



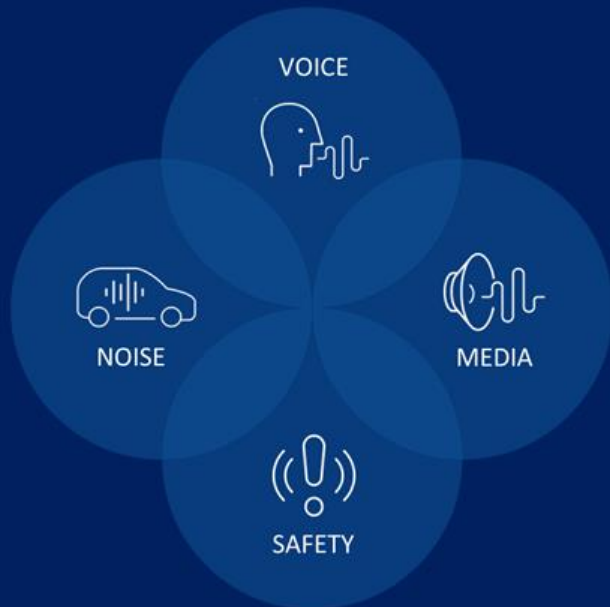
QNX Sound

Software-Defined Audio for Automotive

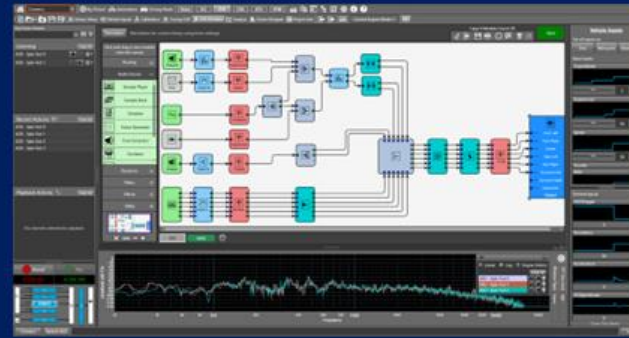
Jose Maria Marin
Global Director, QNX Sound

