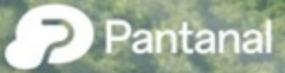


 oppo Pantanal

Pantanal

User-centric Cross-Platform Smart
System for Multi-device
Connection in the Internet of
Experience

OPPO



Pantanal Introduction

Contents

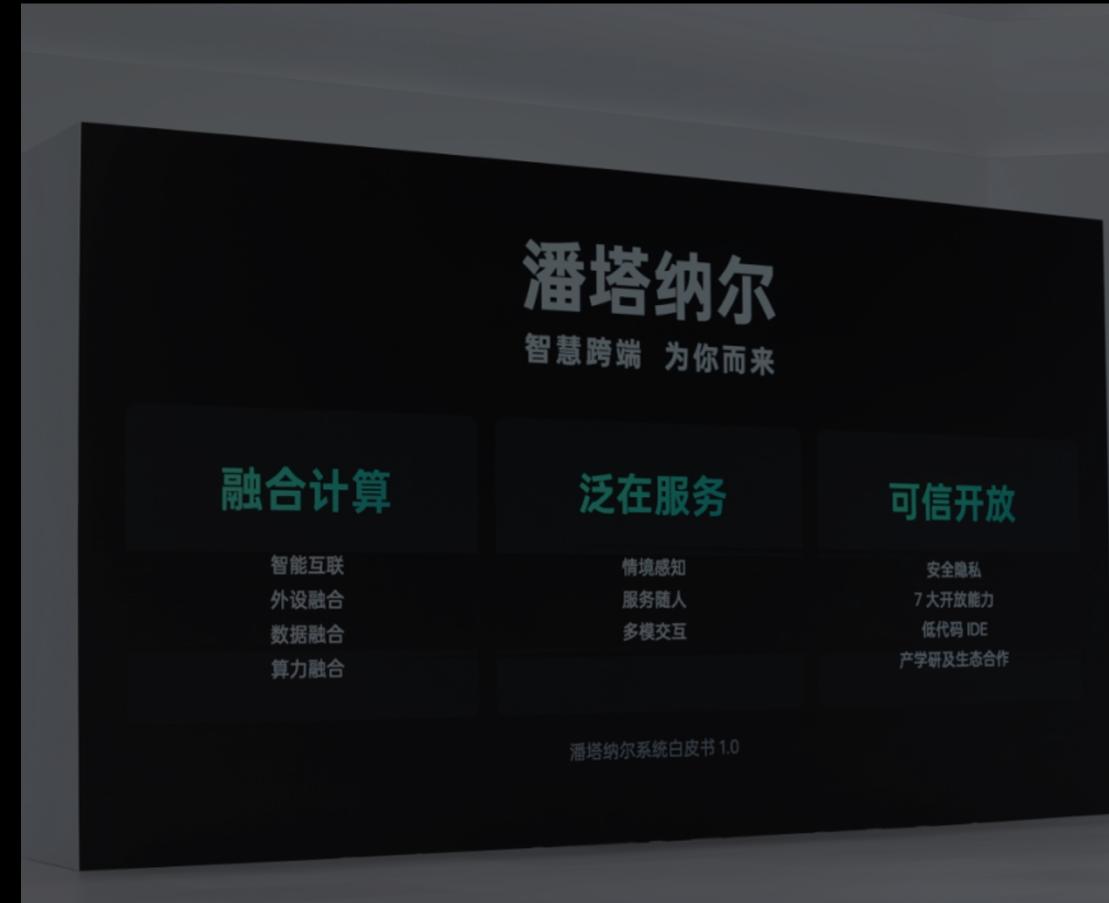
◆ About the Pantanal System

◆ Pantanal Solution

- Extensive entry points
- Accurate reach to users
- Efficient service development

◆ Cooperation Case

At OPPO Developers Conference
2022, OPPO unveiled **Pantanal**, a
user-centric cross-platform smart
system developed independently by
OPPO to **connect multiple devices**
in the Internet of Experience.



Great value of the Pantanal ecosystem, drew much attention from state media as well as finance and technology media

The Pantanal system came under the spotlight after its launch in 2022, has driven much attention from news media, including state media.



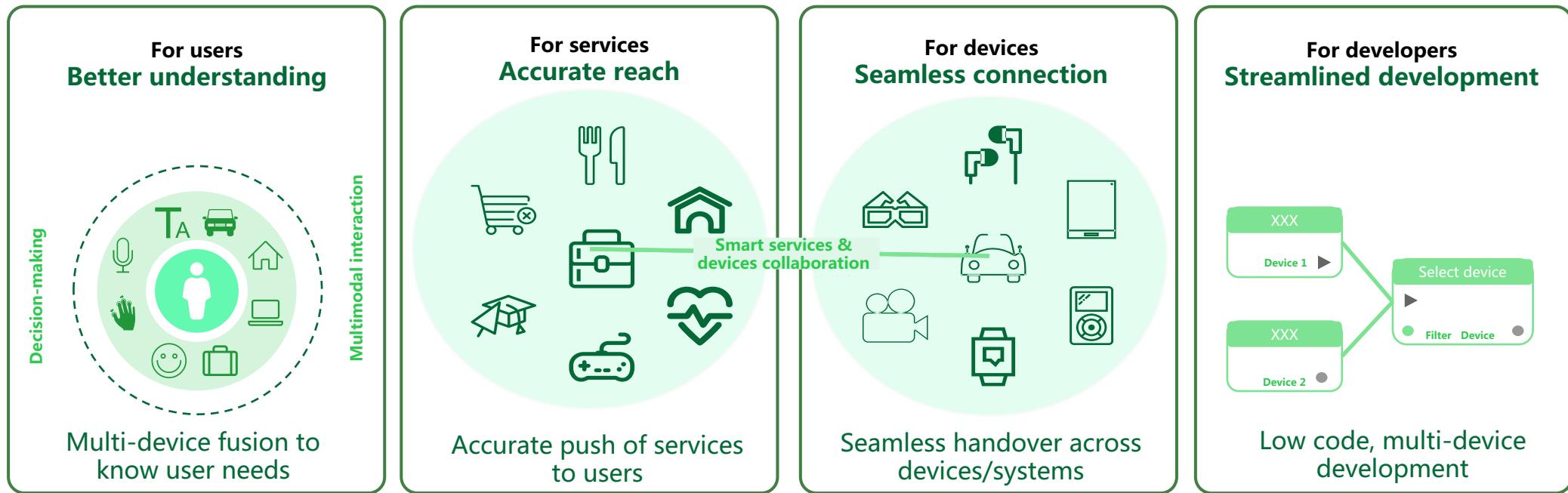
OPPO also released the *Pantanal System White Paper 1.0* jointly with partners to accelerate the implementation of the open ecosystem.



Pantanal

A user-centric cross-platform smart system for multi-device connection in the Internet of Experience

Pantanal leverages device-cloud integration to provide Pantanal Computing and Pantanal Service capabilities, which enable smart collaboration between multiple devices, systems, and services around users, and support streamlined, low-cost app development. Based on the Pantanal system, a Pantanal Trust ecosystem can be built to create a smart lifestyle and propel the development of the digital industry.



Support seamless collaboration between diverse services and devices to provide one-stop service experiences for users

Break barriers between devices/services to make services easier to use and improve the quality of digital life

User needs

Better understand needs of users and push services to users accurately and naturally on appropriate devices at appropriate time

Enterprises' needs for marketing

Simplify development environments with different devices/systems, prevent repeated development, and facilitate code migration

Enterprises' needs for app development

Pantanal Base

Solve core problems that affect user experiences: barriers between devices/services and complex operations

Users' pain points

Vertical domain devices and services can meet user needs accurately, but frequent switching between separate devices and services increases the complexity of operations.

