Enabling the Next Phase of RISC-V:
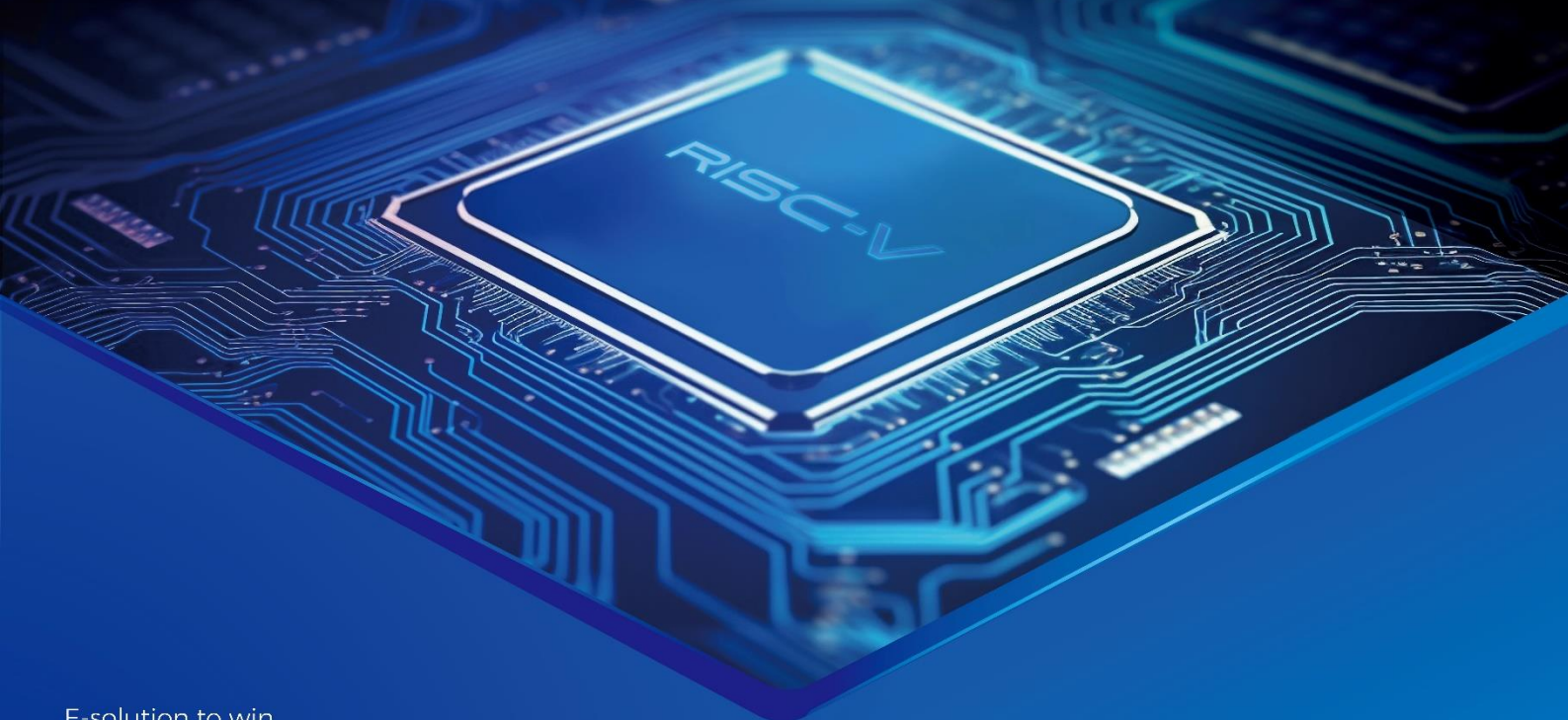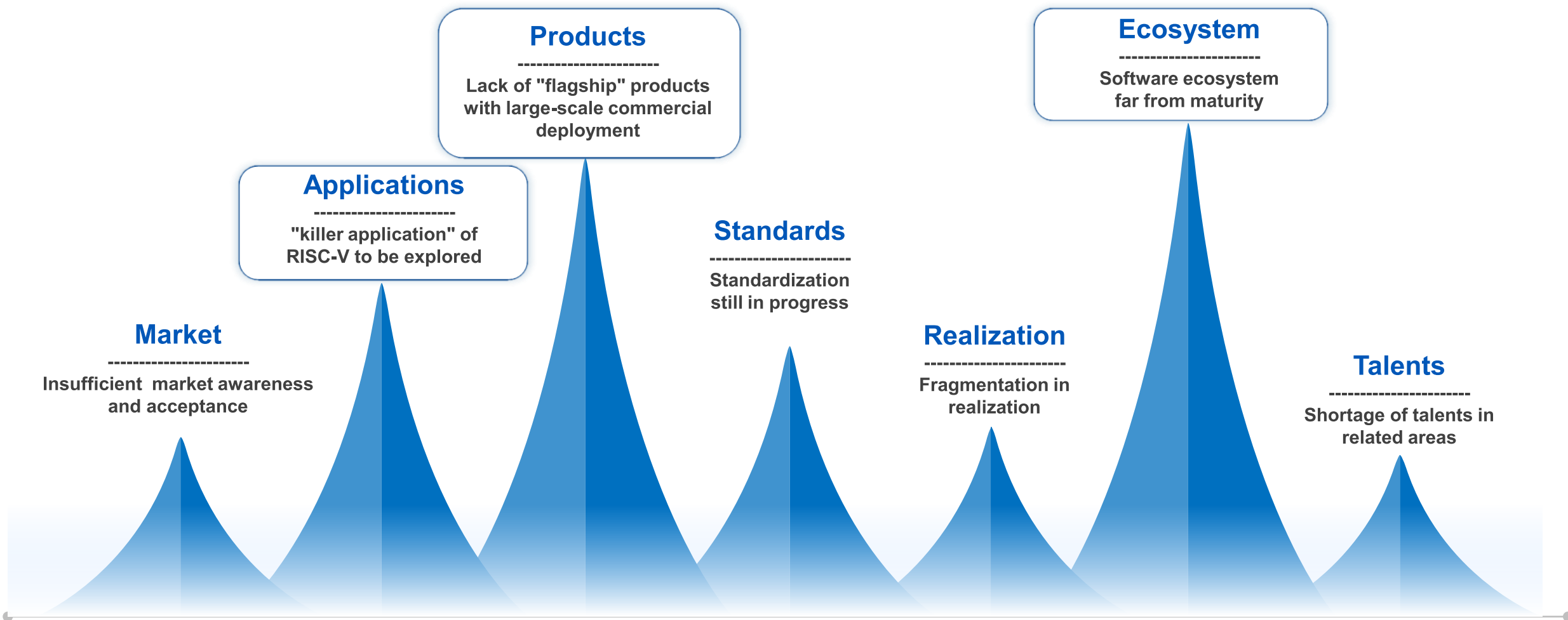
Product Innovation and Scalable Solutions

