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State of Automotive E/E Architecture 2026

Measuring the Migration — 22 OEMs across the AR0–AR5 Ladder

archi-intelligence Research Team

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Front Matter

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This research draws on public sources from January 2024 to January 2026, including but not limited to: public-company filings and SEC/HKEX disclosures; official OEM and supplier technical releases (AI Day, HDC, IAA, CES, etc.); published patent literature; peer-reviewed academic papers and conference proceedings; industry standards bodies (AUTOSAR, ISO, SAE, IEEE, etc.); and mainstream technical media. For unverifiable rumor or anonymous-source information, we adopt a conservative posture—either not citing it, or explicitly labeling it as "directional inference based on public reporting."

5. On research limitations

As a survey work, this research openly acknowledges asymmetry in data availability. Public technical detail for Tesla, NVIDIA, and Google is relatively complete, whereas the vehicle-side low-level implementation detail for Huawei, Xiaomi, and some Chinese OEMs is limited in public disclosure. This report strives to flag this asymmetry in comparisons; readers should beware of misreading "differences in disclosure" as "differences in capability." This edition additionally notes that the total-to-AR mapping is linear (v1); a threshold-based mapping is planned for a subsequent iteration of the framework.

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Abstract

Building on the AR0–AR5 capability-threshold framework and the five-dimension instrument introduced in the flagship report, this paper conducts a systematic empirical assessment of electrical/electronic (E/E) architecture maturity across 22 major global automakers, applying a **dual-time-horizon** method that scores each firm both in its currently deployed state (Snapshot, 2026-01-31) and against its publicly confirmed near-term trajectory (Roadmap, 2027-07). All scoring follows a graded evidence standard and a fully transparent, reproducible equal-weight summation of the five dimensions, such that any reader may independently recompute every total and AR tier from Appendix A.

The central empirical finding is structural: **on the dimension of architecture maturity, the global landscape has been substantially reordered—leadership has migrated away from the traditional centers of the industry toward late-moving firms with lighter legacy burdens and toward cross-industry entrants.** Two facts give this judgment its sharpest form. First, **only two firms reach AR4 (Multi-Embodiment Physical AI Platform)—Tesla and Huawei HIMA—one a disruptor automaker, the other an ICT entrant; no traditional incumbent qualifies.** Second, the AR3 leading cluster is dominated by Chinese new players (Xpeng, NIO, Li Auto, Xiaomi), which have traversed in roughly a decade the architectural-centralization path that incumbents have yet to complete; in the same distribution, the European premium triad and the Japanese/Korean majors—despite their longstanding strengths in mechanical engineering and functional safety—occupy the lower end.

A methodologically central observation runs through the report and is, in our view, the single counterintuitive insight readers should carry away: **functional-safety certification is not a proxy for architecture maturity.** European OEMs retain global leadership on functional safety (D4), yet trail across architectural centralization, software-hardware decoupling, and compute concentration. The two capabilities measure orthogonal things—the rigorous maintenance of an existing design on one hand, the active reconstruction of an architecture on the other—and treating ASIL D certification as evidence of architectural advancement carries a systematic bias, increasingly so as the locus of automotive value migrates from driving safety toward continuous evolution as an intelligent terminal.

The dual-time horizon offers one signal favorable to the followers—the Roadmap aggregate narrows the paper gap, and the firms farthest behind commit to the largest leaps—but a roadmap is a commitment, not an accomplished fact, and the implementation gap is typically wider for incumbents bearing larger legacy systems. Each roadmap in this report is annotated with a delivery-risk rating.

Keywords: architecture maturity; software-defined vehicle; E/E architecture; functional safety; Architecture Readiness; dual-time-horizon assessment; architectural debt

Chapter 1 Methodology: Source Taxonomy and Evidence Standard

1.1 Pyramid of Source Authority

The archi-intelligence Research Series classifies every piece of evidence along a structured pyramid built on three orthogonal dimensions: **legal accountability** (whether the source is bound by statutory or fiduciary obligation), **independence** (whether the source originates from the firm itself, from a regulator, from a third party, or from indirect channels), and **temporality** (whether the statement describes a deployed state or a forward-looking commitment). The pyramid is not a ranking of credibility in the abstract; it is a calibration of how each evidence type may be used, and under what scoring constraints.

Tier 1 — Regulatory Filings ★★★★★

Sources include SEC 10-K / 10-Q / 20-F, HKEX annual reports and announcements, SSE/SZSE disclosures, Frankfurt Börse and Euronext filings, BaFin ad-hoc disclosures, and audited financial statements. False statements in these documents carry criminal and civil liability; they are cited directly, with document name, date, and page number.

Tier 2 — Investor Communications ★★★★☆

Capital Markets Day presentations, Investor Update / Investor Day materials, quarterly earnings call transcripts, Strategy Day releases, BMW's Annual Conference and equivalents, and Annual Shareholders' Meeting decks. Forward-looking statements here are bound by fiduciary duty; they are cited with speaker title, date, and slide number.

Tier 3 — Official Technical Releases ★★★★☆

AI Day / HDC / Tech Day presentations, the 1024 Tech Day, NIO IN, Huawei HDC, official SOP/EOP announcements, and publicly disclosed patents. This tier is corporate communication—subject to publicity considerations but with explicit official commitment behind it; sources are cited with event, speaker, and date.

Tier 4 — Industry Media and Analyst Reports ★★★☆☆

Reuters, Bloomberg, the *Financial Times*, *Automotive News*, *36Kr*, *Late Post*, *Geek Park*, the Chinese-language *Wall Street Journal*, and analyst notes from Gartner, IDC, Counterpoint, and Canalys. Second-hand information, potentially edited; cross-validated against Tier 1–3 wherever possible, and explicitly flagged when used in isolation.

Tier 5 — Unofficial Channels ★★☆☆☆

Forums, social media, and anonymous sources without traceable origin. Used only as background context, never as a basis for scoring.

1.2 Evidence Standards for Scoring

Each scoring decision in this report is constrained by an evidence standard calibrated to the time horizon it serves. **Snapshot scoring** (the currently deployed state) requires Tier 1–3 evidence verifiable as of the cutoff (2026-01-31); forward-looking statements are inadmissible, mass production must have entered SOP, and software functionality must have been publicly released. **Roadmap scoring** (the 2027 near-term trajectory) requires Tier 1–2 evidence—regulatory filings or formal investor communications—and excludes internal goals not communicated to investors; targets beyond the 2027-07 window are deferred to subsequent assessment cycles.

When tiered sources conflict, the higher tier prevails; when same-tier sources conflict, the more recent prevails; persistent disagreements are documented in the individual profile. The absence of public disclo-

sure is not equated with the absence of capability—for features inferrable from product behavior but not publicly disclosed, scoring may be assigned at a conservative lower bound, with the inference noted.

1.3 Five-Dimension Framework and AR Mapping (Core Methodology)

Architecture maturity, for the purposes of this report, is measured along **five orthogonal dimensions (D1–D5)**, each rated on a 0–5 scale; the five scores are summed with equal weight to yield a 0–25 total, which is then mapped linearly onto the AR tier defined in the flagship report. The full set of rules is disclosed below, such that any researcher equipped with the five-dimension detail scores in Appendix A may independently reconstruct each firm's total and AR tier.

Five-Dimension Definitions (D1–D5)

- **D1 Architectural Centralization** — the degree to which the E/E architecture has consolidated from distributed ECUs toward domain controllers, zonal controllers, and ultimately central compute.
- **D2 Software-Hardware Decoupling** — the extent to which software and hardware are decoupled; whether a service-oriented architecture (SOA) and an independently evolvable software platform are in place.
- **D3 OTA Maturity** — over-the-air update capability, from single-ECU reflash to vehicle-wide FOTA covering powertrain and safety-critical components.
- **D4 Functional Safety Architecture** — the maturity of the functional-safety architecture, scored on three sub-dimensions detailed below.
- **D5 Compute Concentration** — the concentration and pooling of compute resources, and the topology and scheduling capability of heterogeneous computing.

Score Aggregation: Equal-Weight Direct Summation

The total is the unweighted sum D1 + D2 + D3 + D4 + D5 (max 25). **No additional weighting is applied to any dimension or to any firm.** This represents a deliberate departure from earlier internal drafts, which had applied non-public additional weights to the functional-safety dimension for certain incumbent OEMs; that weighting has been removed in its entirety, restoring equal-weight summation as the sole aggregation rule and, with it, reproducibility and consistency across the sample.

D4 Functional Safety: Three-Sub-Dimension Rubric

D4, the functional-safety dimension, is scored along three observable sub-dimensions: (i) the **depth of redundant architecture**—the granularity of multi-layered redundancy across perception, braking, steering, power, and communication, together with the precision of ASIL decomposition; (ii) the **certification level**—ISO 26262 ASIL D process or management certification, ISO 21448 (SOTIF) certification, and EU regulatory type approvals under UN-R157 / UN-R155 / UN-R156; and (iii) **production validation**—whether L3 has been productized under the strictest regulation in force (at present satisfied globally only by Mercedes DRIVE PILOT under UN-R157).

D4 anchors:

D4	Standard
5	Production L3 + UN-R157 certification + multi-layered redundancy
4	ASIL D certification + fine-grained redundant architecture
3	ASIL D process certification *or* complete redundant design (one of the two)

D4	Standard
2	Baseline functional safety (ISO 26262 compliant, but no complete ASIL D certification)
1	Weak functional-safety capability / no public evidence

Total Score → AR Tier: Linear Mapping

Total (max 25)	AR Tier	Capability Threshold (per the flagship report)
24–25	AR5	Trusted General Embodied Agent — research / prototype only
22–23	AR4	Multi-Embodiment Physical AI Platform
19–21	AR3	Cross-Device Collaborative Agent
16–18	AR2.5	(half-tier transition)
14–15	AR2	Zonal Platform
12–13	AR1.5	(half-tier transition)
10–11	AR1	Domain-Level Integration
< 10	AR0	Mechanical-Electrical Island — empty in this sample

The bin boundaries are calibrated against this report's self-consistent sample, such that the linear mapping aligns as closely as feasible with the empirical capability thresholds the AR tiers were originally drawn to mark.

Documented Corrections (Transparent Record)

The current scoring incorporates the following corrections relative to earlier drafts, all publicly recorded:

- **Removal of opaque weighting** — the non-public additional weights (without uniform rule, ranging from +2 to +6) previously applied to the D4 dimension of eight incumbent OEMs have been removed in their entirety; the five-dimension equal-weight summation is now the sole rule.
- **Mercedes D4: 4 → 5** — the world's only production L3 (DRIVE PILOT) holder under UN-R157, with five-layered redundancy.
- **GWM D4: 3 → 4** — EU KBA UN-R155/156 type approval, GEEP4.0 five-layered redundancy, and the world's first UL SOTIF certification.
- **Tesla D4: 3 → 4** — system-safety strength evidenced by dual-loop redundancy, shadow-mode validation, and a vast accumulated mileage; public evidence on third-party certification remains limited, a particularity of its vision-only path, surfaced here as a tension between **certification visibility and substantive safety capability** rather than concealed.
- **Toyota — five-dimension correction** — the original public-data sample under-estimated Toyota's architecture maturity; following domain-expert review, the scores have been revised to align with the relevant peer group of traditional incumbents (e.g., Volkswagen).

Known Methodological Limitations (Honest Disclosure)

The total-to-AR mapping in this report is linear (v1). A **threshold-based mapping**—one more faithful to the AR-threshold spirit, requiring designated key dimensions to clear minimum bars before entry into a higher tier (for example, AR3 requiring both centralization and OTA to meet bar concurrently)—is planned for a subsequent iteration of the framework. Consistent with the methodological stance of the flagship report, the AR framework is offered as a research proposal rather than as an industry-consensus standard; critique, revision, and extension from both industry and academic communities are welcomed.

