

New Trends in the Mobility and Automotive Semiconductor Industries

A Supply-Chain Perspective

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SEMICON[®]
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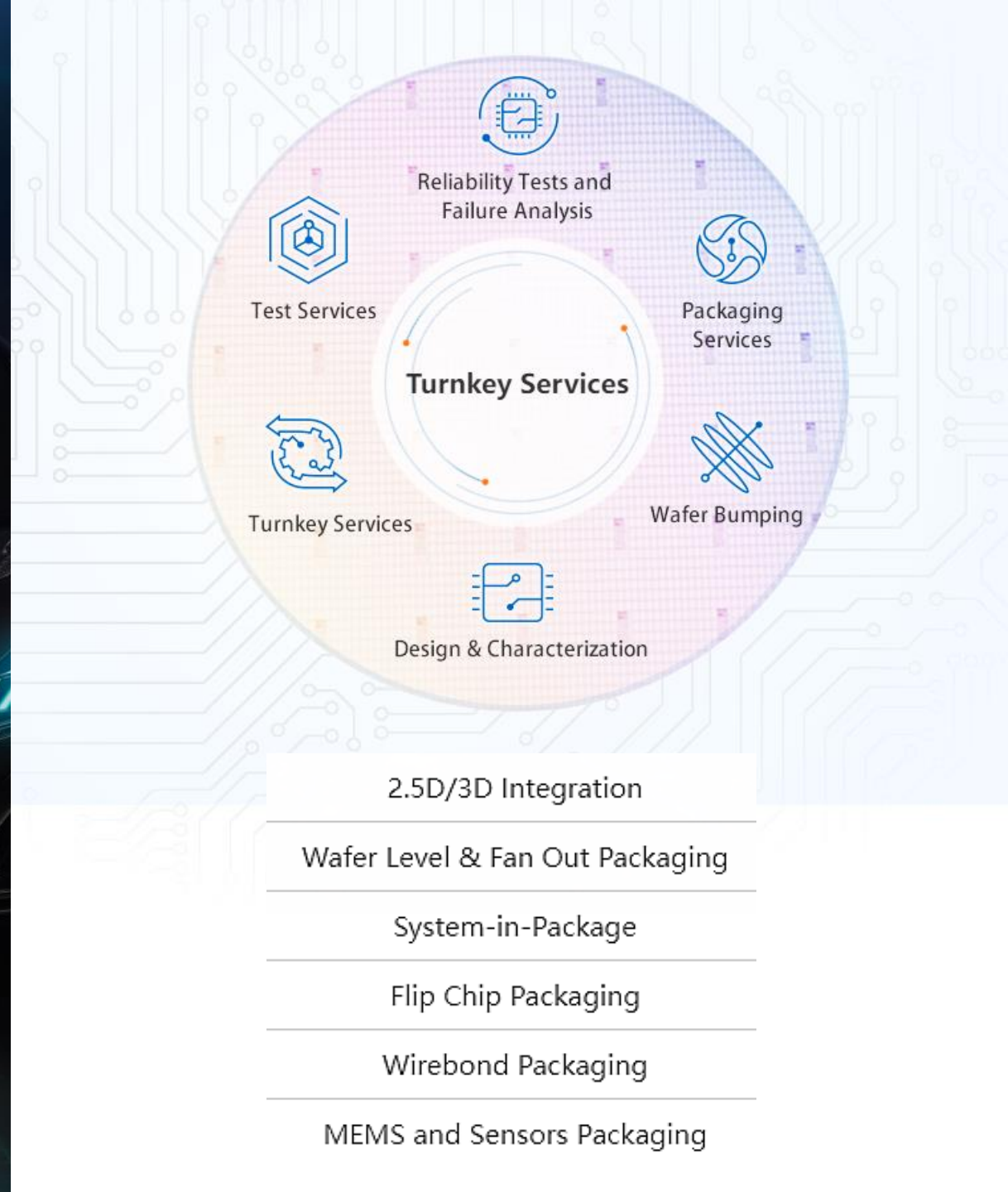
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Known and unknown challenges

The **automotive supply chain** for manufacturing cars, trucks and other vehicles is one of the most complex in the world. **Why is it?**

Known challenges

- Numerous parts per vehicle
- Multi-tier compartments
- Design unicity, no easy replacement

Manufacturing complexity



- Assuring continuity of stock
- Logistic excellence
- Secure Just-in-Time

Lean management



- Chip shortages

- Long-term forecasting
- Warranty returns
- Recalls management

Commercial framework



- Trade restrictions

- Economic downturns
- Natural disasters

Global factors



- Geopolitical instability
- Pandemics
- Energy crisis

- Cost control

Competitiveness



- New players
- New sub-markets
- Innovation

Consumer trends

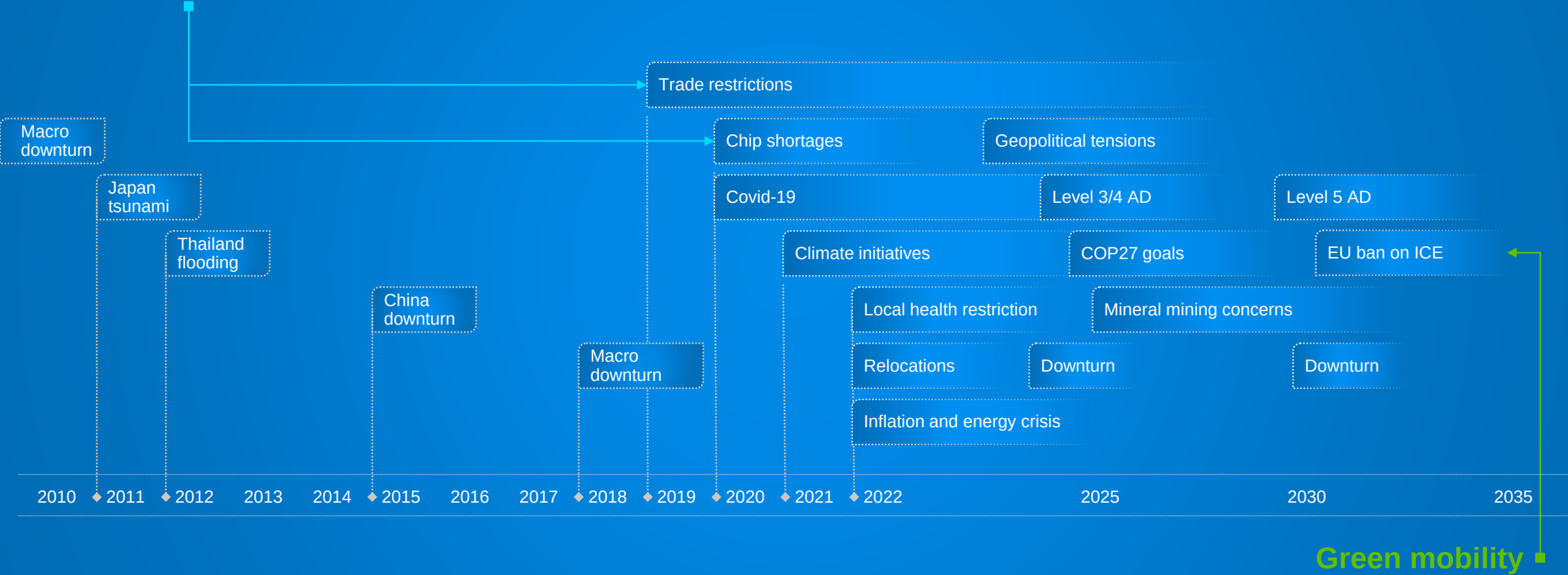


- Shift to EVs
- Shared mobility
- Autonomous driving
- Safety regulations

New challenges

Intensifying Disruptions Over the Last Five Years

Semiconductor segment is particularly exposed to global crises



“A series of revolutions is reshaping the auto industry in depth”

