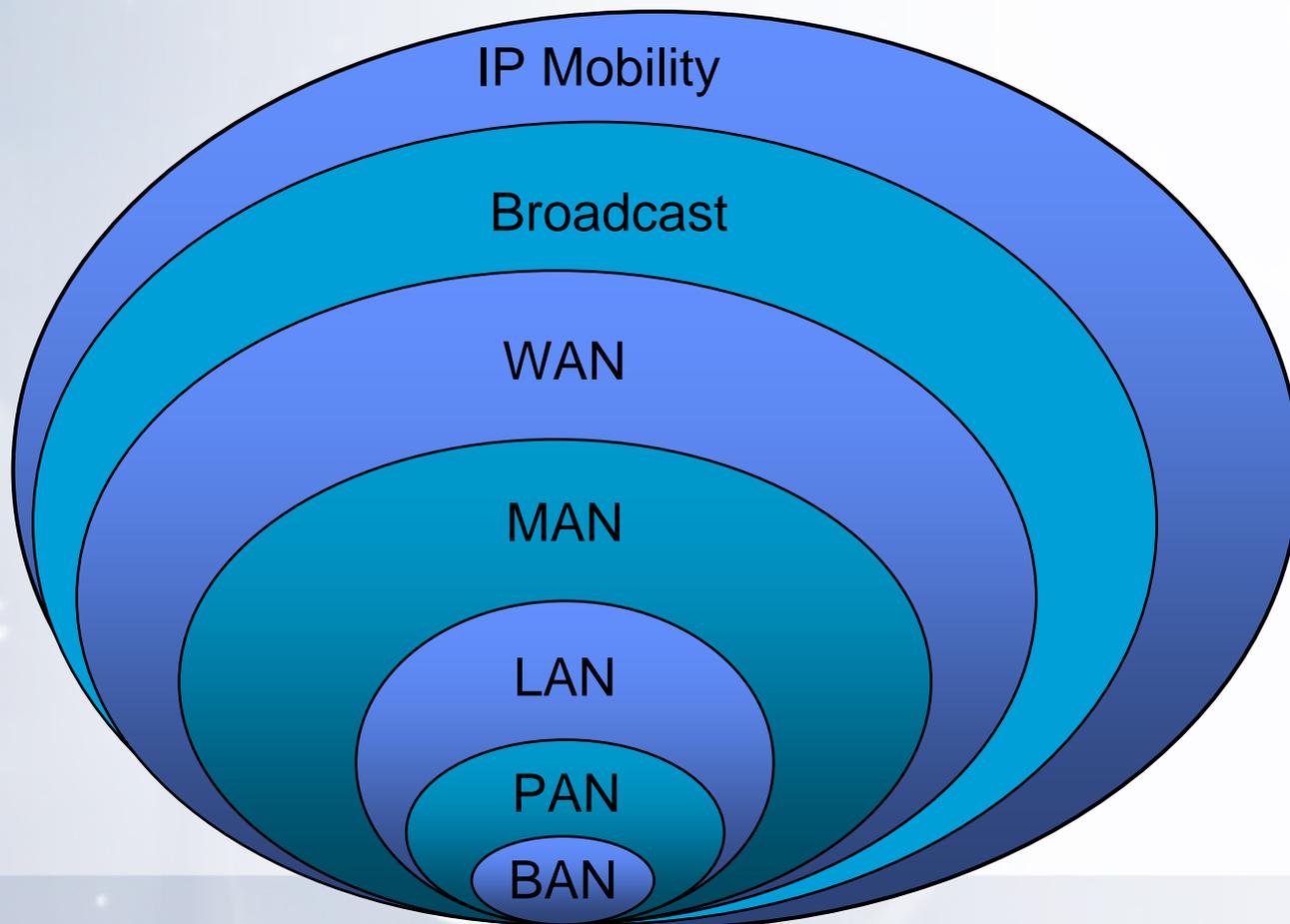
<100m range: WLAN, Bluetooth

## PAN Personal Area Network

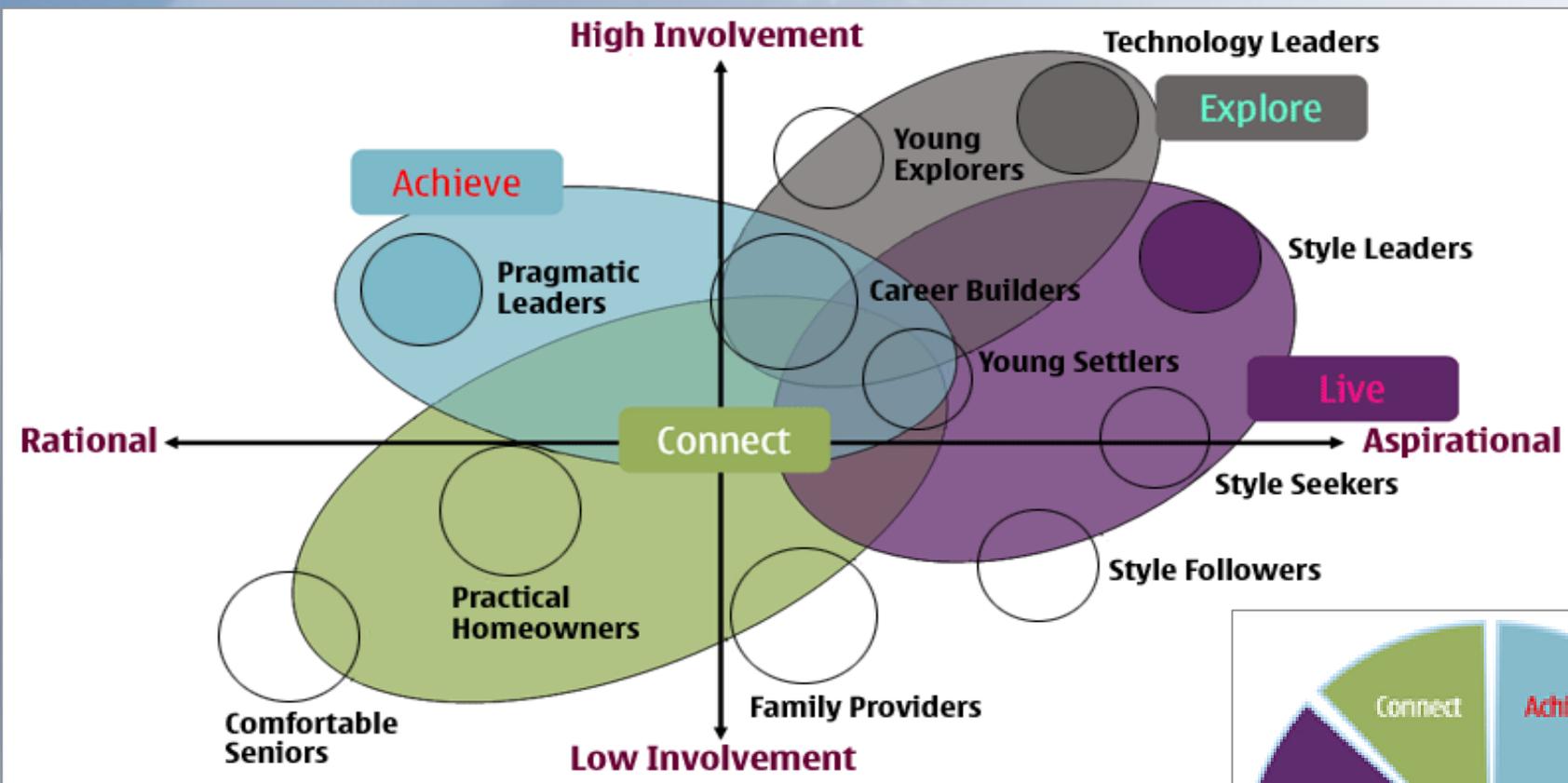
<10m range: Bluetooth, UWB

## BAN Body Area Network

<0.1m range: Touch zone, RFID, NFC, wearable computing



# User segmentation and device categories



# Download, install and use applications

<p><b>OfficeSuite</b> SUPPORTED: W, X MobileSystems® OfficeSuite BUY EUR 24.99</p>	<p><b>SKY FORCE Reloaded S60v3</b> BUY EUR 9.95</p>	<p><b>DOCUMENTS</b> Previewer BUY EUR 14.99</p>	<p><b>Smart Communication Manager</b> BUY EUR 24.99</p>
<p><b>Office2Go</b> Shortcuts Inbox Calendar Documents Contacts BUY EUR 89.00</p>	<p><b>PhotoRite SP for S60 3rd</b> TRY BUY EUR 19.99</p>	<p><b>Concise Oxford English Dictionary S60 3rd Edition</b> BUY EUR 29.95</p>	<p><b>Alien Pinball</b> BUY EUR 8.99</p>
<p><b>Handy Safe</b> TRY</p>	<p><b>Total Air Mayhem</b> TRY</p>	<p><b>eMSII</b></p>	<p><b>Backgammon Professional</b></p>



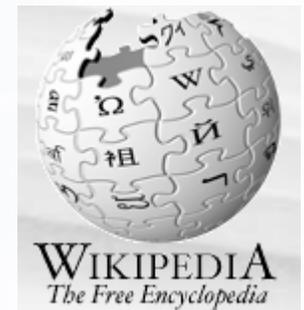
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# Agenda