Separate | Use of different devices, for example:

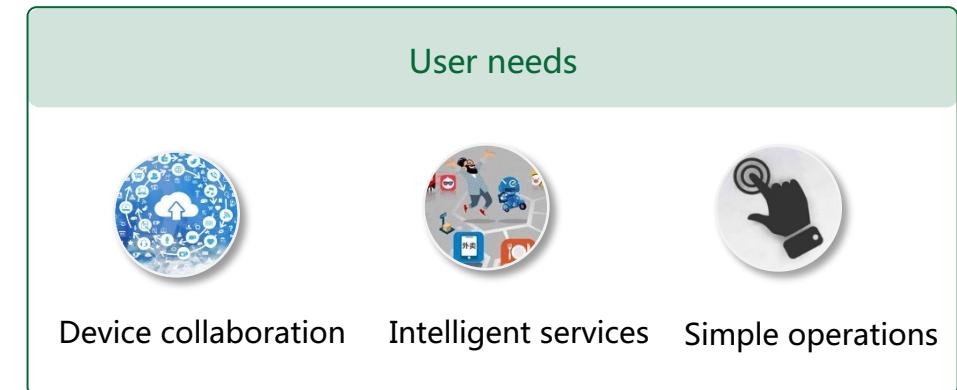
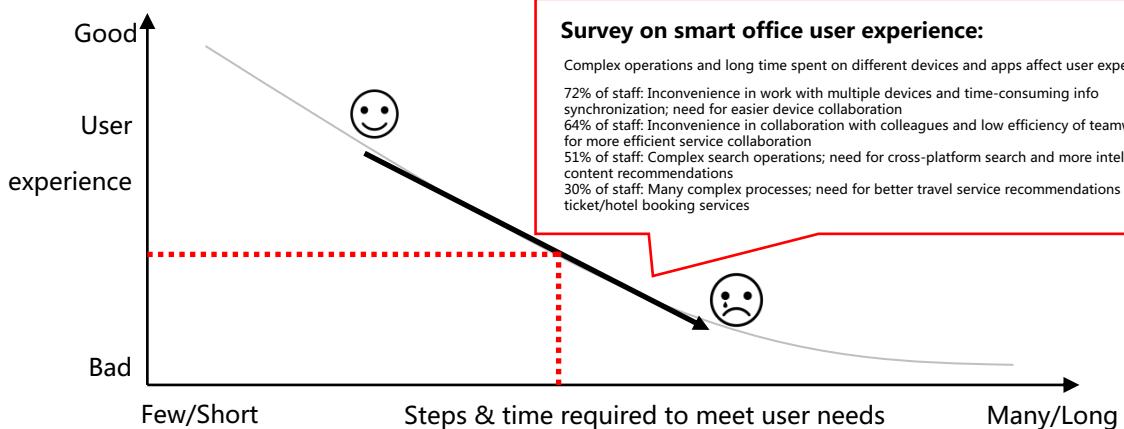
To edit a document, you need to share information and switch between multiple devices:

1. See an article on your smartphone.
2. Copy some content of the article to a document on your PC.
3. Continue to edit the document on your tablet after work.

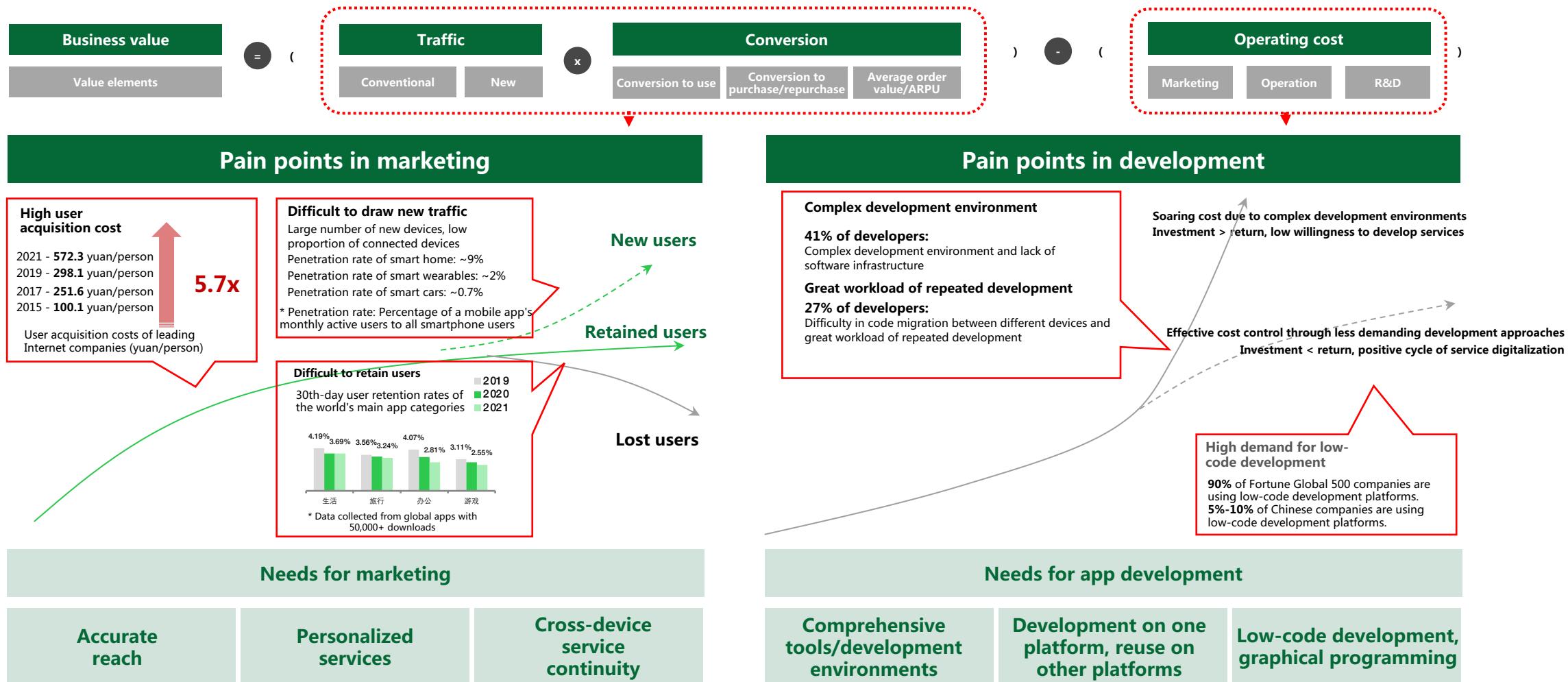
Complex | Switching between multiple services, for example:

To prepare for a trip, you need to switch frequently between multiple apps:

1. Book air tickets and hotel on a travel service app.
2. Use a map app to determine the routes to the airport and hotel.
3. Use a ride-hailing app to order a ride to the destination, and check flight information on the airlines company's app.



