

Tizen Overview & Architecture

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TIZENTM
 *Open Technet*

There are many smart devices
in mobile market.



And, almost as many
software platforms for them



Many smart devices
also appear in non-mobile market



User Expectation by it

- **Before smart device,**
 - The user knew that they were different.
 - Therefore, the user did not expect anything among them.
 - **Now,**
 - The user is expecting anything among them.
 - However, They provide different applications and user experiences
 - Disappointed about inconvenient and incomplete continuation between them.
- 1 Due to different and proprietary software platform



Proprietary platforms

Why do they?

- **Why could not manufacturers provide the same platform for their devices?**
 - The platform has been designed for a specific embedded device.
 - Manufacturers do not want to share their proprietary platforms.
- **There is no software platform considering cross category devices as well as fully Open Source.**



Proprietary platforms

What if there is..

- **What if there is a standard-based, cross category platform?**
 - The same software can run on many categories of devices with few or no changes
 - Devices can be connected more easily and provide better convergence services to users
- **What if the platform is Open Source?**
 - Manufacturers can deploy the platform on their products easily
 - New features/services can be added without breaking
[given the software complies to platform standards]



The platform
having these two features is



- ✓ Standard-based, **Cross Category Platform**
- ✓ **Fully Open Source** Platform

Standard-based, cross category platform

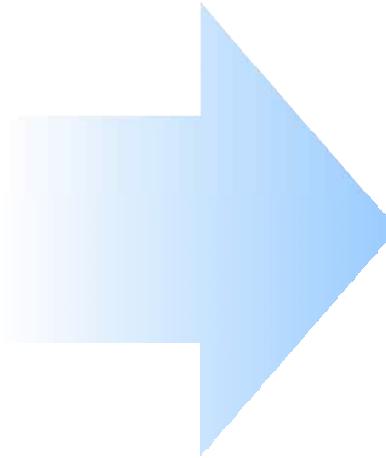


for mobile



for IVI

Tizen 2.0 Profiles



for TV



for camera



for printer



for PC



for washing
machine?