1.4 Dual-Time-Horizon Scoring

To capture both the present state and the near-term trajectory, each OEM is scored along two horizons. The **Snapshot** (2026-01-31) records the architecture currently deployed and externally verifiable: mass-production status, public software versions, and existing certifications constitute the admissible basis. The **Roadmap** (2027-07) records the architecture implied by publicly confirmed commitments, drawn exclusively from Tier 1–2 channels—regulatory filings and formal investor communications—with internal goals and media speculation excluded.

The gap between the two horizons is informative on its own: it captures the firm's transformation intent and the demands its public commitments place on its organization. As §1.5 elaborates, that gap must be read together with a delivery-risk rating, lest ambition be mistaken for feasibility.

1.5 Delivery-Risk Rating for Roadmaps

A roadmap is a commitment, not an accomplished fact. Each OEM's Roadmap in this report is therefore accompanied by a delivery-risk rating, in three bands:

- **LOW** — organizational delivery capacity demonstrated, supplier ecosystem stable, history of meeting commitments on schedule.
- **MEDIUM** — the path is clear but execution carries non-trivial risk, e.g., heavy supplier dependence or organizational restructuring in progress.
- **HIGH** — material uncertainty in delivery, e.g., recent strategic pivots, a persistent record of missed roadmaps, or structural execution-capability gaps.

  The rationale supporting each rating is documented in the individual profile in Chapter 3.

1.6 Assessment Time Window

- **Data cutoff** — 2026-01-31.
- **Snapshot window** — production status, software versions, and certifications as of the cutoff.
- **Roadmap window** — 2027-07; targets beyond this date are deferred to subsequent assessment cycles.
- **Methodology-revision window** — this report applies v2 (equal-weight summation + linear mapping); the v3 iteration will explore threshold-based mapping.

Chapter 2 Industry Panorama: The Global Map of Architecture Maturity

For more than a century, the definition of "a good car" has rested with the European and Japanese centers of the industry—on mechanical precision, on functional safety, on manufacturing discipline. As the core architecture of the automobile migrates from a distributed electromechanical system toward a centralized, software-defined one, that definitional authority is being recomposed. This chapter advances, through five figures, the central judgment of the report: **on the dimension of architecture maturity, the global landscape has been substantially reordered—leadership has migrated away from the traditional centers of the industry toward late-moving firms with lighter legacy burdens and toward cross-industry entrants.** The five figures present, in turn, two-dimensional positioning, overall distribution, regional structure, individual ranking, the decoupling of the safety dimension from architecture maturity, and the dual-time horizon.

2.1 Two-Dimensional Positioning: The Synchrony of Tools and Systems

The first figure positions the 22 OEMs along two orthogonal axes. The vertical axis, **Architecture Readiness (AR)**, registers how advanced the designed system currently is; the horizontal axis, **AI²-ML Architecture Intelligence Maturity**, registers the maturity of the tools and methodology with which an organization evolves that architecture.

Figure 2.1 AR × AI²-ML two-dimensional evaluation—positioning of 22 OEMs (Snapshot 2026-01-31). The diagonal band marks the ideal zone (tools ≈ system).

Figure 2.1 AR × AI²-ML two-dimensional evaluation (Snapshot 2026-01-31).

The 22 firms cluster tightly along the diagonal, and the regularity itself bears emphasis: architecture

maturity is strongly coupled to the maturity of the tools used to evolve it; almost no firm departs from the diagonal for long. The implication is structural rather than incidental—**how advanced a system can become is bounded by the methodology with which an organization iterates it, which is to say that architecture maturity is closer to a product of organizational capability than to a separately procurable component.** This in turn exposes the inherent difficulty of the incumbent strategy of "buying into" a more advanced architecture: absent the accompanying evolutionary toolchain, a foreign architecture is difficult to sustain, let alone extend.

A more diffuse pattern is also visible. The majority of firms sit slightly above the diagonal—system maturity (AR) modestly exceeding tooling maturity (AI²-ML), with gaps typically in the 0.5–1.0 range. This is the individual-level signature of "architectural debt" described in the flagship report: system complexity is advancing somewhat faster than the methodology designed to absorb it. The gap appears among Chinese new players (NIO, Xiaomi) as much as among certain incumbents, indicating that this is not the pathology of any single firm but a condition of the industry in transition.

2.2 Distribution: A Right-Skewed Long Tail and an Established High Ground

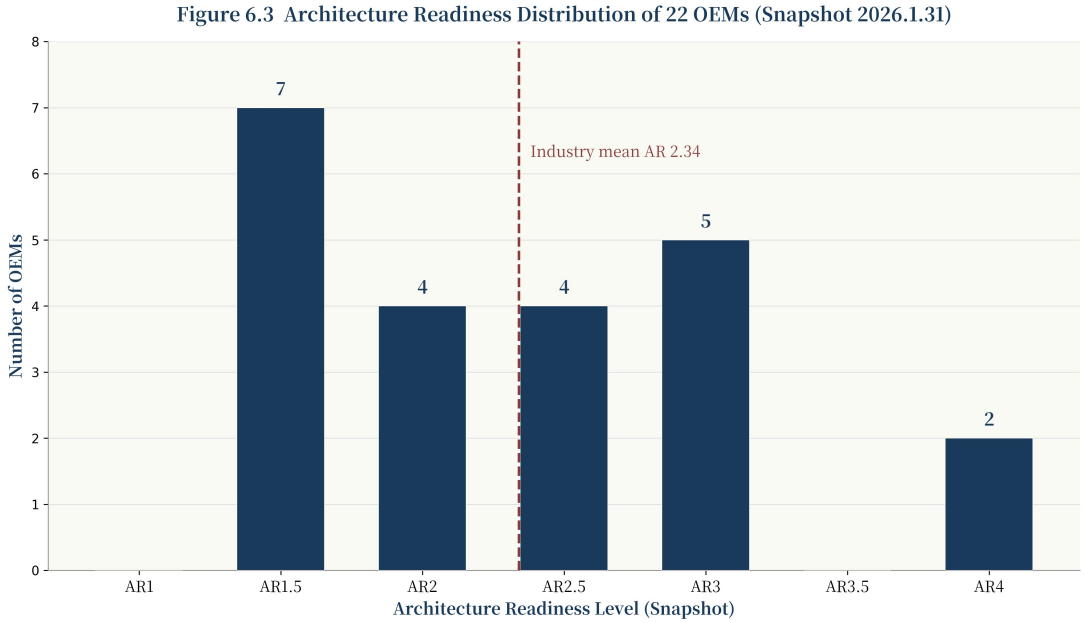

Figure 2.2 Distribution of architecture maturity across 22 OEMs (Snapshot 2026-01-31), with the industry mean line.

Figure 2.2 Distribution of architecture maturity across 22 OEMs (Snapshot 2026-01-31).

The industry mean stands at AR 2.34, but the mean conceals more than it reveals. The distribution is markedly right-skewed: the largest bin is AR1.5 (seven firms, all European and Japanese/Korean incumbents), followed by AR2 (four), AR2.5 (four), AR3 (five), with AR4 (two) at the top. The center of mass sits distinctly on the lower end—more than half of the sample falls below the mean, and the long tail is composed of incumbents.

Two implications follow. First, the weight of the low-end tail is a sign that the lag of the traditional camp is not idiosyncratic but structural: the European and Japanese/Korean incumbents are sedimented, almost collectively, in the AR1.5–2 range. Second, opposite that tail stands a leading cluster that is already constituted, not still forming: AR3 already holds five firms and AR4 holds two,

jointly occupying a distinct high ground of seven. The leap in architecture maturity is, moreover, not smoothly continuous—moving from the distributed paradigm of AR1.5 into the centralized paradigm of AR3 requires reorganizing the domain-controller hierarchy and redrawing the software-hardware decoupling boundary; it is a paradigm shift, not a performance improvement. The longer a firm remains in the low-end tail, the deeper its organizational inertia, and the more onerous that shift becomes.

2.3 Regional Map: The Relative Lag of the Traditional Centers

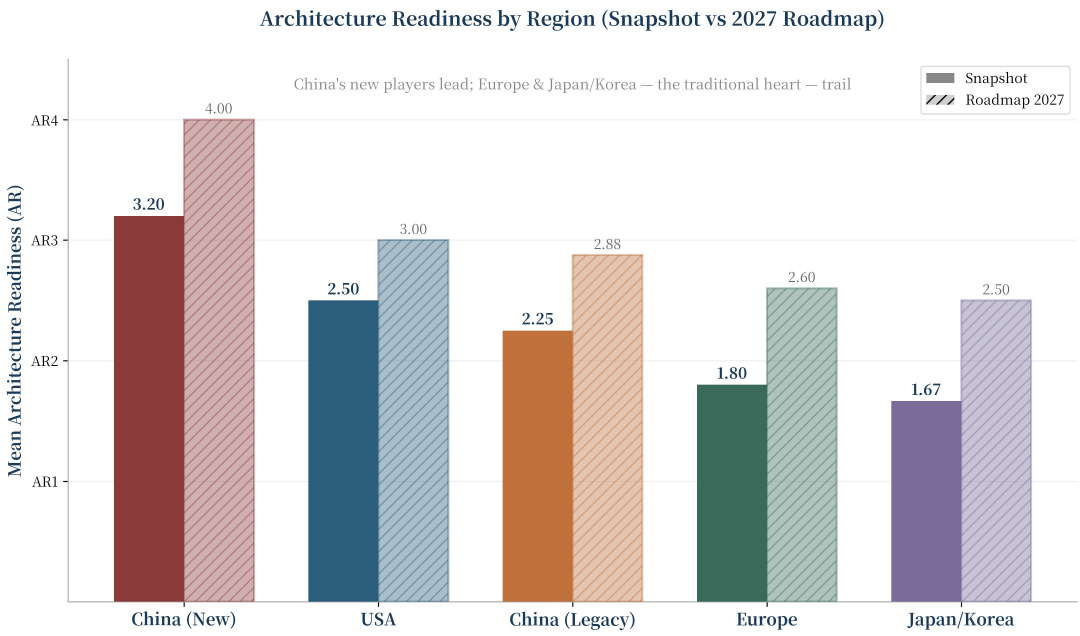

Figure 2.3 Mean architecture maturity by region (Snapshot vs 2027 Roadmap).

Figure 2.3 Mean architecture maturity by region.

Aggregated by region, the report's central structural finding becomes legible: China's new players lead at a regional mean of 3.20; the United States occupies the middle (2.50); Europe (1.80) and Japan/Korea (1.67) sit at the bottom—both below China's legacy automakers (2.25). On the specific dimension of architecture maturity, the traditional centers of the industry exhibit a systematic relative lag.

Three structural forces account for the pattern. The first is **the asymmetry of legacy burden**: China's new players have designed around centralized compute and software definition from inception, whereas European and Japanese/Korean firms carry decades of distributed-ECU architecture, supplier-bound organizational divisions of labor, and capital-allocation routines that, in any paradigm shift, convert from historical assets into migration costs. The second is **the difference in market-iteration pressure**: the Chinese market exerts continuous downward pressure on cycle time, which in turn forces architectural evolution; the incumbents' core markets, by contrast, have tolerated longer software-experience cycles, blunting the urgency of structural change. The third is **the path dependence of existing strengths**: deep accumulation in mechanical engineering and functional safety inclines the incumbents to evaluate competitiveness through the lens of those strengths, and thereby to underestimate the impact of an architectural paradigm shift conducted on a different axis. It bears emphasis that the dimension measured here is architecture maturity specifically; nothing in this assessment negates the incumbents' established advantages in vehicle integration, in brand, or in manufacturing systems.