Help developers lower the costs of user acquisition and app development



Contents

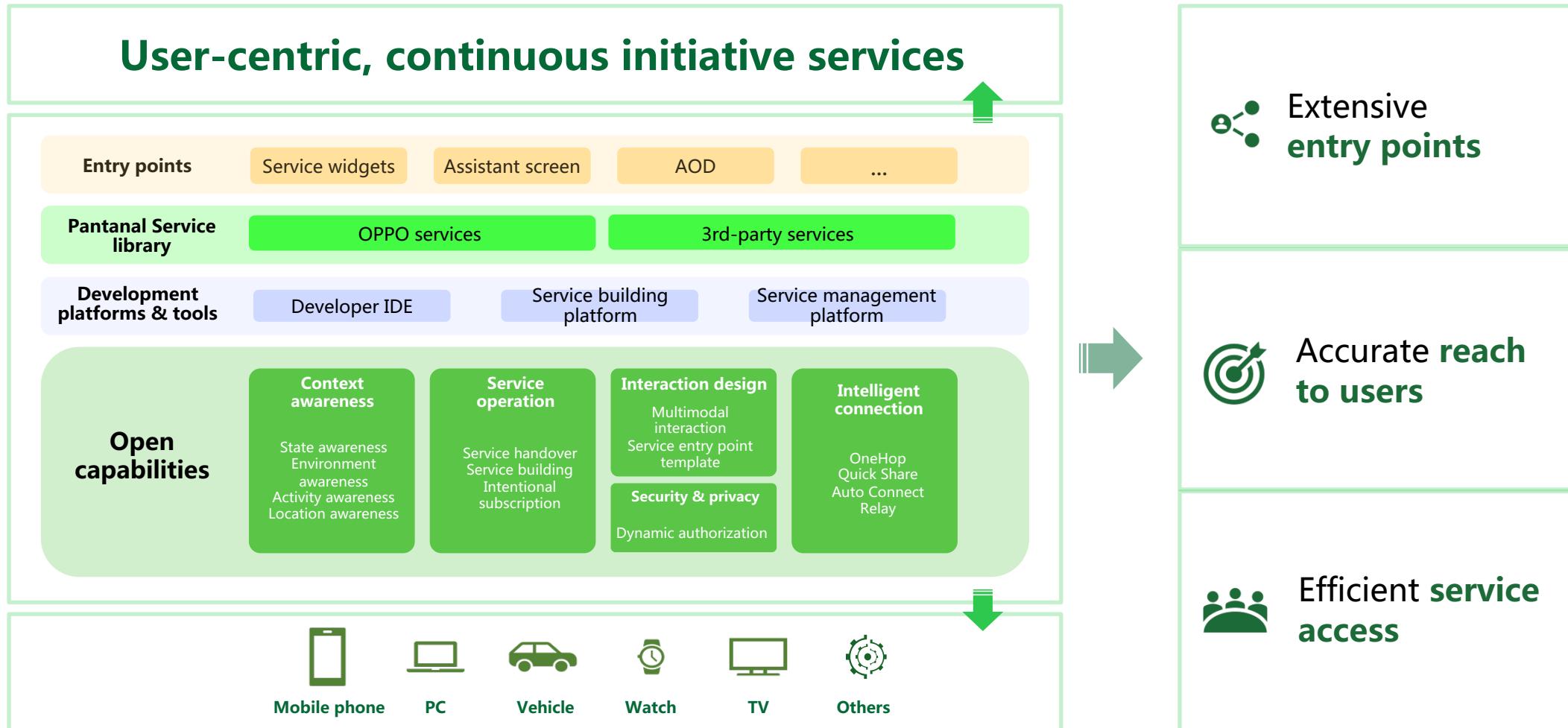
◆ About the Pantanal System

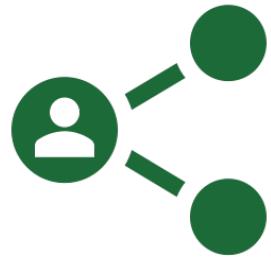
◆ Pantanal Solution

- Extensive entry points
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◆ Cooperation Case

Pantanal, helping developers achieve a commercial success





Extensive **entry points**



Accurate **reach to users**



Efficient **service access**



*产品的颜色、外观、界面、功能仅供参考，请以实际为准。

Entry points to Pantanal

Widget recommendation on main screen

Major mode of service recommendation

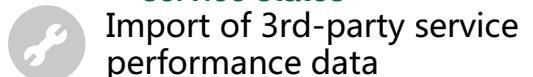


Three sizes of service widgets (mm): 4x2, 2x2, 2x1



Notification center and lock screen

Real-time synchronization of service states



Only one size to show more information



AOD and status capsule

Intensified reminder of important service nodes



Only one size to show less information

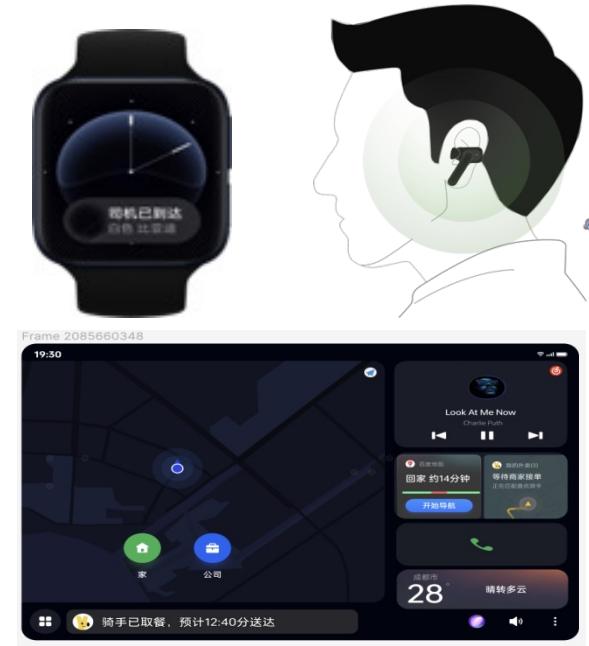


Multi-device connection

Cross-device services



Following standards of devices



Entry points to Pantanal

Widget recommendation on main screen

Major mode of service recommendation



Development mode:

Developers design and develop service widgets following the given standard and integrate them into the Pantanal SDK. The service widgets can also be developed by OPPO.

The system needs to obtain certain data for service recommendation. For example, it obtains the user's air ticket order and departure time to display the Travelsky service widget at appropriate time and places, and obtains the user's destination city to recommend hotels on the Travelsky app.



Interaction logic:

Service widgets should display service information directly. The user can tap a widget to switch to the corresponding app, miniprogram, or quick app. Buttons or other controls and tap events can be added to service widgets.



Product specifications:

Service widgets can be displayed in three sizes (mm): 4x2, 2x2, and 2x1. The sizes of 2x2 and 2x1 are required, and the size of 4x2 is optional.



Value:

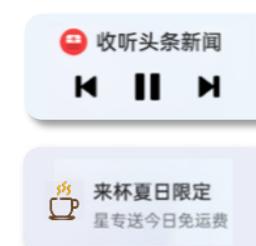
This entry point is **fixed on the main screen**. The system will be installed on tens of millions of smartphones in 2023, and have MAU gradually increase to over 500 million.



4x2 widget



2x2 widget



2x1 widgets



Example of a main screen

Entry points to Pantanal

Notification center and lock screen

Real-time synchronization of a service order's states

Example:



Development mode:

The shape template is fixed. Developers only need to define the content to display in Pantanal SDK.



Interaction logic:

Key information that the user cares about is displayed during performance of a service order. The user can open the app to check the service order by tapping a notification.



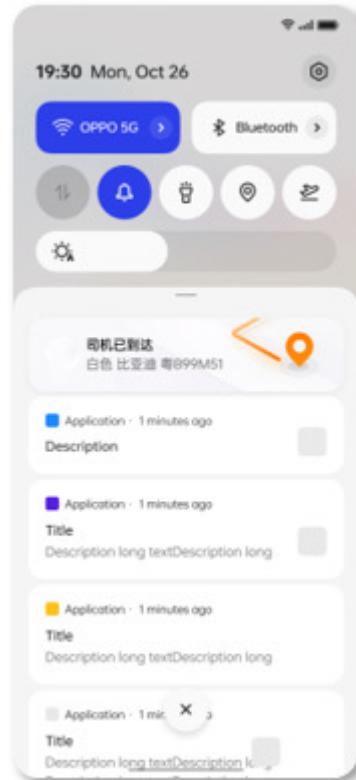
Product specifications:

Only one dimension template is available, allowing for display of much information.



Value:

The system will be installed on tens of millions of smartphones in 2023, and have MAU gradually increase to over 500 million.



Notification center



Lock screen

Entry points to Pantanal

AOD and status capsule

Real-time display of key states and nodes of a service order



Development mode:

The shape template is fixed. Developers only need to define the content to display in Pantanal SDK.



Interaction logic:

Key information that the user cares about is displayed during performance of a service order. The user can open the app to check the service order by tapping a notification.



Product specifications:

Only one dimension template is available, allowing for display of only a little key information.



Value:

The system will be installed on tens of millions of smartphones in 2023, and have MAU gradually increase to over 500 million.

开放在线值机

车辆即将到达

开始检票 13A

司机已到达

Example



AOD



Status capsule

Entry points to Pantanal

Original entry points Assistant screen and flashback key



Development mode:

The original SDK will support features of the new version after an upgrade.



Interaction logic:

Same as before.



Product specifications:

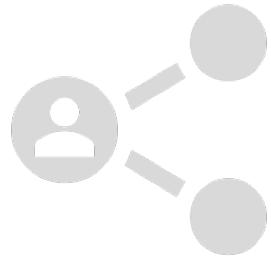
Same as before.