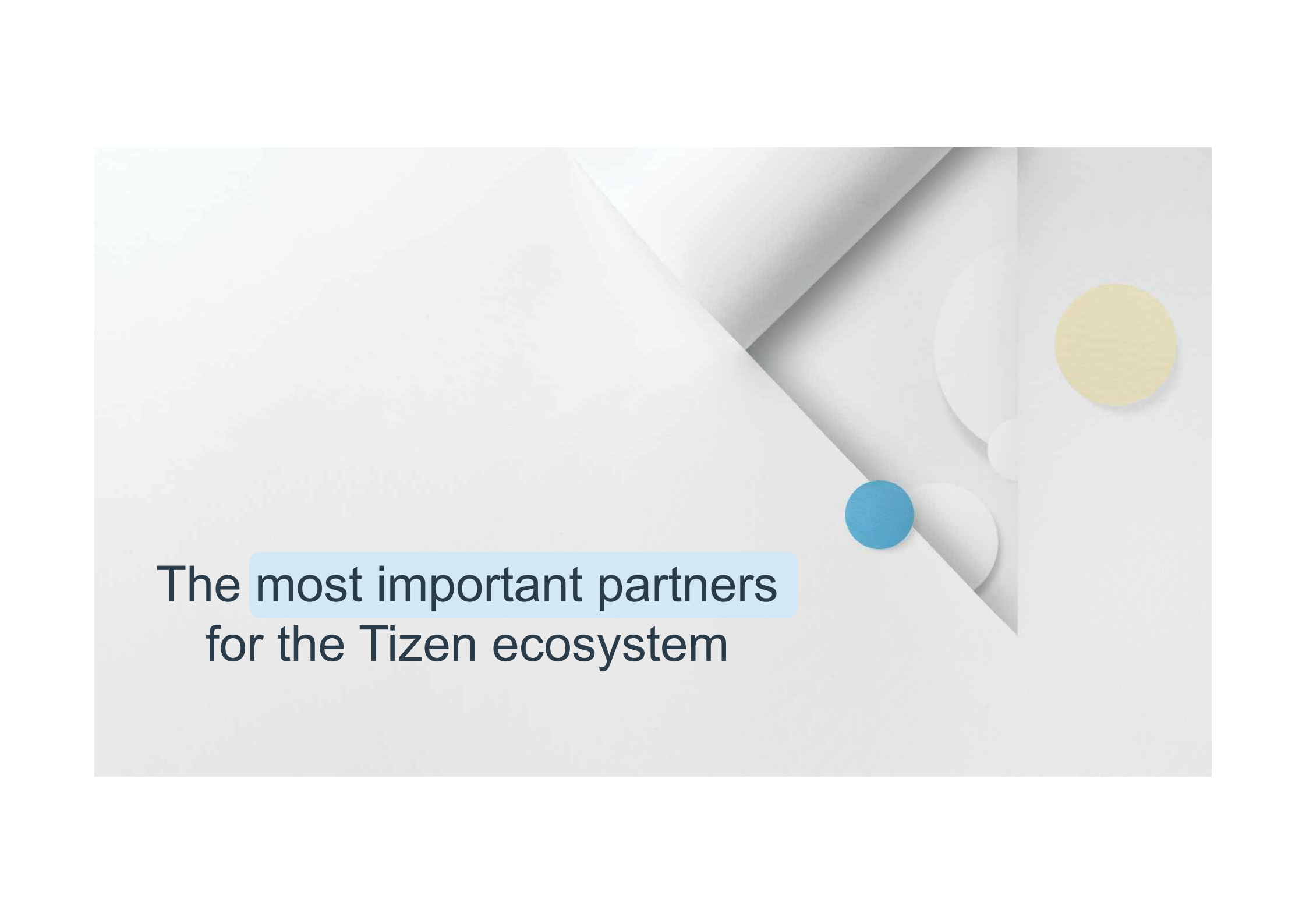
Future Profiles

Standard-based, cross category platform



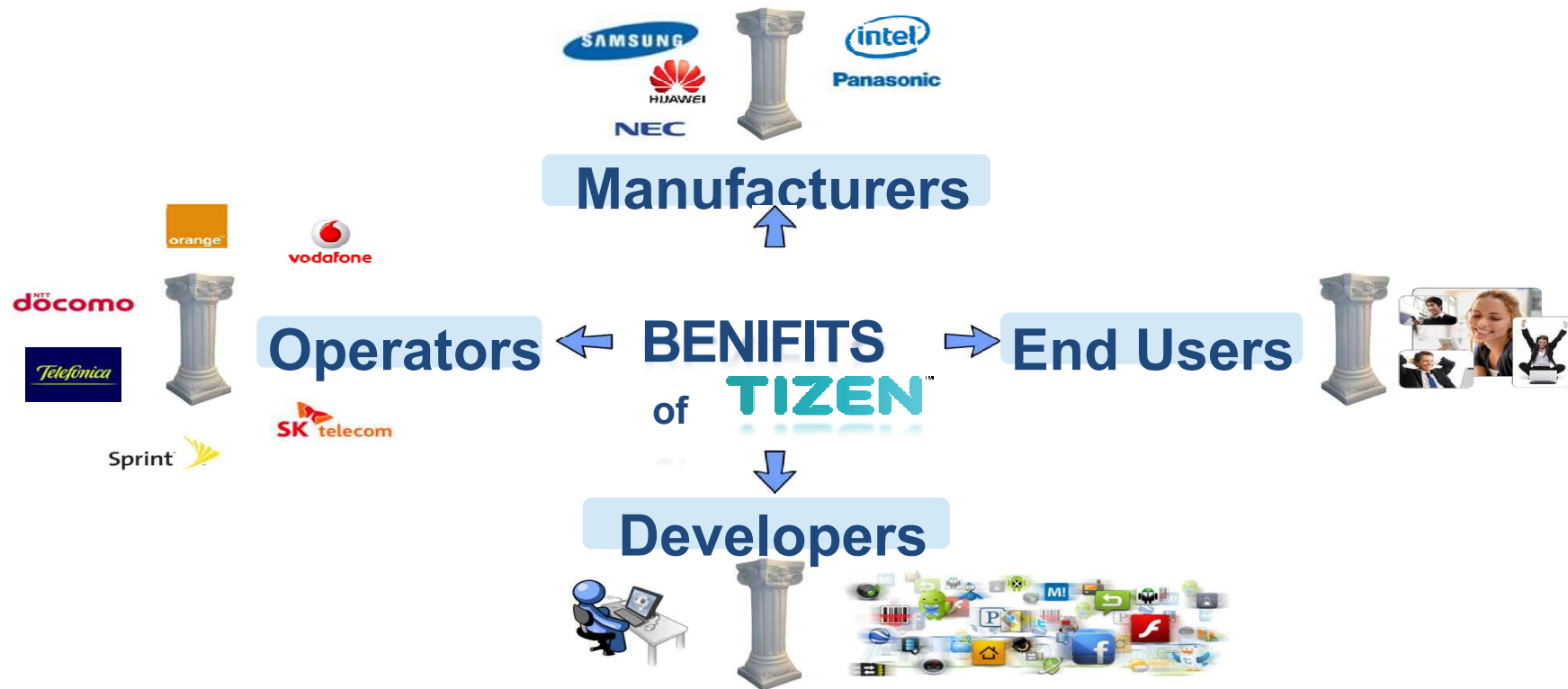
Fully Open Source platform



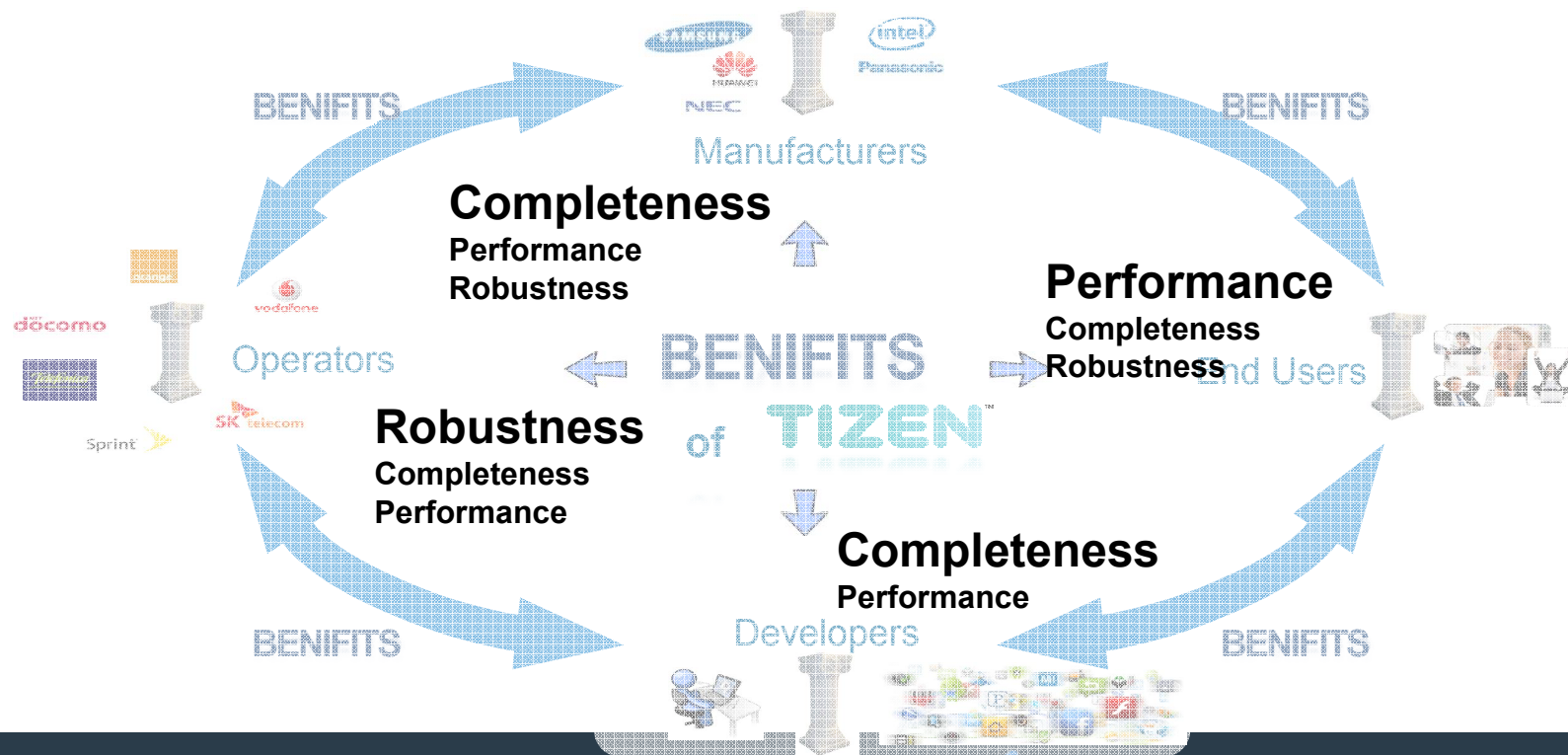
The background of the slide is a light gray with a subtle, abstract geometric pattern. On the right side, there are several overlapping white and light gray shapes that resemble folded paper or layered planes. Three solid-colored circles are also present: a yellow one in the upper right, a blue one in the lower right, and a smaller white one partially visible behind the blue circle.