2.4 Ranking: The AR4 Duo and the Late-Mover Advantage

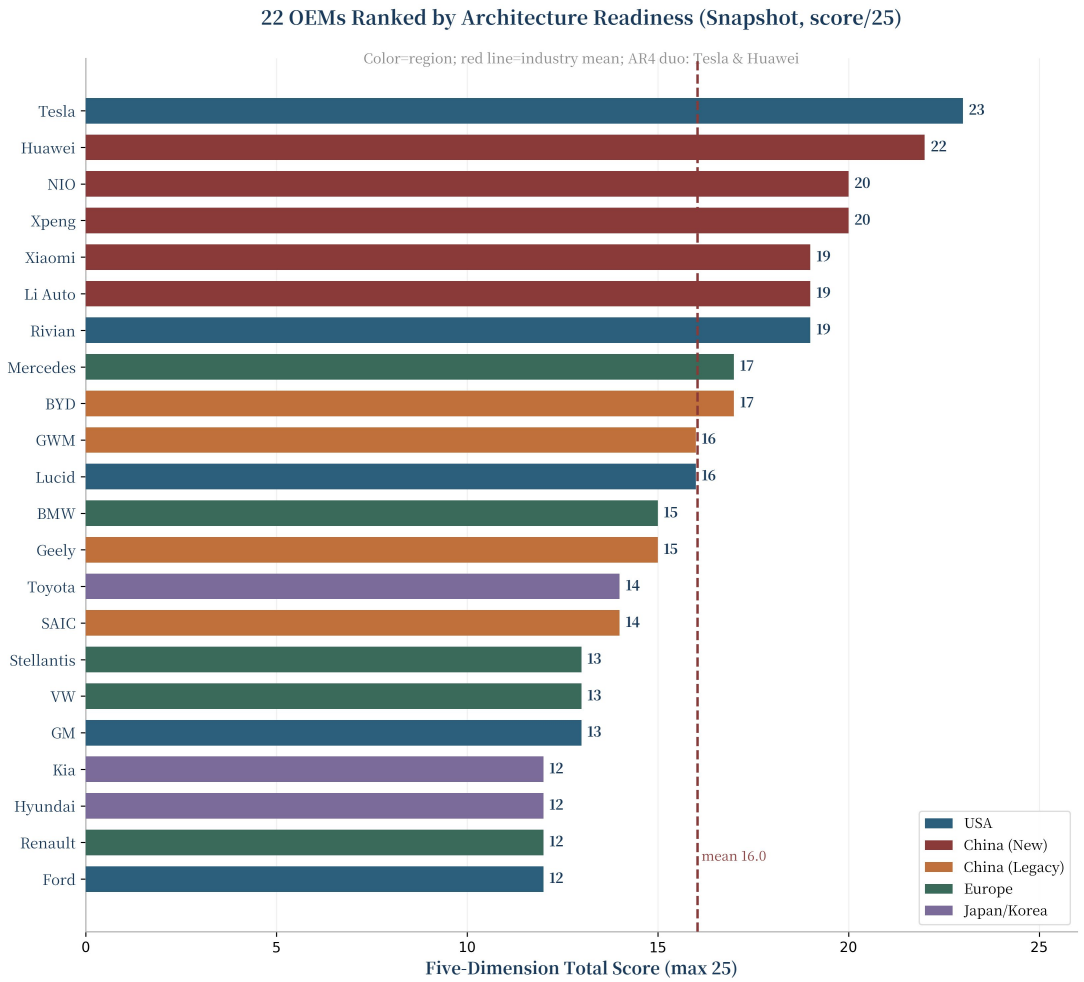

Figure 2.4 Ranking of 22 OEMs by architecture maturity (Snapshot 2026-01-31, five-dimension total / 25).

Figure 2.4 Ranking of 22 OEMs by architecture maturity (Snapshot 2026-01-31).

The firm-by-firm ranking renders the landscape unambiguous, and two facts in particular bear emphasis. **Only two firms reach AR4—Tesla and Huawei HIMA—and neither is a traditional automaker**: the former reconstructs the vehicle as a central computing platform from first principles; the latter, entering from the ICT sector, consolidates the vertical software stack through its MDC compute platform and HarmonyOS. The convergence is not coincidental. The capabilities AR4 demands—the thoroughness of software definition, autonomy over compute, a cross-domain systems view—are precisely those most abundant among AI- and ICT-background firms and most scarce among traditional automakers; a century of accumulation in mechanical engineering and supply chain confers limited leverage at this threshold.

The second fact concerns the cluster below. Taking the sample mean (16 points) as a divide, the leading cluster above is dominated by Chinese firms, while the trailing cluster below holds the European premium triad, the Japanese/Korean majors, and the U.S. traditional incumbents (GM, Ford). The contrast is sharpened by direct comparison: Xpeng, NIO, and Li Auto—founded barely more than a decade ago—register architecture maturity systematically higher than the longer-established premium incumbents. On the dimension of architecture maturity, a longer product and organizational history

manifests less as competitive advantage than as migration cost; the larger the legacy system, the steeper the climb out of the distributed paradigm.

2.5 The Decoupling of Functional-Safety Certification from Architecture Maturity

Where the preceding four figures depict who leads, this section addresses a finding of greater methodological significance: leadership on the functional-safety dimension is not, in itself, leadership in architecture maturity.

The data present a clear paradox. On D4 (functional safety), the European OEMs retain global leadership: Mercedes holds the world's only production L3 system (DRIVE PILOT) under UN-R157, scored D4 = 5; BMW and Volkswagen sustain fine-grained ASIL decomposition with multi-layered redundancy, scored D4 = 4. Those same firms, however, trail across architectural centralization (D1), software-hardware decoupling (D2), and compute concentration (D5).

The root of the paradox is that functional safety and architecture maturity measure two different orders of capability. Functional safety answers "*will the system fail*"—a defensive, stability-oriented capability accumulated through redundant design, process rigor, and validation over long horizons. Architecture maturity answers "*can the system continuously absorb new capability*"—an evolutionary capability that rests on the thoroughness of software definition and the agility of organizational iteration. The two are not positively correlated: Mercedes can lead globally on L3 certification while trailing on software-hardware decoupling, precisely because the former rewards the rigorous maintenance of an existing design and the latter rewards the active reconstruction of an architecture—two organizational dispositions that pull in different, often opposing, directions.

The corollary is consequential for incumbents: **functional-safety certification is not a proxy for architecture maturity.** Treating ASIL D certification as evidence of architectural advancement carries a systematic bias, and the bias grows as the locus of automotive value migrates from driving safety toward continuous evolution as an intelligent terminal. The decades-long process advantages built around safety compliance do not, on the architecture-evolution axis, transfer—their marginal contribution there is diminishing. The condition described here is not a deficit of capability but a mismatch between an evaluation paradigm and a competitive paradigm.

2.6 The Dual-Time Horizon: A Narrowing Gap, Held against Delivery

The final figure shifts the view from current state to confirmed 2027 roadmaps—and yields the report's one signal favorable to the followers, qualified sharply.

Figure 2.5 Architecture leap of 22 OEMs—Snapshot → 2027 Roadmap.

Each line in the dumbbell chart marks a single firm's committed traverse from current state to 2027 roadmap. Three readings emerge in sequence. First, the roadmaps of China's new players uniformly point to AR4; at that point the AR4 tier widens from two firms into a cluster led by Chinese new players, and the leading group continues to expand rather than consolidate. Second—and counter to intuition—the firms with the lowest starting points have committed to the largest leaps: Hyundai and Kia commit to +5 (12 → 17), among the largest in the sample, with BMW and Volkswagen at +4. Transformation intent is, at the level of stated roadmap, clearly registered.

But a roadmap is a commitment, not an accomplished fact. The Roadmap mean (3.05) exceeds the Snapshot mean (2.34) by 0.71—on paper the gap is narrowing—yet between commitment and delivery lies an implementation gap of organization, supply chain, and engineering reality, and that gap is typically

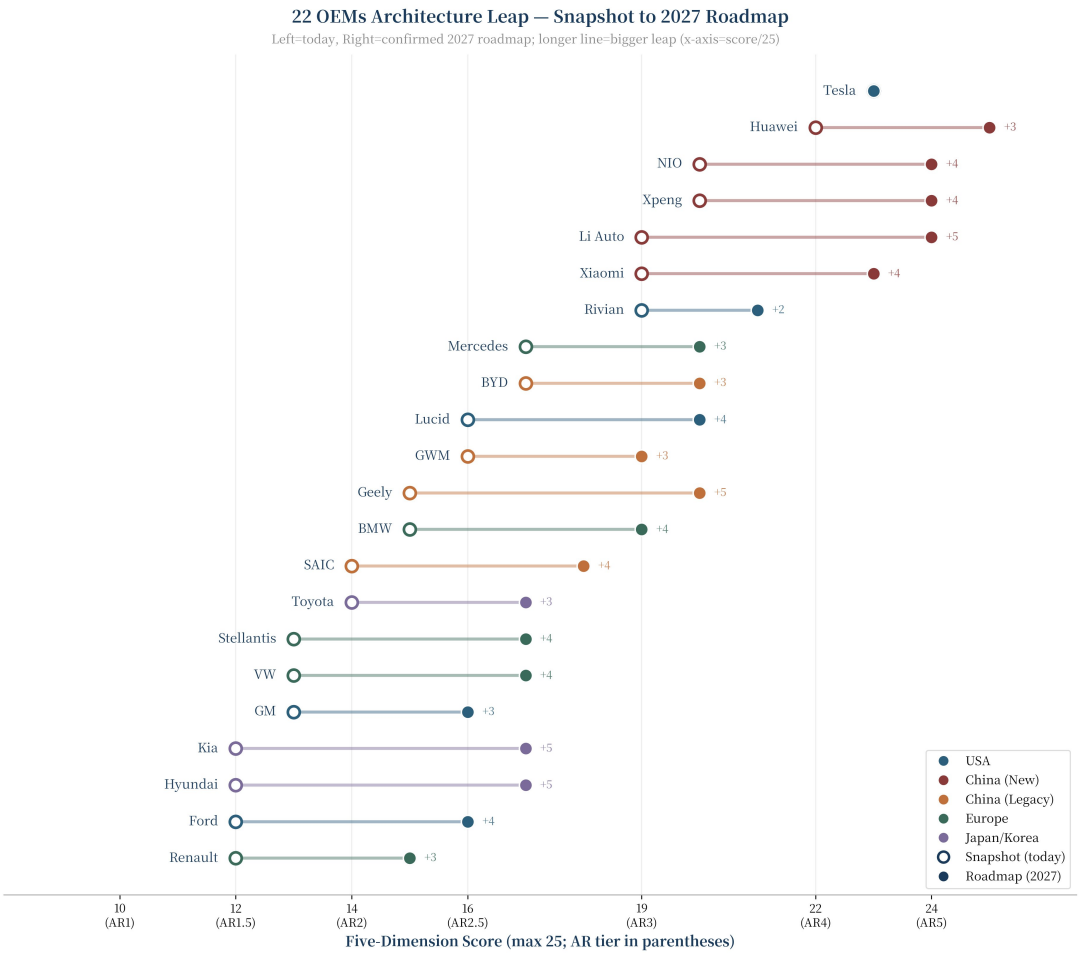

Figure 2.5 Architecture leap of 22 OEMs—Snapshot → 2027 Roadmap. The horizontal axis is the five-dimension total, with the corresponding AR tier annotated below.

wider for incumbents bearing larger legacy systems. Two firms committing to +4 may face very different realized probabilities: the new player with an agile organization on one hand, the century-old incumbent constrained by supplier lock-in and high coordination cost on the other. Volkswagen's CARIAD and its E³ architecture program illustrate the trajectory: an integral plan, met in execution by delay and restructuring. For this reason every roadmap in this report is annotated with a **delivery-risk rating** (see the individual profiles in Chapter 3), drawing a line between the ambition of a roadmap and its feasibility of execution.