(Luca de Meo, CEO Renault)

Auto Makers Are Expanding Voice Controls for Drivers. Cars Will Talk More, Too.

Verbal commands will go deeper into the auto's functions, and the car may have comments of its own—even judging your singing performance

Mike Colias | November 3, 2022

Renault to Separate EV Unit in Sweeping Overhaul

The French car maker will also pair up with China's Geely in a combustion-engine venture.

Nick Kostov | November 8, 2022

Electric Vehicles Took Off. Car Makers Weren't Ready.

More buyers are lining up for EVs, catching car companies flat-footed and triggering a race for more batteries, factories and materials. “Can I afford to keep waiting for this?”

Mike Colias | September 18, 2022

Ford Posts Loss as It Takes \$2.7 Billion Charge on Argo Driverless-Venture

The auto maker intends to absorb several hundred workers from the startup, which is shutting down.

Nora Eckert | October 27, 2022

The Next Big Battle Between Google and Apple Is for the Soul of Your Car

In the future, your choice of smartphone ecosystem—Android or iPhone—could determine which make and model of car you choose.

Christopher Mims | October 1, 2022

EV Battery Startup Plans \$1.6 Billion Factory in Michigan

Our Next Energy, which involves several former leaders of Apple's secretive car project, has plans for its factory to produce enough cells annually for 200,000 EVs by the end of 2027.

Tim Higgins | October 5, 2022

EUROPE

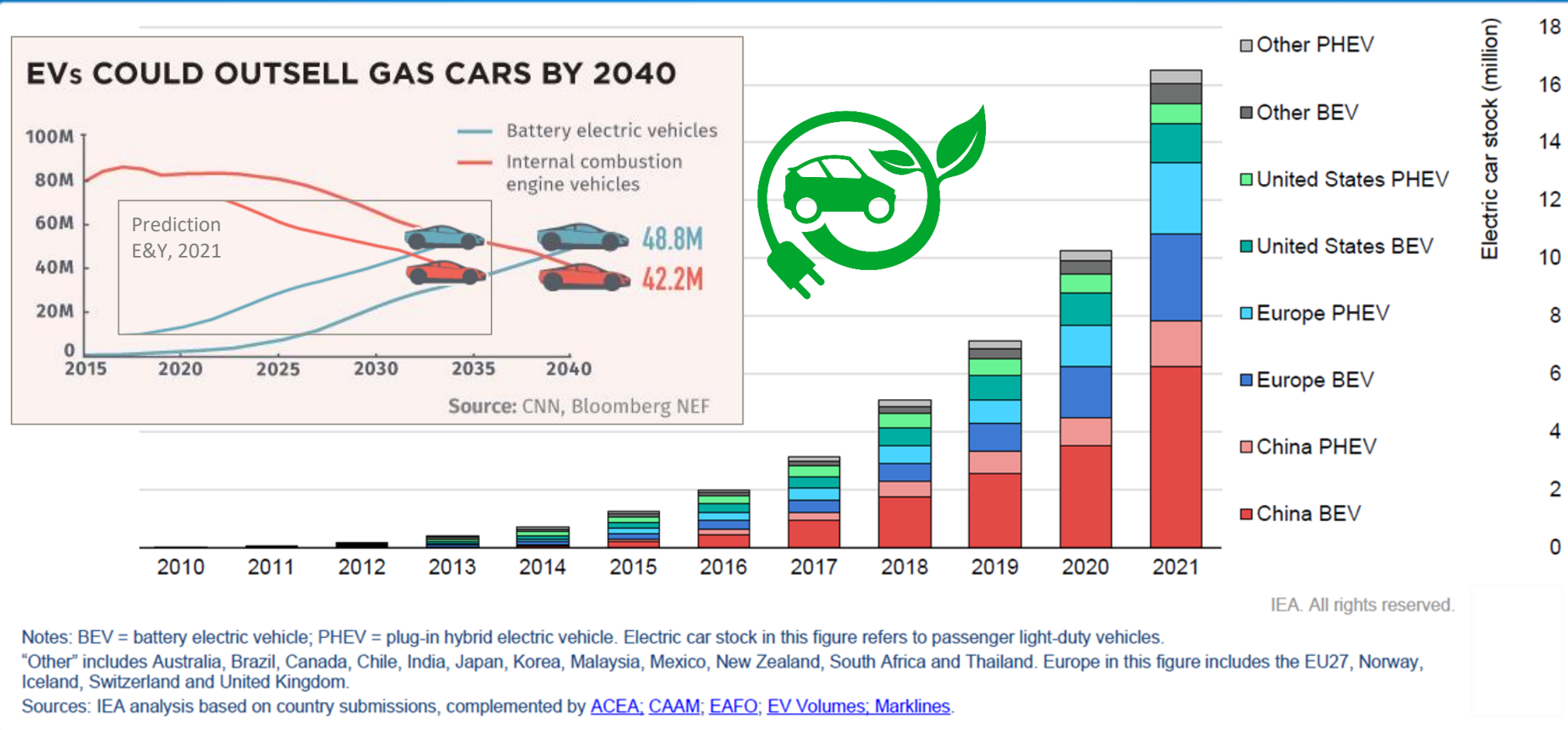
EU Reaches Deal on Combustion-Engine Vehicle Ban Starting in 2035

European lawmakers reached an agreement on rules that will effectively ban the sale of new cars that run on gasoline.