QNX Sound

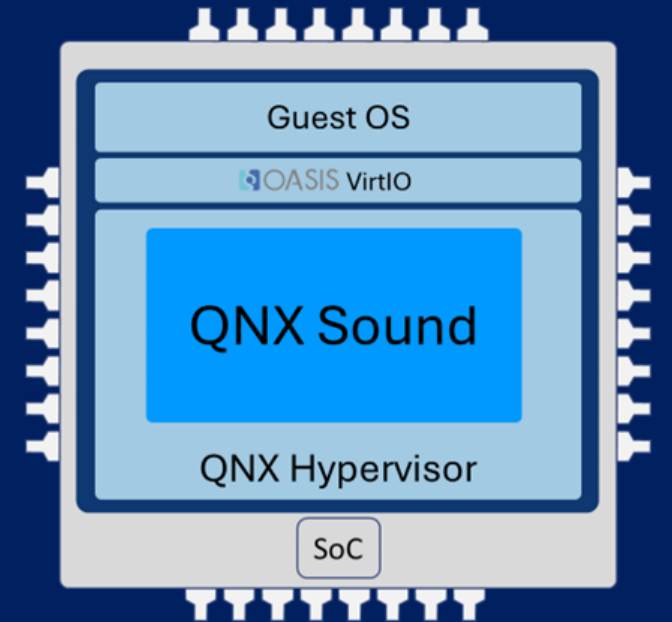
Algorithms



Tools

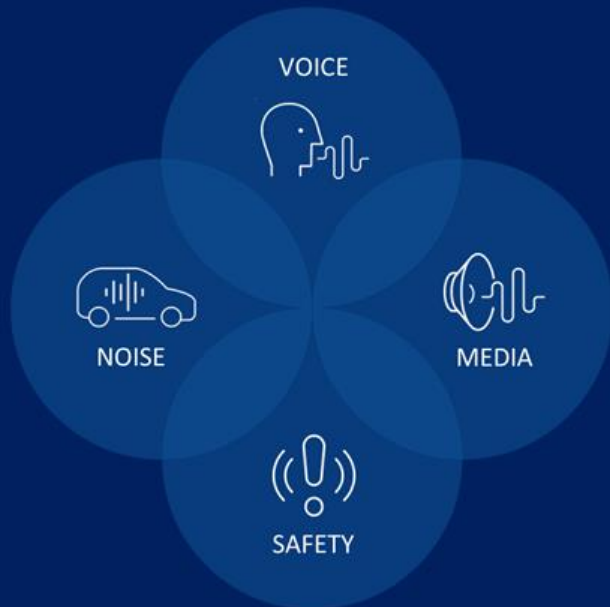


Integration



QNX Sound

Algorithms



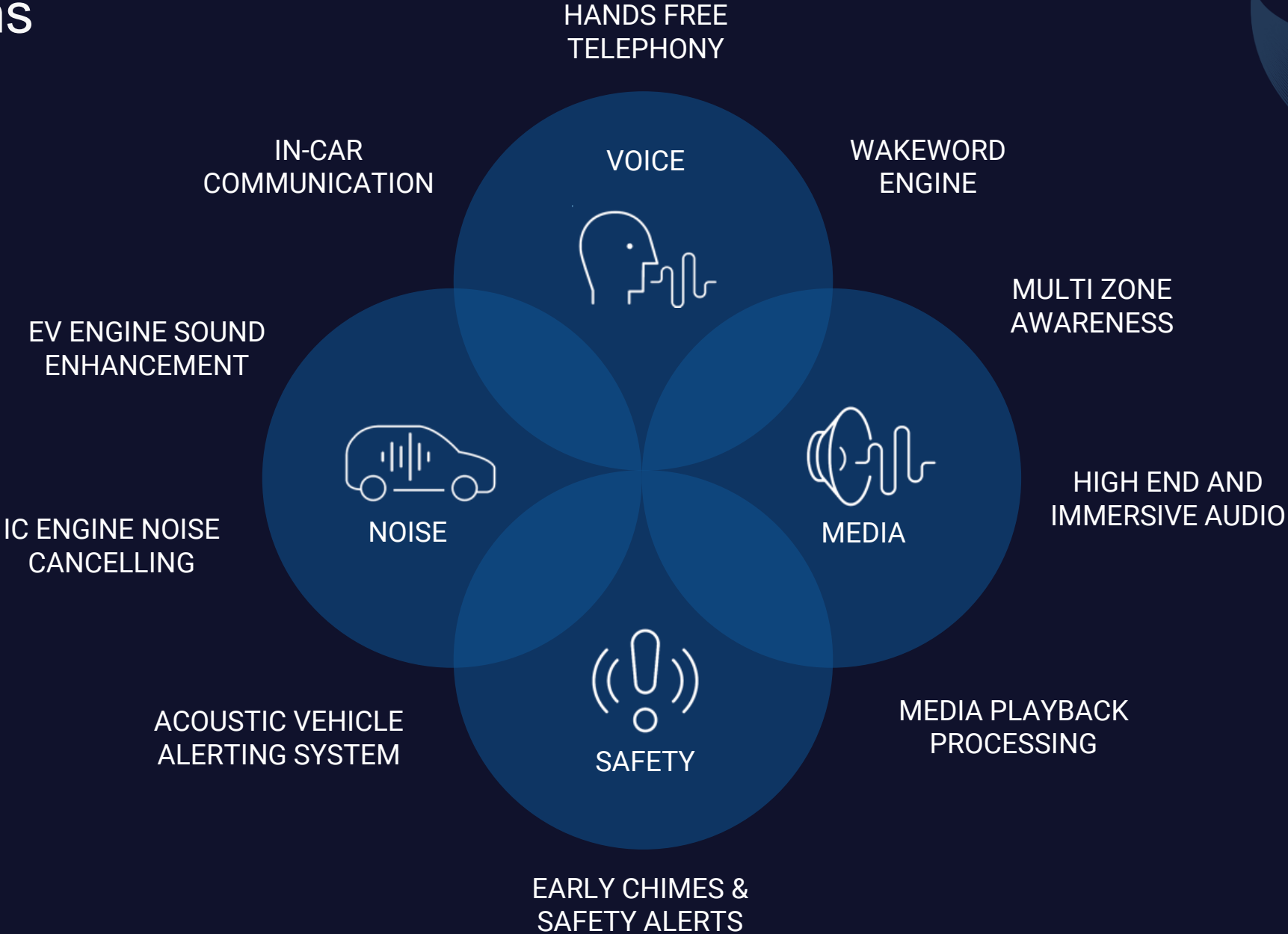
Tools



Integration



Algorithms

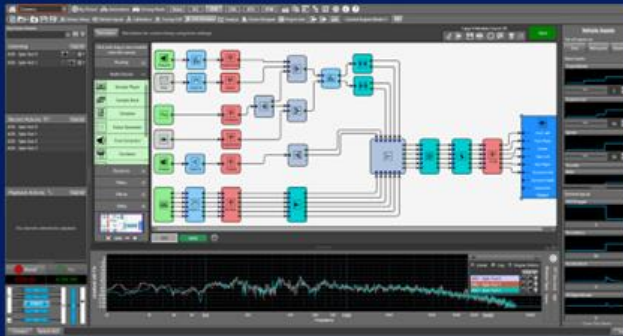


QNX Sound

Algorithms



Tools



Integration



Tools

Big Picture Presets: Reinitalize (Reinitalize the runtime library using these settings)

Click and drag a new module onto the canvas

Routing +

Audio Source -

Sample Player

Sample Bank

Noise Generator

Tone Generator

Oscillator

Dynamics +

Filters +

Effects +

Utility +

100%

ESE AVAS

Amplitude (dB FS)

Frequency

ASD - Spkr Out 0

ASD - Spkr Out 1

ASD - Spkr Out 2