Chapter summary: The five figures jointly support a single judgment—on the dimension of architecture maturity, the global landscape has been substantially reordered. China's new players lead with a systematic advantage; the AR4 high ground is held by two non-traditional firms (Tesla and Huawei) spanning the United States and China; the traditional centers of Europe and Japan/Korea register a relative lag. The underlying logic is that architecture maturity measures evolutionary capability and the thoroughness of software definition, not manufacturing accumulation or the rigor of functional safety—the latter being precisely where the incumbents are relatively strong, and the two not being equivalent. The 2027 roadmaps show the paper gap narrowing, but the implementation gap between commitment and delivery is wider for firms carrying larger legacy systems. Chapter 3 dissects the 22 OEMs profile by profile, providing concrete empirical support for each judgment advanced here.

Chapter 3 Individual Profiles: 22 OEMs

The following profiles dissect each of the 22 OEMs along the structure of the assessment: Architecture Snapshot, five-dimensional scoring (current and roadmap), confirmed near-term roadmap, delivery-risk rating, key architectural decisions, evolution trajectory, and evidence chain. The order follows the regional sequence used throughout the report—United States (§3.1–3.5), China new players (§3.6–3.10), China legacy transitioners (§3.11–3.14), Europe (§3.15–3.19), Japan / Korea (§3.20–3.22).

3.1 Tesla (United States / AI-Native Disruptor)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	HW4 (AI4) + FSD V14
Latest Vehicle	Model Y Juniper + Cybertruck Production
Way-to-Play	AI-Native Disruptor (sole complete representative)

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **5/5** — single-SoC dominance with extreme zonal simplification
- D2 SW-HW Decoupling: **4/5** — end-to-end neural networks replacing C++, tightly coupled to AI4
- D3 OTA Maturity: **5/5** — full-stack OTA with phased rollout
- D4 FuSa Architecture: **4/5** — vision-only L4 regulatory certification remains contested
- D5 Compute Concentration: **5/5** — AI4 → AI5 generational leap

Snapshot Total: 23/25 (AR4, AI²-ML L3–L4)

Architecture Confirmed Roadmap (2027)

- HW5 / AI5 (late 2026 to early 2027, Cybercab debut): TSMC N3P, 2,000–2,500 TOPS; the SoC evolves into an inference GPU
- FSD V14 full rollout (FY2026 roadmap)
- Cybercab partial Robotaxi (testing already underway in Dallas / Houston)
- FSD regulatory expansion (approved in the Netherlands, April 2026)
- Optimus Gen 3 production plan

Roadmap 5-Dimensional Scoring

- D1: 5/5, D2: 5/5, D3: 5/5, D4: 3/5, D5: 5/5
- **Roadmap Total: 23/25 (AR4, AI²-ML L4)**

Roadmap Risk Rating: LOW (AI5 already contracted to TSMC N3P; Cybercab in road testing; FSD regulatory approval partially secured)

Key Architectural Decisions

1. Vision-only path (no LiDAR) — the prerequisite for cross-embodiment reuse
2. Full-stack vertical integration — from AI4 silicon to the Cortex training cluster, all in-house
3. End-to-end neural networks supersede 300,000+ lines of C++ (the V12 revolution)
4. FSD–Optimus team merger (June 2025) — Ashok Elluswamy leads both
5. AI5 = the entire SoC evolves into an inference GPU, without dedicated ISP or graphics units

Evolution Trajectory

2019 HW3 → 2023 HW4/AI4 → late 2026–early 2027 AI5 144 TOPS → ~500 TOPS → 2,000–2,500 TOPS

FSD V11 (rule-based) → V12 (end-to-end) → V13 (HW4-native) → V14 (4.5×) 2023 → Jan 2024 → Dec 2024 → 2025–26

Evidence Chain

- **Tier 1**: Tesla 10-K FY2024 (SEC, Jan 2025); Tesla 10-K FY2025 (SEC, Jan 2026)
- **Tier 1**: Tesla Q1 2026 Production/Deliveries announcement (Apr 2, 2026)
- **Tier 2**: Tesla Q1 2026 Shareholder Deck (Apr 22, 2026): OCF $3.9B, FCF $1.4B
- **Tier 3**: Tesla AI Day 2022, 2023 public presentations
- **Tier 3**: Samsung Texas $16.5B AI5 foundry contract announcement (Jul 2025)
- **Tier 3**: Cybercab unsupervised testing in Dallas / Houston (Apr 2026)
- **Tier 4**: Electrek, The Verge — sustained coverage

3.2 GM (United States / Pragmatic Modernizer)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	Ultium + Ultifi 1.0 (partially deployed)
Latest Vehicle	Equinox EV in production + Cadillac Vistiq
Way-to-Play	Pragmatic Modernizer (post-Cruise wind-down)

5-Dimensional Scoring (Snapshot)

- D1: 2/5 — predominantly domain-controller based
- D2: 3/5 — partial service-orientation under Ultifi
- D3: 3/5 — selective OTA already in commercial use
- D4: 3/5 — SuperCruise / UltraCruise engineered into production
- D5: 2/5 — predominantly procured silicon

Snapshot Total: 13/25 (AR1.5, AI²-ML L1)

Architecture Confirmed Roadmap (2027)

- Ultifi software platform deployed across volume models (FY2026–2027)
- Ultium product matrix expansion (Equinox EV and others scaling)
- Deepening platform partnerships with Qualcomm and NVIDIA
- North American EV investment cadence adjusted to tariff policy
- Earnings guidance revised upward (tariff-related legal dividend)

Roadmap Scoring: D1: 3/5, D2: 3/5, D3: 4/5, D4: 3/5, D5: 3/5 → **16/25 (AR2.5, AI²-ML)**

Roadmap Risk Rating: MEDIUM (Ultifi has slipped repeatedly in the past, though 2025–26 partial deployment is now evidenced)

Key Architectural Decisions

1. Cruise Robotaxi wound down (December 2024) — a strategic retreat
2. Ultifi pivots from full-stack in-house development to "application-layer service orientation + foundational silicon procurement"

3. OnStar repositioned as an SDV data platform
4. Partnership with Qualcomm on next-generation cockpit
5. Persistent complexity of China joint ventures (SAIC-GM + GAC-Toyota / Honda)

Evolution Trajectory

2019–2022: traditional domain controllers → 2023–2024: Ultium platform in production + Ultifi delayed → 2025–26: Ultifi 1.0 partial features go live → 2027+: Ultifi 2.0 (planned)

Evidence Chain

- **Tier 1**: GM 10-K FY2024 (SEC, Jan 2025)
- **Tier 1**: GM Q1 2026 Earnings Release (Apr 28, 2026): revenue $43.6B, adjusted EBIT $4.3B
- **Tier 2**: GM Q1 2026 Earnings Deck PDF
- **Tier 2**: GM China Q1 2026 Sales Update (Apr 3, 2026)
- **Tier 1**: Cruise wind-down announcement (Dec 2024)

3.3 Ford (United States / Platform Consumer)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	FNV4 + BlueCruise (Mach-E, Lightning, F-150)
Latest Update	Q1 Ford Pro software subscriptions +30% to 879K
Way-to-Play	Platform Consumer + Commercial Software

5-Dimensional Scoring (Snapshot)

- D1: 2/5 — Mach-E / Lightning platforms remain separate
- D2: 2/5
- D3: 3/5 — BlueCruise + Ford Power-Up
- D4: 3/5
- D5: 2/5

Snapshot Total: 12/25 (AR1.5, AI²-ML L1)

Architecture Confirmed Roadmap (2027)

- UEV (Universal EV) low-cost EV platform (Skunk Works team, 2027+)
- FNV4 + BlueCruise multi-modal driving-assist upgrades (continuous OTA)
- Deepening Ford Pro commercial-software subscription business
- Model e continues to lose money, strategically retained
- North American tariff and supply-chain realignment

Roadmap Scoring: D1: 3/5, D2: 3/5, D3: 4/5, D4: 3/5, D5: 3/5 → **16/25 (AR2.5, AI²-ML)**

Roadmap Risk Rating: MEDIUM (no firm SOP timeline yet for UEV; the Skunk Works team was only constituted in April 2024)

Key Architectural Decisions

1. **Ford Pro software subscriptions +30 % to 879K** — the key SDV-commercialization KPI
2. Next-generation low-cost UEV platform under development
3. Model e segment Q1 loss of $777M, strategically retained

4. FNV4 + BlueCruise multi-modal driving-assist upgrades, ongoing
5. Mach-E / Lightning retain their existing architectures

Evolution Trajectory

2019–2022: FNV3 (domain controllers) → 2023–2025: FNV4 (Mach-E / Lightning) → April 2024: Skunk Works team constituted → 2026–2027: UEV platform development → 2027+: FNV5 (planned)

Evidence Chain

- **Tier 1**: Ford 10-K FY2024 (SEC, Feb 2025)
- **Tier 1**: Ford Q1 2026 Earnings (Apr 29, 2026): revenue $43.3B, net income $2.5B
- **Tier 2**: Ford Q1 2026 Press Release + Presentation
- **Tier 2**: Ford Pro subscription data (879K, +30 % YoY)
- **Tier 3**: BlueCruise Europe expansion announcement (Nov 2025)
- **Tier 4**: *Reuters*, *Automotive News* — Skunk Works coverage

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3.4 Rivian (United States / AI-Native Disruptor, VW Alliance)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	R1 (R1T / R1S, 40–80 ECUs → 7 ECUs after simplification)
Next Platform	R2 / R3 (2026 production ramp)
Way-to-Play	AI-Native Disruptor + Tier-1-Led Alliance Principal

5-Dimensional Scoring (Snapshot)

- D1: 4/5 — R1 has reduced ECUs from 40–80 down to 7
- D2: 4/5
- D3: 4/5
- D4: 3/5
- D5: 4/5

Snapshot Total: 19/25 (AR3, AI²-ML L2)

Architecture Confirmed Roadmap (2027)

- R2 mass-market platform production ramp (SOP 2026, scale 2027)
- DOE $4.5B critical loan approved (April 2026)
- VW ID.EVERY1 on the RV Tech architecture (2027 production)
- RV Tech joint venture 50:50 (VW $5.8B capital injection)
- R3 derivative models (2027+)

Roadmap Scoring: D1: 5/5, D2: 4/5, D3: 4/5, D4: 4/5, D5: 4/5 → **21/25 (AR3, AI²-ML)**

Roadmap Risk Rating: LOW (R2 already at SOP; VW $5.8B injected; DOE $4.5B approved; ID.EVERY1 2027 under contract)

Key Architectural Decisions

1. **Extreme ECU consolidation**: 40–80 → 7 ECUs, saving 2.5 kilometers of wiring
2. R2 platform at scale ($45K–$55K mass market)
3. **VW $5.8B injection into RV Tech** (November 2024) — Rivian becomes an object of architectural learning for Western incumbents

4. DOE $4.5B critical loan approved (April 2026)
5. Zonal-topology domain-controller architecture as a benchmark for global technology export