Kim Mackrael | October 28, 2022

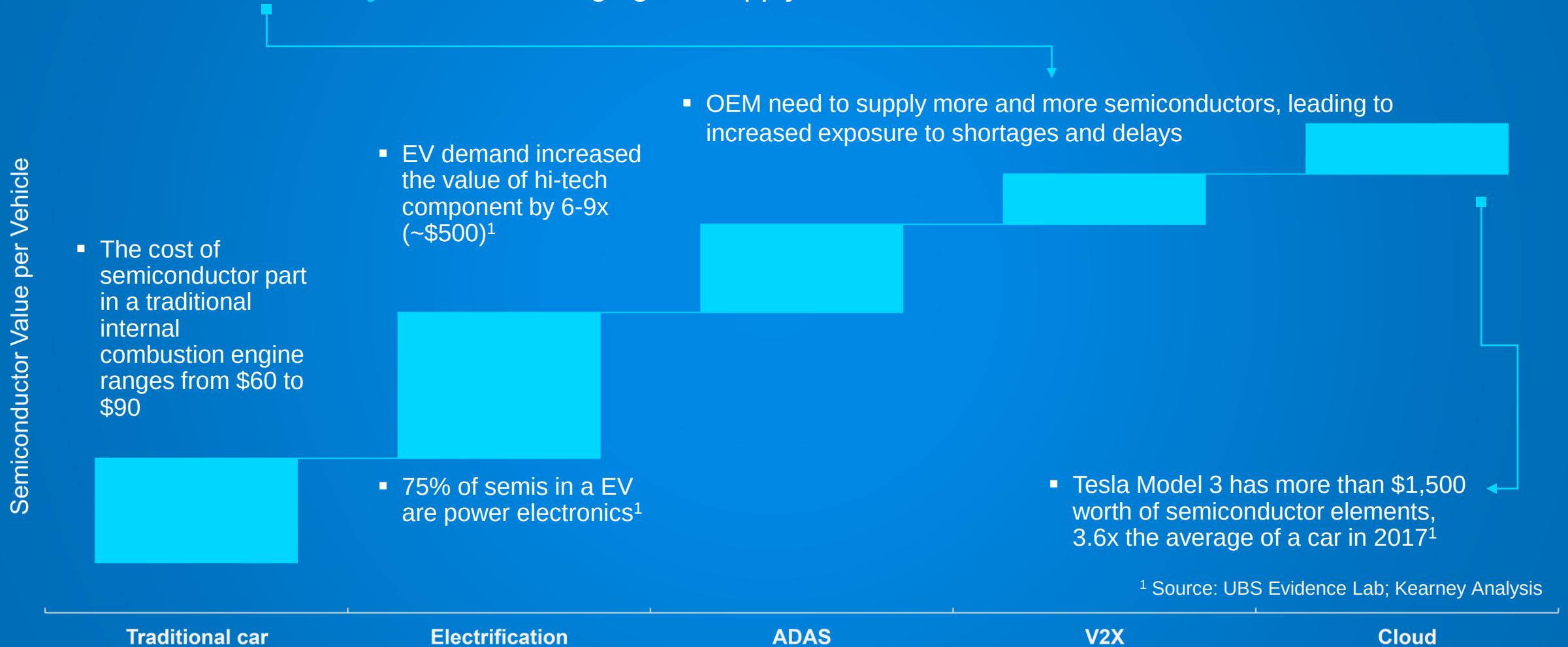
The Move to Green Mobility

Long-term **megatrend** affecting the entire manufacturing eco-system, especially the **semis supply-chain**



A Growing Semis Content: The Perfect Storm

Green and **Smart Mobility** further challenging the supply-chain

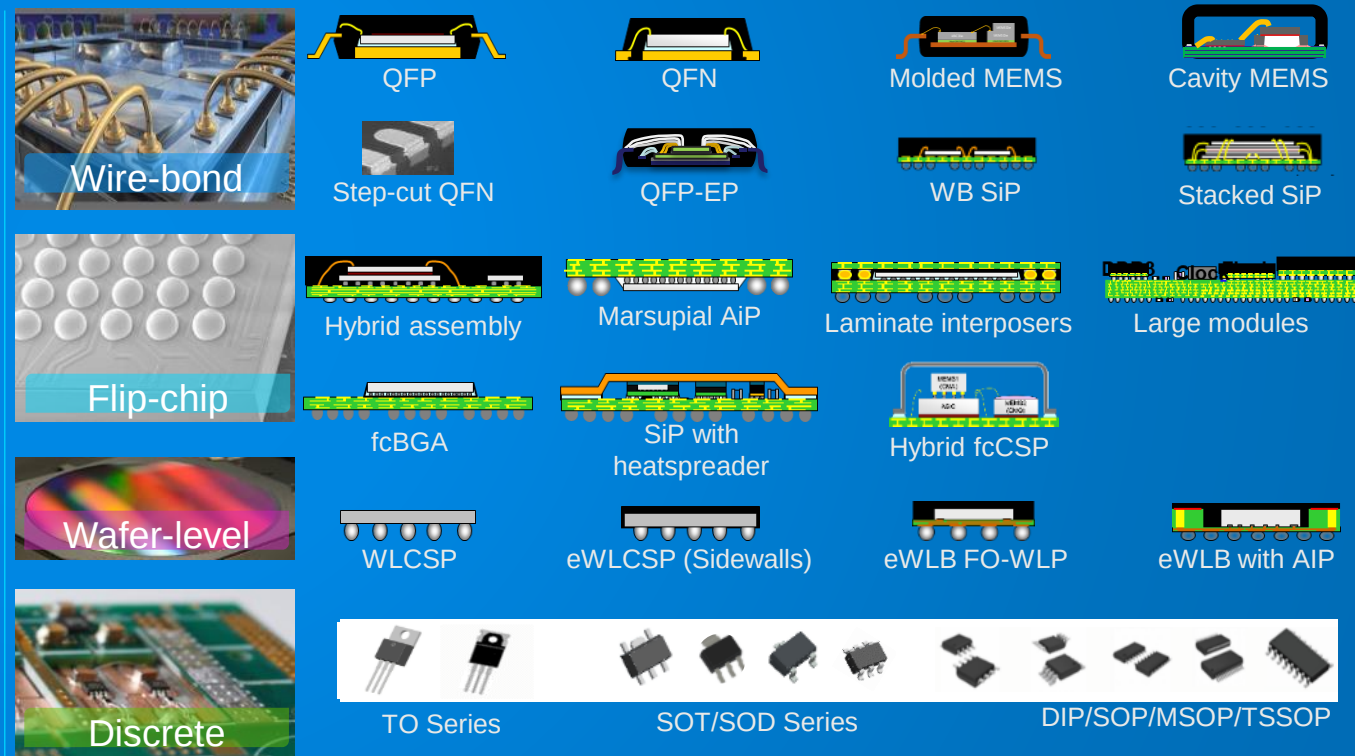
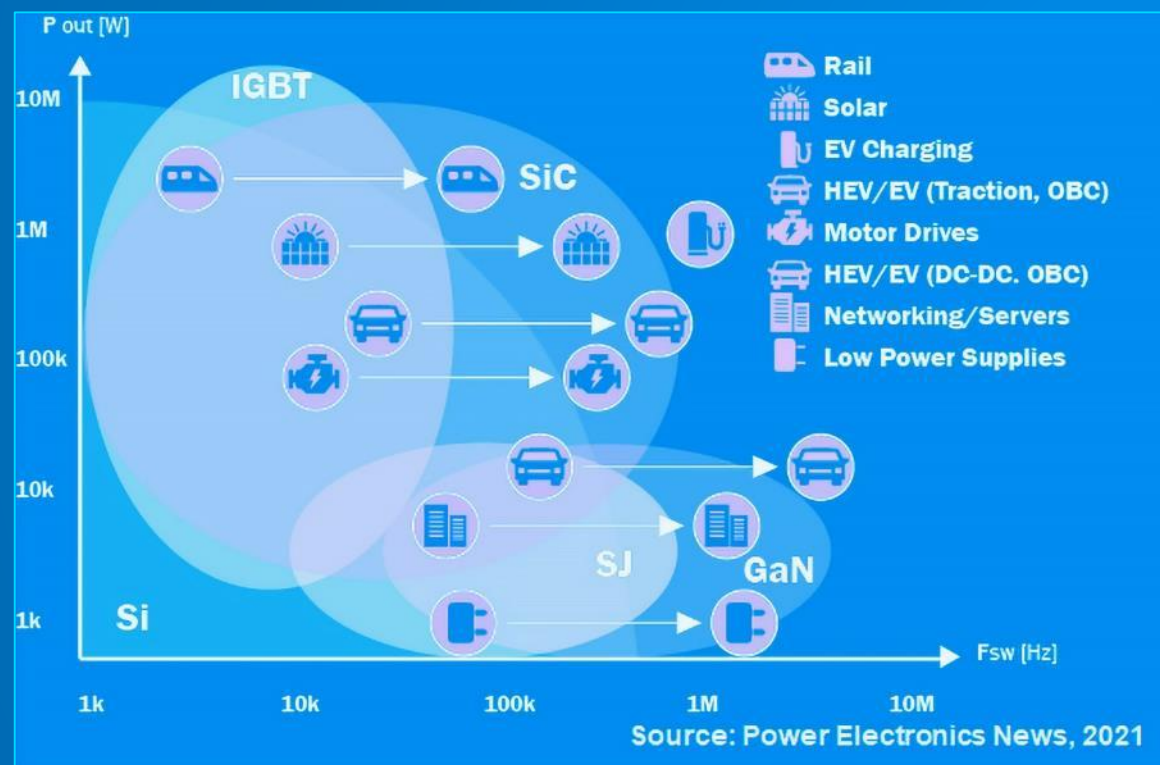