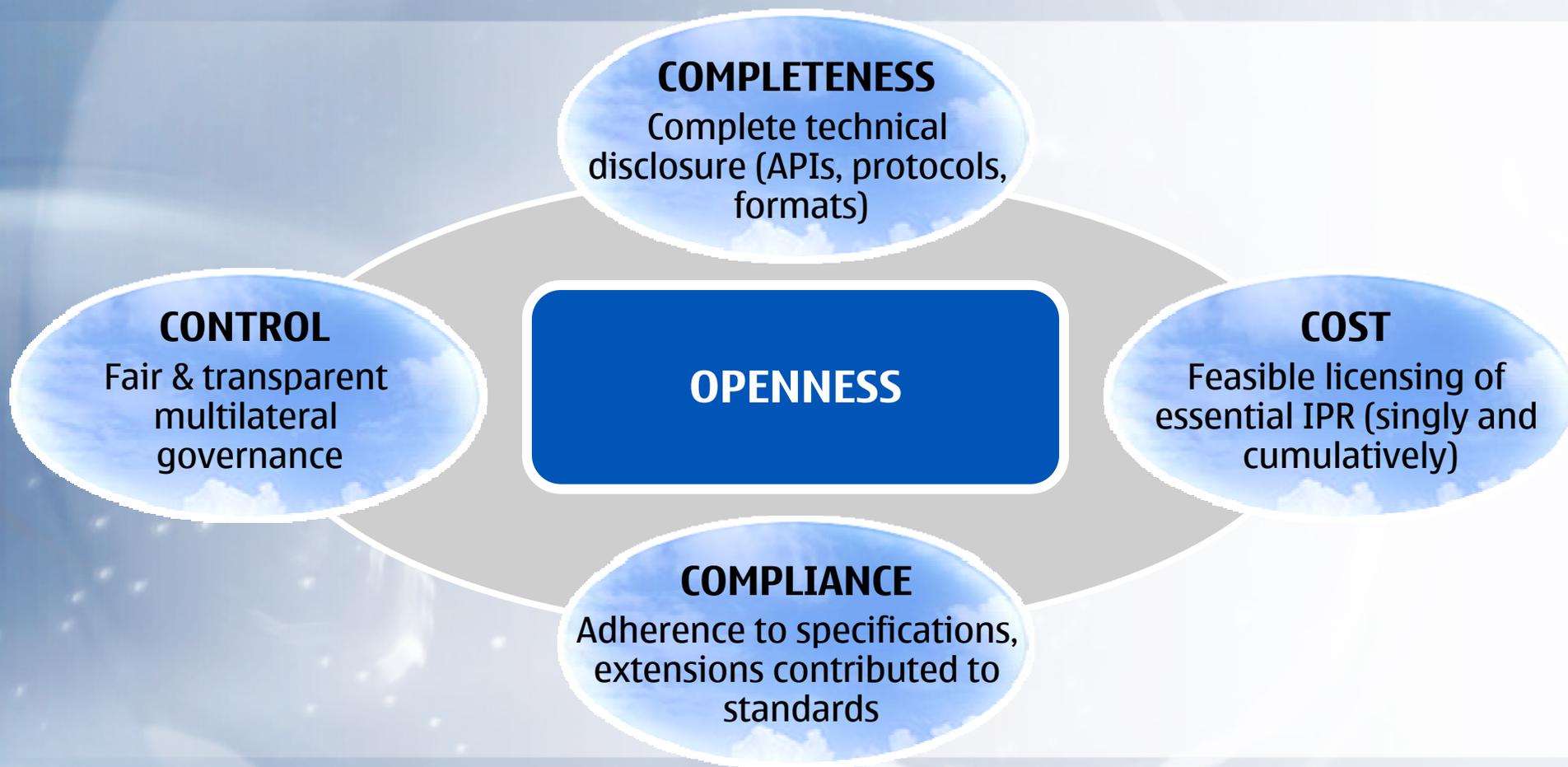
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# Open platforms

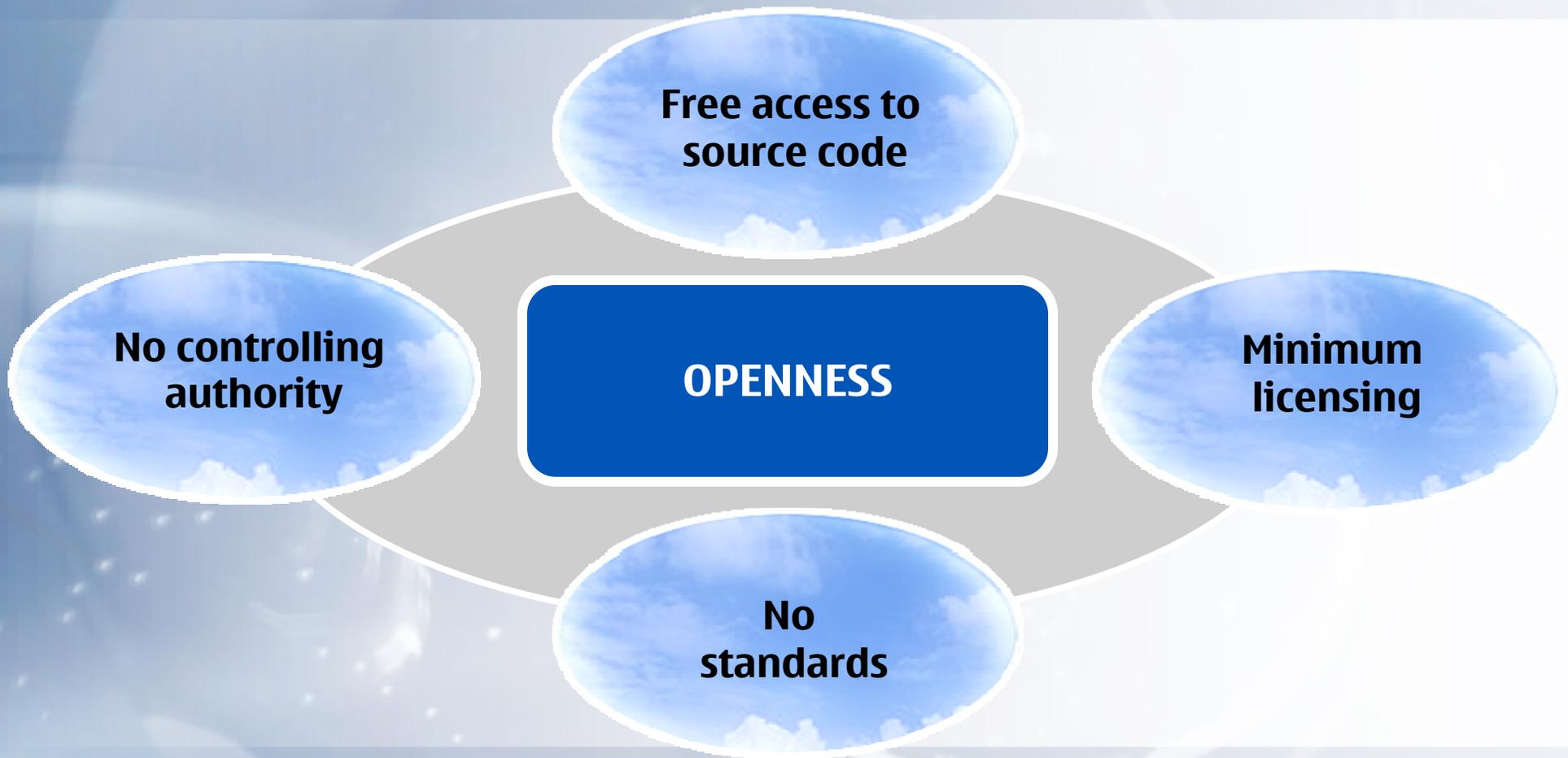
- In computing, an **open system** is a computer operating system that provides interoperability, portability or both
- In computing, a **platform** describes some sort of framework, either in hardware or software, which allows software to run. Typical platforms include a computer's architecture, operating system, or programming languages and their runtime libraries.