ESWIN

北京奕斯伟计算技术股份有限公司
Beijing ESWIN Computing Technology Co., Ltd.
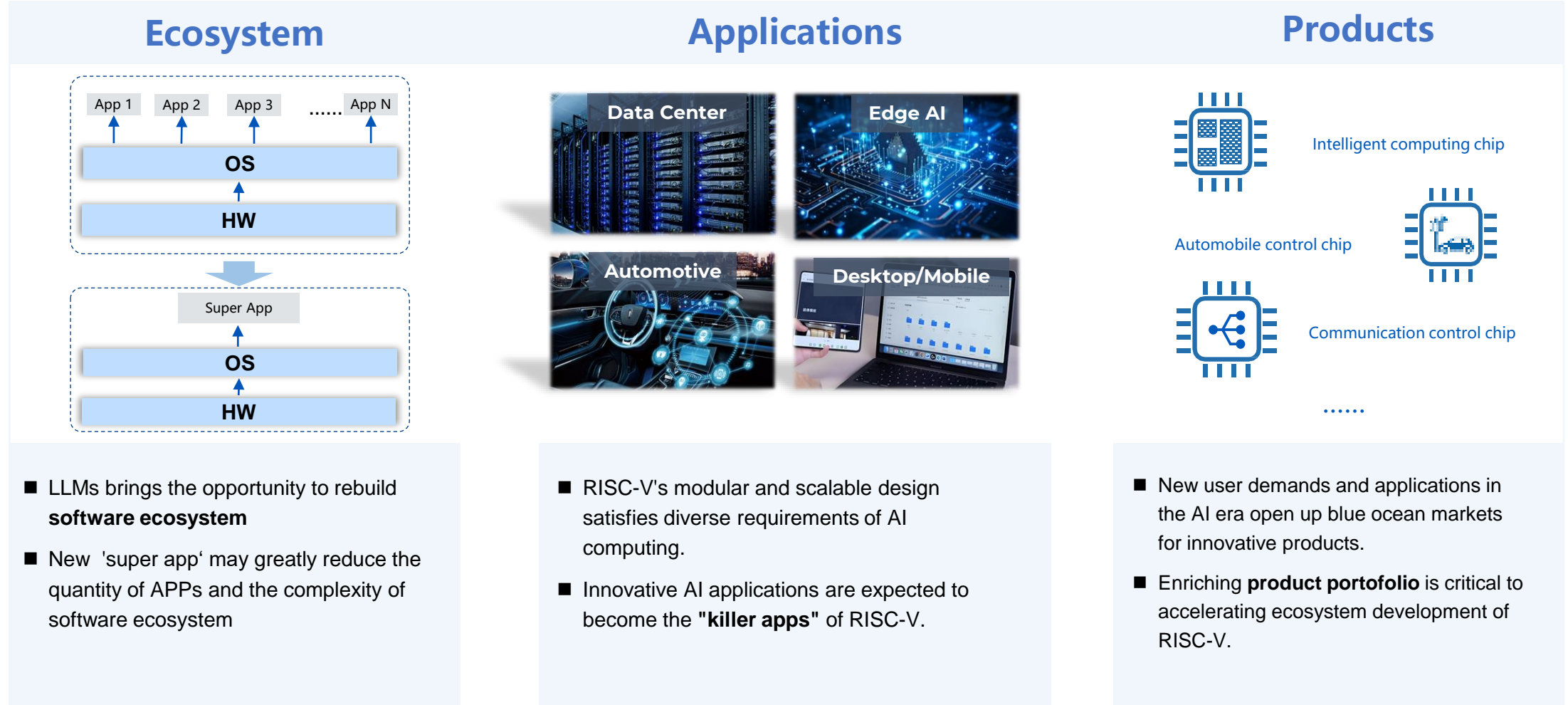
E-solution to win

