WAVE®
COMPUTING

MIPS Open™
The New Standard in Open Use ISAs

Presented by Yuri Panchul, MIPS Open Technical Lead
MIPS Open Meetup in Moscow, April 15, 2019

Wave + MIPS – A Powerful AI + IP Combination

MIPS becomes IP licensing company

MIPS Computer Systems Inc. founded **1981**

Smartphone LTE modem

Wave Establishes MIPS Open Advisory Board

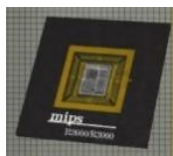| 1980	1990	2000	2010	2017	2018	2019

1981 MIPS architecture invented by team from Stanford

First MIPS product ships: R2000 uP

DTV/STB product ships: NEC SONY

Cable Modem product ships: TOSHIBA BROADCOM

Wi-Fi - Residential Gateway ATHEROS Lantiq

Enterprise Networking CAVIUM PMC NETLOGIC
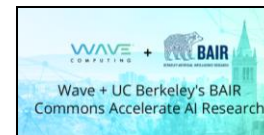
Automotive MCUs & ADAS MICROCHIP MOBILEYE MStar semiconductor

Wave Acquires MIPS MIPS Open

Wave Launches MIPS Open

Joins AWS, Facebook, Google & Samsung on UC Berkeley's BAIR initiative

Wave + UC Berkeley's BAIR Commons Accelerate AI Research

WAVE COMPUTING®

MIPS Open™

- Accelerates innovation for system-on-chip designs

- Expands adoption of MIPS RISC architecture & grows supporting ecosystem

- Dedicated Advisory Board prevents architectural fragmentation

- Delivers peace of mind & investment protection for existing MIPS customers

Decades of silicon-proven innovation

ADAS

TVs

Smartphones

Routers

Set-top boxes

Switches

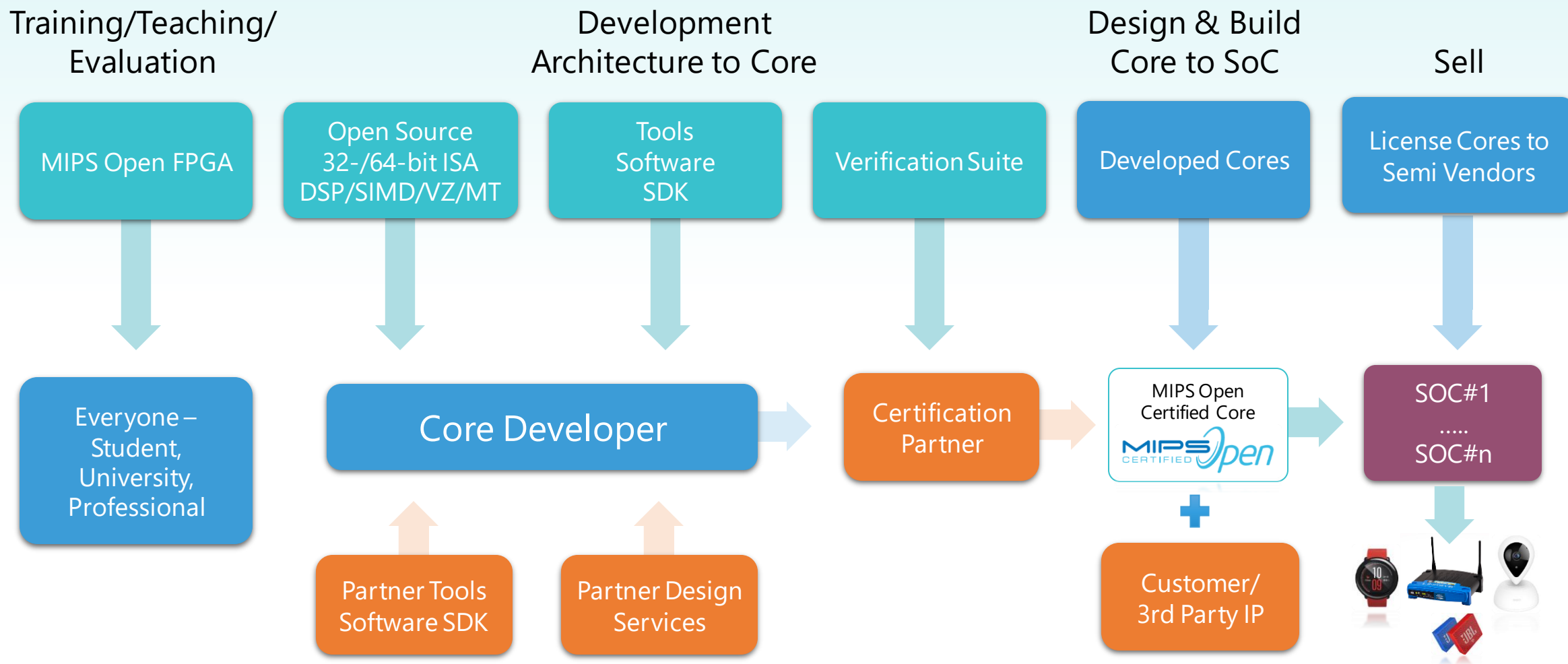## Fueling Next-Gen Edge Designs

Autonomous vehicles

Visual analytics

IoT

HPC

WAVE COMPUTING®

Unified Approach

- Compatibility
- No Fragmentation
- Same tools, software
- Flexibility – UDI support

Proven Architecture

- MIPS architecture-based designs are shipping in billions of devices
- Shipping Products – wired modems, wireless modems – LTE/5G/Wi-Fi, IoT, automotive – ADAS, data centers, AI and others.

Established Ecosystem

- Well-established