Pantanal Service, Cross-Device Access

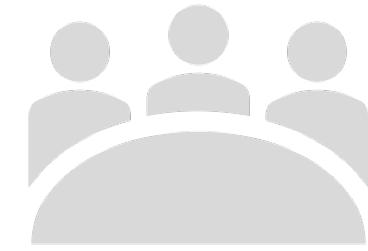




Extensive **entry points**



Accurate **reach to users**



Efficient service access

Smart decision-making and cross-device connectivity to enable accurate reach to users

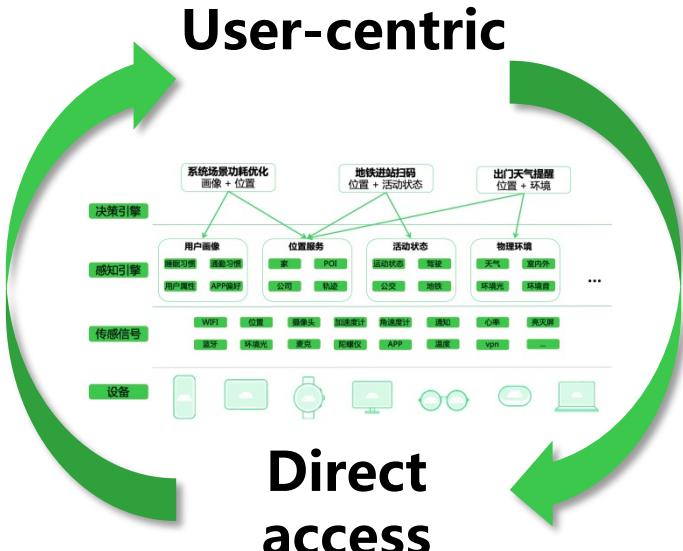
Smart decision-making



Cross-device connectivity



Accurate reach



Smart, accurate

Redefined service logics

- Many apps & services seldom used
- Many ads and pushed messages
- Apps & services difficult to use or find

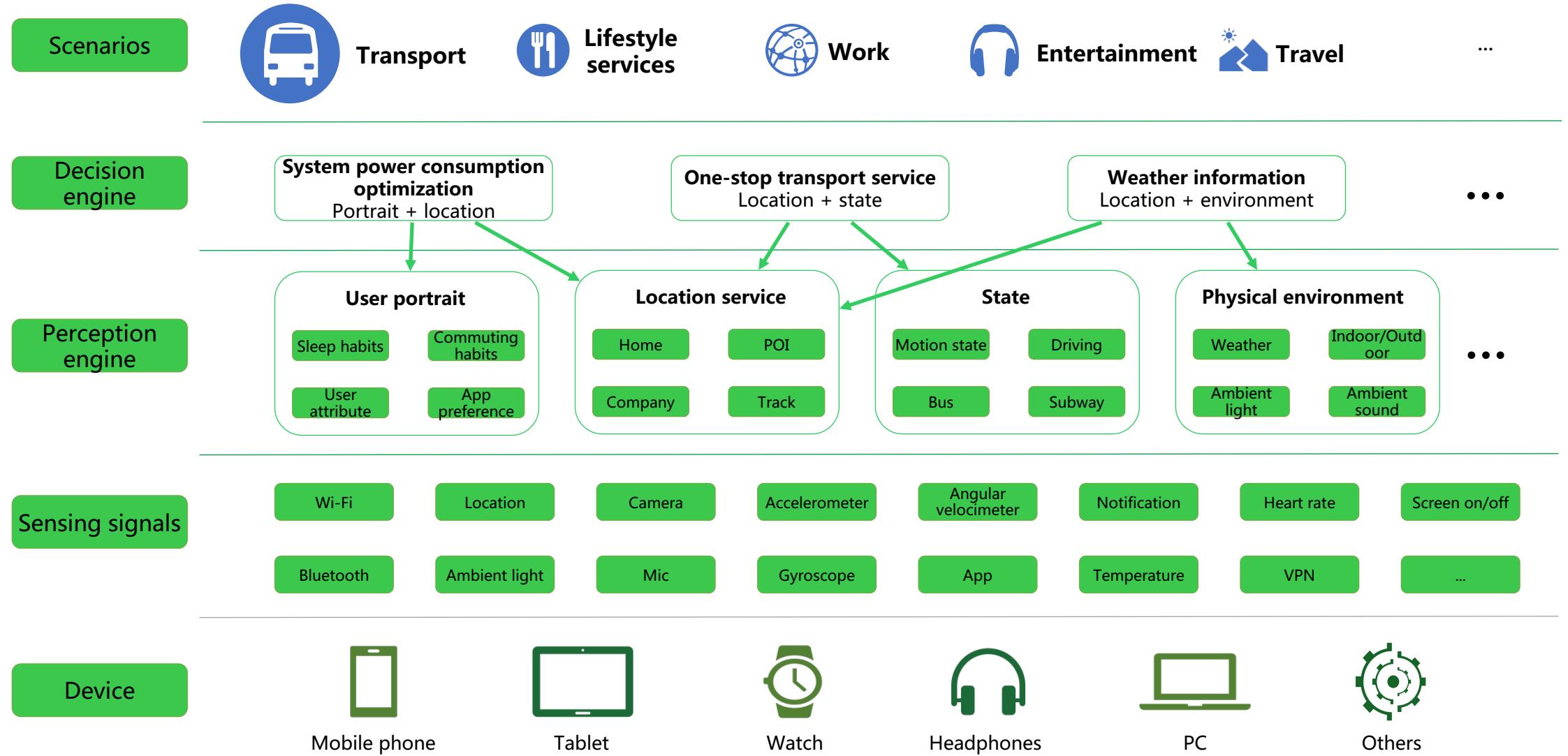
--> **Accurate push of services**

Direct access

Redefined human-machine interaction logic

- Accurate intention understanding
- Real-time context awareness
- Fewer search operations, direct access to services

Smart decision engine



One-stop travel service, natural, continuous service experience in multiple scenes

Planning

Trip plan, tap to book



Before departure

Alert on change,
tap to know



In the airport

Catering service
recommendation,
tap to buy



Before boarding

Reminder, tap to
download



After landing

Recommendation
right in time, tap to
hail a ride



Expandable
applications

Pantanal leverages its context awareness capability to understand the user's needs and recommends the most suitable services whenever needed, such as lifestyle, travel, shopping, and healthcare services.

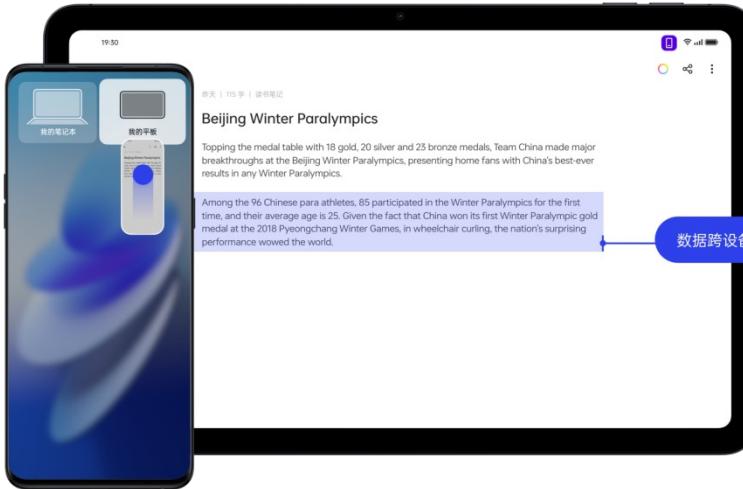
Seamless | Auto device connection with the same account, free data migration between near- and far-field devices

Cross-device trust,
auto connection



Connect to another trusted device with the same account, no need for authentication