Evolution Trajectory

2018 founded → 2021 R1T launched → November 2024 VW $5.8B investment → 2026 R2 production ramp → April 2026 DOE $4.5B loan approved → 2027 VW ID.EVERY1 (on Rivian architecture) in production

Evidence Chain

- **Tier 1**: Rivian 10-K FY2024
- **Tier 1**: Rivian Q1 2026 Financial Results (Apr 30, 2026)
- **Tier 2**: VW Group China Investor Update 2026 (Apr 23)
- **Tier 1**: VW–Rivian joint announcement (Nov 12, 2024)
- **Tier 3**: Rivian R2 reveal event (March 2024)
- **Tier 3**: DOE $4.5B loan approval announcement (April 2026)

3.5 Lucid (United States / AI-Native Disruptor)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	Air / Gravity (full-stack high-voltage SDV)
Investor Day	Investor Day 2026 (Mar 12, 2026)
Interim CEO	Marc Winterhoff
Way-to-Play	AI-Native Disruptor + Robotaxi Platform Supplier

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **3/5** — zonal transition in progress
- D2 SW-HW Decoupling: **3/5** — in-house software across the full-stack high-voltage electric powertrain
- D3 OTA Maturity: **3/5**
- D4 FuSa Architecture: **4/5** — engineering depth from a former Tesla VP + Robotaxi-grade safety validation
- D5 Compute Concentration: **3/5**

Snapshot Total: 16/25 (AR2.5, AI²-ML L1–L2)

Architecture Confirmed Roadmap (2027)

- ★ **Uber Robotaxi expanded to at least 35,000 vehicles** (Apr 14, 2026; from 20K to 35K, +75 %)
- ★ **$1.05B total capital raise** = $300M common stock offering + Uber $200M + Ayar/PIF $550M convertible preferred
- ★ **Uber 11.5 % stake** (37.75M Class A common shares, triggering the 10 % disclosure threshold)
- ★ **Midsize platform** — smaller battery pack at equivalent range, engineered for Robotaxi scale economics (2026 SOP)
- **Robotaxi commercial launch** — San Francisco Bay Area within 2026 (Nuro leading the autonomy stack, testing initiated December 2025, test-vehicle deliveries completed February 2026)

- **Hertz Oro Mobility** — fleet day-to-day operations
- Lucid Gravity continues in production; full-stack high-voltage electric powertrain technology exported

Roadmap 5-Dimensional Scoring

- D1: 4/5, D2: 4/5, D3: 4/5, D4: 4/5, D5: 4/5
- **Roadmap Total: 20/25 (AR3, AI²-ML L2)**

Roadmap Risk Rating: MEDIUM (Uber partnership signed + $1.05B raised + test vehicles delivered; yet Lucid remains loss-making (Q1 revenue only $282.5M), the 35K-vehicle delivery window spans several years, and reliance on PIF long-term capital persists)

Key Architectural Decisions

1. ★ **Pivot to Robotaxi platform supplier** — from a luxury-EV brand to a high-utilization fleet platform supplier
2. ★ **Uber 35,000-vehicle commitment** (Gravity + Midsize) — a qualitative shift in commercialization path
3. ★ **$1.05B capital raise** (common $300M + Uber $200M + PIF $550M)
4. ★ **Uber 11.5 % stake** — deepened strategic alignment
5. **Midsize platform** — smaller battery at equivalent range, optimized for Robotaxi unit economics
6. Three-way division of labor: Nuro (autonomy) + Hertz Oro Mobility (fleet operations) + Uber (demand)
7. Full-stack high-voltage SDV powertrain efficiency (Air registering the industry's highest energy efficiency) carried into Robotaxi production

Evolution Trajectory

2021 Air launched → 2024 Gravity in production → July 2025 Lucid–Nuro–Uber Robotaxi partnership → December 2025 Nuro autonomy testing initiated → February 2026 test-vehicle deliveries completed → March 12, 2026 Investor Day → April 14, 2026 $1.05B raise + Uber 35K commitment → 2026 Bay Area Robotaxi commercial launch → 2027 Midsize at scale

Evidence Chain

- **Tier 1**: Lucid Group 10-K FY2024, FY2025 (NASDAQ: LCID)
- **Tier 1**: Lucid Q1 2026 Results (revenue $282.5M)
- **Tier 1**: ★ Lucid public stock offering announcement ($1.05B total raise, Apr 14, 2026)
- **Tier 1**: ★ Uber SEC Form 3 (11.5 % stake, 37.75M shares)
- **Tier 2**: ★ Lucid Investor Day 2026 (Mar 12, 2026)
- **Tier 3**: ★ Uber / PIF investment + 35K Robotaxi announcement (Apr 14, 2026, PR Newswire)
- **Tier 4**: *Electrek*, *24/7 Wall St*, *Yahoo Finance* — sustained coverage

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3.6 Xpeng (China New Players / AI-Native Disruptor + Physical AI)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	X-EEA 3.0 + Turing chip (G7 Ultra in production)
Latest Tech	★ VLA 2.0 (full rollout Mar 2, 2026)
Way-to-Play	AI-Native Disruptor + Physical AI

5-Dimensional Scoring (Snapshot)

- D1: 4/5
- D2: 4/5 — VLA 2.0 end-to-end architecture
- D3: 4/5
- D4: 3/5
- D5: 5/5 — G7 Ultra: 3× Turing = 2,250 TOPS

Snapshot Total: 20/25 (AR3, AI²-ML L2–L3)

Architecture Confirmed Roadmap (2027)

- X-EEA 4.0 (planned 2027)
- IRON humanoid robot + flying-car system → full-stack "Physical AI"
- VW CEA architecture collaboration (first China-market vehicles from 2027)
- Four new vehicles to launch globally in 2026; overseas sales targeted to double
- Deepening Robotaxi business

Roadmap Scoring: D1: 5/5, D2: 5/5, D3: 5/5, D4: 4/5, D5: 5/5 → **24/25 (AR4, AI²-ML)**

Roadmap Risk Rating: LOW (VLA 2.0 already in full rollout; Turing in production; VW collaboration past concept stage; first quarterly net profit posted)

Key Architectural Decisions

1. ★ **VLA 2.0 (full rollout Mar 2, 2026)** — end-to-end large model + Turing AI
2. Turing in-house silicon in production (Q2 2025) — 750 TOPS per chip, supporting 30B parameters
3. G7 Ultra: 3× Turing = 2,250 TOPS (among the highest of any production SUV globally)
4. **Full-stack Physical AI ecosystem**: AI vehicle + IRON robot + flying car
5. VW CEA architecture collaboration — reverse technology export to Europe

Evolution Trajectory

2017 founded → 2022 X-EEA 2.0 → 2024 X-EEA 3.0 → August 2024 Turing tape-out → Q2 2025 Turing in production → March 2, 2026 VLA 2.0 full rollout → April 2026 Auto China Physical AI showcase → 2027 X-EEA 4.0 (planned)

Evidence Chain

- **Tier 1**: XPeng 20-F FY2024 (SEC, Apr 16, 2025)
- **Tier 1**: XPeng 20-F FY2025 (SEC, Apr 16, 2026): deliveries 429,445 (+125.9 %), revenue RMB 76.7B (+87.7 %)
- **Tier 2**: Q4 2025 + FY2025 Earnings Call (Mar 20, 2026)
- **Tier 3**: VLA 2.0 official announcement (Mar 2, 2026)
- **Tier 3**: Auto China 2026 Tech Launch (Apr 24, 2026)
- **Tier 3**: 1024 Tech Day 2024
- **Tier 3**: Turing chip technical release (Aug 2024)
- **Tier 1**: VW–Xpeng strategic partnership announcement (Jul 2023)

3.7 NIO (China New Players / AI-Native Disruptor + Vertical Integration)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	NT2.0 + Cedar platform + Shenji NX9031
Latest Vehicle	★ ES9 (debut Apr 2026 Auto China)
Way-to-Play	Vertical Integration + AI-Native

5-Dimensional Scoring (Snapshot)

- D1: 4/5
- D2: 4/5 — ★ SkyOS, a vehicle-wide AI-native OS
- D3: 4/5
- D4: 3/5
- D5: 5/5 — Shenji NX9031: 5nm, ~1,000 TOPS effective

Snapshot Total: 20/25 (AR3, AI²-ML L2)

Architecture Confirmed Roadmap (2027)

- ★ NWM (NIO WorldModel) — driving-assist large model in production
- ★ SkyOS deployed across the full lineup
- NT3.0 + Cedar platform (production 2026–27)
- ONVO L90 (Cedar-derived, launched Apr 21)
- Multi-brand matrix: NIO + ONVO + FIREFLY
- Global expansion of the battery-swap network

Roadmap Scoring: D1: 5/5, D2: 5/5, D3: 5/5, D4: 4/5, D5: 5/5 → **24/25 (AR4, AI²-ML)**

Roadmap Risk Rating: LOW (the NX9031 + SkyOS + NWM triad already in production debut with ES9)

Key Architectural Decisions

1. ★ **SkyOS** — a vehicle-wide AI-native body OS (peer-level with HarmonyOS Auto / Tesla OS)
2. ★ **NWM (NIO WorldModel)** — in-house driving-assist large model
3. **Shenji NX9031** (released Jul 2024) — the world's first 5nm automotive-grade driving-assist chip
4. ★ **ES9 flagship executive SUV** (debut Apr 2026 Auto China) — the triad enters production
5. ONVO L90 (Apr 21, 2026) — Cedar-derived
6. Q1 2026: revenue ¥25.53B (+74 %), vehicle gross margin 18.8 %

Evolution Trajectory

2018 founded → 2022 NT2.0 (ET7, ES7) → July 2024 Shenji NX9031 unveiled → 2024 ONVO brand launched → 2025 FIREFLY brand launched → April 2026 ES9 + SkyOS + NWM triad in production → 2026–27 NT3.0 + Cedar

Evidence Chain

- **Tier 1**: NIO 20-F FY2025 (SEC, Apr 10, 2026)
- **Tier 1**: NIO Q1 2026 Financial Results (May 21, 2026): revenue ¥25.53B
- **Tier 3**: NIO IN 2024 (Jul 27, 2024) — Shenji NX9031 unveiling
- **Tier 3**: NIO ET9 official technology page (NX9031, ADAM, SkyOS)
- **Tier 3**: ES9 + ONVO L90 Auto China 2026 launch (Apr 2026)
- **Tier 1**: HKEX 9866 + SGX filings

3.8 Li Auto (China New Players / AI-Native Disruptor + Family-First)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	LEEA 3.0 + Mind GPT VLA (i8 first production deployment)
Latest Vehicle	Li i6 (Q1 2026 intensive deliveries)
Way-to-Play	AI-Native Disruptor + Family-First

5-Dimensional Scoring (Snapshot)

- D1: 4/5 — LEEA 3.0 central-compute architecture
- D2: 4/5 — Mind GPT multi-modal end-to-end VLA
- D3: 4/5
- D4: 3/5
- D5: 4/5 — early NVIDIA Thor customer

Snapshot Total: 19/25 (AR3, AI²-ML L2–L3)

Architecture Confirmed Roadmap (2027)

- LEEA 3.0 deployed across the full lineup
- Mind GPT multi-modal end-to-end VLA, continued evolution
- MindVLA-o1 (disclosed at NVIDIA GTC 2026)
- Dual lineup: L-series (range-extender) + i-series (pure EV)
- Fleet of 700K+ vehicles generating training-data return flow

Roadmap Scoring: D1: 5/5, D2: 5/5, D3: 5/5, D4: 4/5, D5: 5/5 → **24/25 (AR4, AI²-ML)**

Roadmap Risk Rating: LOW (i8 VLA already in production; i6 delivered; LEEA 3.0 deployed on models currently on sale)