I. RISC-V: Challenges

Products

Lack of "flagship" products with large-scale commercial deployment

Ecosystem

Software ecosystem far from maturity

Applications

"killer application" of RISC-V to be explored

Standards

Standardization still in progress

Market

Insufficient market awareness and acceptance

Realization

Fragmentation in realization

Talents

Shortage of talents in related areas

The main challenges faced by RISC-V (RISC-V Summit China 2022)
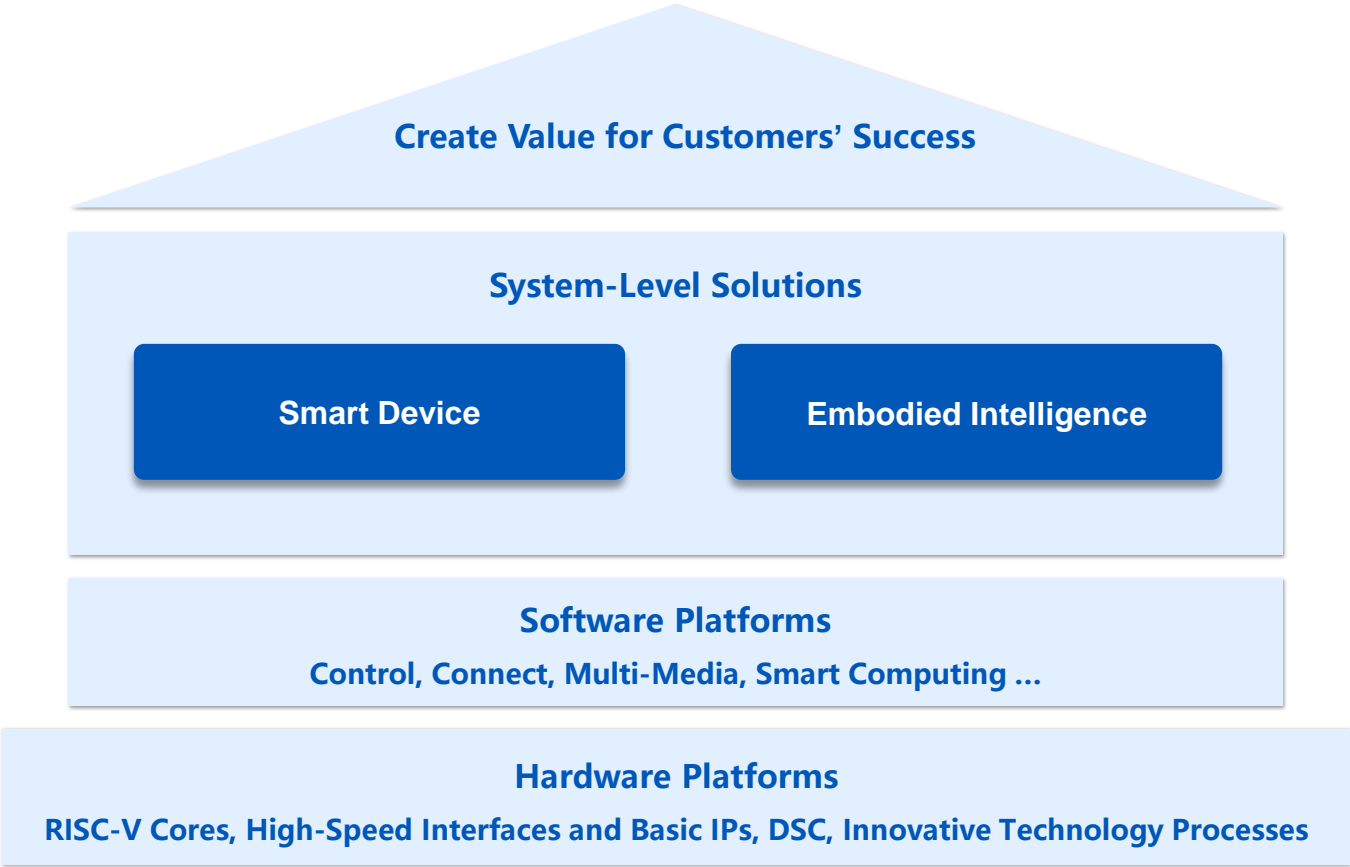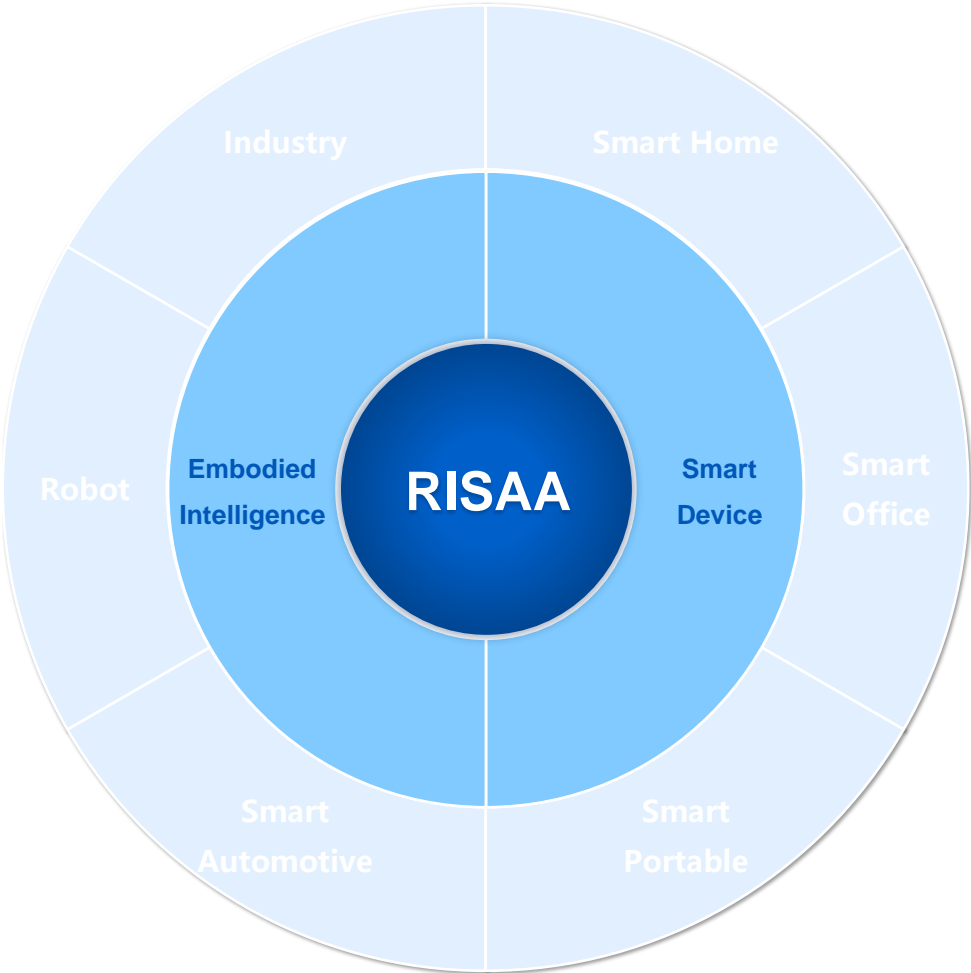
I. RISC-V: Opportunities