The most important partners
for the Tizen ecosystem

Four pillars of Tizen ecosystem



Platform pre-conditions for ecosystem



How Tizen
supports them?



Key Requirements

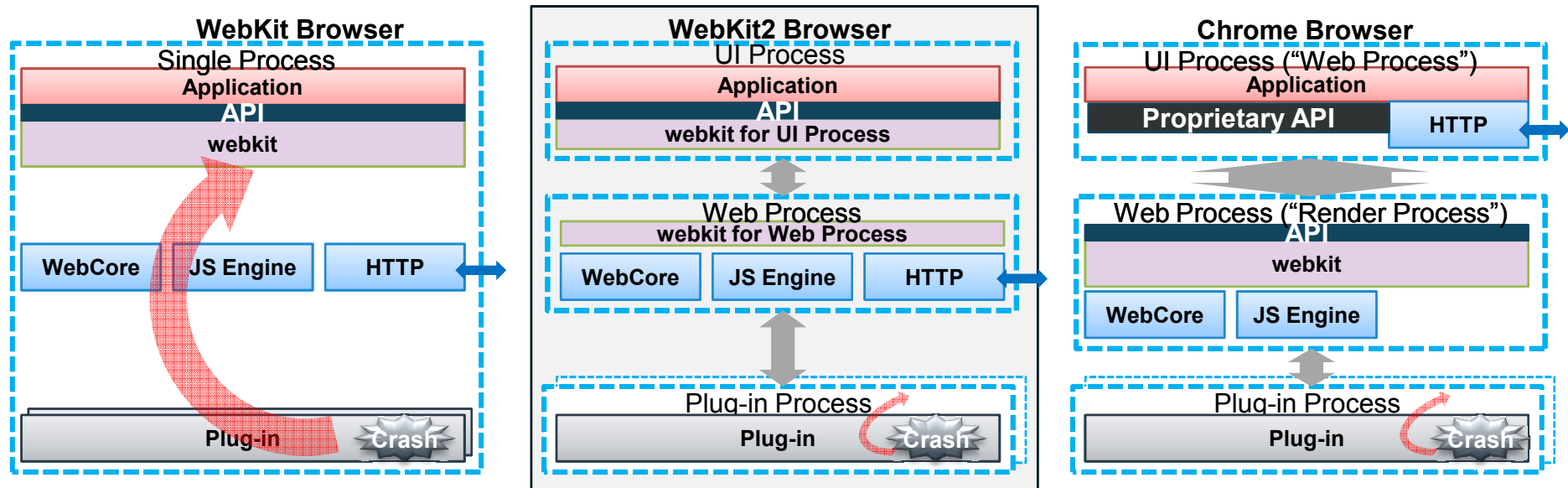
- **Robustness requires:**
 - Model for stable web application
 - More secure platform
- **Performance requires:**
 - Optimized graphics toolkit including smooth animations
 - Supporting rich effect with video
 - High performance of Web 2D & 3D Graphics
 - Minimizing power consumption and memory overhead while processing 2D/3D graphics
- **Completeness requires:**
 - Plentiful web API
 - Cellular functionalities
 - Fast and easy connectivity
 - Scalable UI

The background is a light gray with a subtle geometric pattern of overlapping planes and shadows, creating a 3D effect. On the right side, there are several circles: a large yellow one, a medium blue one, and a small white one, all with soft shadows. The text "How Tizen solved them?" is written in a blue, sans-serif font on the left side.

How Tizen solved them?

Robustness: Model for Stable Web App

- WebKit2 (<http://www.webkit.org>)
 - Multi-process model: protect web application from plug-in crashes
 - ※ Standardized API with small IPC overhead



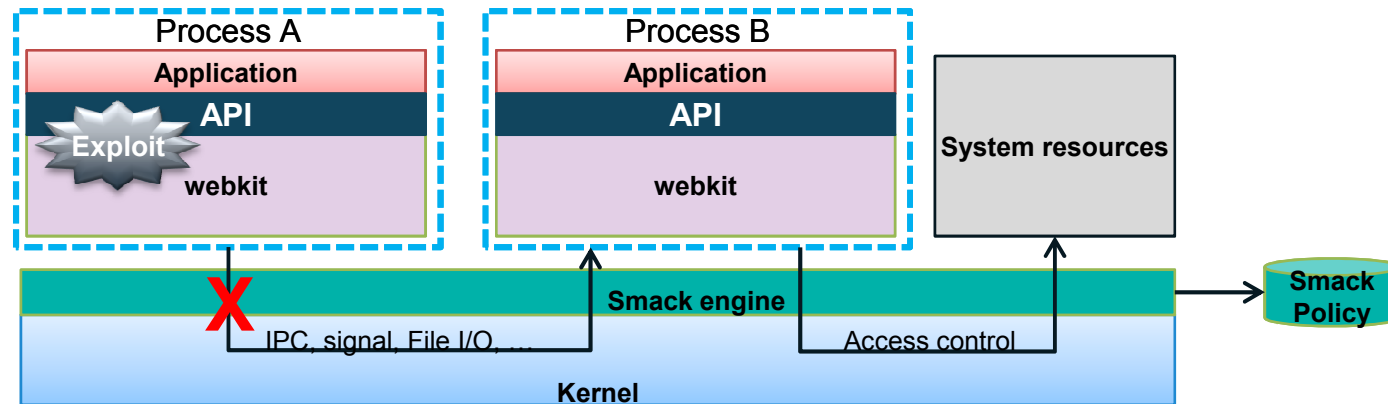
Process Boundary

IPC

Open Technet TIZEN™

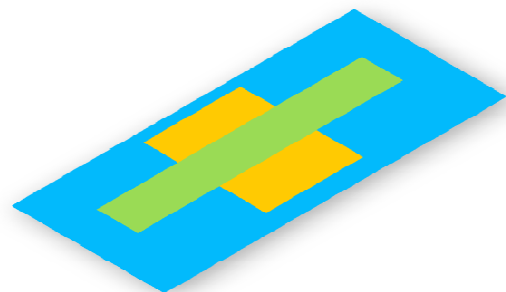
Robustness: More Secure Platform

- **Smack as the main system-level access control**
 - Simple, but fast and memory effective
 - SMACK web site: <http://schaufler-ca.com/>
- **Web Runtime enforces fine-grained access control for Web Apps**
 - Only allowed resources can be accessed
- **Smack-based process sandboxing for all widget processes**
 - Significantly reducing attack effectiveness