Key Architectural Decisions

1. **LEEA 3.0 central-compute E/E architecture** (note: the version number is 3.0, not 5.0)
2. **i8 VLA model** (production July 2025) — China's first OEM to mass-produce a VLA
3. **Mind GPT multi-modal end-to-end VLA**, in continuous evolution
4. **Mind GPT-3o** — trained on 3 trillion tokens and 1.2 billion kilometers of real-vehicle data
5. Li i6 (pure-EV sedan), intensive Q1 deliveries, carrying low-cost high-tier driving-assist
6. FY2025 total revenue RMB 112.3B

Evolution Trajectory

2015 founded → 2022 L9 → 2024 L6 → July 2025 i8 (LEEA 3.0 + VLA) → Q1 2026 i6 intensive deliveries → April 2026 Auto China LEEA 3.0 detailed → 2027+ LEEA 4.0 (planned)

Evidence Chain

- **Tier 1**: Li Auto 20-F FY2025 (SEC, Apr 10, 2026)
- **Tier 1**: Q4 / FY2025 Results (Mar 12, 2026): revenue RMB 112.3B
- **Tier 1**: Li Auto Q1 2026 (scheduled May 28, 2026)
- **Tier 3**: i8 launch (Aug 20, 2025; VLA Driver + MindGPT debut)
- **Tier 3**: MindVLA-o1 (NVIDIA GTC 2026)
- **Tier 3**: Li Auto AI Talk 2025

3.9 Xiaomi (China New Players / Cross-Device Ecosystem + Aggressive Transformer)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	HyperOS + SU7 + YU7
Latest Vehicle	YU7 (in-house "four-in-one domain-controller module")
Way-to-Play	Cross-Device Ecosystem (cross-industry entrant)

5-Dimensional Scoring (Snapshot)

- D1: 4/5 — ★ in-house four-in-one domain-controller module
- D2: 4/5 — HyperOS cross-device ecosystem
- D3: 4/5
- D4: 3/5
- D5: 4/5 — SU7 700 TOPS + XLA cognitive large model

Snapshot Total: 19/25 (AR3, AI²-ML L2)

Architecture Confirmed Roadmap (2027)

- 2026 delivery target of 550,000 vehicles
- "Human × Car × Home" ecosystem deepening
- HyperOS cross-device ecosystem expansion
- AI investment: over RMB 40B in 2026, of which RMB 16B for AI / embodied intelligence
- RMB 60B AI investment over the next three years
- Next-generation platform (2027+)

Roadmap Scoring: D1: 4/5, D2: 5/5, D3: 5/5, D4: 4/5, D5: 5/5 → **23/25 (AR4, AI²-ML)**

Roadmap Risk Rating: LOW (SU7 + YU7 already in production; 2025 marks the first positive operating profit for the EV business at RMB 0.9B)

Key Architectural Decisions

1. **★ YU7 in-house "four-in-one domain-controller module"** — the linchpin of in-house centralization
2. **HyperOS dual-kernel architecture** (Linux + Vela) — cross-device ecosystem advantage
3. SU7 specifications: 800 V high-voltage platform + LiDAR + 700 TOPS + XLA cognitive large model
4. 9,100-ton HyperCasting one-piece die-casting
5. EV business first positive operating profit in 2025: RMB 0.9B, gross margin 24.3 %
6. 2025 deliveries: 411,082 units (+200.4 % YoY)

Evolution Trajectory

2021 EV venture announced → March 2024 SU7 in production → June 2025 YU7 in production → Q1 2026 cumulative deliveries cross 600,000 → April 2026 YU7 full technical disclosure → 2026 target 550,000 units → 2027+ next-generation platform

Evidence Chain

- **Tier 1**: Xiaomi Group HKEX Annual Reports 2024, 2025
- **Tier 2**: Xiaomi FY2025 Q4 Presentation PDF (Mar 24, 2026): revenue RMB 457.3B (+25 %)
- **Tier 1**: Xiaomi 2025 Annual Report (Apr 28, 2026)
- **Tier 3**: SU7 Ultra + YU7 Auto China 2026 launch
- **Tier 3**: Lei Jun annual address (Q4 2025 + FY)

- **Tier 4**: *LatePost*, *36Kr* — in-depth coverage

3.10 Huawei HIMA (China New Players / Tier-1-Led Alliance + Five-Brand Coordination)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	ADS 4.0 WEWA + HarmonyOS Intelligent Mobility (Five Brands)
Brands	AITO / LUXEED / STELATO / MAEXTRO / ★ **SAIC Shangjie**
Way-to-Play	Tier-1-Led Alliance

5-Dimensional Scoring (Snapshot)

- D1: 4/5
- D2: 5/5 — HarmonyOS NEXT, a pure microkernel
- D3: 5/5 — ~10 billion cumulative kilometers (as of Dec 2025)
- D4: 4/5
- D5: 4/5 — MDC series + in-house Ascend silicon

Snapshot Total: 22/25 (AR4, AI²-ML L3)

Architecture Confirmed Roadmap (2027)

- ADS 5.0 (planned 2026–27)
- ★ "Giant Whale" 800 V battery platform (proactive prediction via five-dimensional edge-cloud data coordination)
- ★ Tuling intelligent chassis platform upgrade
- 2026 targets: 3 million cumulative deliveries + 80+ vehicle models
- 2026 five-brand coordinated new models:
  - Shangjie Z7/Z7T (sedan / shooting brake)
  - AITO M6
  - LUXEED V9 (first MPV)
  - MAEXTRO SUV/MPV
  - AITO M9 Ultimate

Roadmap Scoring: D1: 5/5, D2: 5/5, D3: 5/5, D4: 5/5, D5: 5/5 → **25/25 (AR4, AI²-ML)**

Roadmap Risk Rating: LOW (all five brands already in production; cross-validation possible across five publicly listed partner financials)

Key Architectural Decisions

1. ★ **Formal five-brand coordination** established (with SAIC Shangjie newly added)
2. ★ **"Giant Whale" 800 V battery platform** — proactive prediction via five-dimensional edge-cloud data coordination
3. ★ **Tuling intelligent chassis platform upgrade**
4. ADS 4.0 WEWA architecture (World Engine + World Action Model)
5. HarmonyOS NEXT, a pure microkernel, commercialized Oct 2024
6. 2025 full-year deliveries 589,107 units (+32% YoY); cumulative crosses 1 million

Evolution Trajectory

2019 ADS 1.0 → 2022 ADS 2.0 → 2024 ADS 3.0 → Apr 2025 ADS 4.0 WEWA → Oct 2025 cumulative 1M → Apr 2026 Auto China: Five Brands + Giant Whale + Tuling → 2026–27 ADS 5.0 + 3M cumulative target

Evidence Chain

- **Tier 1**: Huawei 2025 Annual Report (Mar 27, 2026)
- **Tier 1**: Cross-validation via partner financials (Seres SSE: 601127; BAIC BluePark 600733; JAC 600418; Chery; SAIC 600104)
- **Tier 3**: Huawei HDC 2024, 2025
- **Tier 3**: ADS 4 Shanghai Qiankun Event (Apr 22, 2025)
- **Tier 3**: HarmonyOS Intelligent Mobility — Auto China 2026 (Apr 24, 2026)
- **Tier 4**: Xinhuanet, People's Daily Online — coverage of HarmonyOS Intelligent Mobility at Auto China

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3.11 BYD (China Legacy Transition / Hybrid Architect + Engineering Depth)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	e3.0 + DiPilot (100 / 300 / 600 three-tier, fully in-house)
Latest Tech	−30 °C cold-cabin 12-minute 20 %–97 % fast charge
Way-to-Play	Hybrid Architect + Vertical Integration

5-Dimensional Scoring (Snapshot)

- D1: 3/5
- D2: 3/5
- D3: 4/5 — 72M km daily training (440K+ fleet)
- D4: 4/5 — deep cumulative validation across YunNian and Blade Battery
- D5: 3/5

Snapshot Total: 17/25 (AR2.5, AI²-ML L1–L2)

Architecture Confirmed Roadmap (2027)

- e3.0 extreme-cold fast-charge technology at scale
- DiPilot full-stack in-house, continued optimization
- e4.0 (planned)
- Tianshen Eye autonomous-driving brand, deepening
- Overseas expansion (Europe / Southeast Asia / South America)

Roadmap Scoring: D1: 4/5, D2: 4/5, D3: 4/5, D4: 4/5, D5: 4/5 → **20/25 (AR3, AI²-ML)**

Roadmap Risk Rating: LOW (DiPilot free across the lineup already live; engineering evidence for e3.0 is strong; production volume is the world's largest)

Key Architectural Decisions

1. e3.0 platform broadly deployed (Han / Dolphin / Seal / Song PLUS, etc.)
2. DiPilot free across the lineup (since February 2025) — 100 / 300 / 600 three-tier
3. **★ −30 °C cold-cabin 12-minute 20 %–97 % fast-charge demonstration**

4. Tianshen Eye (autonomous-driving brand) — 72M km daily training
5. Vertical integration across battery / motor / power electronics (world's first at scale)
6. Q1 2026 revenue ¥150.23B

Evolution Trajectory

2003 founded → 2021 e3.0 → 2024 DiPilot 600 commercial → February 2025 DiPilot free across the lineup → Q1 2026 e3.0 extreme fast-charge + DiPilot full-stack showcase → 2027+ e4.0 (planned)

Evidence Chain

- **Tier 1**: BYD 2025 Annual Results PDF / HKEX (Mar 27, 2026)
- **Tier 1**: BYD Q1 2026 Report PDF / HKEX (Apr 28, 2026): revenue ¥150.23B
- **Tier 1**: SSE 002594 A-share dual disclosure
- **Tier 3**: Tianshen Eye Feb 2025 launch
- **Tier 3**: Auto China 2026 extreme fast-charge demonstration
- **Tier 4**: *Yicai*, *Caixin* — in-depth coverage

3.12 Geely (China Legacy Transition / Hybrid Architect)

Note: per the latest PDF, **Rising (Feiyan) belongs to SAIC, not to Geely**. The correct Geely brand matrix is: Geely Galaxy + Zeekr + Lynk & Co + Geometry + Livan + Volvo + Polestar + Smart + Lotus.