Semiconductor Technologies for Automotive

Semiconductors are integrated in a **wide variety of types**

Semiconductor Technologies (Foundries)

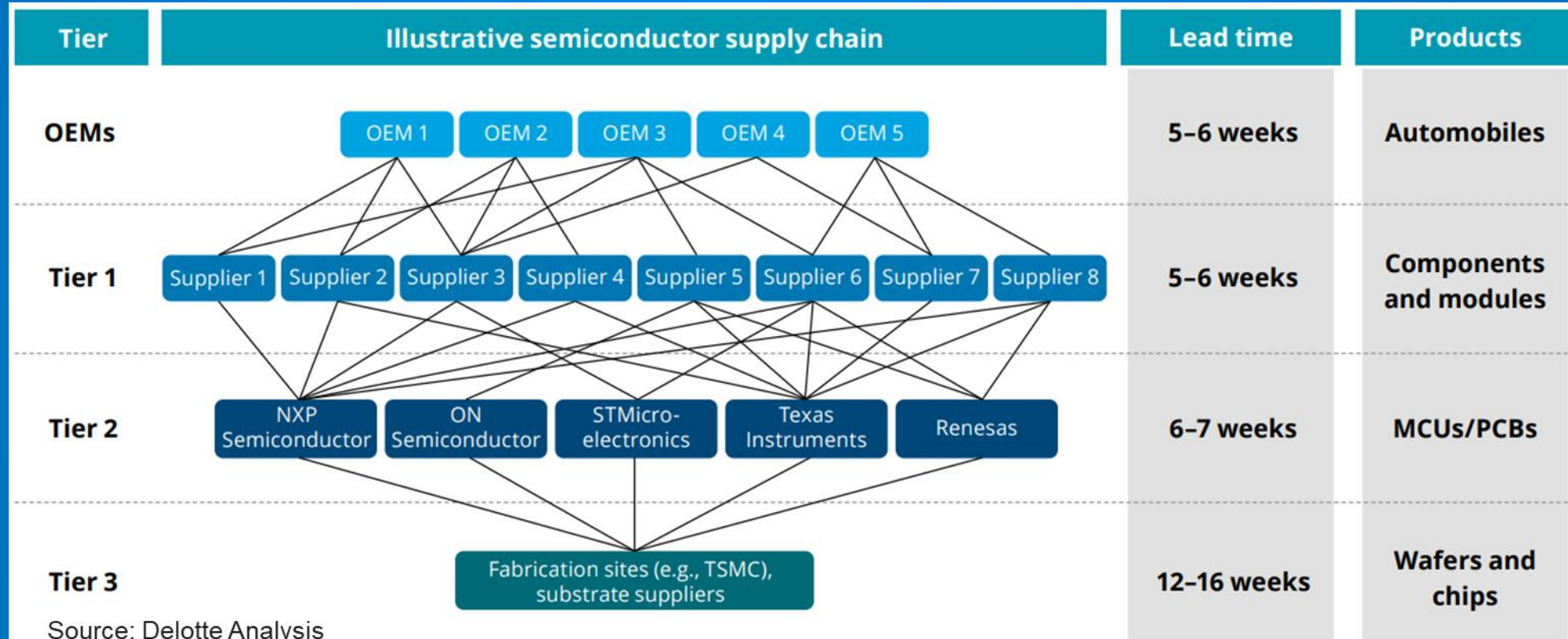
Assembly Technologies (OSATs)



