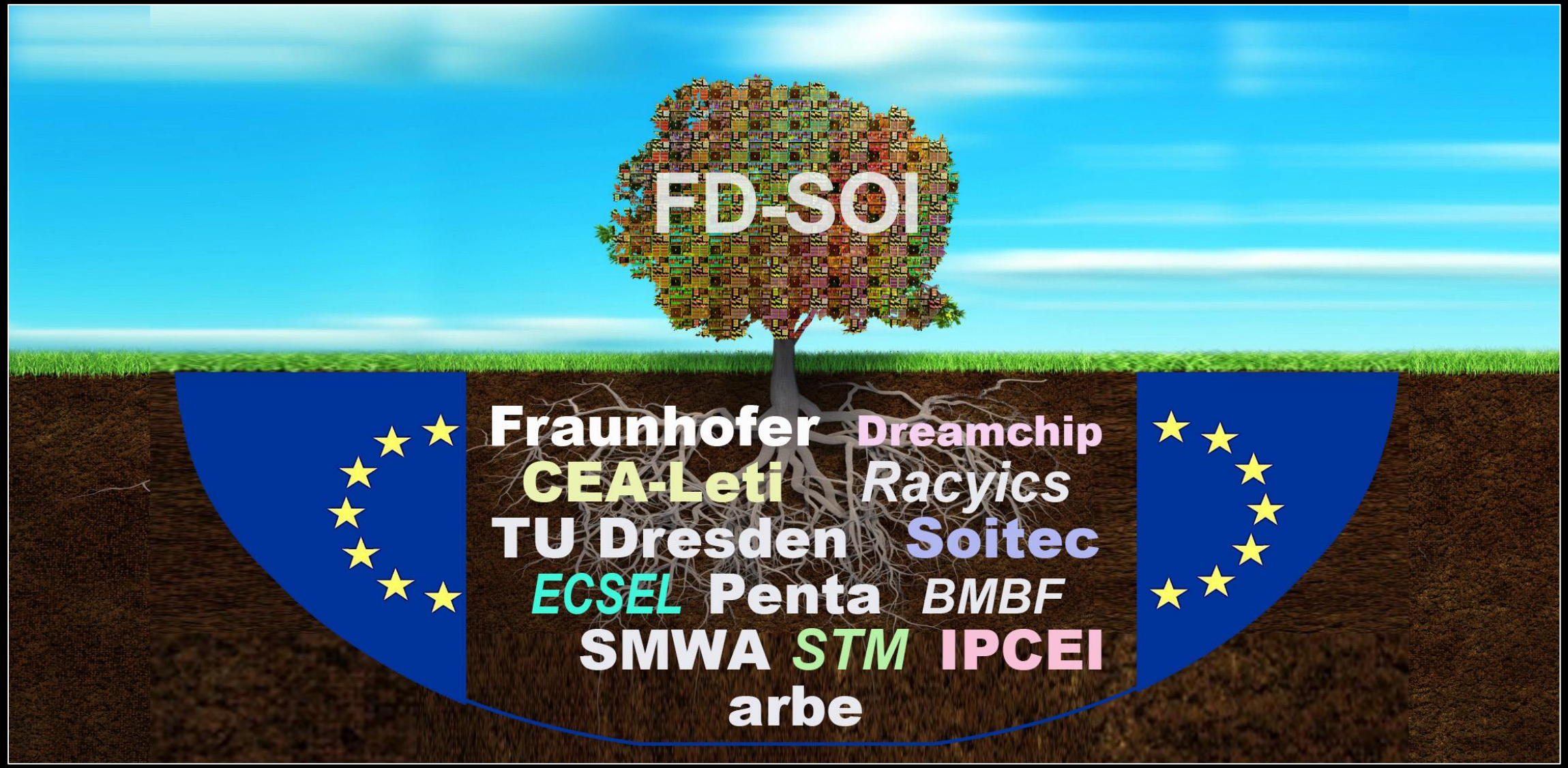
European FD-SOI for Global Leadership

Dr. Thomas Morgenstern | SVP and General Manager, GLOBALFOUNDRIES Dresden

GLOBALFOUNDRIES®

FD-SOI is a technology with strong European roots



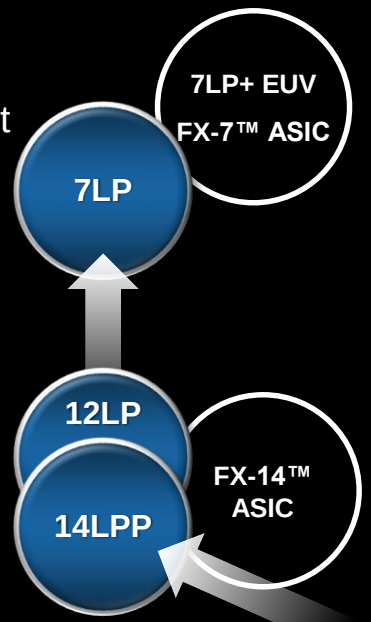
Our dual-track strategy: FinFET and FD-SOI