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	SEA Haohan + GEA + Zeekr E-EA
Key Architecture	★ E-EA = vehicle-wide 800 V + central "super-brain" architecture
Way-to-Play	Hybrid Architect + Multi-Brand Matrix

5-Dimensional Scoring (Snapshot)

- D1: 3/5 — ★ E-EA central "super-brain"
- D2: 3/5 — Flyme Auto + Xingrui computing
- D3: 3/5
- D4: 3/5 — accumulated through Volvo partnership
- D5: 3/5

Snapshot Total: 15/25 (AR2, AI²-ML L1–L2)

Architecture Confirmed Roadmap (2027)

- E-EA 2.0 evolution
- Zeekr + Lynk & Co merger (announced February 2026) → 18-month technical integration
- High-end pure-EV mid-platform migrating to Geely Galaxy + Lynk
- SEA Haohan architecture as cross-brand platform (Geely / Zeekr / Lynk / Polestar / Smart)
- Q1 2026 total sales > 709,000 units; Zeekr March +90 % to 29,318

Roadmap Scoring: D1: 4/5, D2: 4/5, D3: 4/5, D4: 4/5, D5: 4/5 → **20/25 (AR3, AI²-ML)**

Roadmap Risk Rating: MEDIUM (E-EA already in production on Zeekr, but full-brand unification will require an 18-month integration cycle)

Key Architectural Decisions

1. ★ **E-EA = vehicle-wide 800 V + central "super-brain" architecture** (the key architectural definition)
2. Zeekr as the SDV benchmark (001 / 009)
3. **Zeekr–Lynk & Co merger** (February 2026) — internal architectural consolidation
4. SEA Haohan architecture shared across brands (Geely / Zeekr / Lynk / Polestar / Smart)
5. Fourteen years of accumulated technology interchange with Volvo

Evolution Trajectory

1986 founded → 2010 acquires Volvo → 2020 SEA Haohan architecture → 2021 Zeekr established → 2024 Zeekr 9 (E-EA) → February 2026 Zeekr–Lynk merger → 2027+ E-EA 2.0

Evidence Chain

- **Tier 1**: Geely HKEX 0175 Annual Reports 2024, 2025
- **Tier 2**: Geely 2025 Annual Results Presentation PDF (Mar 18, 2026)
- **Tier 1**: Geely 2025 Annual Report (Apr 29, 2026)
- **Tier 1**: Zeekr 20-F (NYSE)
- **Tier 1**: Volvo OMX filings
- **Tier 4**: *Caixin*, *Economic Observer* — in-depth coverage

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3.13 GWM (China Legacy Transition / Hybrid Architect, Upgraded)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	★ Coffee Intelligence (upgraded) "central compute + zonal control" E/E
Latest Vehicle	WEY V9X flagship SUV (debut April 2026 Auto China)
Way-to-Play	Hybrid Architect + Globalization

5-Dimensional Scoring (Snapshot)

- D1: 3/5 — ★ Coffee Intelligence upgraded to central + zonal
- D2: 3/5
- D3: 3/5
- D4: 4/5
- D5: 3/5

Snapshot Total: 16/25 (AR2.5, AI²-ML L1–L2)

Architecture Confirmed Roadmap (2027)

- Coffee Intelligence 4.0 (planned)
- End-to-end driving-assist validated across Hi4 hybrid + pure-EV scenarios
- Overseas exports reaching historic highs (high-margin offset against domestic pressure)
- HAOMO.AI autonomous-driving subsidiary
- Multi-brand matrix: Haval / Tank / Ora / WEY / GWM Pao

Roadmap Scoring: D1: 4/5, D2: 4/5, D3: 4/5, D4: 4/5, D5: 3/5 → **19/25 (AR3, AI²-ML)**

Roadmap Risk Rating: MEDIUM (Coffee Intelligence has been upgraded, but HAOMO.AI commercialization is below expectation)

Key Architectural Decisions

1. ★ **"Coffee Intelligence" upgraded to "central compute + zonal control" E/E architecture** (key upgrade)
2. WEY V9X flagship SUV debuts the new architecture (April 2026 Auto China)
3. End-to-end driving-assist across both Hi4 hybrid and pure-EV scenarios
4. Overseas exports offsetting domestic price competition
5. HAOMO.AI (autonomous-driving subsidiary) operating independently

Evolution Trajectory

1984 founded → 2021 Coffee Intelligence 1.0 → 2024 Coffee Intelligence 3.0 → Q1 2026 Coffee Intelligence upgraded to central + zonal → April 2026 WEY V9X debut → 2027+ Coffee Intelligence 4.0 (planned)

Evidence Chain

- **Tier 1**: GWM HKEX 2333 + SSE 601633 dual disclosure
- **Tier 1**: GWM 2025 Annual Report / HKEX (Mar 27, 2026)
- **Tier 1**: GWM Q1 2026 Report / HKEX (Apr 24, 2026)
- **Tier 3**: HAOMO.AI public releases
- **Tier 3**: WEY V9X Auto China 2026 launch
- **Tier 4**: *36Kr*, *Caixin* — coverage

3.14 SAIC (China Legacy Transition / Hybrid Architect + Internal Consolidation)

Note: IM Motors and **Rising (Feiyan) both belong to SAIC** (correcting earlier attribution confusion).

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	IM AD + Rising R-Tech + SAIC Passenger Vehicle
Latest Tech	★ IM "vehicle-wide digital chassis" solution (April 2026 Auto China)
Way-to-Play	Hybrid Architect + Internal Consolidation

5-Dimensional Scoring (Snapshot)

- D1: 2/5
- D2: 3/5
- D3: 3/5
- D4: 4/5 — 30+ years of FuSa accumulation through the VW JV
- D5: 2/5

Snapshot Total: 14/25 (AR2, AI²-ML L1)

Architecture Confirmed Roadmap (2027)

- ★ Rising technology mid-platform consolidated into the group's "seven technology foundations" (centralization)
- IM + Rising technology architectures consolidated (internal integration)
- IM next-generation platform (planned)

- ★ 2025: SAIC joins Huawei HIMA (Shangjie brand)
- EP33 platform (shared across IM L7 / LS7 / LS6)

Roadmap Scoring: D1: 3/5, D2: 4/5, D3: 4/5, D4: 4/5, D5: 3/5 → **18/25 (AR2.5, AI²-ML)**

Roadmap Risk Rating: MEDIUM (the direction of internal consolidation is favorable, but legacy joint-venture brands still constitute the volume base)

Key Architectural Decisions

1. ★ **Rising technology mid-platform consolidated into the group's "seven technology foundations"** — centralized large-platform R&D
2. ★ **IM "vehicle-wide digital chassis" solution** (April 2026 Auto China)
3. Three-brand architectural integration: IM (with Alibaba) + Rising + SAIC Passenger Vehicle
4. ★ **May 2025: SAIC joins Huawei HIMA Shangjie brand** (a major strategic shift)
5. EP33 global architecture (shared across IM models)
6. MG brand expansion in Europe and India

Evolution Trajectory

1978 founded → 2001 SAIC Volkswagen JV → 2020 IM established → 2024 IM AD in production → May 2025 joins HIMA → April 2026 IM vehicle-wide digital chassis + Rising consolidation → 2027+ IM next-generation platform

Evidence Chain

- **Tier 1**: SAIC 2026 Q1 Report PDF / SSE (Apr 30, 2026)
- **Tier 1**: SAIC 2025 Annual Report
- **Tier 2**: SAIC Investor Sales Volume page
- **Tier 3**: IM AD 2024 launch
- **Tier 3**: Auto China 2026 IM vehicle-wide digital chassis
- **Tier 3**: SAIC HIMA joining announcement (May 2025)

3.15 VW Group (Europe / Recovering Incumbent + Reverse Learning from China)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	E³ 1.2 (in production) + CEA 1.0 (China, launched)
China JV	CARIZON (with Horizon Robotics, 60:40, VW controlling) + Xpeng CEA collaboration
Way-to-Play	Recovering Incumbent (post-CARIAD pivot)

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **2/5** — E³ 1.2 remains domain-centric; CEA 1.0 confined to the China market
- D2 SW-HW Decoupling: **2/5** — the shadow of the CARIAD software-stack delays has not lifted
- D3 OTA Maturity: **3/5** — E³ 1.2 supports OTA at scale
- D4 FuSa Architecture: **4/5** — decades of accumulated production functional-safety capability
- D5 Compute Concentration: **2/5** — predominantly procured silicon, in-house SoC absent

Snapshot Total: 13/25 (AR1.5, AI²-ML L1–L2)

Architecture Confirmed Roadmap (2027)

- ★ **CEA (China Electronic Architecture) 1.0** — a China-exclusive architecture, launched
- ★ **CARIZON JV** (VW × Horizon, 60:40), with L2+ highway NoA already delivered for the ID.Unyx 07
- ★ **Xpeng CEA collaboration** — a co-developed architecture based on Xpeng's X-EEA, first vehicles from 2027
- **C7H SoC** — CARIZON's in-house high-compute chip, mass production 2028 (beyond the assessment window)
- **GAIA 2.0 World Model** — an end-to-end world model under development by VW China
- SSP (Scalable Systems Platform), the global platform, deferred to 2028+
- Rivian JV "RV Tech" architecture → ID.EVERY1 (2027 production; see also §3.4 Rivian)

Roadmap 5-Dimensional Scoring

- D1: 3/5, D2: 3/5, D3: 4/5, D4: 4/5, D5: 3/5
- **Roadmap Total: 17/25 (AR2.5, AI²-ML L2)**

Roadmap Risk Rating: LOW (CEA 1.0 already launched; CARIZON has delivered a production NoA; the Rivian JV is funded; multiple parallel paths reduce single-point execution risk)

Key Architectural Decisions

1. ★ **Three-track parallel strategy** — global SSP (in-house, deferred) + China CEA (CARIZON JV) + Rivian RV Tech (learning from the West)
2. ★ **CARIZON** (VW 60 % + Horizon 40 %) — a China-localized architecture that bypasses the CARIAD impasse
3. ★ **Xpeng CEA collaboration** — a reverse importation of Chinese new-player architectural capability (continuation of the July 2023 strategic partnership)
4. ★ **C7H SoC (2028) + GAIA 2.0 World Model** — the China team closes the compute and AI gap through in-house work
5. Lessons of the CARIAD impasse: after the failure of all-in-house vertical integration, a shift toward "global in-house + regional JVs + learning from the West"
6. ID.EVERY1 (on Rivian architecture, 2027) — entry-level EV in European production

Evolution Trajectory

2020 CARIAD founded → 2022–23 E³ impasse, E³ 2.0 delayed → Jul 2023 Xpeng strategic partnership → Nov 2024 VW–Rivian $5.8 B JV → 2024 CARIZON JV → 2026 CEA 1.0 launch in China + CARIZON delivers NoA → 2027 Xpeng-CEA models + ID.EVERY1 → 2028 C7H SoC + SSP

Evidence Chain

- **Tier 1**: Volkswagen AG Annual Report 2024, 2025 (Frankfurt Börse)
- **Tier 2**: VW Group China Investor Update 2026 (Apr 23, 2026; three PDFs: CEA / CARIZON / GAIA)
- **Tier 2**: VW Group Capital Markets Day materials
- **Tier 1**: VW–Rivian JV announcement (Nov 12, 2024)
- **Tier 1**: VW–Xpeng strategic partnership announcement (Jul 2023)
- **Tier 3**: CARIZON ID.Unyx 07 L2+ NoA delivery release
- **Tier 4**: *Handelsblatt*, *Automobilwoche*, *Caixin* — coverage of the CARIAD episode

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3.16 BMW (Europe / Pragmatic Modernizer + Neue Klasse Leap)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	Current generation (CLAR / FAAR) + Neue Klasse production ramp
Annual Conference	Annual Results Conference (Mar 12, 2026)
Way-to-Play	Pragmatic Modernizer + Full-Stack Coordination

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **3/5** — Neue Klasse "Super-Brain" four-domain centralization
- D2 SW-HW Decoupling: **2/5**
- D3 OTA Maturity: **3/5**
- D4 FuSa Architecture: **4/5** — top-tier production functional safety
- D5 Compute Concentration: **3/5** — Neue Klasse substantially raises central compute

Snapshot Total: 15/25 (AR2, AI²-ML L2)

Architecture Confirmed Roadmap (2027)

- **Neue Klasse platform rolled out across the lineup** — iX3 (2025 production) → i3 series → ICE / hybrid derivatives
- **"Super-Brain" (Heart of Joy + four high-performance compute units)** — central-compute architecture
- BMW Operating System X (next-generation HMI)
- L3 highway commercial expansion (approved in Germany)
- Coordination with Qualcomm and Amazon Web Services
- Panoramic iDrive (full-windshield heads-up display)

Roadmap 5-Dimensional Scoring

- D1: 4/5, D2: 3/5, D3: 4/5, D4: 4/5, D5: 4/5
- **Roadmap Total: 19/25 (AR3, AI²-ML L2)**

Roadmap Risk Rating: LOW (Neue Klasse iX3 already in production; "Super-Brain" architecture announced; L3 approved in Germany)

Key Architectural Decisions

1. ★ **Neue Klasse "Super-Brain"** — Heart of Joy (vehicle dynamics) + four high-performance compute units
2. 800 V electrical architecture + sixth-generation eDrive
3. **Central compute increased 20× relative to the current generation** (BMW's stated figure)
4. BMW Operating System X — next-generation unified software platform
5. L3 highway (approved in Germany) + L2+ City expansion
6. No in-house silicon stack; deep coordination with Qualcomm (a pragmatic path)

Evolution Trajectory

2021 iX (current generation) → 2023 Neue Klasse concept → 2025 iX3 (first Neue Klasse production model) → 2026 i3 series + Super-Brain rollout → 2027 full lineup on Neue Klasse

Evidence Chain

- **Tier 1**: BMW Group Annual Report 2024, 2025 (Frankfurt Börse)

- **Tier 2**: BMW Group Annual Conference 2026 (Mar 12, 2026)
- **Tier 3**: Neue Klasse technical releases (IAA Munich 2023, 2025)
- **Tier 3**: iX3 production launch (2025)
- **Tier 4**: *Automobilwoche*, *Reuters* — Neue Klasse coverage

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3.17 Mercedes-Benz (Europe / Pragmatic Modernizer + MB.OS In-House Stack)

Note: the Mercedes architecture is correctly described as a two-layer construction—**MMA (hardware platform) + MB.OS (software operating system)**—and the two should not be conflated.