Source: JCET 2022

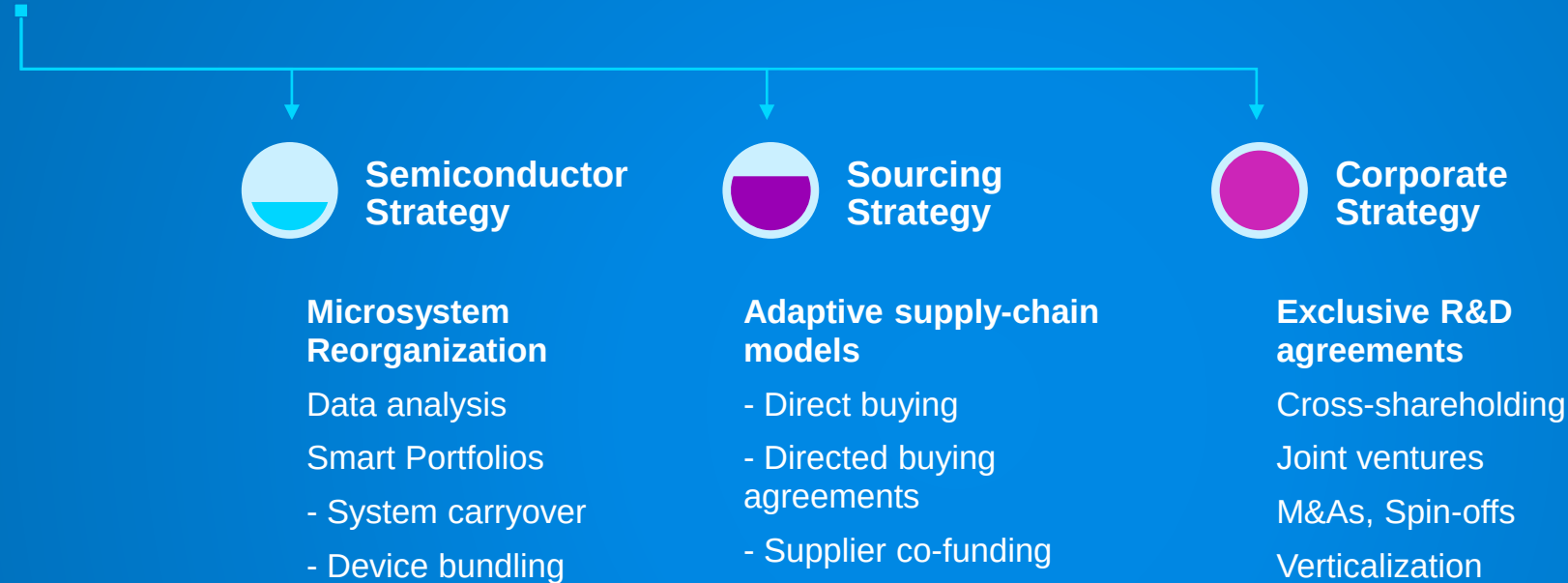
Automotive Semiconductor Supply-Chain

Semiconductor players may cause major **disruptions** and **shortages** due to lack of visibility and control



How to Build a Stronger Ecosystem

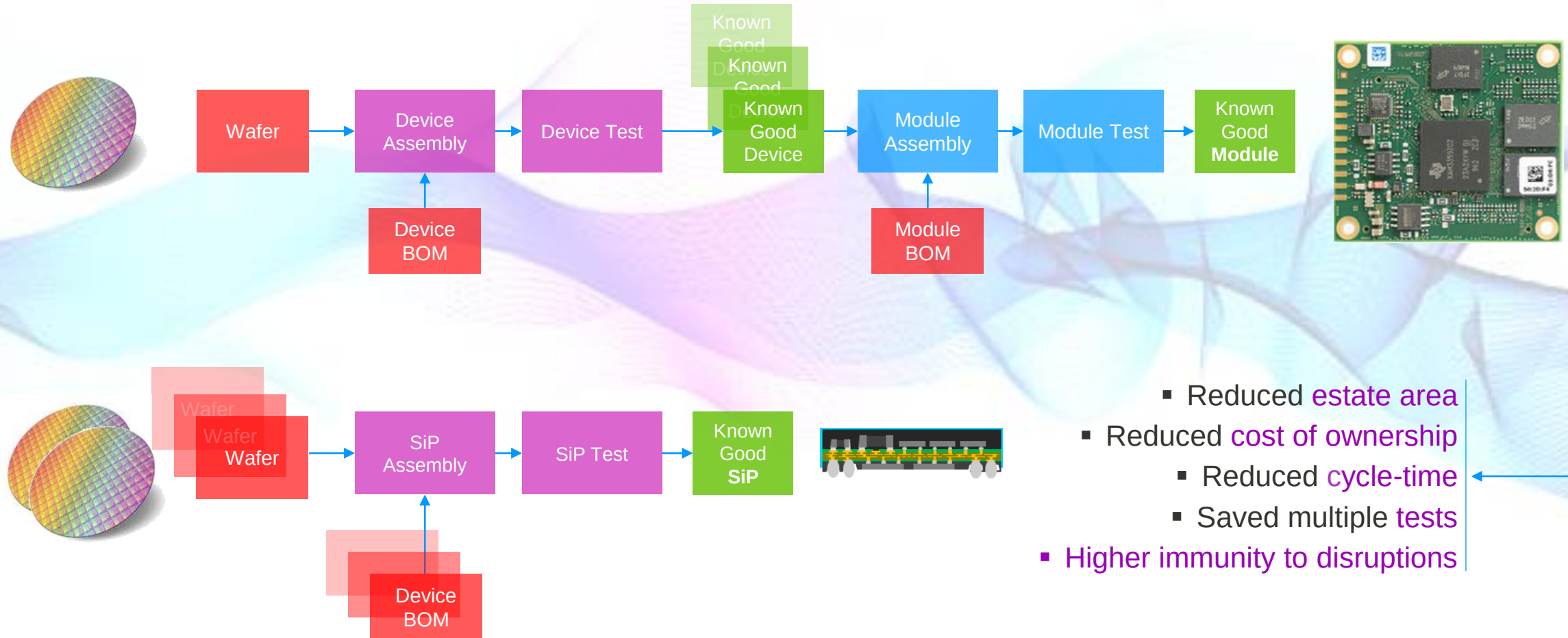
Major **areas** of improvement towards a resilient semiconductor supply-chain



Immunity to disruptions → → →

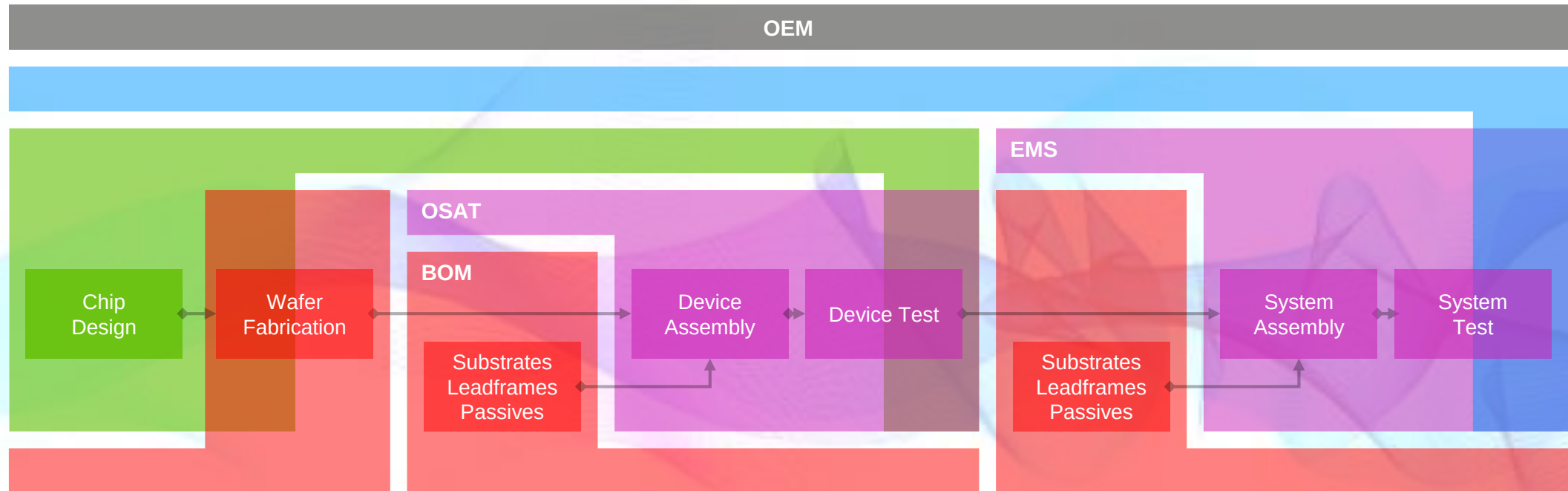
Microsystem Reorganization

Strategic **rebundling** of silicon into sub-systems, leading to more efficient component and module sourcing