Natural interaction,
seamless handover

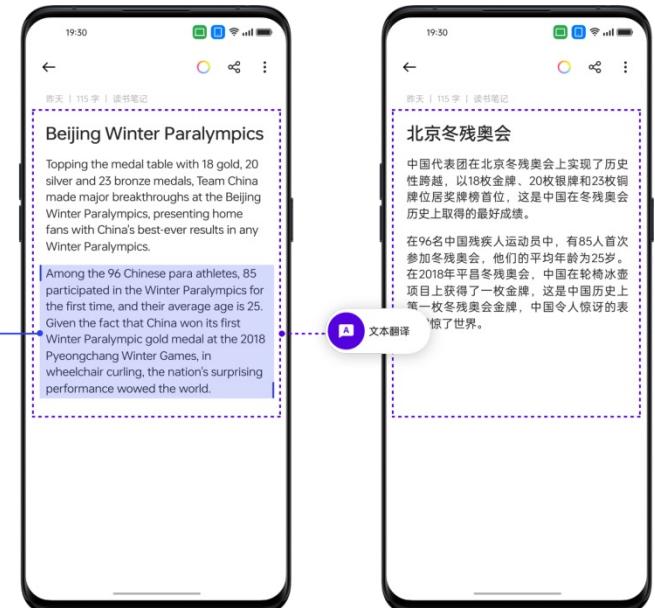


Swipe up to migrate the current work to your tablet

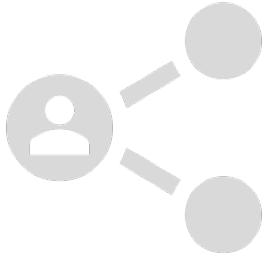
Expandable
applications

Seamless data/file migration between devices creates a natural, continuous service experience whether you are working in office, staying at home, studying, or doing sports.

Free data migration between
near- and far-field devices



Seamless device-cloud data migration,
allowing you to synchronize data from
your tablet at home to your phone



Extensive **entry
points**

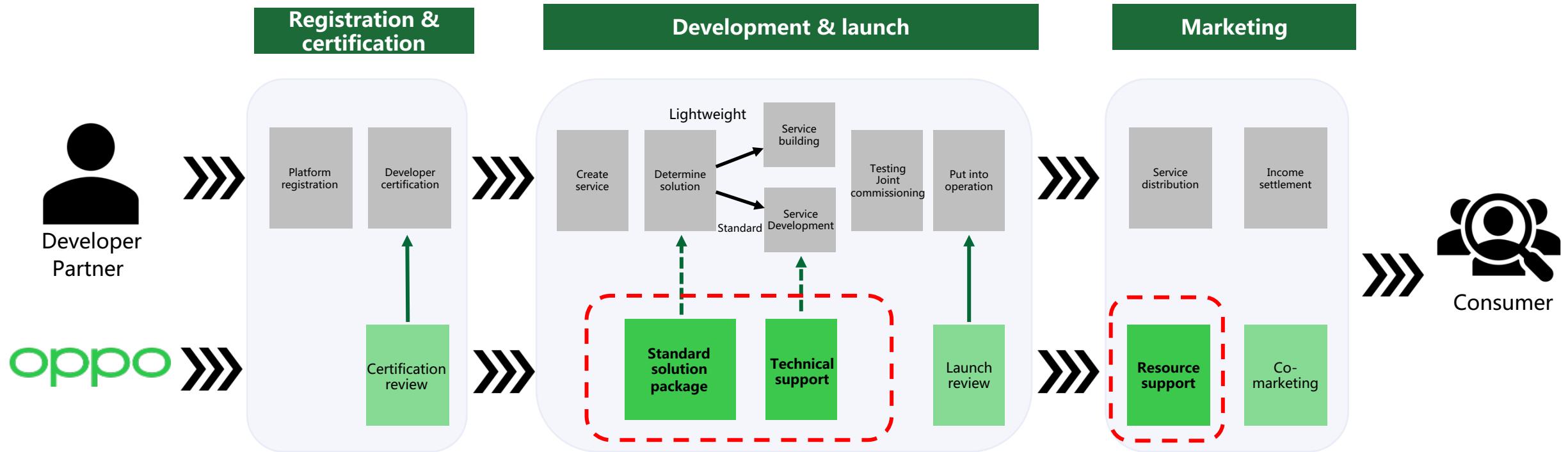


Accurate **reach to
users**



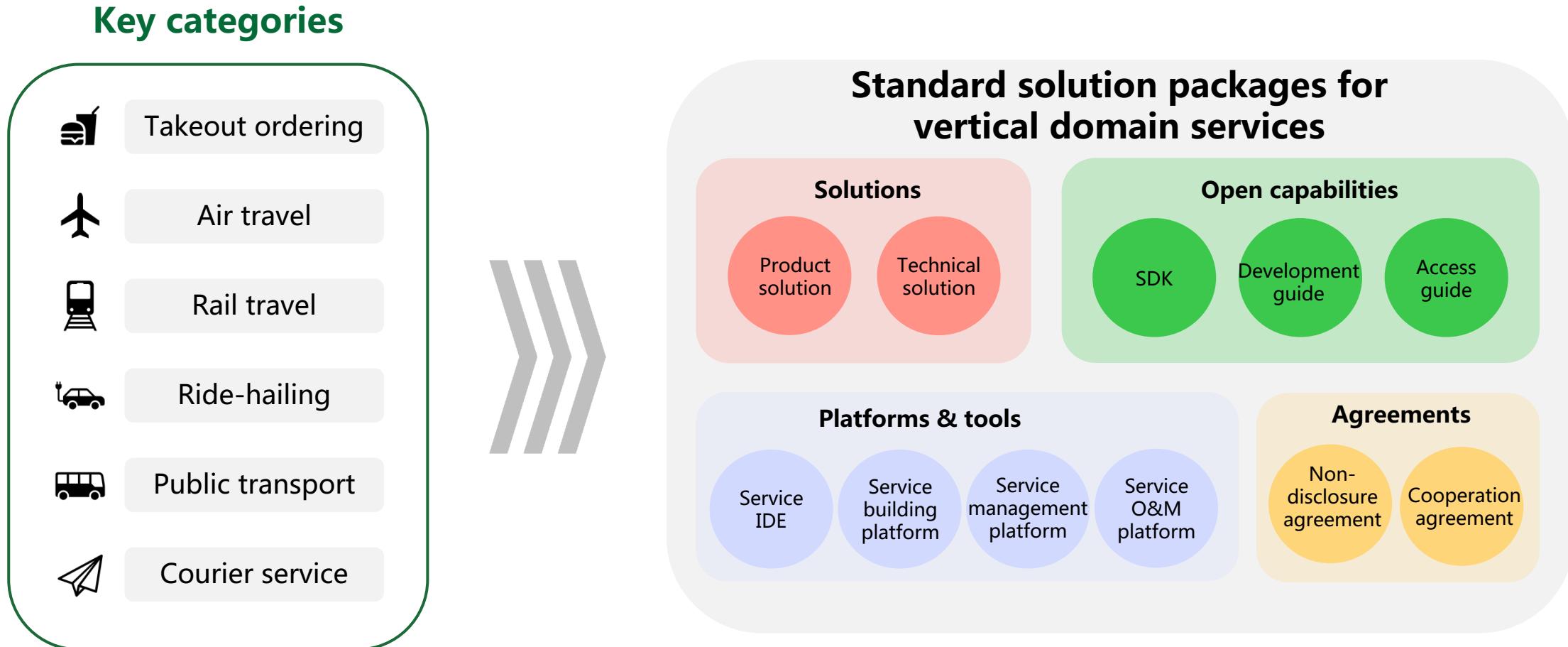
Efficient **service
access**

Comprehensive resources and toolkits for developers



OPPO provides a complete set of resources and toolkits for the Pantanal ecosystem, enabling developers to access Pantanal Service more efficiently.