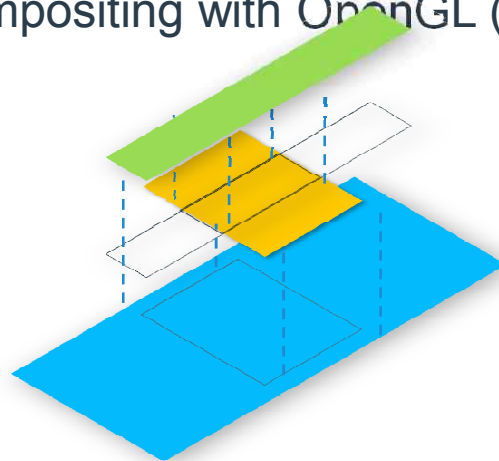


Performance: Optimized Graphics Toolkit

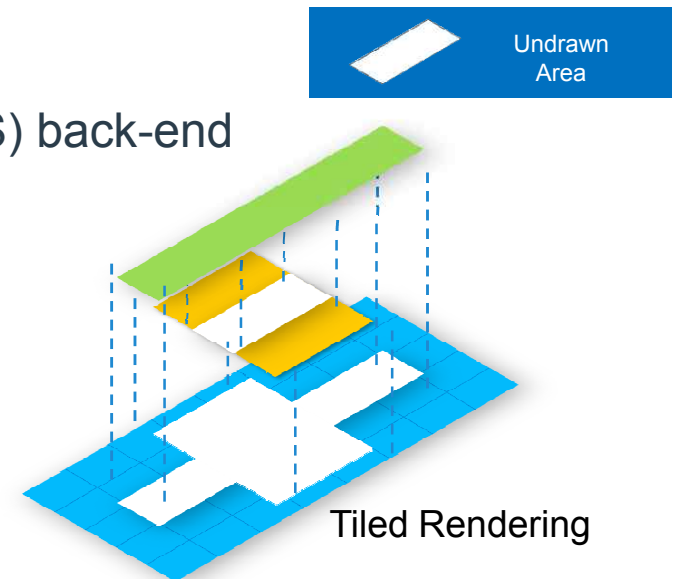
- Enlightenment Foundation Libraries (EFL)
 - Web site: <http://www.enlightenment.org/>
 - Retained-mode graphics engine
 - Smooth animation with low processing power
 - HW accelerated compositing with OpenGL (ES) back-end



Original Scene



Immediate Mode



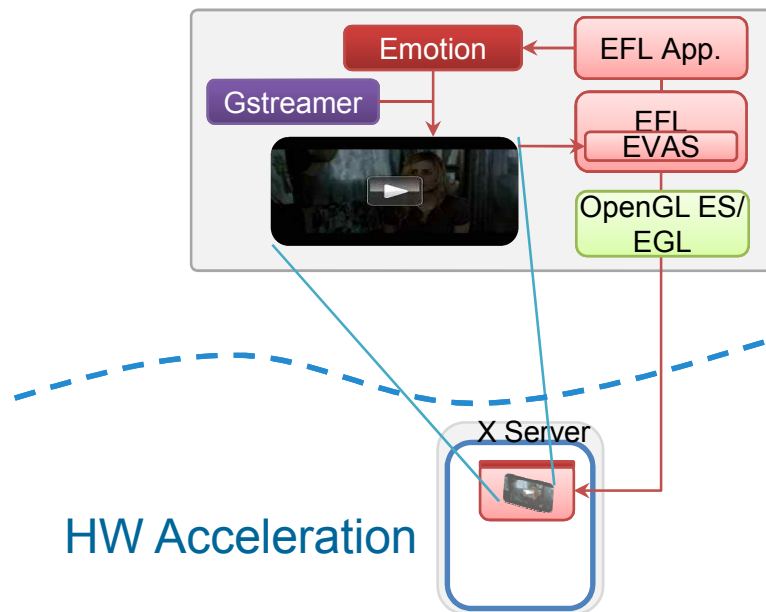
Tiled Rendering

Retained Mode

("Scene Graph")

Performance: Supporting Rich Effect with Video

- Free transform of video object while playback



Performance: Web 2D & 3D Graphics

- 2D Graphics: Cairo OpenGL ES back-end
- 3D Graphics: WebGL support

2D Canvas perf. score



[Source: canvasperf, ie10testdrive]

WebGL fps Test

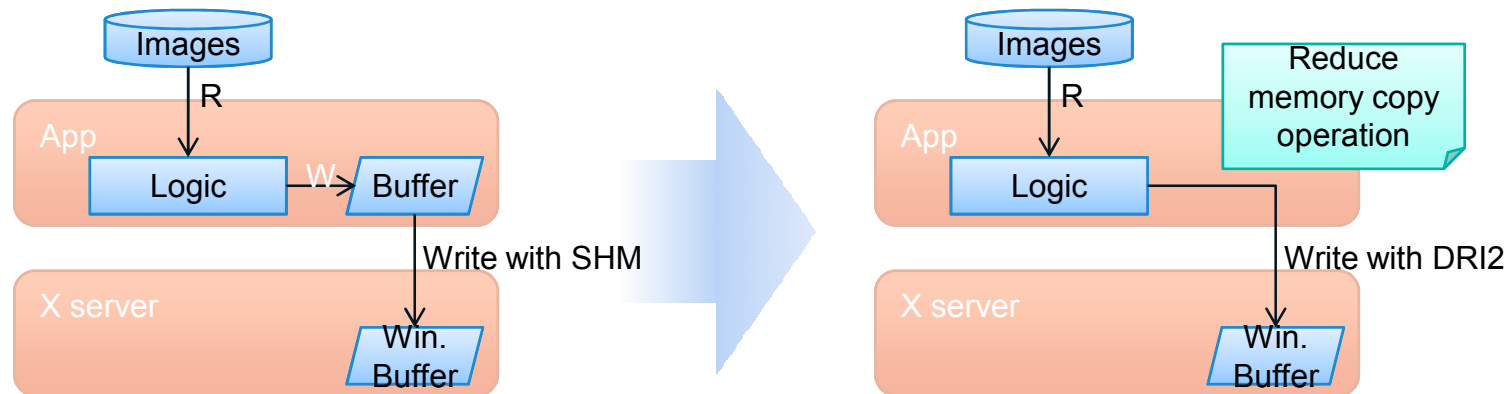


30 16** fps

[Source: Google Experiments, Tizen Demo]