- Tools, software, applications, boards
- Supported and used by customers/ partners

Matured Technology

- 30+ years of legacy of MIPS architecture
- Enabler to build the next trillion devices/ applications

MIPS Open is the World's First Commercial-ready, Silicon Proven, Feature-Rich Architecture Available for Open Use

MIPS Open™ Components

MIPS Open ISA

- Latest R6 version of 32-bit/64-bit ISA
- Extensions such as Virtualization, Multi-threading, SIMD, DSP and microMIPS architectures

MIPS Open Tools

- IDE for Embedded RTOS and Linux Embedded Edition
- Enables MIPS software developers to build, debug, and deploy applications on MIPS-based hardware and software platforms

MIPS Open FPGA

- Getting Started Guide - provides MIPS Open FPGA system as a set of Verilog files
- Labs - includes 25 hands-on labs that guide users in exploring computer architecture & system-level design
- SOC - shows how to build a system-on-chip design based on MIPS Open FPGA that loads the open source Linux

MIPS Open Cores

- Low power, low footprint microAptiv cores
- Microprocessor(MPU)
- Microcontroller (MCU)
- Targeted for embedded applications

MIPS Open Components includes the latest MIPS R6 ISA, low power, low footprint microAptiv cores, microAptiv soft core targeted for FPGA and tools for software development.

Open Use License

- MIPS Open use license includes:
  - Latest MIPS R6 architecture documents
  - microAptiv cores
  - Tools
  - microAptiv softcore targeted for FPGA

Certification

- Access to certification services to core developers
- Verification and Certification of cores developed using MIPS R6 ISA.

Patent License

- Right and license under R6 architecture patents to design, build and sell cores
- Use of the "MIPS Certified" trademark logo for certified cores
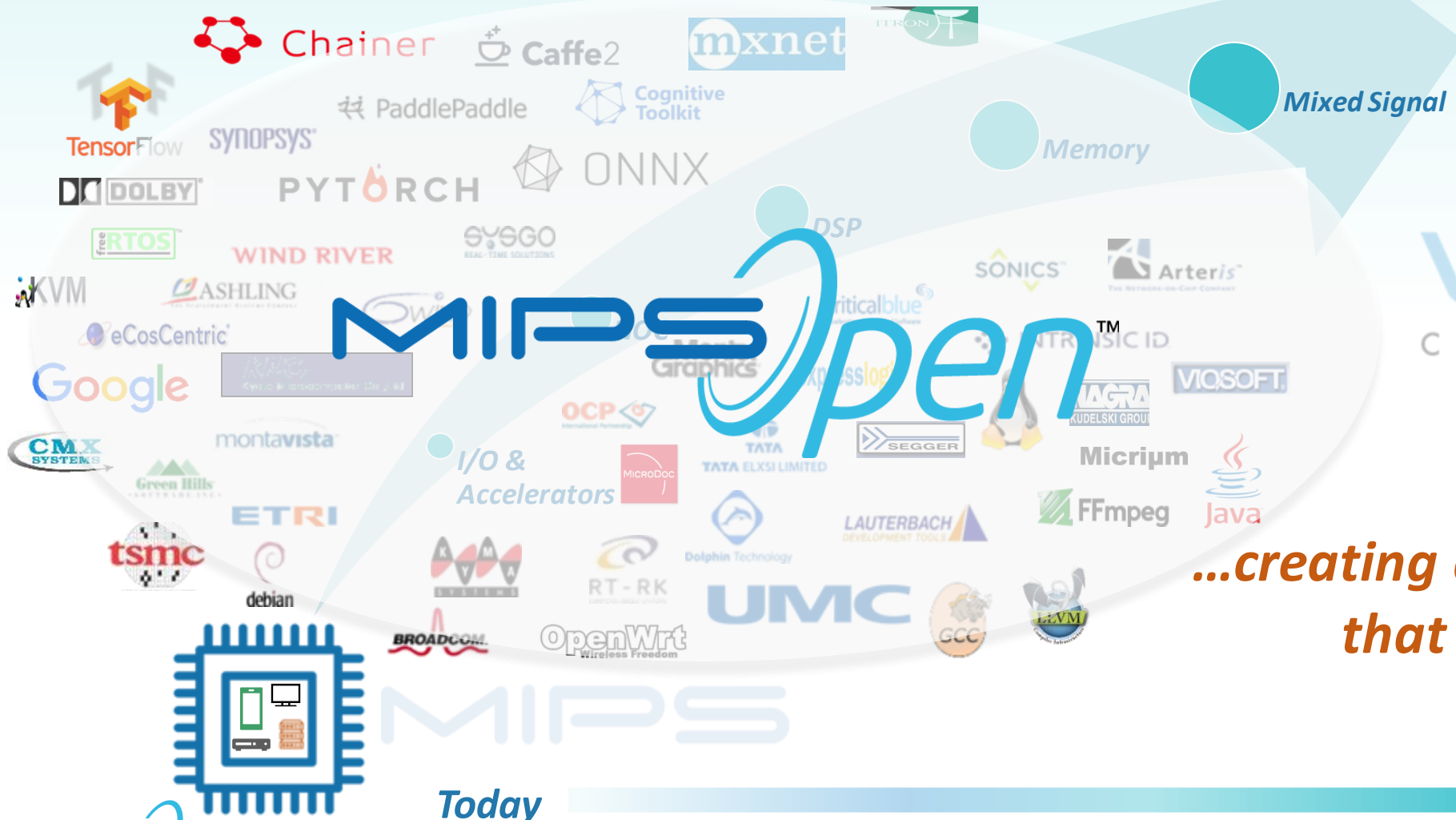
Comprehensive Package