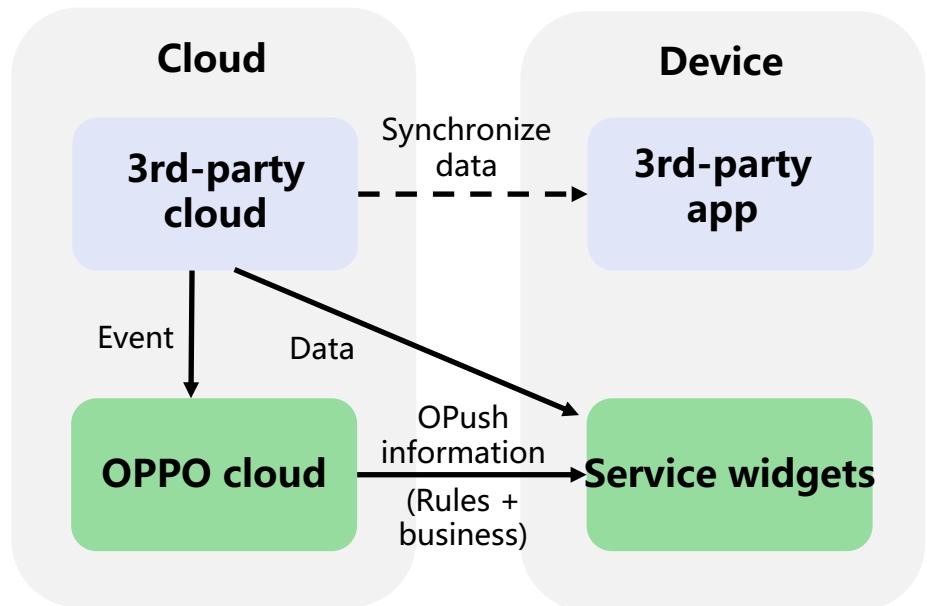
Standard solution packages for key service categories



Technical solution: Multiple data docking modes for developers to choose

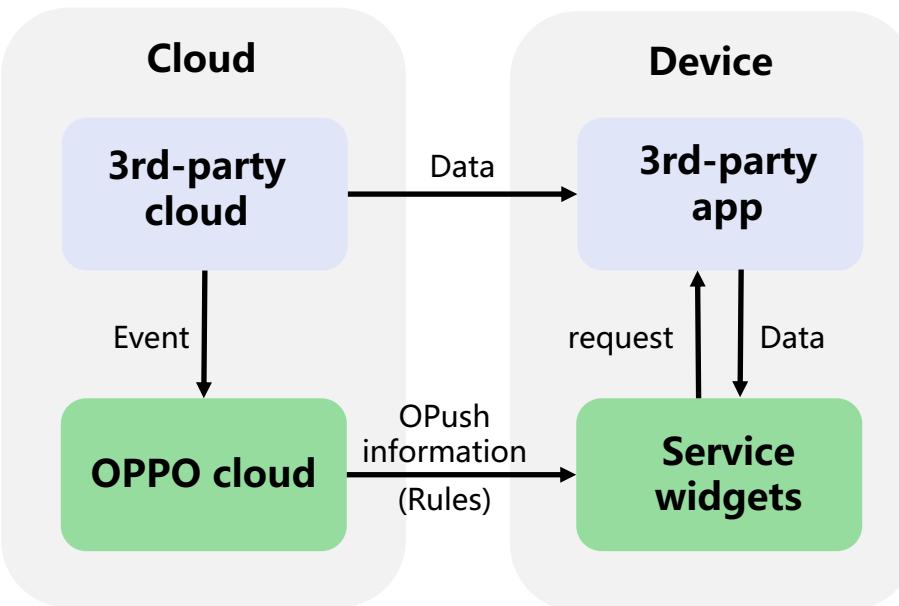
Solution 1: Cloud-cloud docking

(The 3rd party connects its cloud to OPPO cloud and transfers data to the service widget in real time.)



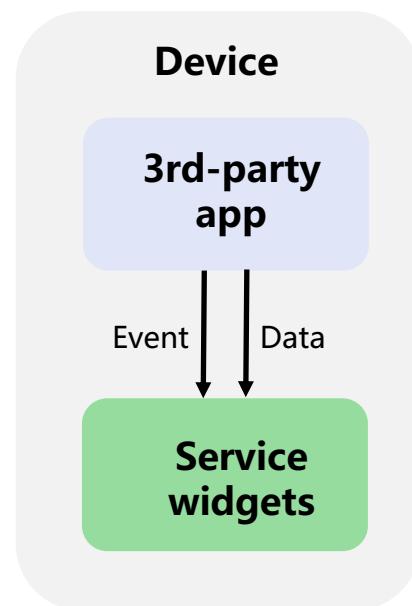
Solution 2: Cloud-device docking

(The 3rd-party cloud provides triggering events, and the 3rd-party app sends data to the service widget.)



Solution 3: Device-device docking

(The app sends data to the service widget.)



Advantage	1. Real-time transfer, best experience; 2. Independence of app status on devices
Disadvantage	1. Need for uniform user accounts on the clouds

1. Simple access method; 2. Independent data processing by the 3rd party, decoupled from OPPO
1. Risk of app killing; 2. Need for exception handling on the app

1. Decoupled from OPPO; 2. High freedom of the 3rd party
1. Delay in perception, leading to a poor experience; 2. Many exceptions

Cloud-cloud docking is recommended, as it not only prevents the app from being killed and provides the best service experience, but also attracts more users to install the app.

Technical solution: Adaptation to multiple devices and entry points

Pantanal provides multiple development templates to adapt to various service features, such as content display, multimodal interaction, and multi-device handover.

多入口自适应



Service widget and status capsule (example)

代码示意：提供UI模板，模板具备自适应能力。

```
<ule_template entry=="default" class="container">
  <text class="message">{{message}}</text>
  <image class="appIcon" src="{{imageSrc}}"/>
  <progress value="{{progress}}"/>
  <button id="openAppBtn"
    onClick="btnOnClick">{{btnText}}
```

Multimodal interaction

(Opened later)



Voice interaction (example)

Sample code: The voice tag is used to set the system to play voice messages at appropriate time.

```
<ule_template entry=="default" class="container">
  <text level="1" class="message" content-presentation:audio>{{message}}</text>
  <image level="2" class="appIcon" src="{{imageSrc}}"/>
  <progress level="2" value="{{progress}}"/>
  <button level="3" id="openAppBtn"
    onClick="btnOnClick">{{btnText}}
```

Multi-device handover

(Opened later)



Auxiliary touch point: watch (example)

Sample code: The distributed tag is used to determine whether to allow service handover.

```
<ule_template entry=="default">
  <image src="{{imageSrc}}" distributed="true"/>
  <text level="1" distributed="true">{{message}}</text>
  <progress level="2" value="{{progress}}"/>
</ule_template>
```

Technical solution: Example of: service widget development

1. The developer transfers third-party data for decision-making to OPPO smart decision engine.

One-stop transport service

2. The developer develops/builds service widgets and integrates them into OPPO service management platform.

3rd-party data for decision-making
(Ride-hailing service as an example)
Example: User's preference for car-hailing
Existing order? Car arrived? Traffic jam information?

OPPO's data for context awareness
Home, company, time, weather...

OPPO smart decision engine

Planning

Trip plan, tap to book



Before departure

Alert on change, tap to know



In the airport

Catering service recommendation, tap to buy



Before boarding

Reminder, tap to download



After landing

Recommendation right in time, tap to hail a ride



Service widgets
(Ordered services)

Service widgets
(Recommended services)

OPPO service management platform

Open capabilities of Pantanal

Pantanal
Trust

Development
environment

Service development framework
(Control library, API reference,
motion library, declarative design)

Service IDE tools
(Development and
orchestration tools)