Performance Optimized

7LP Delivers
- Over 30% die cost reduction
- >40% performance improvement
- >60% power reduction

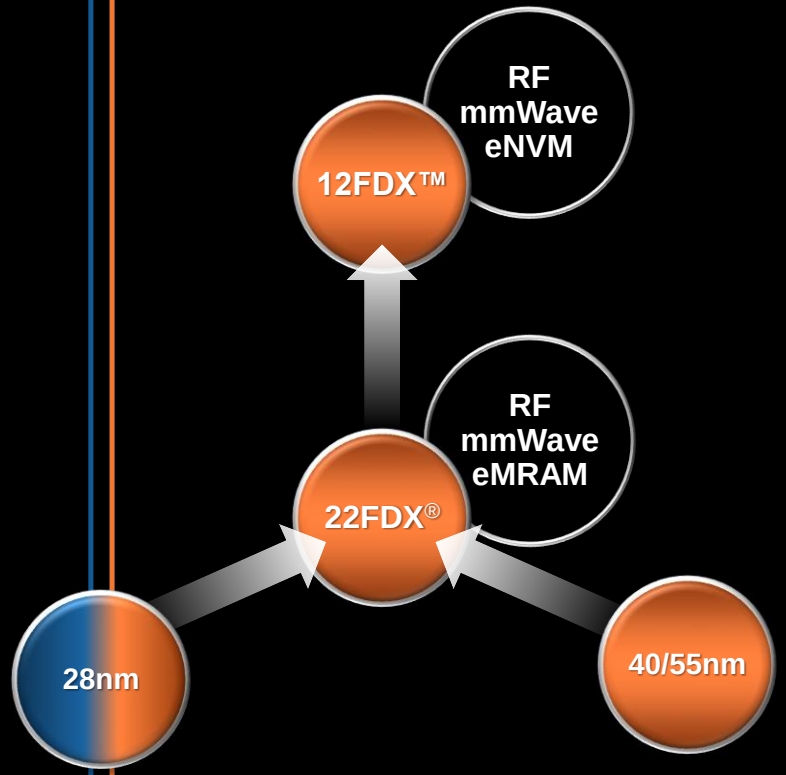
12LP Delivers
- 15% logic density improvement
- >10% performance boost

14LPP Delivers
- High performance
- Balanced cost



FinFET

Power Optimized



FD-SOI

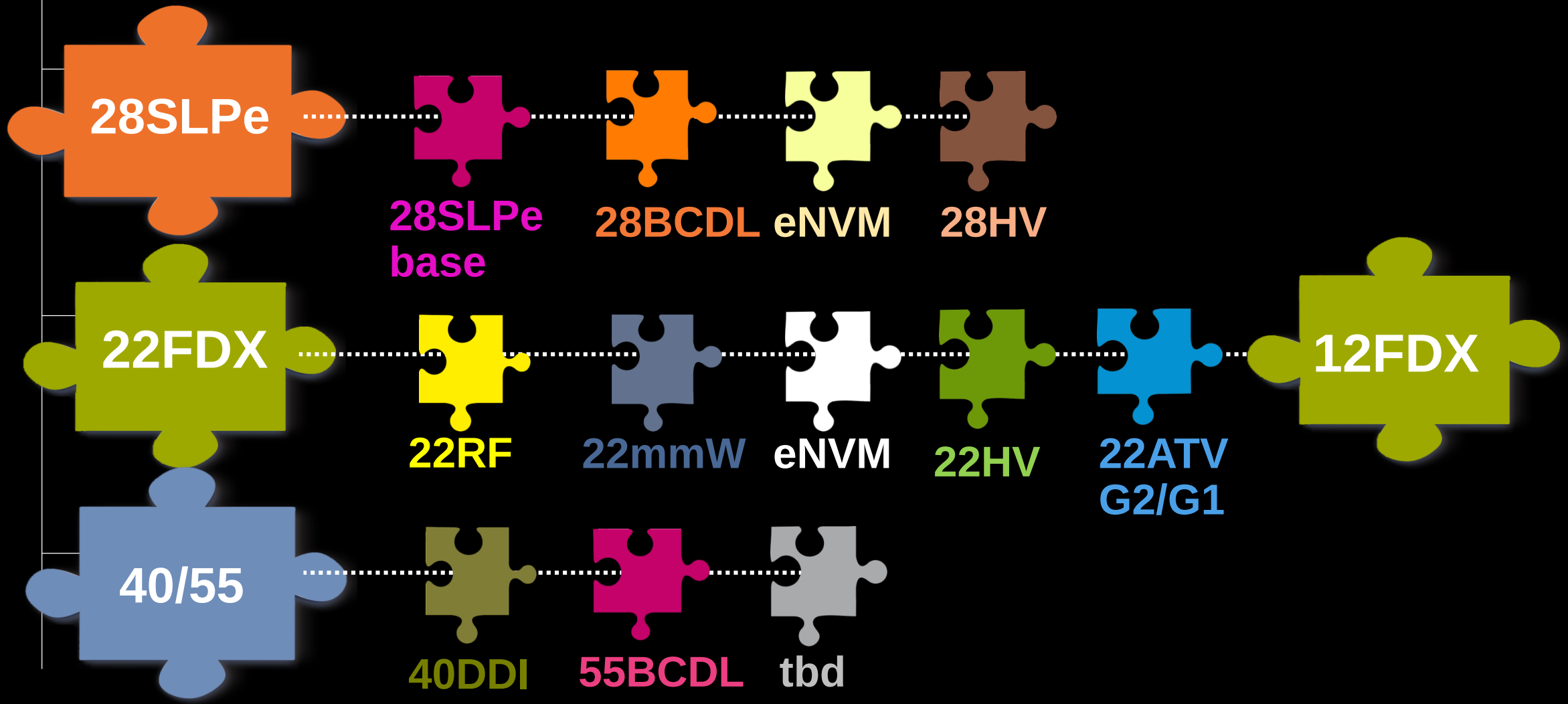
12FDX Delivers
- Full-node scaling
- Energy efficiency
- Superior RF/Analog features
- Enhanced body-biasing