## Building Blocks for Openness – old



## Building Blocks for Openness – new



# S60 software platform for innovation

**Feature Pack 1**

- Next generation web browsing
- Over-the-air firmware update
- Advanced device management
- UI enhancements

**S60 3rd Edition**

- Flexible and safer platform
- New multimedia functionality
- Improved enterprise mobility



The screenshot shows a menu with the following items: Telephone, Extras, Calendar, Log, Favourites, To-do, Settings, Phonebook, Images, and Options. The menu is titled 'Menu' and has an 'Exit' button in the top right corner.



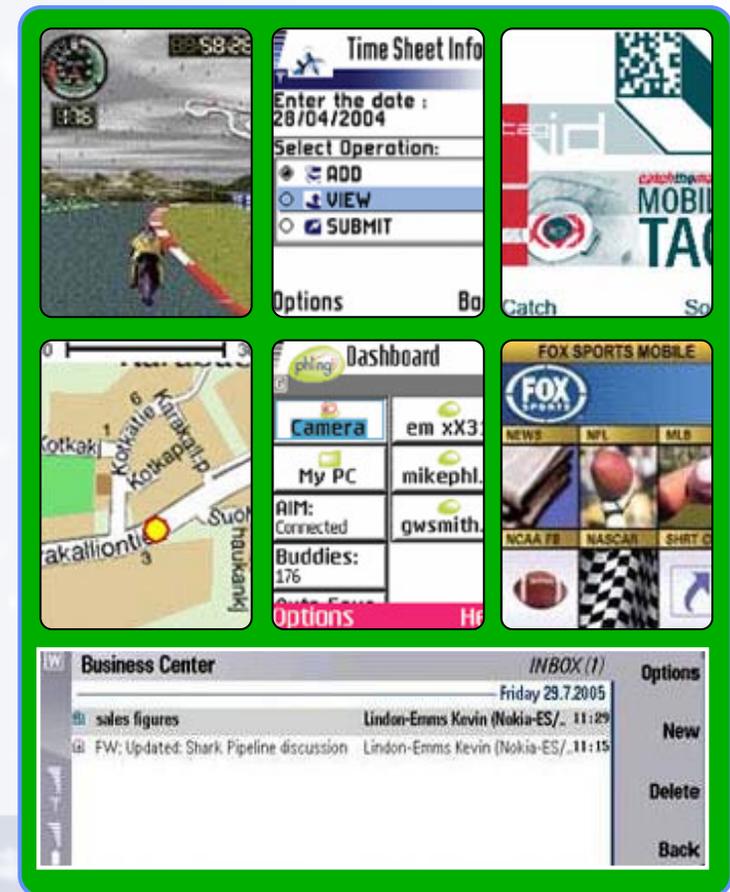
The diagram shows the S60 3rd Edition architecture layers from top to bottom: S60 Apps, S60 Scalable UI, Runtime environments, Platform Libraries & middleware, Symbian OS & Security Platform, and Hardware (incl. Security & Multi-radio). On the right side, there are vertical bars for Licensee Apps, Operator Apps, Developer Apps, and Developer Tools & Support.