Performance: Minimize Graphics overhead

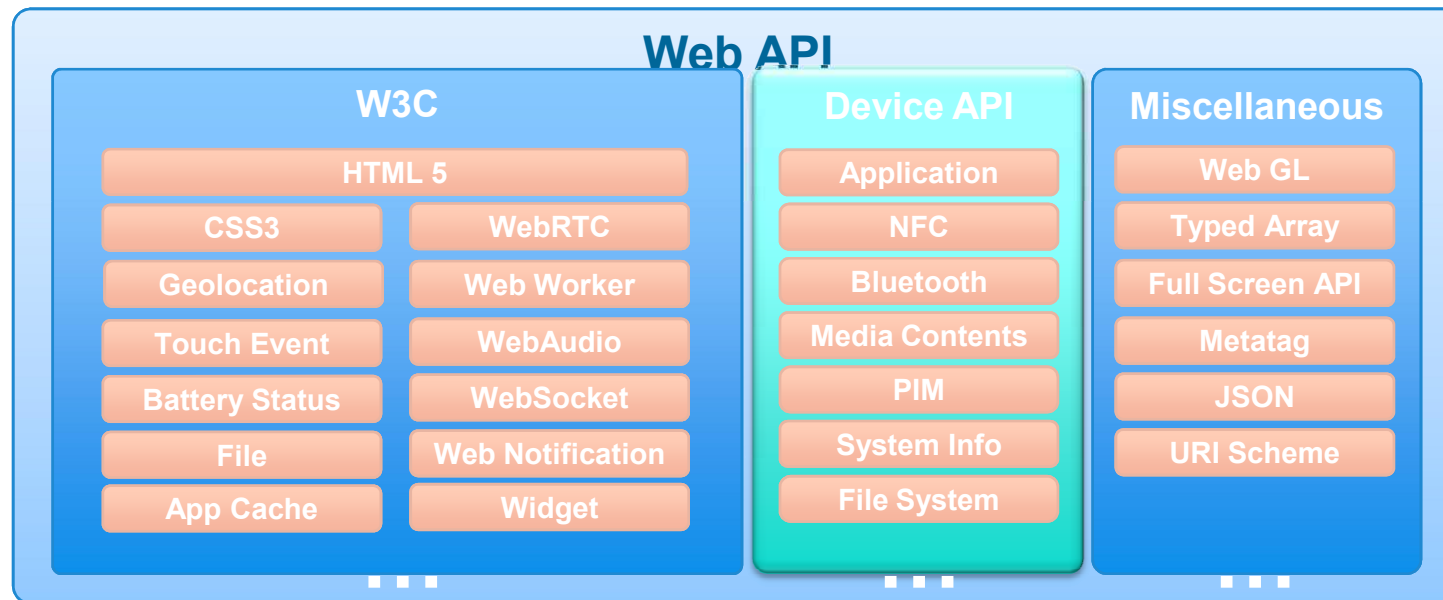
- **DRI2: Direct Rendering Infrastructure ver. 2**
 - Web site: <http://dri.freedesktop.org/>
 - Extension to support implementation of Direct Rendering in X window system
 - DRM (Direct Rendering Manager as a component of DRI) provides DMA memory management and secure hardware access



* SHM: Shared Memory

Completeness: Plentiful Web API

- Tizen web apps can access various device features with: W3C HTML5 device API + Tizen device API

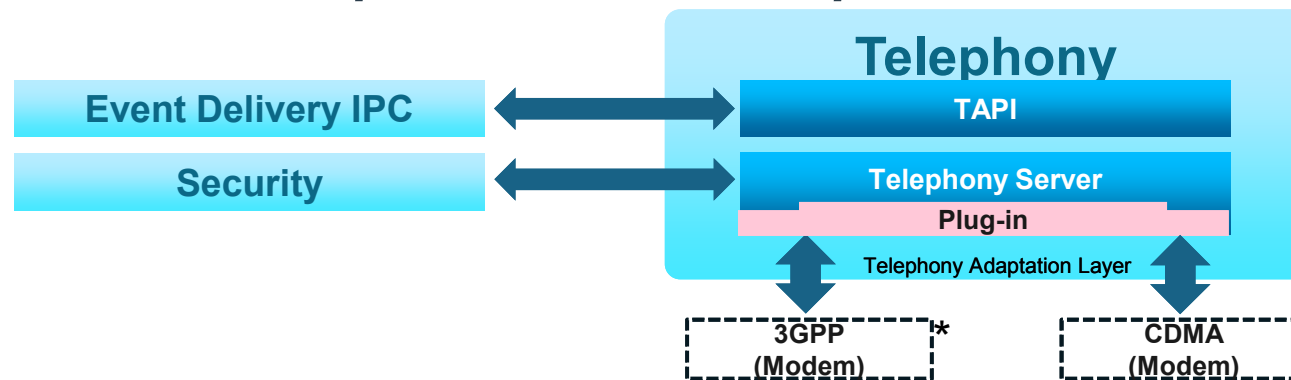


Completeness: Cellular functionalities

- **Cellular functionalities with modem**

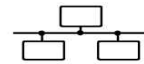
- Managing call/call-dependent services, packet-related services, network registration and configuration services, SMS services
- Managing SIM Application Toolkit services
- Managing SIM files, phone book, and security