22FDX Delivers
- Superior RF/Analog features
- Lower power
- Smaller die
- Fewer masks
- Lower die cost

…with Dresden as the COE

What Dresden is offering: Value Added Solutions (VAS)

Our Platform Strategy with VAS



22FDX® for IoT, Automotive and RF

Compelling

- FinFET-like performance for customer who still want to use planar devices
- Ultra-low voltage (0.4V)
- Ultra-low leakage (1pA/µm)
- MRAM integration for IoT and Auto-MCU
- Automotive grade 2 and 1, mmWave / Radar
- Benchmark RF performance (>400GHz), and PA integration

Relevant

- IoT - ARM, RISC-V processors for NB-IoT and AI – ML functions
- Automotive - ADAS /Vision, Infotainment, Body Electronics MCU, Radar
- RF - <6GHz: Connectivity (BLE, Wi-Fi, Zigbee), Cellular (3G, 4G LTE, 5G)
- RF – mmWave >26GHz, 5G infrastructure, ADC/DAC integration

22FDX/12FDX for IoT, Automotive and RF

STRATEGIC PARTNERSHIPS

"The cost-effective performance and best-in-class energy efficiency benefits of GF's 22FDX platform..."

Joël Hartmann, EVP, Digital Front-End Manufacturing & Technology, STMicroelectronics

"The power consumption we measured on the silicon have fully met the expectations and the result is highly competitive for the ADAS Computer Vision MPSoC market."

Dr. Jens Benndorf, Managing Director and Co-Founder of Dream Chip Technologies

"With over a decade of automotive industry experience, GF's 22FDX delivers a performance on-demand, energy-efficient solution for our current and future radar technology needs."