ASD - Spkr Out 3

Linear Log Engine Orders

Window Type: Hertz

FFT Size (Hz): 500

Close This Panel Log

Frequency Response Combined Group Delay Combined Phase Response

Current Position

Gain

Fixed Gain

12 12

6 6

3 3

0 0

-20 -20

-40 -40

-∞ -∞

0.0

Reverb

Intensity Feedback Spread Dry / Wet Mix

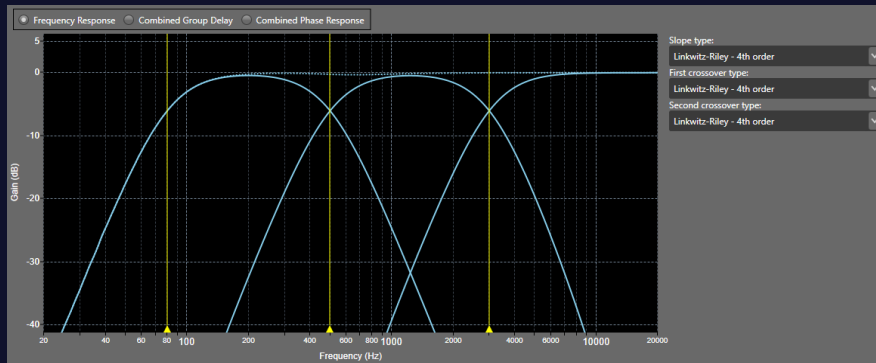
50 50 50 100

Gain (%)

Angle (degrees)

Output 0 Output 1 Output 2 Output 3 Output 4 Output 5 Output 6 Output 7

Show/Hide All



Azimuth Input

Renderer Strength

Gain Panning Effect (%) Left-Right Absolute Delay (us)

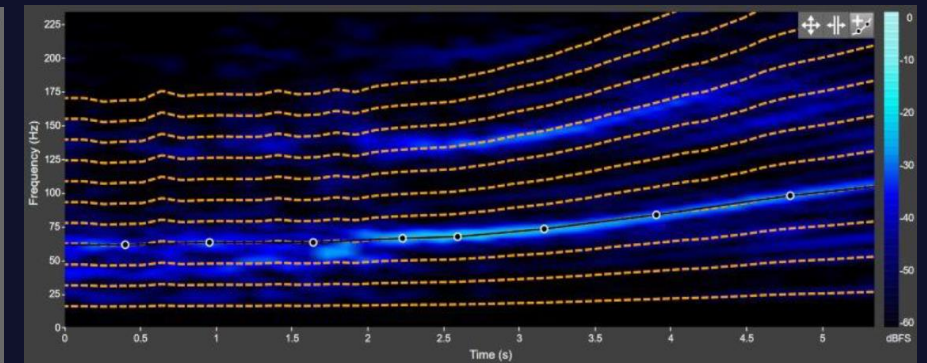
100 1000

Shadow Effect

Left-Right Shadow Effect (%) Front-Back Shadow Effect (%)