※ Field test completed with 2 real operators*



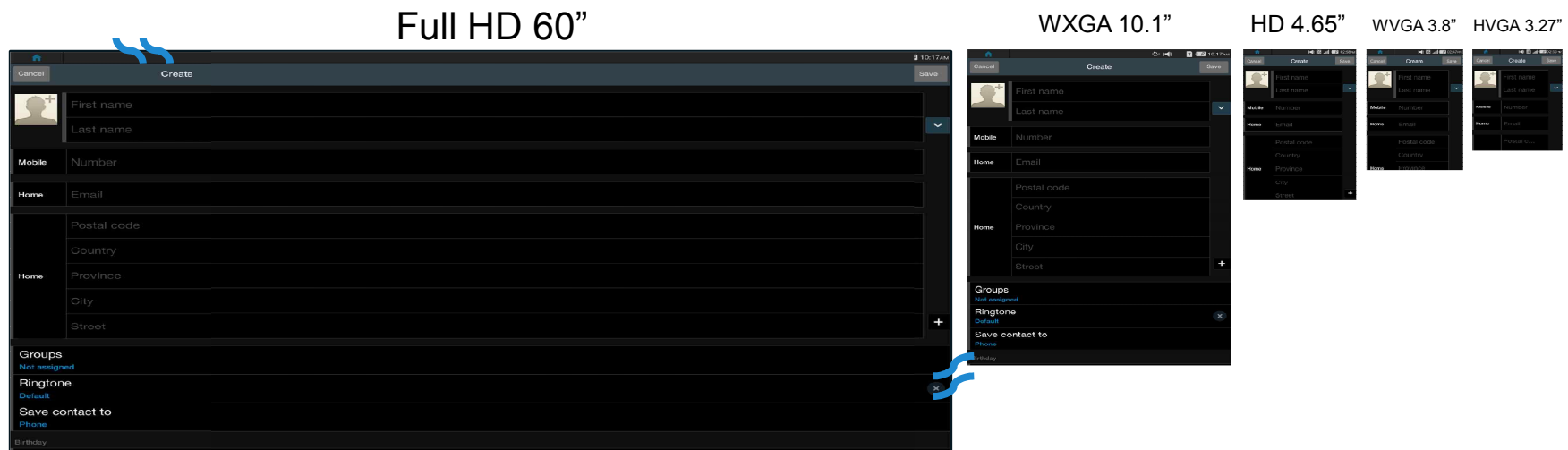
Completeness: Fast & Easy Connectivity

- **ConnMan** (<http://connman.net/>)
 - An light-weight design for targeting embedded devices
 - Compatible with WPA supplicant for supporting Wi-Fi network.
 - Rapidly released with upcoming features
 - High performance
 - ① Reduced DHCP time
2-5 seconds → 200 milliseconds
 - ② Wi-Fi fast connect
 - ③ Integrated DNS Cache for speed improvement
 - Smooth 3G → Wi-Fi handover/offload
 - ① Automatic login into Wi-Fi hotspots called Hotspot 2.0.



Completeness: Scalable UI

- Scalable UI objects for multi-size/resolution/aspect-ratio of screens
- Continuous scaling based on a scale value

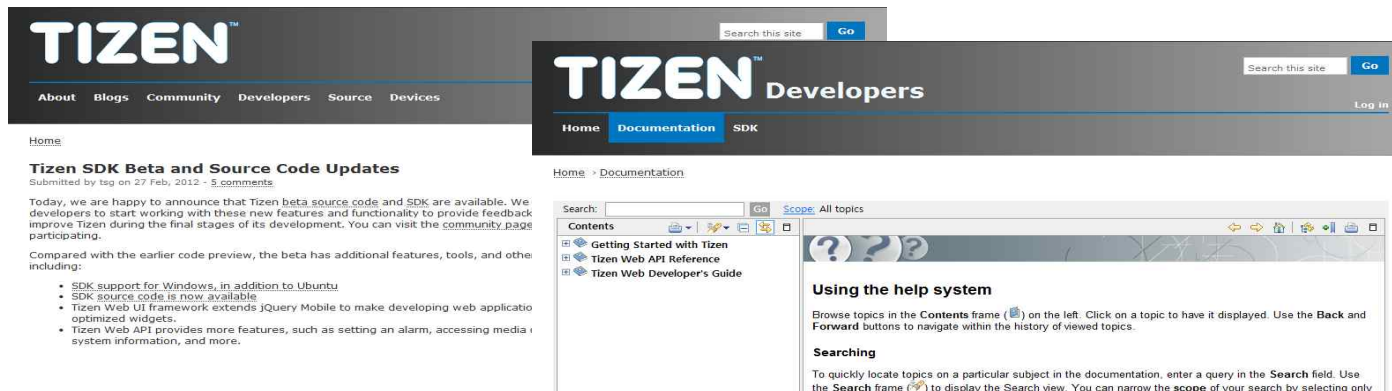


The background features a light gray surface with a diagonal fold line running from the top left towards the bottom right. On the right side, there are several overlapping circles: a large yellow circle, a medium white circle, and a small blue circle. The text is positioned on the left side of the slide, below the fold line.

Tizen Development Environment

Visit Web Site

- Web Site: <http://www.tizen.org>
- Register & Create new account
- Online Help: <http://developer.tizen.org/documentation>
 - For beginners, web application developers and Tizen Platform Developers



Download & Install

Download SDK Installer: <https://developer.tizen.org/sdk>

TIZEN Developers

Home Documentation **SDK**

Home > SDK

SDK

- Download SDK
- Installing the SDK on Ubuntu
- Installing the SDK on Windows
- Release Notes
- Architecture

Tizen SDK

The Tizen SDK is a comprehensive set of tools for developing applications for Tizen devices. It includes an emulator, toolchain, sample code, and documentation. Tizen Web applications may be developed as Ubuntu™. Tizen Web applications may be developed as Ubuntu™. Tizen Web applications may be developed as Ubuntu™. Tizen Web applications may be developed as Ubuntu™.

System Requirements

- Ubuntu 10.04/10.10/11.04/11.10 32-bit, W
- At least dual-core 2 GHz CPU (recommended)
- At least 2 GB of RAM memory
- At least 3 GB of free disk space
- Local administrator authority
- At least 1280x1024 screen resolution

Prerequisites

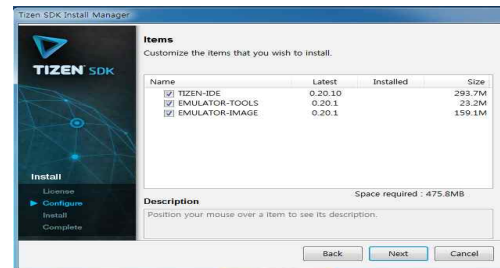
- Oracle Java™ 6 or higher version (do not use Java 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100)
- GNU make, binutils-multilib, debhelper, 1:3.11.0, libx11-6, libxft2, and libur13 package
- To install the SDK, you will need to have root privileges

Getting the Tizen SDK

Keep in mind that this is a beta version of the SDK. The final SDK version will be released soon. Check the package page to download the SDK. See Installing the SDK on Ubuntu or Installing the SDK on Windows for installation instructions.