Security &
privacy

Dynamic
authorization

Pantanal
Service

Context awareness

State awareness

Environment
awareness

Location awareness

Activity awareness

Service operation

Service handover

Service building

Intentional subscription

Interaction design

Multimodal interaction

Service entry point template

Pantanal
Computing

Intelligent
connection

OneHop capability

Quick Share
capability

Auto Connect
capability

Relay capability

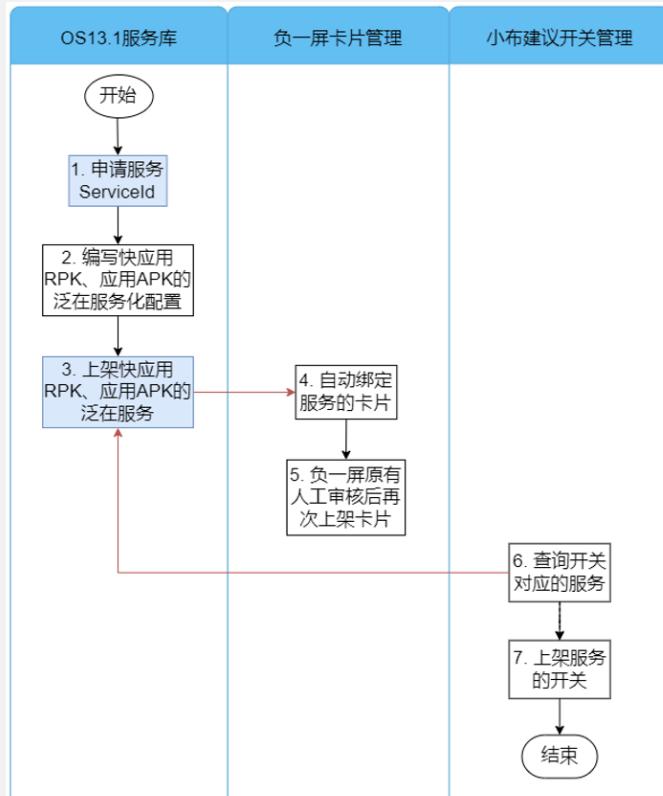
OPPO open platform

<https://oppo.topversion.cn/live>

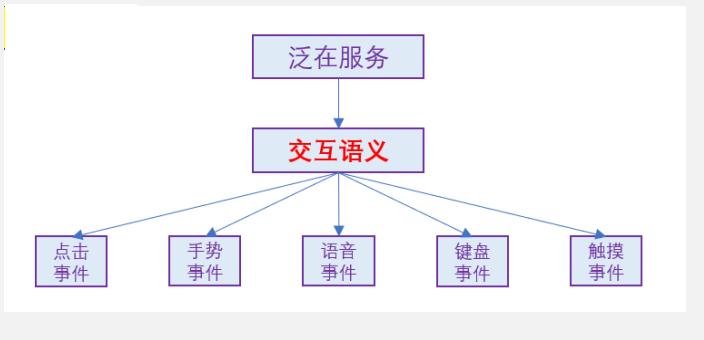


Multiple platforms and toolkits to reduce development cost

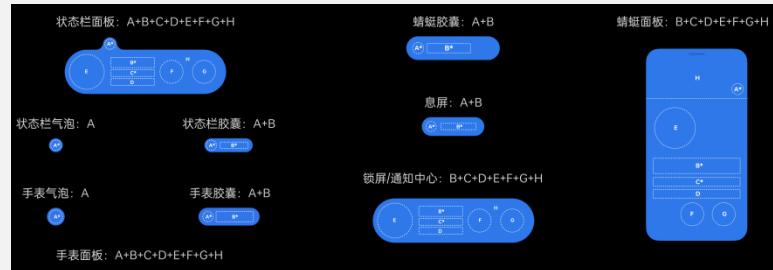
Existing RPKs of quick apps and APKs of general apps can be configured as services and have their basic features integrated into Pantanal with **0 changes in code**.



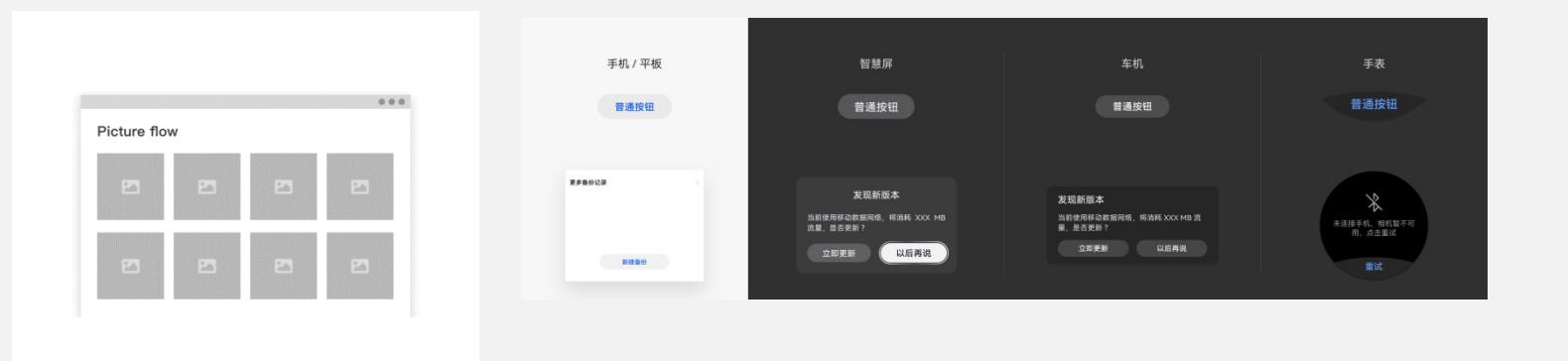
Standardized interaction design enables new interactive modes to be added with **0 coding** (implemented at the end of 2023).



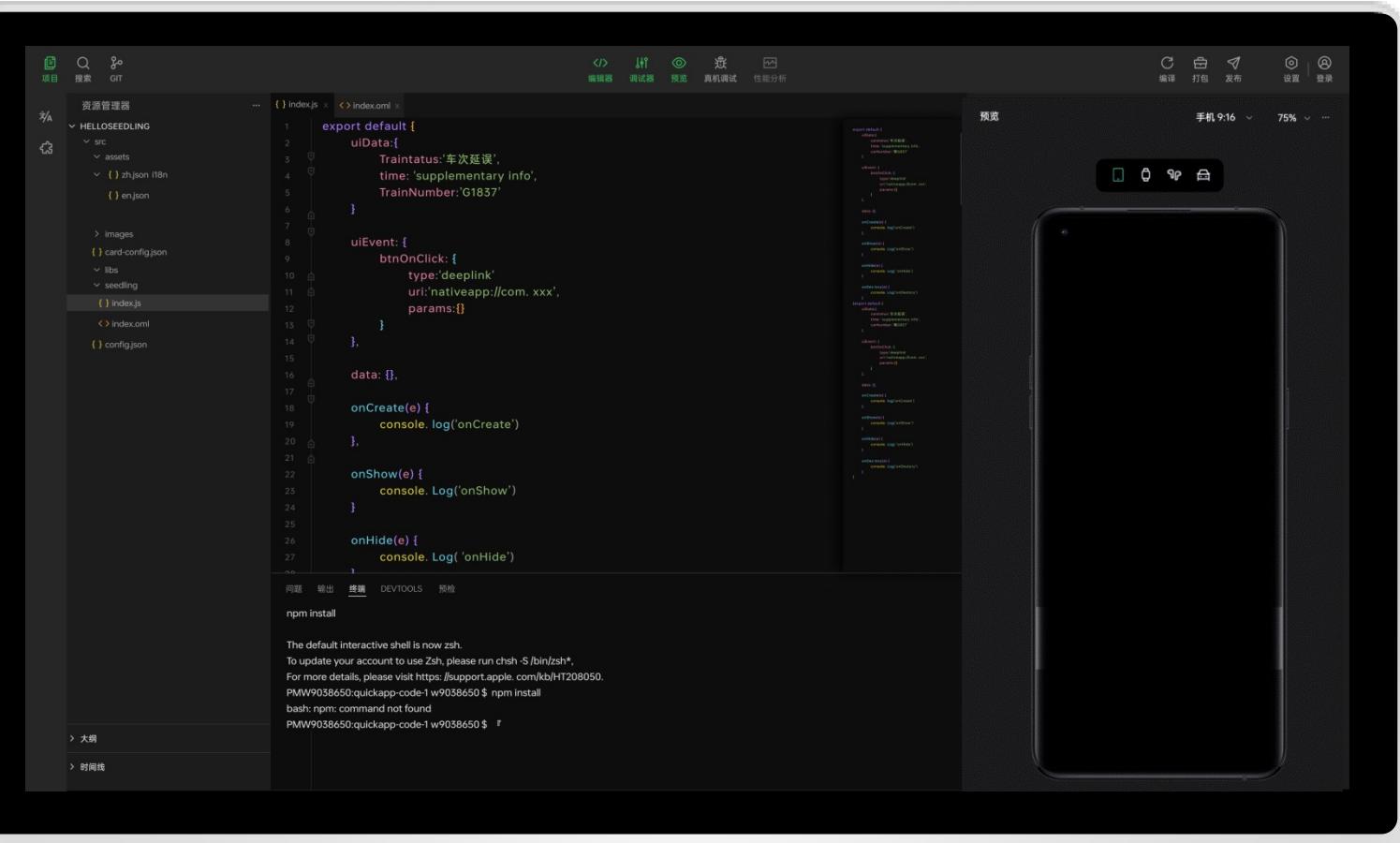
The service building platform (available at the end of 2023) will reduce the service widget development workload from 6 person days to **2 person days**.