➢ The emergence of LLM such as ChatGPT and DeepSeek has provided RISC-V with good opportunities to address the challenges of ecosystem, applications, and products

Ecosystem

- LLMs brings the opportunity to rebuild **software ecosystem**
- New 'super app' may greatly reduce the quantity of APPs and the complexity of software ecosystem

Applications

- RISC-V's modular and scalable design satisfies diverse requirements of AI computing.
- Innovative AI applications are expected to become the **"killer apps"** of RISC-V.

Products

Intelligent computing chip

Automobile control chip

Communication control chip

......

- New user demands and applications in the AI era open up blue ocean markets for innovative products.
- Enriching **product portofolio** is critical to accelerating ecosystem development of RISC-V.

II. ESWIN Computing's Product Innovation — Business Orientation

ESWIN

A Provider of Intelligent System-Level Solutions

Industry

Smart Home

Robot

Embodied Intelligence

RISAA

Smart Device

Smart Office

Smart Automotive

Smart Portable

Create Value for Customers' Success

System-Level Solutions

Smart Device

Embodied Intelligence

Software Platforms

Control, Connect, Multi-Media, Smart Computing ...

Hardware Platforms

RISC-V Cores, High-Speed Interfaces and Basic IPs, DSC, Innovative Technology Processes

RISAA: ESWIN Computing RISC-V+AI Ecosystem & Technology Platform

Products

200+ Products

50+ RISC-V products

207
152
118
79
31
0
9
23
36
56

2020 2021 2022 2023 2024

■ Product Numbers   ■ RISC-V Product Numbers

Technology

IP/Patents/Standards

500+ accessible IPs
300+ authorized Patents, 30 adopted Standards

506
409
335
249
222
124
80 75
45
28
0 1 4 16 30

2020 2021 2022 2023 2024

■ Accumulated Accessible IPs   ■ Accumulated Authorized Patents   ■ Accumulated Adopted Standards
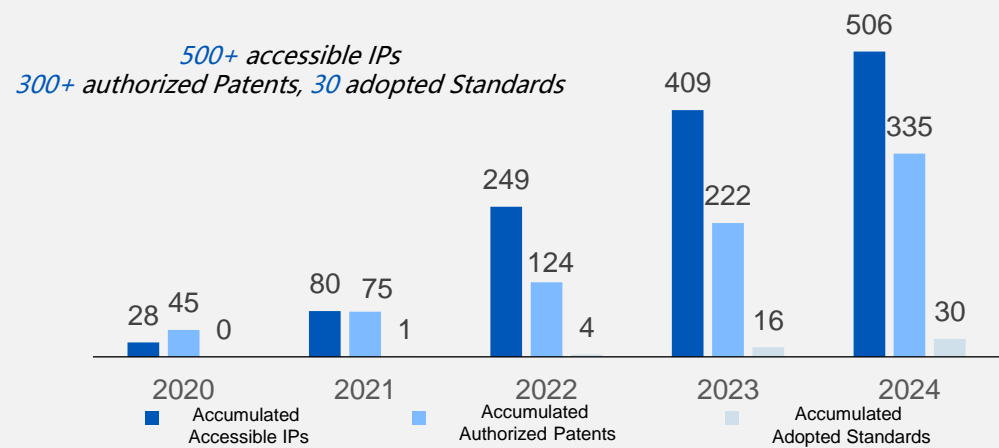
Industry Roles