Adaptive Supply-Chain Business Models – F0

Tier-1 buy from IDM; IDM buy from OSAT

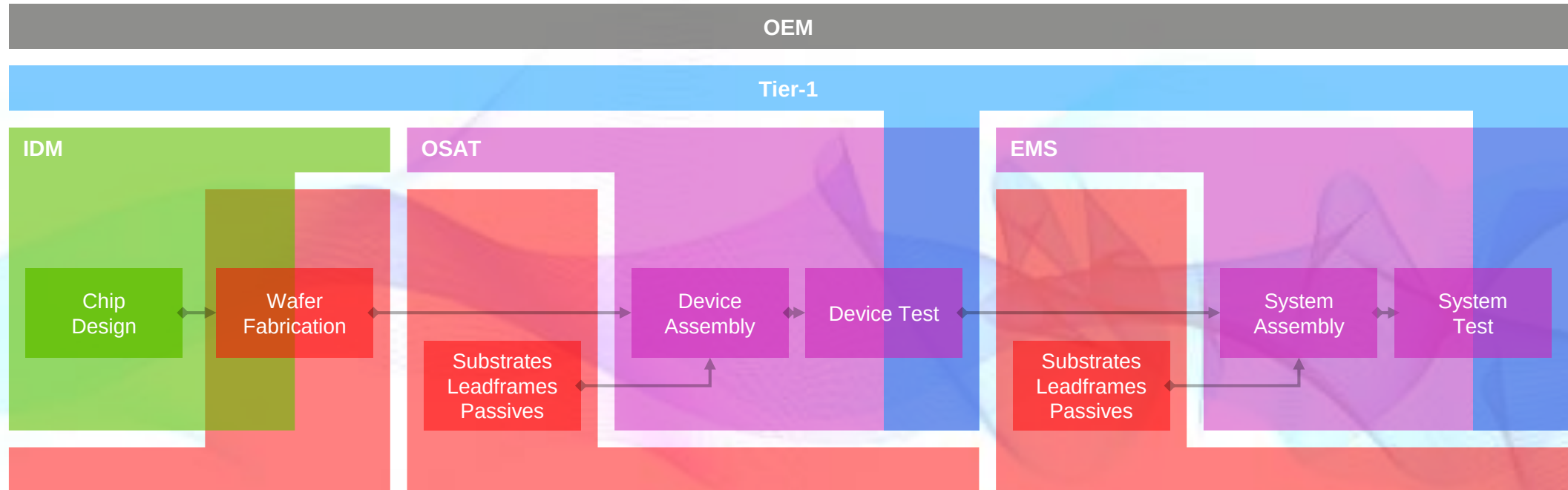


- ▲ **Structured** web of relationships
- ▲ **Standardized** stack of devices, systems, software
- ▲ Access to **extensive supplier base**

- ▼ **Low visibility** throughout the supply chain
- ▼ Rigidity of the **cost structure**
- ▼ Dominance of remote supplier **latency**

Adaptive Supply-Chain Business Models – F1

Tier-1 buy from IDM and OSAT

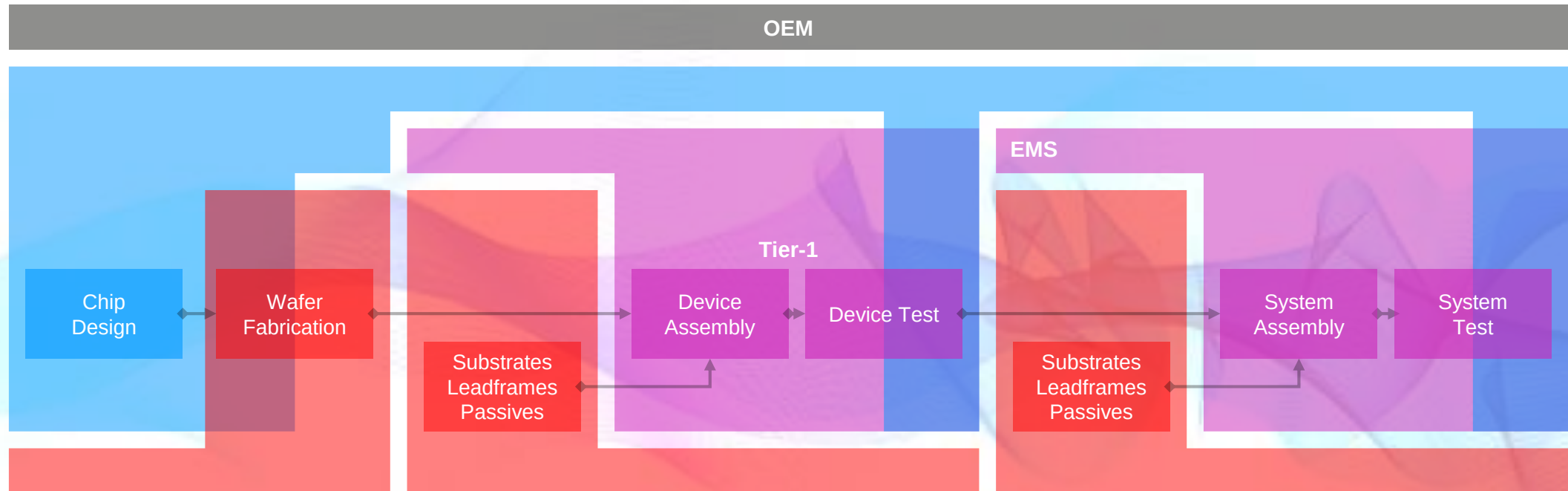


- ▲ Better **visibility** as to assembly and test
- ▲ Risk mitigation as to **substrate procurement**
- ▲ **Cost model** can improve due to reduced avalanche of gross margin

- ▼ Tier-1 to manage an **additional supplier**
- ▼ **Knowledge transfer** from IDM (think at test)
Tier-1 can **delegate OSAT** to buy wafers from IDM; impact on return management and liability