Operating System	Download	File Size	Updated Date
Ubuntu 32-bit	tizen_sdk.tar.gz	5.9 MB	February 26, 2012
Windows 32-bit	tizen_sdk.exe	5.7 MB	February 28, 2012

Install SDK



Download Source: <https://source.tizen.org/>

TIZEN Source

Home Platform Release

Download the source code

We are happy to provide a beta release of the source code for the Tizen operating system. The beta release of the operating system source code is targeted towards smartphones and tablet devices and runs on the PC emulator. We will have full source code for smartphones, tablets and additional device targets with a reference user experience available in the coming weeks and months.

Tizen provides a standards-based software platform for multiple device categories, which supports web applications. The Tizen Web API reference provides a comprehensive description for Web application development.

Getting Started!

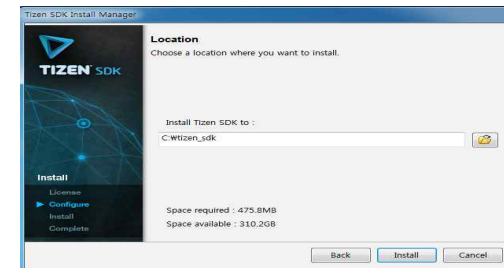
Get the essential resources, guidelines, and tools needed to create Tizen applications and download the source code.

- Inside Tizen**
Find all Tizen components and explore the Tizen source code.
[Source Code](#)
- Getting Started**
Learn the application development process with step-by-step instructions including SDK basics.
[Developing your first Tizen application](#)
- The Tizen SDK**
The Tizen SDK provides you with the essential tools and images to begin development.
[Download the Tizen SDK](#)
- Joining the Tizen Community**
The Tizen community is made up of all the people who collectively work on or with Tizen. Come and get involved.
[More about the Tizen Community](#)

Tizen.org
Privacy Policy
Terms of Service
Trademarks

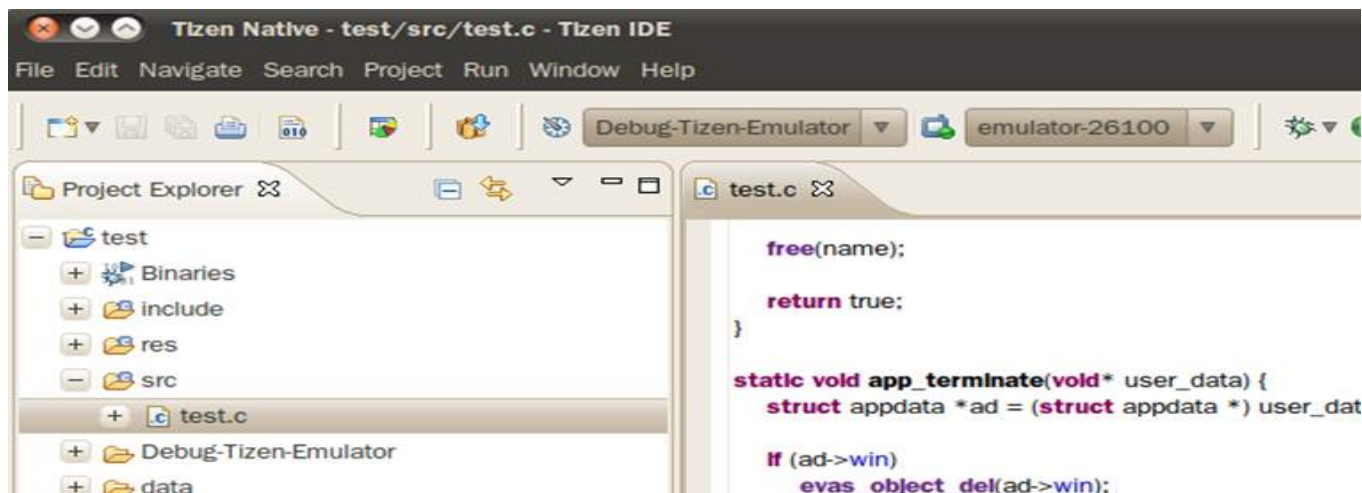
THE LINUX FOUNDATION

Linux is a registered trademark of Linux Torvalds.
Tizen is a registered trademark of The Linux Foundation.
* Other names and brands may be claimed as the property of others.



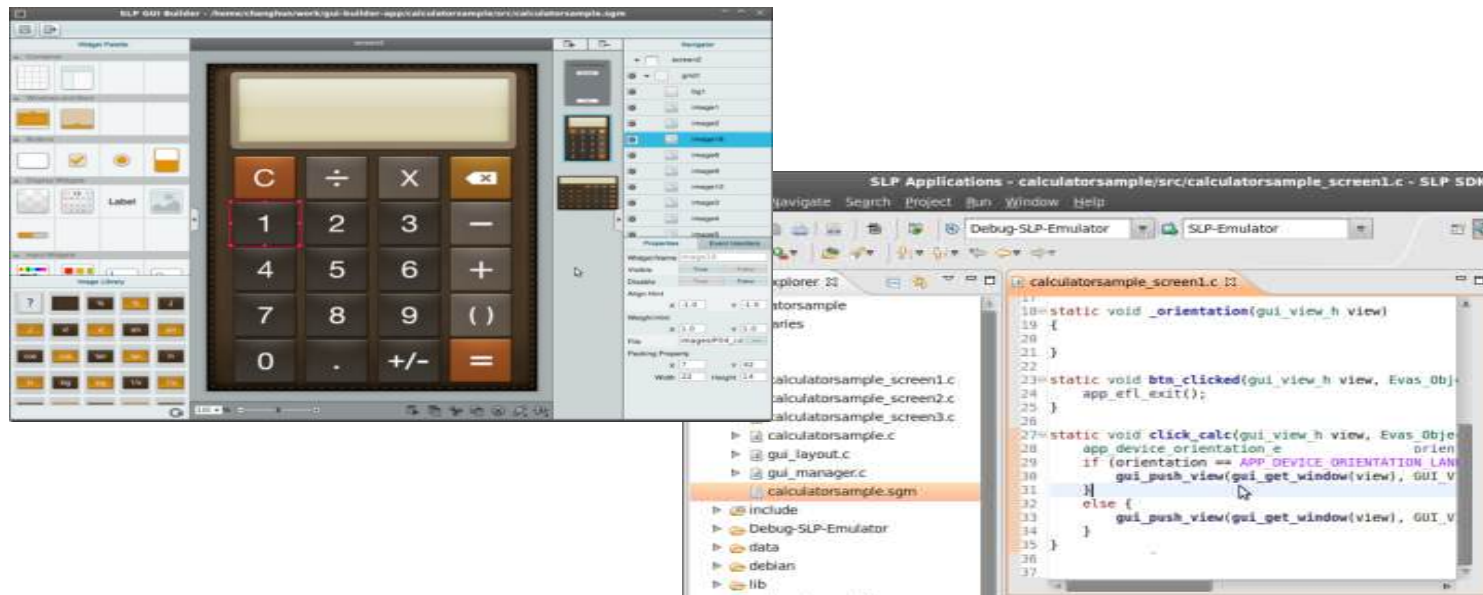
IDE

- Competitive editor for HTML, CSS, Javascript
- Project management, templates, samples, documentation
- Multiple target (Emulator/Device) management