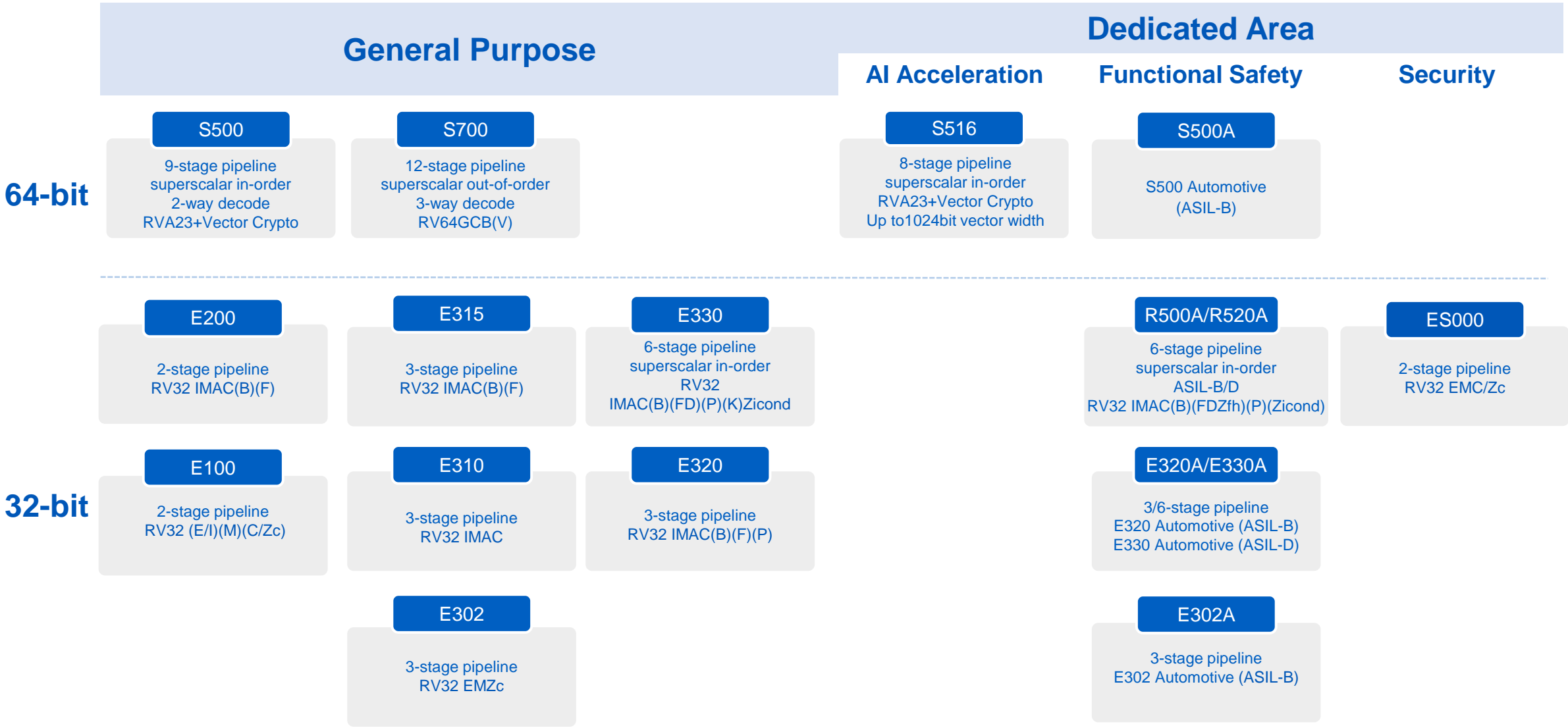| Premier Member	General Member	Rotating Chairman	Initiating Unit	Rotating Chairman
RISC-V International (RVI)	RISC-V Software Ecosystem(RISE)	RISC-V Working Committee of China Electronics Standardization Association(RVEI)	Beijing Open Source Chip Research Institute (BOSC)	Zhongguancun Standardization Association(ZSA)

......

II. ESWIN Computing's Product Innovation — RISC-V Cores

General Purpose

Dedicated Area

AI Acceleration | Functional Safety | Security

64-bit

S500
9-stage pipeline
superscalar in-order
2-way decode
RVA23+Vector Crypto

S700
12-stage pipeline
superscalar out-of-order
3-way decode
RV64GCB(V)

S516
8-stage pipeline
superscalar in-order
RVA23+Vector Crypto
Up to1024bit vector width

S500A
S500 Automotive
(ASIL-B)

32-bit

E200
2-stage pipeline
RV32 IMAC(B)(F)

E315
3-stage pipeline
RV32 IMAC(B)(F)

E330
6-stage pipeline
superscalar in-order
RV32
IMAC(B)(FD)(P)(K)Zicond

R500A/R520A
6-stage pipeline
superscalar in-order
ASIL-B/D
RV32 IMAC(B)(FDZfh)(P)(Zicond)

ES000
2-stage pipeline
RV32 EMC/Zc

E100
2-stage pipeline
RV32 (E/I)(M)(C/Zc)

E310
3-stage pipeline
RV32 IMAC

E320
3-stage pipeline
RV32 IMAC(B)(F)(P)

E320A/E330A
3/6-stage pipeline
E320 Automotive (ASIL-B)
E330 Automotive (ASIL-D)

E302
3-stage pipeline
RV32 EMZc

E302A
3-stage pipeline
E302 Automotive (ASIL-B)

II. ESWIN Computing's Product Innovation — Key Products

Micro LED Tiling Control Solution
ETS8682

- 32bit RISC-V CPU
- VBO/Mini-LVDS/USB/Ethernet interfaces
- Support Multi-scenario Micro LED Tiling Control
- Micro LED Real-Time Image Quality Calibration

Mini LED Multimedia Control Solution
EMS9012

- 32bit RISC-V CPU @200MHz
- 176KB SRAM, 512KB Flash
- 1000+ Zones Control
- Dynamic Brightness Adjustment
- LED Driver Mapping Control
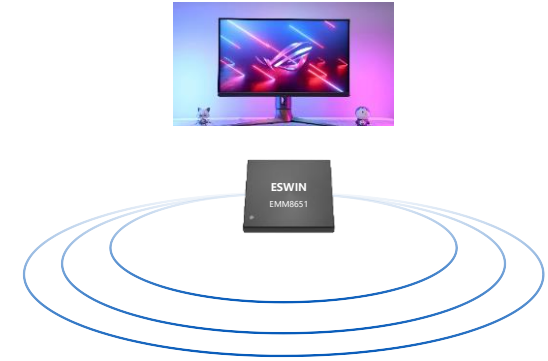
Gamming Monitor System Solution
EMM86xx series

- 32bit RISC-V CPU
- HDR10, Local Dimming, 3DLUT
- Direct Ambient Light Control
- HW Enabled PIP/PBP
- HW Enabled Eagle Eye
- Simultaneous Free Sync & MPRT

II. ESWIN Computing's Product Innovation — Key Products

WiFi6/BLE Connectivity Solution
ECW6700

- 32bit RISC-V CPU @240MHz
- 2.4 and 5 GHz Wi-Fi 6 & BLE 5
- Low Power Consumption
- Support Matter and Multiple IOT Cloud Platforms

5G Small Base Station Transceiver Solution
ECT8676

- 32bit RISC-V CPU @240MHz
- Frequency Range 1.7GHz-6GHz
- 2T2R1O SDR Structure, Bandwidth 200MHz
- Flexible and Configurable Frequency/Bandwidth

5G V2X System Solution
ECM9300

- 64bit RISC-V CPU @1.1GHz
- 2T2R Structure, Peak Rate 48.936 Mbps
- System Latency <20ms
- AEC-Q100 Grade2