Adaptive Supply-Chain Business Models – F2

Tier-1 own design and buy from OSAT

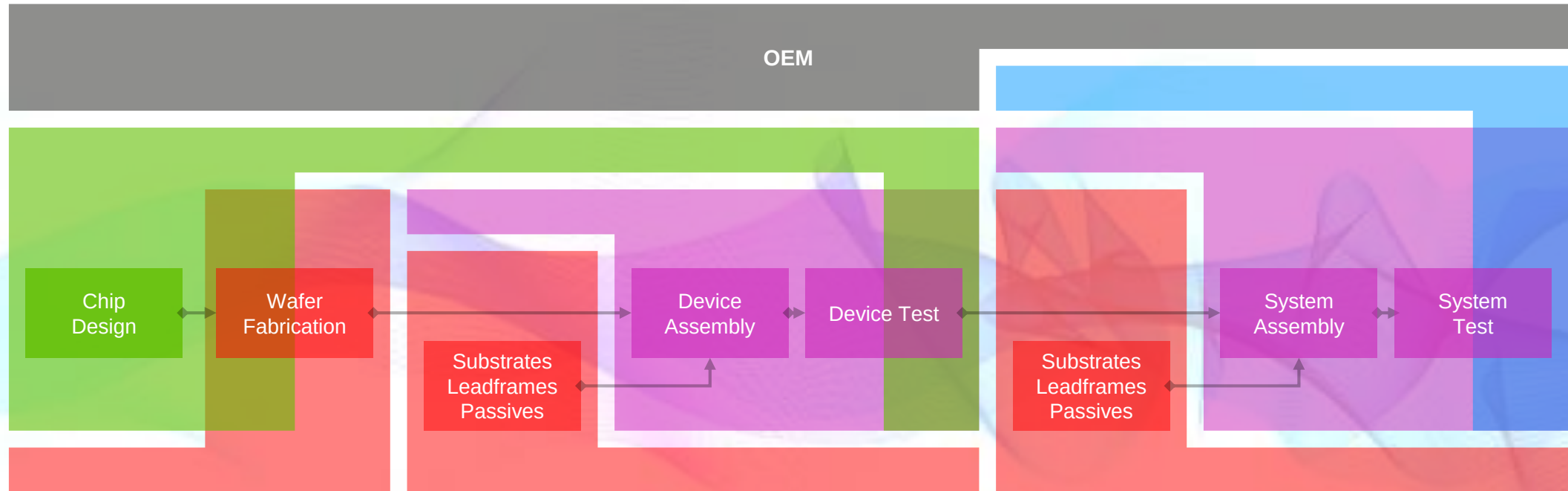


- ▲ Focus on **IP-intensive devices** (e.g. sensors)
- ▲ **Higher visibility** as to wafer procurement

- ▼ **Capex intensive** for Tier-1
- ▼ Biased **decision making** for outsourcing to foreign IDMs and/or foundries

Adaptive Supply-Chain Business Models – F3

OEM buy from IDM

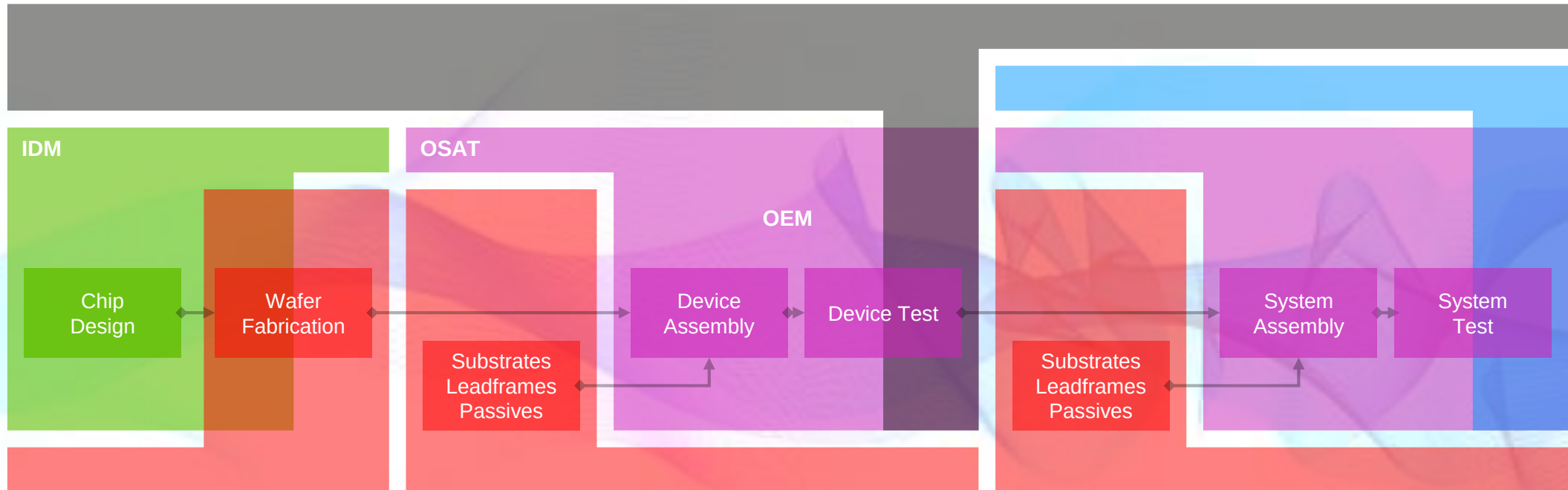


- ▲ OEM and IDM can **team up to design SoC**, up to finished device
- ▲ **Optimization of cost** is expected due to reduced cascaded margins
- ▲ **High visibility** towards wafer supply and assembly

- ▼ **3-way system definition** and return management (OEM + Tier-1 + IDM)