100 100

Current Position



QNX Sound

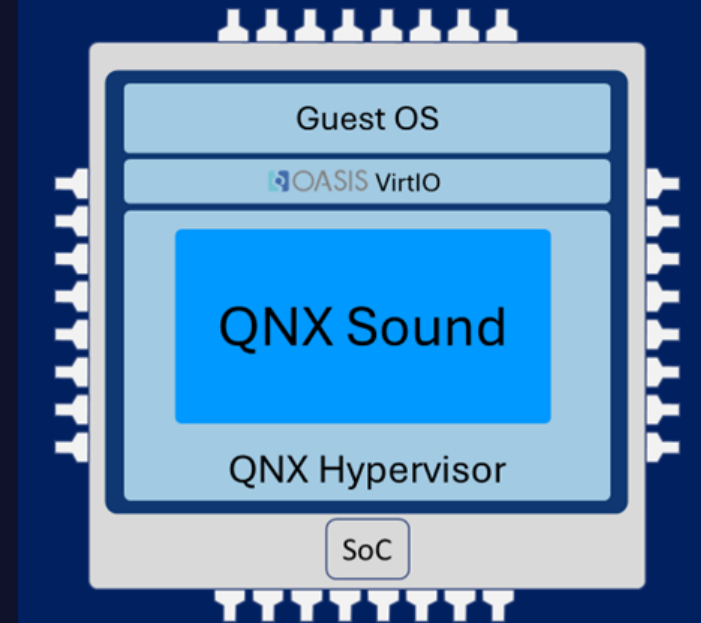
Algorithms



Tools



Integration

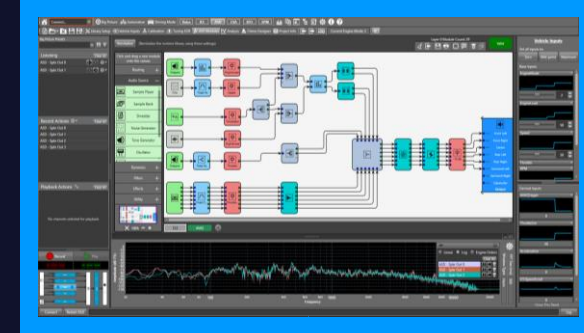
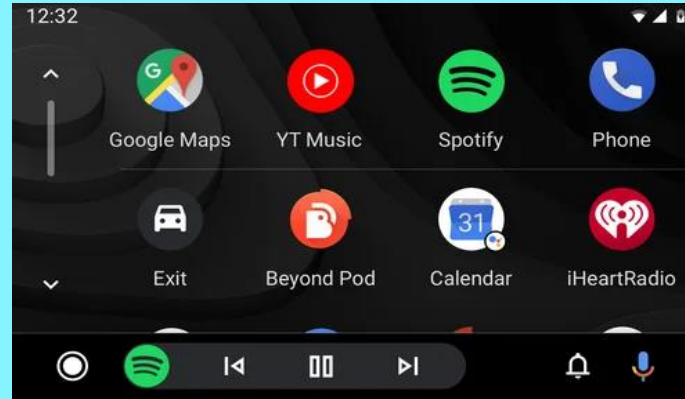