- Complete package
- Instruction set, cores, tools for the community to accelerate innovation at the edge
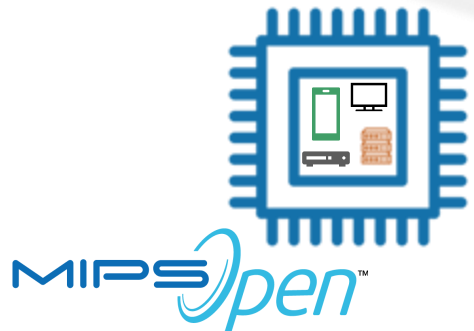
MIPS Open provides a comprehensive open use package and tools to enable fast time to market for certified cores.

WAVE COMPUTING®

Building on an established ecosystem...

Growing new markets with AI

...creating an AI solution stack that enables end-to-end business models

Mixed Signal

Memory

DSP

I/O & Accelerators

MIPS Open™

WAVE COMPUTING®

Today → Tomorrow

Individual Membership

Entry level

FREE
per year

- Allows participation in all working groups and access to all working group materials.
- Represent individual, academic and non profits interests.

Silver Membership

Entry level of corporate membership.

$ 10,000
per year

- Allows participation in all working groups and access to all working group materials.
- Right to vote on working group initiatives.
- Can be appointed to lead a working group. If so appointed, automatically become a member of the technical steering committee.
- Can be nominated to run for election to the board of directors as a Silver class representative.
- Vote as a Silver class for representation on the board of directors.

Gold Membership

Middle tier of membership.

$ 50,000
per year

- Allows participation in all working groups and access to all working group materials.
- Right to vote on working group initiatives.
- Can be appointed to lead a working group. If so appointed, automatically become a member of the technical steering committee.
- Can be nominated to run for election to the board of directors as a Gold class representative.
- Vote as a Gold class for representation on the board of directors.Allows participation in all working groups and access to all working group materials.

Platinum Membership

Decision-making level of membership

$ 100,000
per year

- Leadership and decision-making level of membership.
- Automatically appointed to the board of directors and the technical steering committee.
- Set direction, approve budgets and projects, appoint working group leaders, create new working groups, and supervise foundation staff.
- Have access to all foundation meetings and materials.
- Allows participation in all working groups and access to all working group materials.
- Right to vote on working group initiatives.Leadership and decision-making level of membership.

'Open Use' microAptiv UC/UP Cores

Q2'19

March 28th, 2019

Wave's First MIPS Open Program Components Now Available

Feb 19th, 2019

Wave Computing + prpl Foundation partner on MIPS Open Advisory Board

Dec 17th , 2018

Wave Computing Launches MIPS Open Initiative

Thank You