GUI Builder

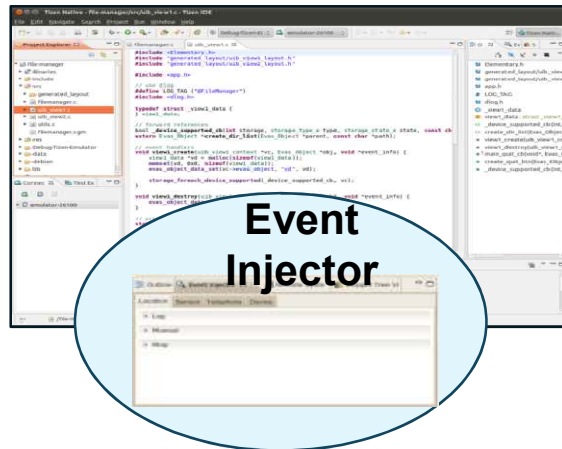
- You can visually develop application UI using GUI builder in WYSIWYG manner



Emulator

- Various Device Emulation based on open source QEMU
- Event Injector such as Call/SMS send and receive

IDE



Emulator

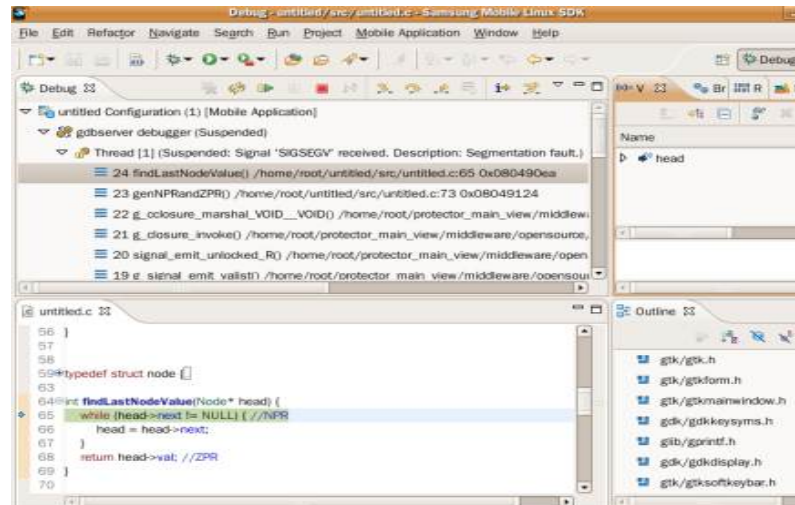


Emulator Manager



Debugging & Profiling

- Supports for various debugging with gdb and logcat
- Powerful Analysis for Memory and CPU usage



Tizen Open Source Community

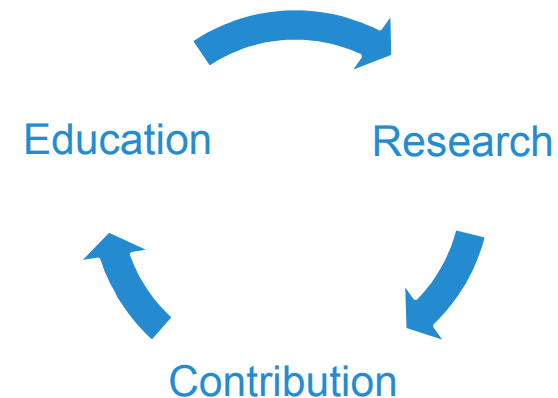
- **Contribute to Tizen Open Source Community**
 - Web Site: <https://www.tizen.org/community>
 - Anyone can contribute by:
 - ① Submitting patches
 - ② Filing bugs
 - ③ Documenting Feature requests
 - ④ Developing applications
 - ⑤ Helping with wiki documentation
 - ⑥ Participating in other community efforts and programs

The background features a light gray surface with a large, white, folded paper effect on the right side. Several circles are scattered on the right: a large yellow one, a medium white one, a small white one, and a blue one. The text is positioned on the left side of the image.

Tizen for Research and Education

Research and Education

- **For research**
 - Testing and evaluating research results using Tizen
 - Reflecting research results to the real world via Tizen
- **For education**
 - Tizen itself includes various technologies such as network, sensor, graphics, multimedia, web, security, etc.




Academia Partners

- **Chaperone (UC Berkeley)**
 - Prof. Ras Bodik (ras@bodik.org)
- **MobiSocial (Stanford Univ.)**
 - Prof. Monica S. Lam (lam@cs.stanford.edu)
- **Security & Mobile Sensing (Cambridge Univ.)**
 - Ross Anderson (rja14@cam.ac.uk)
 - Cecilo Mascolo (cm542@cam.ac.uk)

STANFORD
UNIVERSITY





Therefore,
Tizen will be the best choice
for Manufacturers, Operators,
Developers, and End users

Tizen Release History

Tizen 1.0

Apr. 2012

Web-centric platform

- Highest HTML5 coverage
- Tizen Device Web API
- Web UI framework (jQueryMobile based Extension)

Linux kernel 2.6.36

Tizen 2.0

Feb. 2013

Web/native dual framework

- Native API
- Unified SDK for Web and native
- Web Runtime based on WebKit2
- Web Audio, HTML Media Capture
- HTML Drag & Drop, Clipboard API

Linux kernel 3.0 (w/ many 3.4 features backported, such as CMA/IOMMU)
Memory optimization for graphics (Framebuffer → DRM/GEM, DMABUF)
eMMC 4.5 support, V4L2 (for codec and camera) support

Tizen 2.1

May. 2013

Readiness for commercialization in terms of stability & maturity

- Hybrid Web and native app support
- Content security policy
- Trusted inter-app sharing
- Account management
- QR code and image recognition
- Systemd replacing init daemon