The responsive layout and multimodal controls (available at the end of 2024) enable developers to develop a service with only 80% as much code as before.

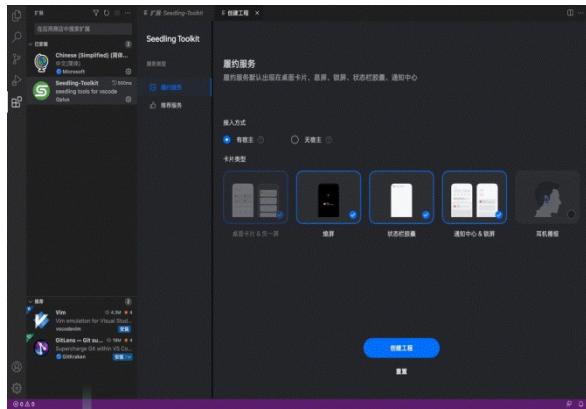


Pantanal IDE for developers

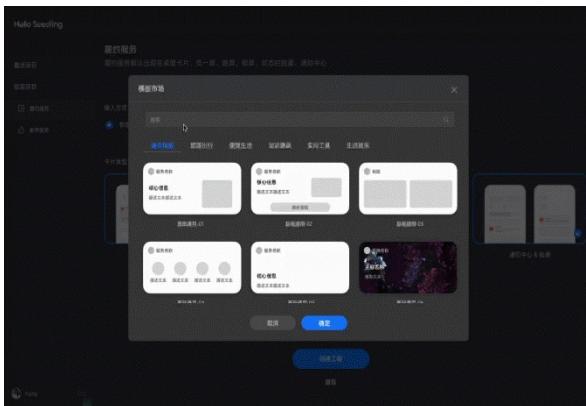


Pantanal is developed based on OPPO's own technology R&D system and is still in its infancy in terms of ecosystem development due to incomplete infrastructure. To help Pantanal developers develop and debug Pantanal service programs in a simple, efficient way, OPPO has developed an IDE that integrates all Pantanal modules. This IDE improves the efficiency and experience of Pantanal service development.

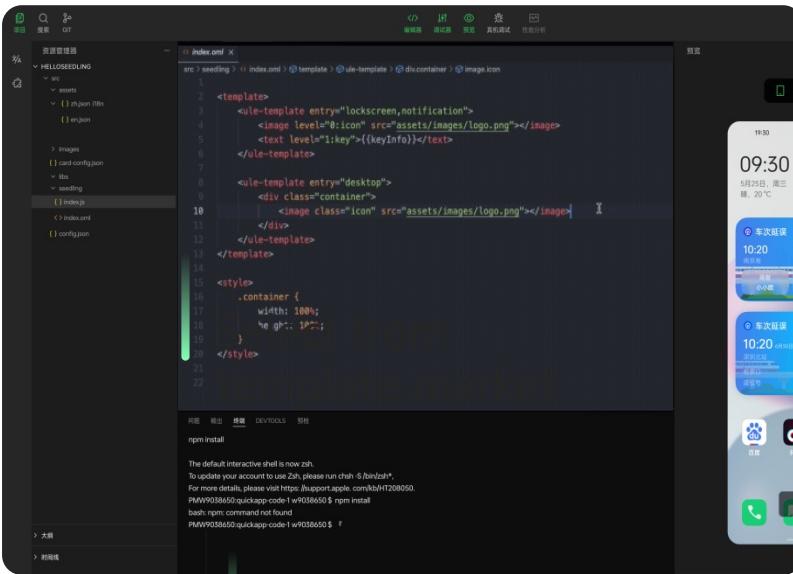
IDE operation procedure



1. Create a project



2. Select a service template



3. Edit code

Project file format | Highlighted syntax
Auto-complete | Syntax error report



4. Debug and preview the program



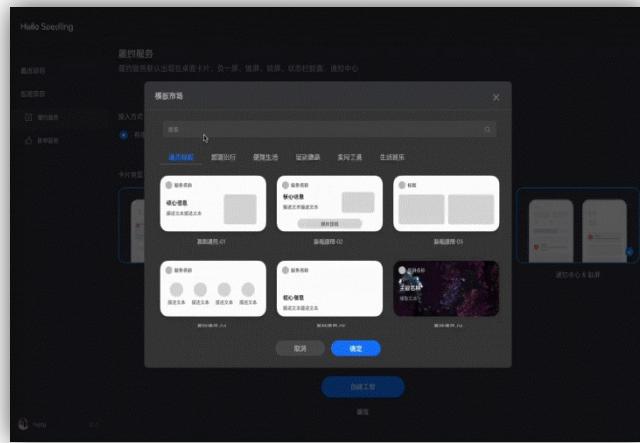
5. Compile and package the program

Pantanal service building platform

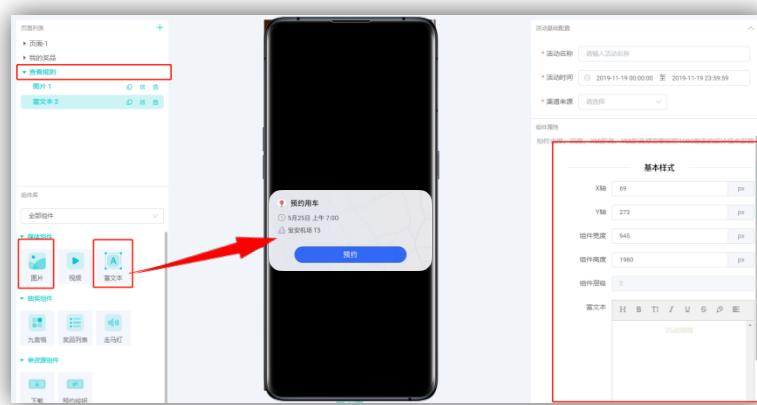
Pantanal provides a service building platform to help developers create service widgets quickly.

On this platform, developers can use widget templates to create, package, and launch Pantanal service widgets, even if they don't have any experience in app development. This platform reduces the development workload to **2 person days**.

Service building procedure



1. Select a widget template



2. Configure the widget



3. Debug and launch the widget

Online preview → Configuration & packaging → Singing→Launch

Resource support for developers

OPPO provides the following resource support for developers:

- Technical support: Developers can get technical support on a 24/7 basis.
- Developer community: Pantanal developers can share technical articles, their development experience, and other information in the community.
- Development training: OPPO provides online technical training for Pantanal developers.
- Live streaming: KOLs and OPPO experts can share Pantanal-related technical information and development cases online.
- Offline activities: OPPO will organize Pantanal developer salons and industry summits.
- Incentive plan: OPPO has initiated the Gravity Plan to motivate developers.



Online training courses (example)



Developer salon



Gravity Plan

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Meituan &OPPO: Deliver closed-loop lifecycle services

After Meituan's takeout service and catering recommendation service are imported to Pantanal, OPPO provides Meituan with support for service discovery, exposure, and subscription throughout a customer journey. Then, users can enjoy closed-loop lifecycle services.



Service discovery

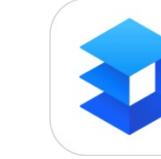


Service exposure (service widgets, AOD, notification, flashback)



Service subscription

Partners in the Pantanal ecosystem



 上汽集团
SAIC MOTOR

Hisense

SKYWORTH
创维 创导未来

JMGO

CHANGHONG 长虹

 TECNO

KONKA 康佳

- An innovative ecosystem for a win-win future