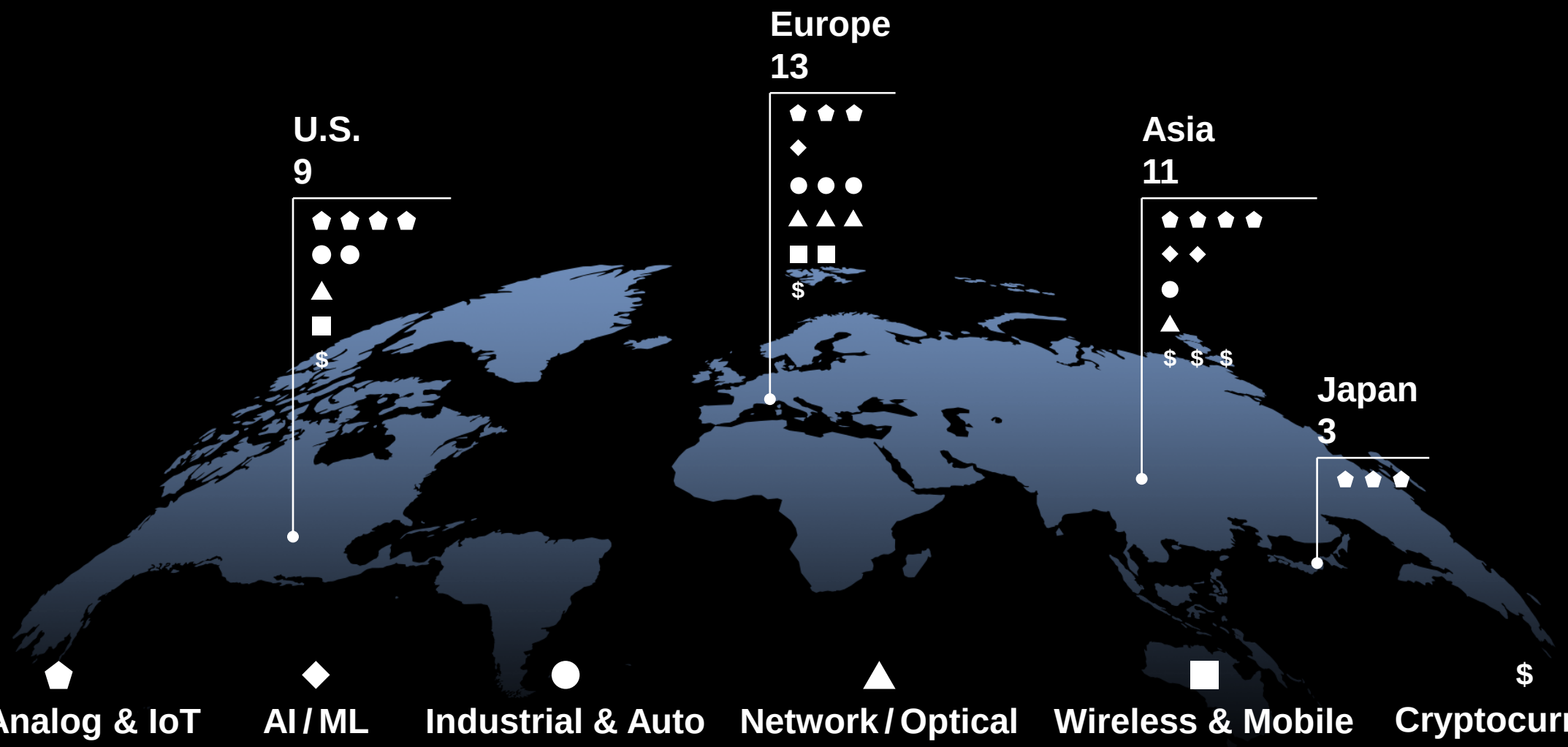
Kobi Marenko, CEO of Arbe Robotics

22FDX Auto Qualified, Ready for Production

- Dresden, Fab 1 automotive qualified — **Q1 2018**
- 22FDX fully qualified for automotive Grade 2 — **NEW!**
  - AEC Q-100; with ambient temp up to 105°C
- Prototyping ongoing, automotive production — **Q3 2018**
- Features high voltage, eNVM auto grade, RF, mmWave
  - Next-gen eMRAM in development — **Q1 2019**
- 22FDX and Arbe Robotics 77GHz high resolution radar chipset

Marketplace Validation of 22FDX – Market Applications

36 client DWINs across the world



Ecosystem Partnering via FDXcelerator™
Comprehensive design platform including IP and design flows

Amkor Technology
REM
SYNOPSYS
cadence
Fraunhofer
invecas
ASE GROUP
ANDES TECHNOLOGY
Mentor Graphics
SONICS
Perceptia™ IP and Design Services
leti
Rambus
surecore
ENCORE SEMI
ICSCAPE
Racyics
DOLPHIN INTEGRATION
EXTOLL
menta
VeriSilicon
Uniquify
Infosys
ATTOPSEMI Technology
ememory
sasken
Imagination
Dream CHIP
analogix
INNOSILICON Innovation For Certain
Kilopass
eVaderis
NETSPEED SYSTEMS
ARTERIS IP

Positioning Europe in the Global Manufacturing Supply Chain

Cloud-based assistants | **Autonomous cars** | **Fabs pioneering IoT** | **Real-time health monitoring**

Applications

IOT | SMART TRANSPORTATION | SMART MANUFACTURING | SMART MEDTECH

New European Manufacturing Investment

BOSCH | nexperia | STMicroelectronics | NXP | intel | TOWERJAZZ The Global Specialty Foundry Leader | Infineon | GLOBAL FOUNDRIES | X-FAB MIXED-SIGNAL FOUNDRY EXPERTS | amu | LFOUNDRY A SMIC COMPANY

Leading Equipment & Materials

ASML | DAS | ASM | VAT PASSION. PRECISION. PURITY. | EDWARDS | BASF We create chemistry | Air Liquide | SPTS | Besi | soitec | EVG | AIXTRON | siconnex customized solutions | Schneider Electric | siltronic perfect silicon solutions | unity sc | FRT THE ART OF METROLOGY

R&D Hub

imec | leti cea tech | Fraunhofer

*Energy-efficient Semiconductors enabling **"SMART"** Applications*

Advancing European value chains with FD-SOI