Adaptive Supply-Chain Business Models – F4

OEM buy from IDM and OSAT

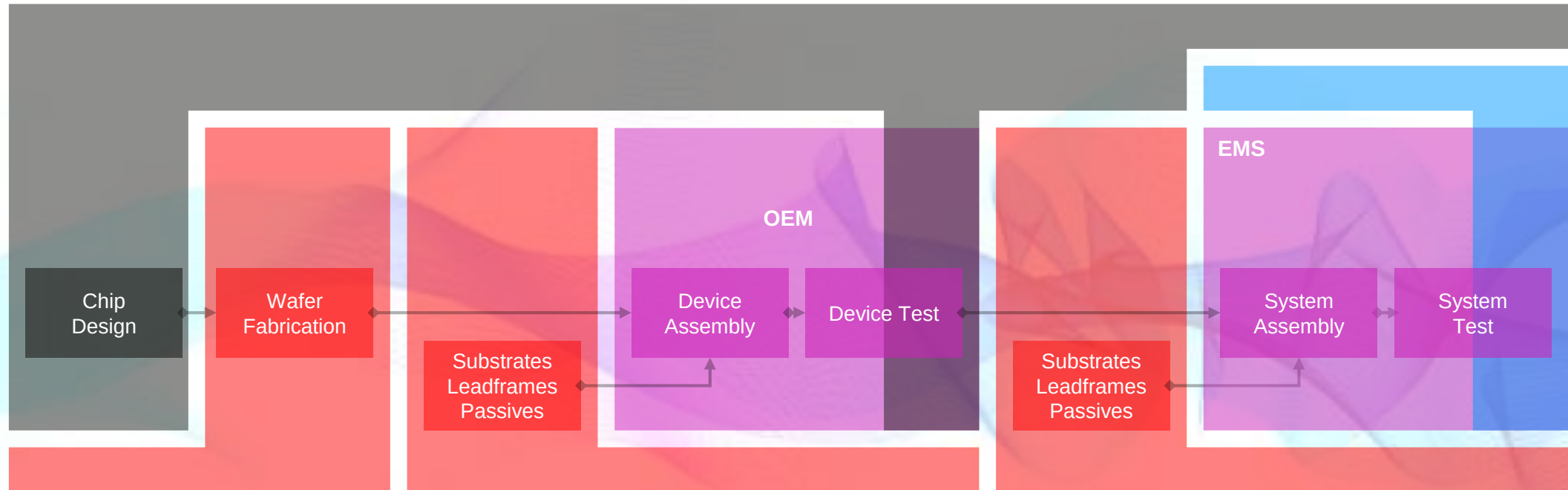


- ▲ OEM, IDM and OSAT team up to design, manufacture and assemble/test an SoC
- ▲ **Further optimization of cost** is expected due to reduced cascaded margins
- ▲ **High visibility** towards wafer supply and assembly

- ▼ **4-way system definition** and return management (OEM + Tier-1 + IDM + OSAT)
- ▼ **Knowledge transfer** from IDM

Adaptive Supply-Chain Business Models – F5

OEM own design and buy from OSAT



- ▲ OEM own SoC design and partner with OSAT
- ▲ Direct or directed buying agreements with suppliers
- ▲ Optimized cost is expected due to direct buying
- ▲ Highest visibility towards wafer supply and assembly
- ▲ Optional JV with Tier-1 to further extend benefits

- ▼ Capex-intensive model for OEM
- ▼ More rigid decision making for outsourcing services

Supporting the Transformation

At JCET we are increasingly aware and compliant to the transformation: **it is happening!**

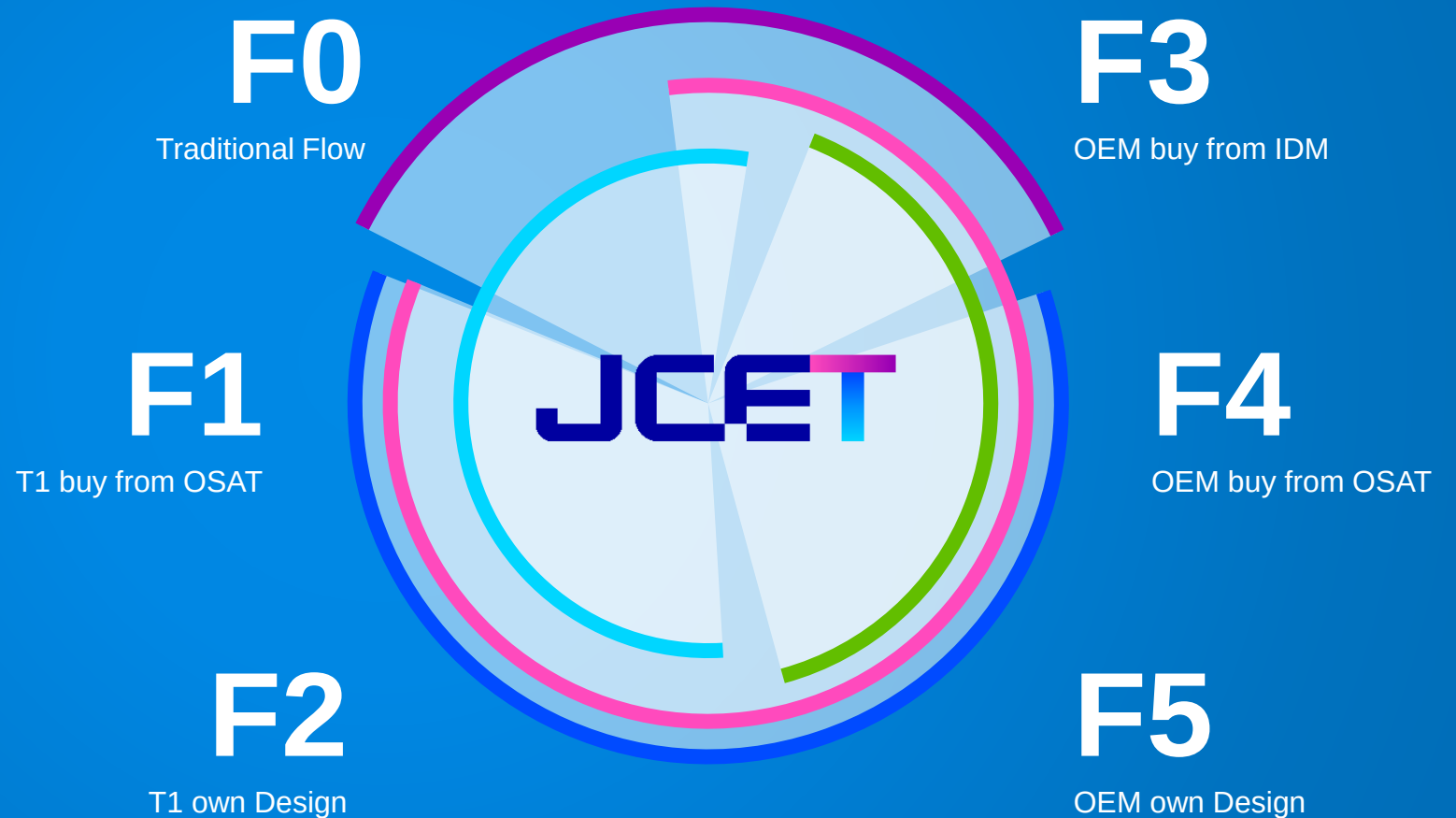
- Evolution from assembly service providers towards **microsystem integration partner**

- Flexibility to implement new legal and commercial frameworks with **OEMs, Tier-1 and wafer fabs**

- Study of **innovative governance and ownership**, context-aware liability

- Dedicated **Automotive BU** to lead the change

- Strong ties with **IDMs and fabless** for AEC-Q compliant packaging



Key Takeaways

- | **Semiconductors** are among the weakest links in the Automotive supply-chain
- | **Smart Mobility** and **Green Mobility** make the picture more complicated: the perfect storm!
- | **Car makers and their suppliers** are studying ways to improve the supply-chain and make it immune to disruptions:
 - | Microsystem reorganization, smart portfolios
 - | Adaptive supply-chain business models
 - | Corporate strategies and verticalization
- | **As responsible supplier**, JCET supports the transition towards the future with strong corporate awareness and compliance



Thank you!

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