## S60 3<sup>rd</sup> Edition features

- Firmware over-the-air (FOTA)
- Open source browser for full Internet experience
- Built-in business features, such as calendar, data synchronization, and email
- New security framework and built-in content protection
- Security is not intended to compromise openness and flexibility

# Over 1.2 billion mobile Java devices today

- Low developer entry barrier
- Breadth of APIs – brings both opportunities and fragmentation at the same time
- Solid, defined roadmap with industry support – led by Sun Microsystems
- Performance-critical multimedia processing loops can be a power bottleneck
- MSA (JSR-248) addressing these issues



Source: Nokia, Ovum, Sun Microsystems 2006

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# Linux in mobile phones

- Handhelds.org started open source movement for mobile phones
- Linux was not created for a mobile phone, hence a lot of modification work is needed
- Today, Linux OS mainly used by Motorola, PalmSource and Samsung
- The mobile industry is taking a standardization approach to agree on common mobile Linux elements
- Linux is standardized in OSDL's Mobile Linux Initiative, LiPS Forum, CELF, and most recently announced "Foundation X"



“X”

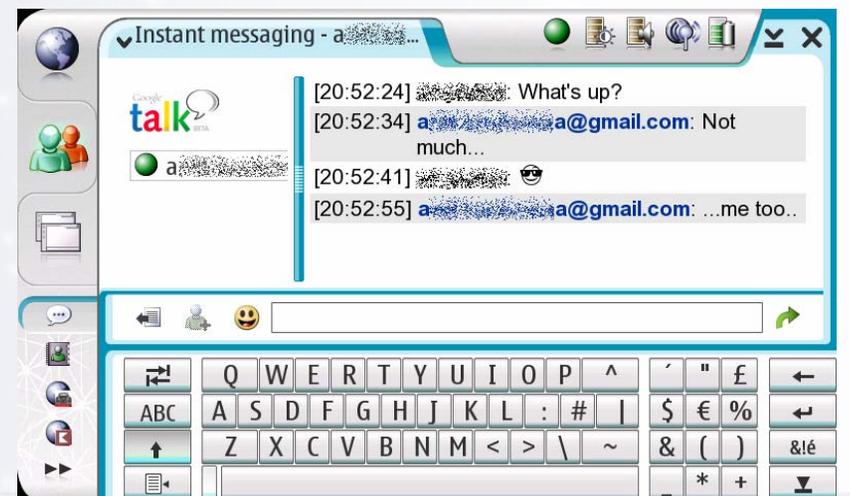
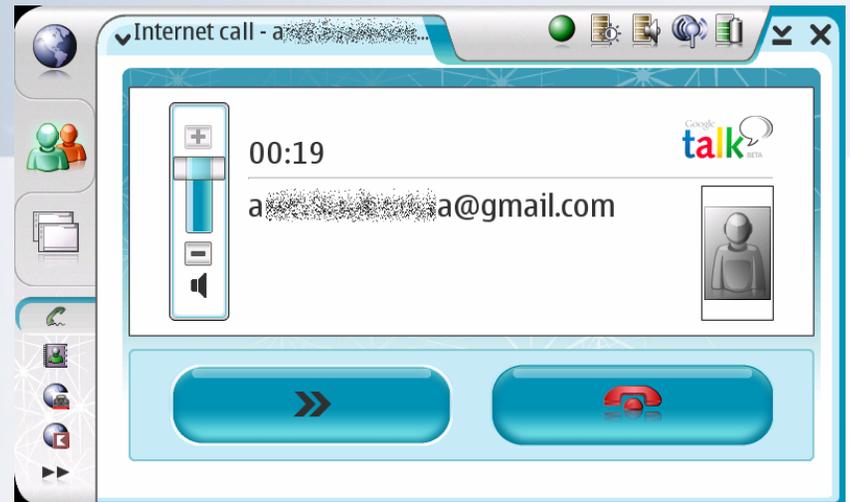


Source: *Linux in the mobile space: today and tomorrow*, Evans Data Corp. 2006

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# The Nokia 770 Internet Tablet