II. ESWIN Computing's Product Innovation — Key Products
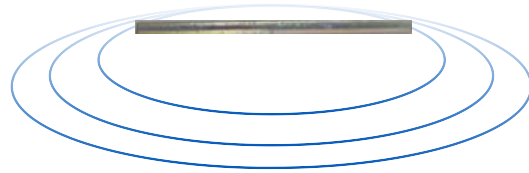
Automotive LCD Display and Touch Solution
EPD6501

- 32bit RISC-V CPU
- Support Max. 4K×1K Resolution
- 1920 Source Channels+960 Touch Channels
- Safety Function: OSD/Fail Detection/PCD etc.
- AEC-Q100 Grade2

Automotive OLED&LCD Touch Solution
EPH8630

- 32bit RISC-V CPU
- Support 8inch~18inch OLED&LCD Touch
- 240Hz Report Rate，SNR＞40dB
- 5mm Glove Touch
- AEC-Q100 Grade2
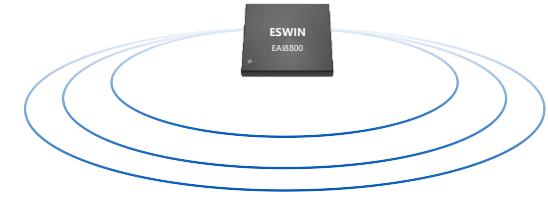
Automotive Camera Monitor System Solution
EAI8800

- 32bit RISC-V CPU
- Extremely Low Latency: End-to-End <20ms
- Startup <100ms, Sensor Configuration <500ms
- Provide complete set of solutions including motherboards, screen assemblies and cameras

II. ESWIN Computing's Product Innovation — Key Products

Automotive Motor Control Solution
EUA5103

- 32-bit RISC-V CPU

- 128KB Flash, 32KB SRAM

- Integrated LDO, LIN Transceiver, Motor Pre-Drive

- AEC-Q100 Grade1 Qualified
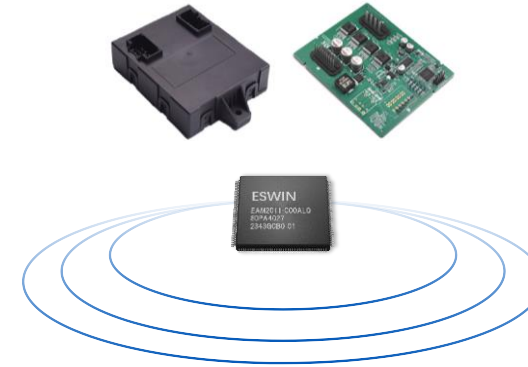
Automotive Control Solution with AI
EAM2011

- 32bit RISC-V CPU @160MHz

- AI-API/AI Framework and Algorithm Libraries
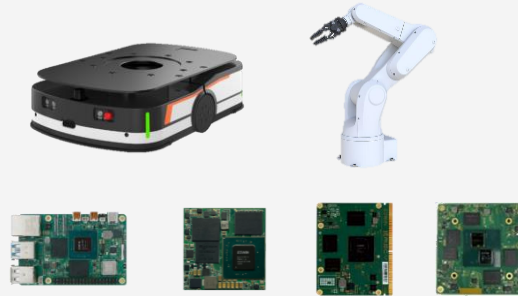
- RTOS/AutoSAR CP

- ESWIN IDE/AI Studio

II. ESWIN Computing's Product Innovation — Key Products

AI PC

- **DeepComputing** DC-ROMA RISC-V AI PC
- Designed for Framework Laptop, with modular upgrades and open-source flexibility
- Local LLM support
- To be released TODAY

Machine Vision

- More efficient in cost aggregation in stereo vision
- vSlam capability up to 1080P@240fps
- AI-based Point Cloud Completion algorithm
- Algorithms: 3DNR, HDR, AE, AWB, AF
- ......

AI Acceleration

- Memory Bandwidth up to 440GB
- Memory Capacity: 256GByte
- Computing Power: 160Tops
- ......