Integration

Instrument Cluster - QNX® RTOS Safety



In-Vehicle Infotainment- Android



HAL

OASIS VirtIO

QNX® Hypervisor

QNX Sound

IO-snd

Audio IP Library

Control Server

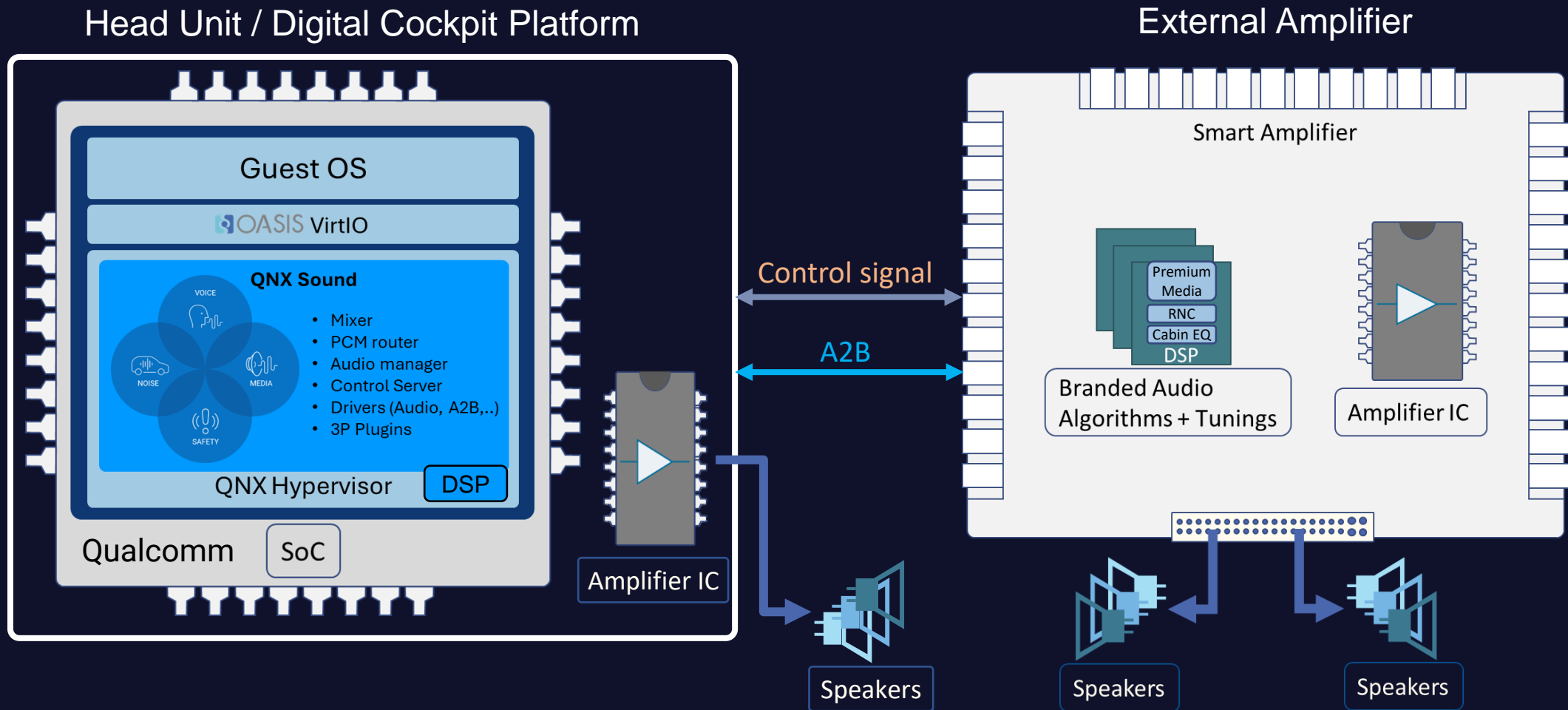
Native Audio Driver

In-SoC DSPs

Audio IP Library

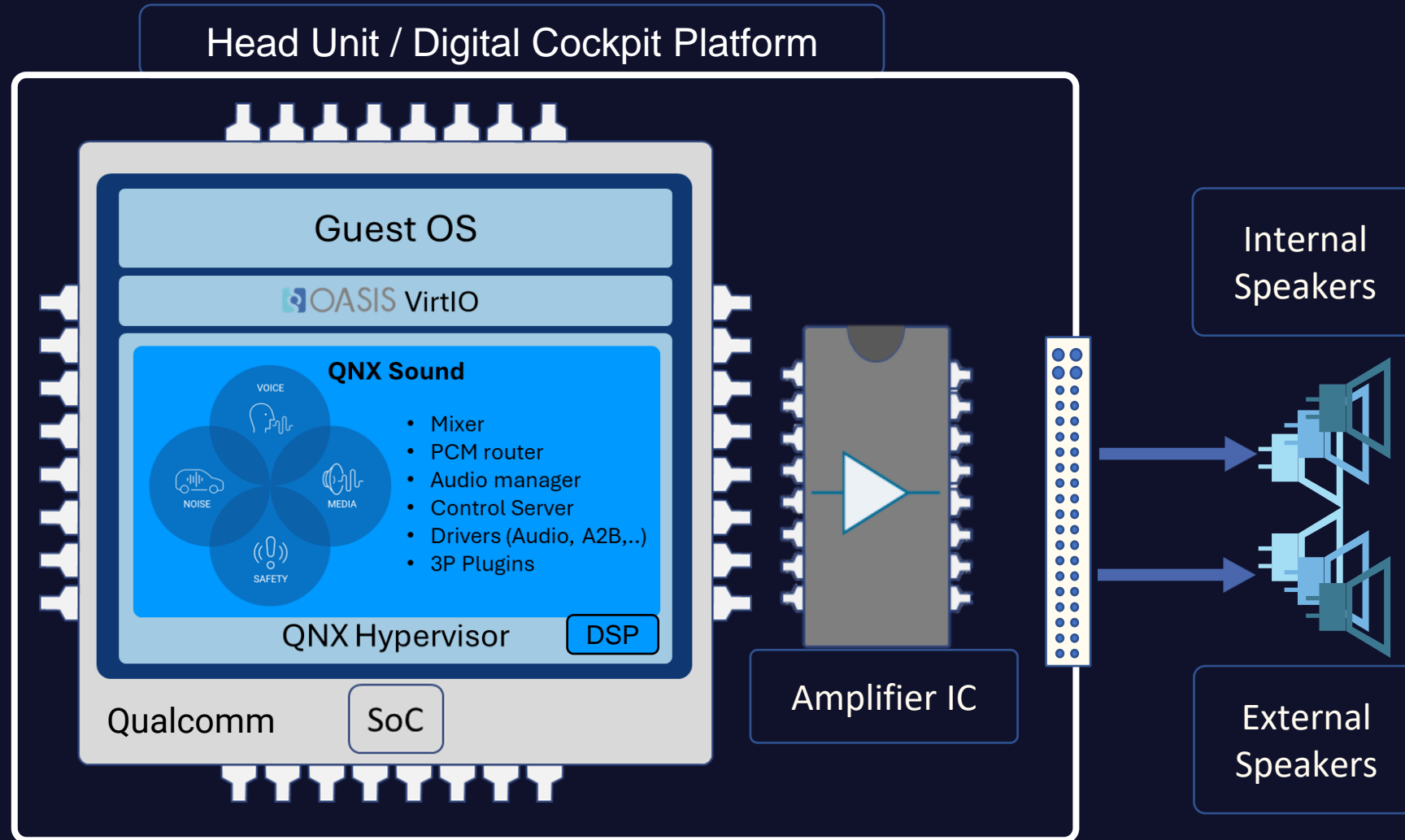
Audio Hardware interfaces (Mics, Speakers, Bluetooth,...)

QNX Sound Production Program #1 – SOP 2024



QNX Sound Production Program #2 – SOP 2026

World's 1st SDA



QNX Sound demo car

QNX Sound = OEM Sound

CPU utilization

```
118 processes; 1246 threads;
CPU states: 7.6% user, 0.6% kernel
CPU 0 Idle: 85.5%
CPU 1 Idle: 85.5%
CPU 2 Idle: 93.6%
CPU 3 Idle: 95.5%
CPU 4 Idle: 89.3%
CPU 5 Idle: 93.7%
CPU 6 Idle: 95.9%
CPU 7 Idle: 97.2%
Memory: 32749M total, 17874M avail, page size 4K
```