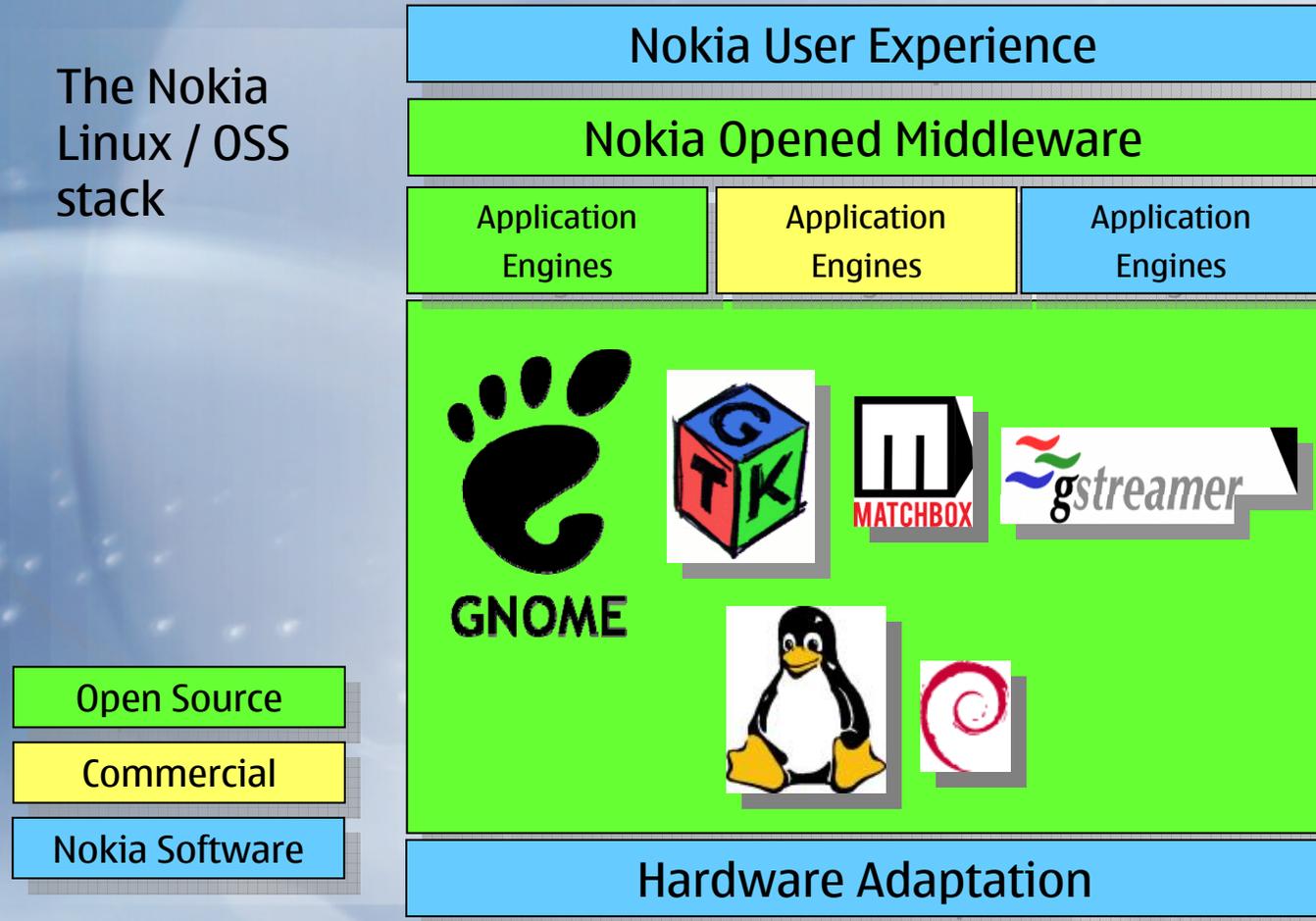


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# Open Architecture – our fundamental design principle

The Nokia  
Linux / OSS  
stack



- ...
- GNOME desktop environment components
  - GTK+, Gnome-vfs, Gconf
- D-BUS message bus
- Matchbox window manager
- X.org window server
- GStreamer and Helix multimedia frameworks
- Sylpheed email engine
- BlueZ bluetooth stack
- OMAP Linux DSPgateway
- Debian package management system
- Linux kernel
- ...

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## Open Development – as a part of OSS communities

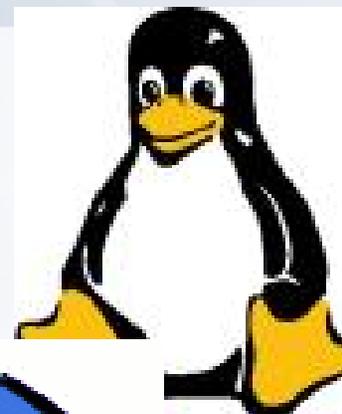
- We first identified gaps in existing OSS components and our needs, and then we
  1. **Integrated** hundreds of unmodified components as such
  2. **Sponsored** development of existing OSS components like OMAP kernel, D-BUS, GNOME-VFS, GTK+, GStreamer, OBEX Telepathy, etc
  3. **Developed** new components and open sourced them

### All activities focused on

1. NOT re-inventing the wheel
2. Work constructively with the open source community with a give and take approach
3. Solving critical issues in the areas of:
  - UI and usability
  - Power management
  - Performance
  - Memory management
  - Application functionality
  - Cross-development tools
  - Integration
  - Testing

# 1. We integrated components as such

- This is the ultimate goal
  - No branching –no back-porting
  - Shared maintenance cost
  - Good quality
- Not always trivial
  - We have resource limited hardware
  - We are building consumer products
    - Quality
    - Uncompromised user experience



```
libatk1.0-0  
base-passwd  
libbz2-1.0  
desktop-file-utils  
libexpat1  
libgcc1  
libstdc++5  
gnuchess  
libid3-3.8.3  
iptables  
libpcap0.7  
libpng12-0  
nano-tiny  
libncurses5  
ncurses-base
```



**freedesktop.org**

## 2. We sponsored the development of existing components

- We selected components, such as D-BUS because
  - It addressed our requirements well – a good starting point
  - There was an active community around it
  - We and the existing community had very similar goals
  - We believed that we can become a part of the community and there is no need to branch
- We sponsored the development
  - Contributed code and participated in the development
  - Performed a lot of testing
  - Hired key developers
  - Promoted the use of D-BUS



...