- 64bits RISC-V CPU (8 Cores/Out-of-Order Execution)
- Support Die-to-Die Cache Coherent Interconnection
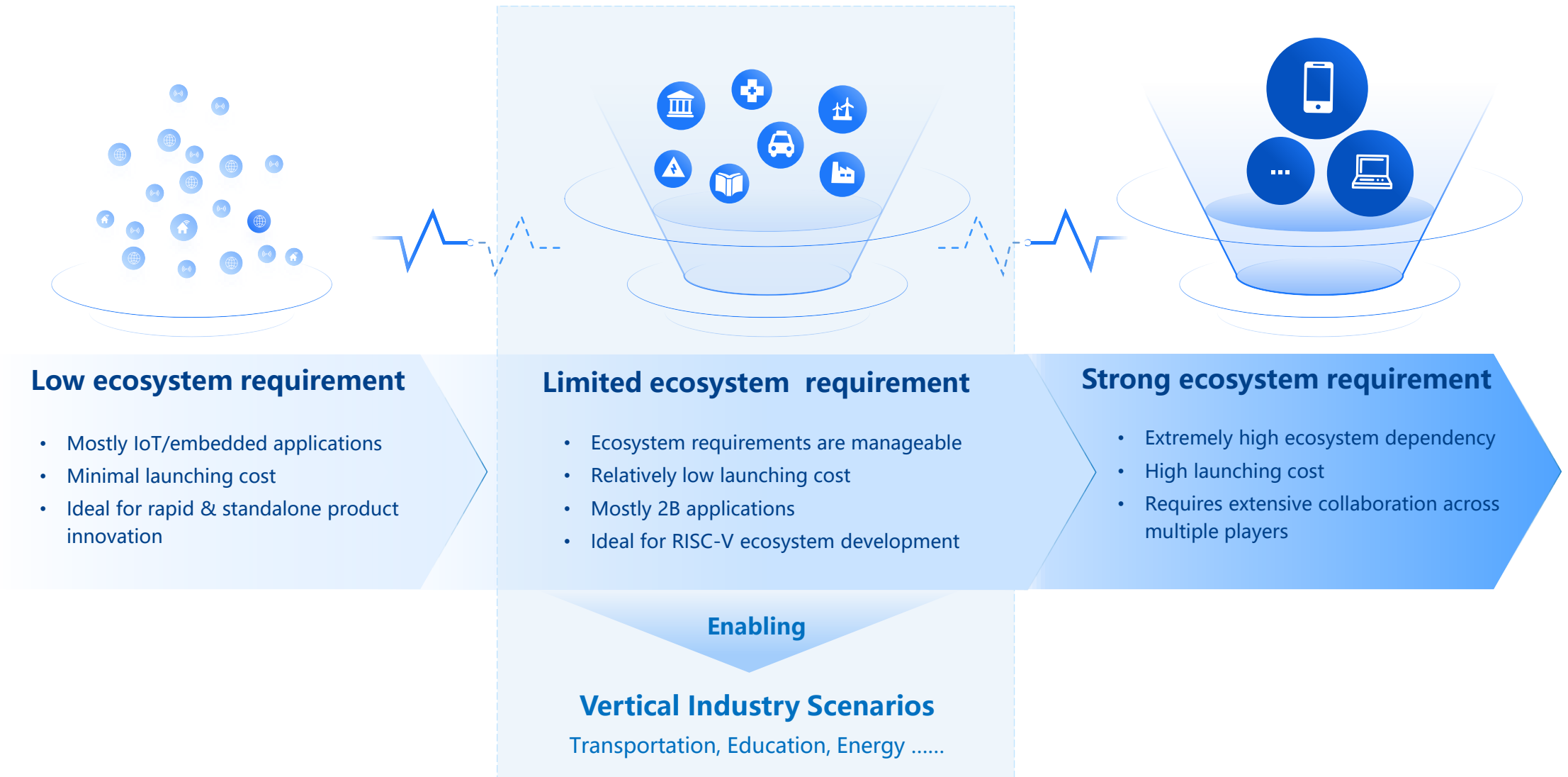- Self-developed NPU with 40TOPS @INT8
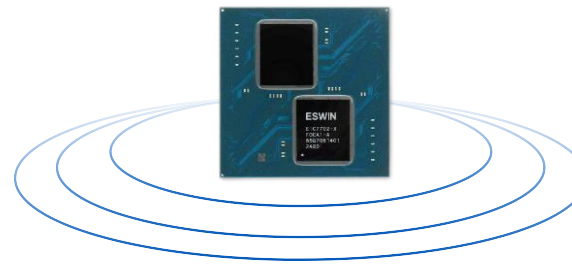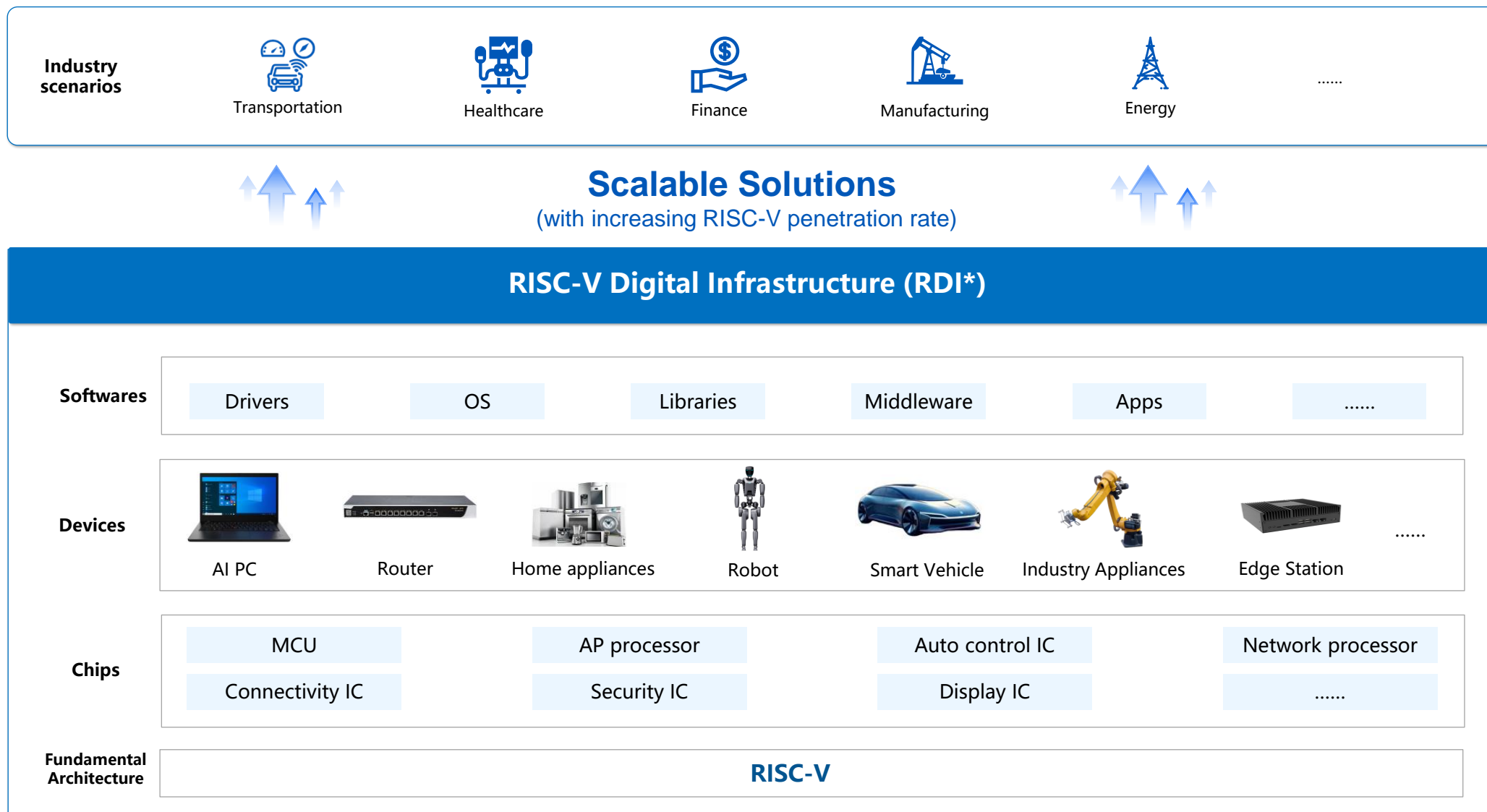
RISC-V Intelligent Computing SoC
EIC7702X