PID	TID	PRI	STATE	HH:MM:SS	CPU	COMMAND
356399	11	26	CdV	0:10:57	1.85%	io-audio
4046959	2	10	Sem	0:02:37	0.38%	qvm
4046959	7	10	Sem	0:01:37	0.37%	qvm
1040472	10	29	NSlp	0:01:53	0.31%	sensor
4046959	53	10	SigW	0:01:16	0.29%	qvm
12312	2	25	Rcv	0:00:38	0.28%	io-pkt-v6-hc
4046959	6	10	Sem	0:01:40	0.28%	qvm
4046959	4	10	Sem	0:01:31	0.26%	qvm
4046959	3	10	Sem	0:01:30	0.23%	qvm
1	24	10	Rcv	0:00:00	0.20%	kerne

1.85% io-audio

- 7.1.4 Dolby Atmos
- 19 Speakers
- A2B booster amp
- No DSPs



Ecosystem





Thank you!

Jose Maria Marin

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符号系统的听觉部分

人的 / 人类的

People's / Humankind's

大脑决定的思考的快慢系统 = 认知方式

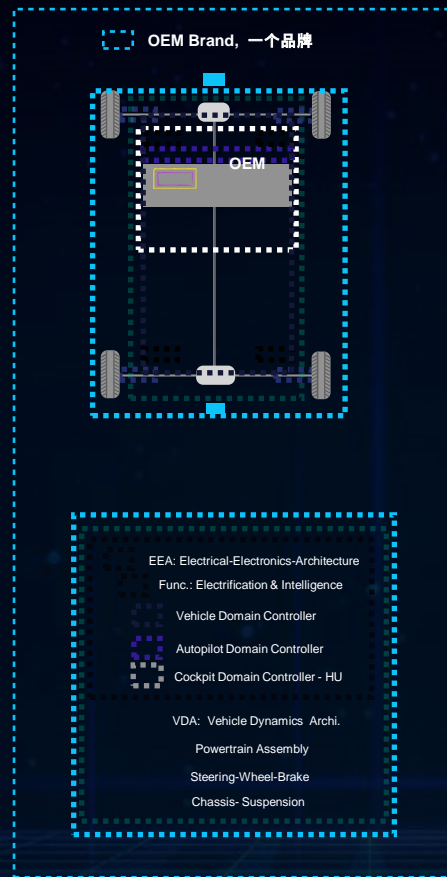
Brain based Fast & Slow in thinking = Cognitive routes



先敬罗衫后敬人, 皮囊好了再是魂

Fancy Cloth & Body First before Soul

品牌 = 罗衫 + 皮囊 + 灵魂

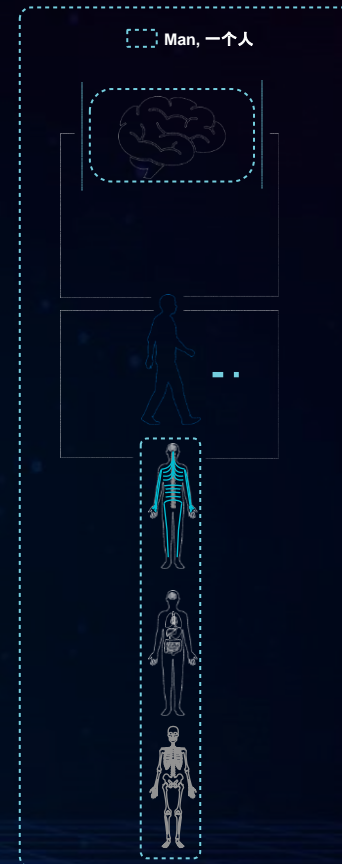


Brand = Fancy Cloth + Body + Soul

灵魂 | Soul
能力 | Ability
价值观 | Sense of Value
追求 | Pursue

罗衫 | Fancy Cloth
品味 | Taste
穿搭 | Style

身体 | Body
脑力 | Intelligence
皮囊 | Appearance
器官 | Organ
骨骼 | Bones



声音: 品牌中不可或缺的一部份

Sound: Indispensable part of Brand

功能与架构 | Function & Architecture

车与品牌 | Auto & Brand

对象化的过程 | Object Oriented Process

对象 | Object

融合了“感性体验”与“工程理性”的音频架构

The Audio Architecture that Combines “USE” & “ERC”

用户感性体验: USE



ERC:工程理性构建



软件决定交付, 架构决定体验
面相未来的大音科技 全栈式音频体验解决方案

大音科技