### **GNOME**

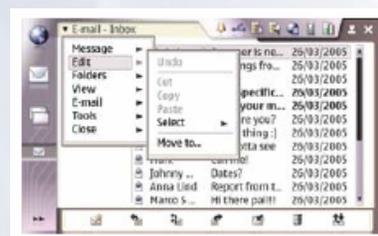
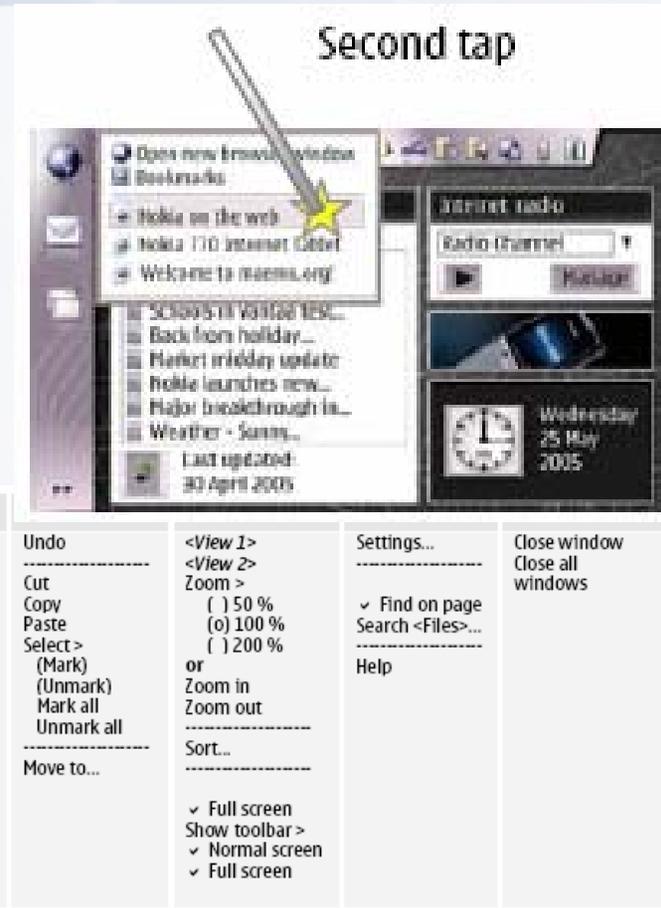
gconf,  
D-BUS,  
gnome-vfs,  
GTK+,  
Telepathy ...

**Matchbox,  
X.org,  
GTK+,  
gStreamer**

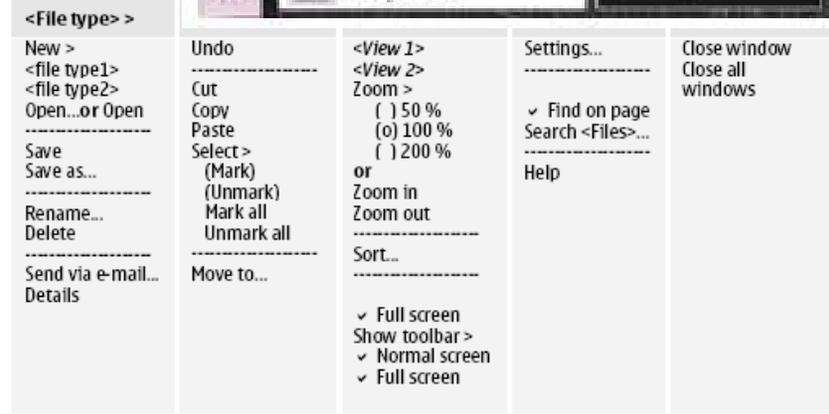
...

# 3. We developed new components and open sourced them

- Developed for our own needs
  - By ourselves or through subcontractors
  - (L)GPL'd
  - Nokia copyright
- Examples:
  - Hildon application framework
  - OMAP DSPgateway
  - Scratchbox



Vertical menu layout



# Maemo Development Platform @ maemo.org

- Open source development environment for Nokia 770 Internet Tablet
- Targeted to open source developers and innovation houses
- Opportunity to develop and share your own applications for Nokia 770
- Key features
  - maemo.org developer website
  - Test and debug environment on x86
  - Flashing tools
  - Developer root filesystem
  - Hildon application framework and UI
  - Scratchbox cross-compilation toolkit
  - Developer documentation & sample applications
  - Mailing lists, Wiki and planet for discussion, announcements and support
  - Bug reporting system for maemo SW
  - Garage for hosting software projects



# Installable applications through maemo

## 1. Accessories

1. GPE PIM Application Suite For Maemo
2. Dates: Electronic Calendar
3. FBReader: e-book reader
4. Free42: HP 42S RPN Calculator Emulator
5. Maemopad+: Sketching and notes app
6. Maemo Mapper
7. Osso Xterm
8. Osso Xterm (advanced)
9. Xournal

## 2. Education

1. Granule

## 3. Statusbar and home applets

1. Bluetooth plugin
2. Clock applet
3. CPU/Mem/Screenshot applet
4. CPU/Mem/Screenshot applet with Swapon/off
5. CPU/Mem/Screenshot applet with run command
6. IpHome homepage-plugin

## 4. GUI bluetooth applications

1. Xkbd-btHID

## 5. GUI networking applications

1. VNC Viewer
2. VNC server
3. Rdesktop
4. Nicotine
5. Bloglines 770: RSS reader
6. Grsync
7. TapiocaUI

## 6. Multimedia

1. Glurp
2. NFlick
3. Ogg Vorbis Player
4. PLCreator
5. Tuner Tool
6. Streamtuner (maemo port)

## 7. Games

1. Blitzkrieg Onslaught
2. Crimson Fields
3. Descent II: First Person 3D Sho
4. Doom
5. Jooleem
6. La Pulga
7. Lineo
8. Nethack
9. Pipepanic
10. ScummVM
11. SnowBall
12. Sokoban
13. SuperTux
14. TuxPaint
15. TwinDistress
16. Vectoroids
17. Xbill Maemo
18. Freeciv for Maemo