- Integrated video codecs that able to archives 8K@112fps on decoding and 8K@50fps on encoding
- Support high-precision Large Language Model (LLM)

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Low ecosystem requirement

- Mostly IoT/embedded applications
- Minimal launching cost
- Ideal for rapid & standalone product innovation

Limited ecosystem requirement

- Ecosystem requirements are manageable
- Relatively low launching cost
- Mostly 2B applications
- Ideal for RISC-V ecosystem development

Strong ecosystem requirement

- Extremely high ecosystem dependency
- High launching cost
- Requires extensive collaboration across multiple players

Enabling

Vertical Industry Scenarios

Transportation, Education, Energy ......

E-solution to win

Industry scenarios

Transportation Healthcare Finance Manufacturing Energy ......

Scalable Solutions
(with increasing RISC-V penetration rate)

RISC-V Digital Infrastructure (RDI*)

Softwares

| Drivers | OS | Libraries | Middleware | Apps | ...... |

Devices

AI PC Router Home appliances Robot Smart Vehicle Industry Appliances Edge Station ......

Chips

| MCU | AP processor | Auto control IC | Network processor |
| Connectivity IC | Security IC | Display IC | ...... |

Fundamental Architecture

RISC-V

* Proposed by Mr. Wang Dongsheng

➢ **RISC-V V2X（Vehicle to Everything）system solution：The first systematic deployment case of RISC-V for the vertical industry scenario of intelligent transportation**

- Build together with 10+ partners, some from the intelligent transportation industry.
- The core devices already empowered by RISC-V, with more to follow.
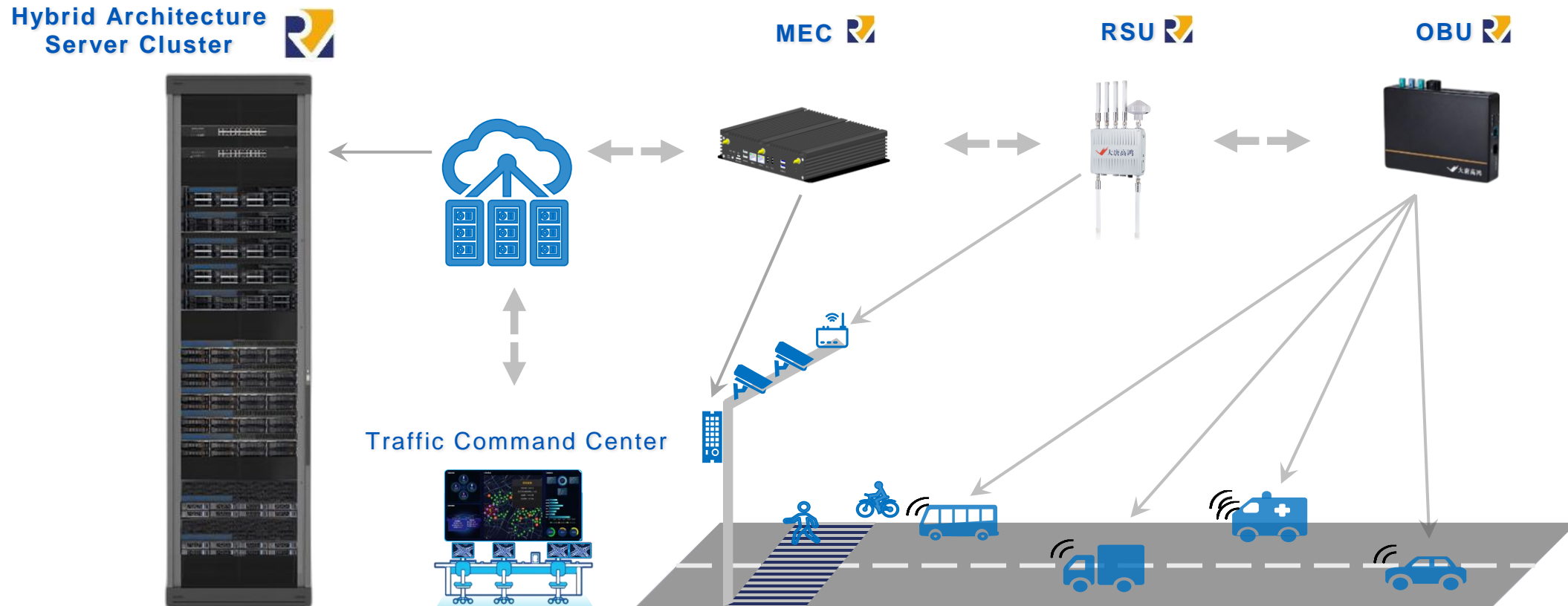
Smart City

Education

Transportation

Manufacturing

**Embrace RISC-V's New Opportunities,
Jointly Accelerate Industrial Deployment**

Smart Office

Finance

Healthcare

Energy

Thanks

ESWIN

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Official Account