## 8. Themes

1. 12pt & 14pt Themes for OS 200

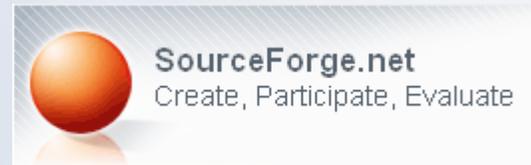
## 9. Command Line tools

1. VIM
2. Midnight Commander
3. Bash: GNU Bourne-Again Shell
4. bc
5. findutils (find, xargs)
6. btscanner
7. Bluetooth port scanning suite
8. Bluetooth OBEX server
9. Less: reversible text file viewer
10. live-f1
11. Joe's Own Editor (joe)
12. becomeroot
13. Gnuplot
14. Octave
15. Zip
16. Unzip

## 10. Command line Networking tools

1. Aircrack-ng
  2. Dsniff
  3. Dropbear SSH Server and Client
  4. IRSSI IRC client
  5. knock
  6. Links terminal www browser
  7. Ntpdate: set clock from a NTP server
  8. netcat
  9. socat
  10. OpenSSH Server and client
  11. OpenVPN: SSL VPN solution
  12. Pine: mail and news reader for terminal winc
  13. vpnc - client for cisco3000 VPN Concentrat
  14. busybox with ipv6,iproute,netcat,ping,ping6
  15. rsync
  16. wget
  17. tnftp (lukemftp)
  18. Wireless Tools
  19. Nmap, the port scanner
  20. Enhanced CTorrent
  21. Privoxy
  22. thttpd
  23. thttpd-util
  24. gpsd
  25. gpsd-clients
- ## 11. Libraries
1. sqlite3
  2. pysqlite2
- ## 12. Kernel Images
1. Linux Nokia770-26 + IPv6 + NFS v3 client s
- ## 13. Programming
1. Python
  2. SmallBASIC
- ## 14. System Tools
1. Graphical
    1. Task Manager

# Opensource development with Nokia



- **Affix:** A Bluetooth Protocol Stack for Linux developed by Nokia Research Center in Helsinki and released under GPL.
- **eRCP:** Embedded Rich Client Platform
- **Maemo:** An open development environment for creating applications for handhelds, such as Nokia 770.
- **Mobile Web Server:** Symbian port of Apache httpd and connectivity solution that gives a mobile phone a global URL.
- **MobileNews:** An application that allows you to browse and read your favorite NNTP newsgroups right on your mobile phone.
- **Mobile Tools for the Java™ Platform (MTJ):** MTJ is an open source project in the eclipse foundation. The purpose is to enhance the eclipse platform with mobile specific features.
- **MUPE: Multi-User Publishing Environment:** An application platform for creating mobile, multi-user, context-aware applications. MUPE is a client-server architecture where all components are written with Java. The J2ME client can be run in most phones.

<http://opensource.nokia.com>

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# Opensource development with Nokia



- **NORS- Nokia Remote Sensing Platform:** A platform for mobile-centric wireless sensing, according to the Remote Sensing Architecture (N-RSA).
- **Python for S60:** Port of the Python language to S60.
- **S60 OSS Browser:** Built on top of the S60WebKit browser engine.
- **S60 Internet Radio:** Implementation of HTTP Internet Radio streaming for S60
- **Sofia-SIP:** An open-source SIP User-Agent library, compliant with the IETF RFC3261 specification.
- **Semantic Web Server – URIQA:** A Semantic Web-Enabled Web Site Infrastructure.
- **Symbian Perl:** Port of programming Perl for Symbian.
- **Wilbur:** A Semantic Web toolkit written in Common Lisp.
- **XMLPatch:** An XML Patch Operations Framework Utilizing XPath Selectors

<http://opensource.nokia.com>

**NOKIA**

# Nokia OS Licensing

- Nokia uses free and open source software license NOKOS 1.0
- NOKOS 1.0 is approved by Open Source Initiative OSI
- If you develop on Nokia open source software you may say your sw is “OSI Certified Open Source Software”
- Other OSI approved licenses include GPL, LGPL, BSD, MIT, and Mozilla Public License MPL
- For full licence terms:
  - [www.opensource.org](http://www.opensource.org) – Open Source initiative
  - [www.fsf.org](http://www.fsf.org) – Free Software Foundation



# Inside the ecosystem



**Our new centers in addition to those in Finland, China, Germany, Hungary, Japan**

- Open innovation grows from people, working together on a topic that inspires them
- Nokia Research Center works with leading universities worldwide for collaboration that advances the concept of Internet and mobility
- Most work is done in an open environment
- A joint facility with MIT, with some forty researchers both from Nokia and MIT
- Research collaboration agreement with Stanford university, including mobility courses jointly taught by Stanford and NRC
- Other key areas to follow

# Agenda

- A view of the mobile industry today
- Various user scenarios bring a number of alternatives
- How open platforms can help address complexity
- **Conclusions**

## Conclusions

- Usage scenarios for mobile life are increasing in number
- Technologies are increasing in number and complexity
- Complex technology can be hidden from those user who don't want it, but those who want should be able to develop and modify their mobile devices
- Open platforms enable this opportunity for both usage models
- Open innovation embraces powers of communities
- Join development work now