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	MMA (hardware) + MB.OS (software)
Vehicle Coverage	40+ models planned on MB.OS
Way-to-Play	Pragmatic Modernizer + In-House Software Stack

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **3/5** — MMA platform central-compute
- D2 SW-HW Decoupling: **3/5** — MB.OS full-stack from in-house silicon to cloud
- D3 OTA Maturity: **3/5**
- D4 FuSa Architecture: **5/5** — Drive Pilot L3, the first globally in mass production (a regulatory breakthrough)
- D5 Compute Concentration: **3/5**

Snapshot Total: 17/25 (AR2.5, AI²-ML L2)

Architecture Confirmed Roadmap (2027)

- ★ **MB.OS full-stack in-house operating system** — four-layer architecture from silicon to cloud
- ★ **MMA platform rolled out across 40+ models** — new CLA (2025 launch) → full lineup
- **Drive Pilot L3** — already in commercial use in Germany, California, and Nevada, expanding
- MB.OS × Google (maps / navigation) + × NVIDIA (Drive) + × Luminar (LiDAR) — multi-party collaboration
- MB.OS Virtual Assistant (LLM-based)
- CLA 800 V + high-efficiency electric drive

Roadmap 5-Dimensional Scoring

- D1: 4/5, D2: 4/5, D3: 4/5, D4: 4/5, D5: 4/5
- **Roadmap Total: 20/25 (AR3, AI²-ML L2–L3)**

Roadmap Risk Rating: LOW (MB.OS + MMA already in production on CLA; Drive Pilot L3 commercialized in multiple jurisdictions)

Key Architectural Decisions

1. ★ **MMA (hardware platform) + MB.OS (software OS), a two-layer architecture** — clean separation
2. ★ **MB.OS, an in-house software stack** — silicon / OS / middleware / applications across four layers, with a full-stack disposition akin to Tesla's while preserving external collaboration

3. ★ **Drive Pilot L3** — the world's first L3 in mass production (Germany since 2021), a regulatory and liability benchmark
4. CLA (first MMA model, 2025) — 800 V + MB.OS + L2++
5. Multi-party collaboration: Google (navigation) + NVIDIA (Drive) + Luminar (LiDAR) + Momenta (China)
6. MB.OS Virtual Assistant — an LLM-driven cockpit assistant

Evolution Trajectory

2021 Drive Pilot L3 (Germany) + EQS (MBUX) → 2024 MB.OS unveiled → 2025 new CLA (first MMA + MB.OS model) → 2026 MMA rollout → 2027 40+ models on MB.OS

Evidence Chain

- **Tier 1**: Mercedes-Benz Group Annual Report 2024, 2025 (Frankfurt Börse)
- **Tier 2**: Mercedes-Benz Capital Market Day / Annual Results 2026
- **Tier 3**: MB.OS technical release + CLA launch (2025)
- **Tier 3**: Drive Pilot L3 commercial announcements (Germany / California / Nevada)
- **Tier 4**: *Automobilwoche*, *Reuters* — MB.OS coverage

3.18 Stellantis (Europe / Platform Consumer + FaSTLAne 2030 Multi-Party Coordination)

Note: based on the May 21, 2026 Investor Day update—the FaSTLAne 2030 framework + a three-way technical alliance (Wayve / Qualcomm / Applied Intuition).

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	STLA Brain + STLA SmartCockpit (production ramp)
Strategic Framework	★ FaSTLAne 2030 (released May 2026 Investor Day)
Way-to-Play	Platform Consumer + Multi-Party Technical Coordination

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **2/5** — STLA Brain centralization in progress
- D2 SW-HW Decoupling: **3/5** — STLA SmartCockpit service-oriented
- D3 OTA Maturity: **3/5**
- D4 FuSa Architecture: **3/5**
- D5 Compute Concentration: **2/5** — dependent on Qualcomm procurement

Snapshot Total: 13/25 (AR1.5, AI²-ML L1–L2)

Architecture Confirmed Roadmap (2027)

- ★ **FaSTLAne 2030 framework** (May 21, 2026 Investor Day) — software-defined-vehicle strategic spine
- ★ × **Applied Intuition** (extended May 21, 2026) — Vehicle OS + Cabin Intelligence + autonomy support for the next-generation STLA Brain
- ★ × **Qualcomm** (extended May 21, 2026) — Snapdragon Digital Chassis (driving-assist + cockpit + connectivity) across the next-generation architecture
- ★ × **Wayve** (newly signed May 21, 2026) — end-to-end autonomous driving, door-to-door hands-off targeted earliest 2028 in North America

- **× Microsoft** (Apr 16, 2026) — cloud and generative AI
- STLA Brain next-generation + STLA SmartCockpit continued iteration

Roadmap 5-Dimensional Scoring

- D1: 3/5, D2: 4/5, D3: 4/5, D4: 3/5, D5: 3/5
- **Roadmap Total: 17/25 (AR2.5, AI²-ML L2)**

Roadmap Risk Rating: MEDIUM (the collaboration framework is dense and well-defined, yet Stellantis's financials are strained (gross margin only 5.79 %); STLA Brain production scale and execution remain to be demonstrated; the 2028 door-to-door timeline is distant)

Key Architectural Decisions

1. ★ **FaSTLAne 2030** — the financial and technical framework for the software-defined vehicle, released at the May 2026 Investor Day
2. ★ **Three-way technical alliance (Wayve + Qualcomm + Applied Intuition)** — all announced on May 21, 2026
3. **× Applied Intuition** — Vehicle OS + Cabin Intelligence + autonomy, supporting next-generation STLA Brain
4. **× Qualcomm** — Snapdragon Digital Chassis across the next-generation vehicle architecture
5. **× Wayve** — end-to-end autonomous driving, door-to-door hands-off (2028 North America target)
6. **× Microsoft** (Apr 16, 2026) — cloud and generative AI
7. Strategic essence: not full-stack in-house, but rapid software-capability backfill via dense external collaboration (Platform Consumer in its purest form)

Evolution Trajectory

2021 Stellantis founded (FCA + PSA) → 2022 STLA Brain / SmartCockpit / AutoDrive three platforms unveiled → 2024 STLA SmartCockpit (Applied Intuition collaboration) → April 2026 × Microsoft → May 21, 2026 FaSTLAne 2030 + three-way Wayve / Qualcomm / Applied Intuition extension → 2027 STLA Brain next-generation → 2028 door-to-door hands-off

Evidence Chain

- **Tier 1**: Stellantis N.V. Annual Report 2024, 2025 (NYSE: STLA; gross margin 5.79 %)
- **Tier 2**: ★ Stellantis Investor Day 2026 — FaSTLAne 2030 Framework (May 21, 2026)
- **Tier 3**: ★ Stellantis × Applied Intuition STLA Brain extension announcement (May 21, 2026)
- **Tier 3**: ★ Stellantis × Qualcomm Snapdragon Digital Chassis announcement (May 21, 2026)
- **Tier 3**: ★ Stellantis × Wayve end-to-end autonomous-driving announcement (May 21, 2026)

3.19 Renault (Europe / Recovering Incumbent + futuREady Strategic Pivot)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	Current generation + Ampere software + ★ futuREady framework (released March 2026)
Strategy Day	Strategy Day (Mar 10, 2026)
Way-to-Play	Recovering Incumbent + Software-Defined Pivot

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **2/5**
- D2 SW-HW Decoupling: **2/5**
- D3 OTA Maturity: **2/5**
- D4 FuSa Architecture: **3/5**
- D5 Compute Concentration: **3/5** — compute coordination with Qualcomm and Google

Snapshot Total: 12/25 (AR1.5, AI²-ML L1)

Architecture Confirmed Roadmap (2027)

- ★ **futuREady framework** (Strategy Day, Mar 10, 2026) — the software-defined-vehicle strategic spine
- ★ **Software-centralized E/E architecture** — new platform 2027+
- Ampere (EV + software subsidiary) continues to advance
- × Google (HMI + AI) + × Qualcomm (compute) — deepening collaboration
- × Xpeng (technology-collaboration exploration) + Geely (powertrain collaboration)
- FlexEVan + modular platform

Roadmap 5-Dimensional Scoring

- D1: 3/5, D2: 3/5, D3: 3/5, D4: 3/5, D5: 3/5
- **Roadmap Total: 15/25 (AR2, AI²-ML L1–L2)**

Roadmap Risk Rating: MEDIUM (the futuREady strategic direction is clear, but model-level realization is still distant; the prior cancellation of Ampere's IPO indicates execution volatility; the partnership foundations with Google and Qualcomm are nonetheless solid)

Key Architectural Decisions

1. ★ **futuREady framework** (Mar 10, 2026) — software-defined-vehicle strategic pivot, previously substantially under-estimated
2. ★ **Software-centralized E/E architecture** — new platform planned 2027+
3. Ampere (EV + software) — despite the cancelled IPO, software-capability buildup continues
4. × Google — Android Automotive + Gemini in-cabin
5. × Qualcomm — Snapdragon Digital Chassis compute
6. Alliance coordination: architecture-sharing potential across the Renault–Nissan–Mitsubishi Alliance

Evolution Trajectory

2021 current generation → 2023 Ampere established (software + EV) → 2024 Ampere IPO cancelled → March 10, 2026 Strategy Day futuREady framework → 2027+ software-centralized new platform

Evidence Chain

- **Tier 1**: Renault Group Annual Report 2024, 2025 (Euronext Paris)
- **Tier 2**: ★ Renault Strategy Day 2026 — futuREady (Mar 10, 2026)
- **Tier 3**: Ampere strategic release (2023, 2024 IPO cancellation announcement)
- **Tier 3**: Renault × Google + × Qualcomm partnership announcements
- **Tier 4**: *Reuters*, *Automotive News Europe* — futuREady coverage

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3.20 Toyota (Japan / Cautious Giant + Arene OS Gradualism)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	Current generation (hybrid-dominant) + Arene OS in development
Software Subsidiary	Woven by Toyota
Way-to-Play	Cautious Giant (scale first, software measured)

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **3/5** — still predominantly distributed / domain-centric
- D2 SW-HW Decoupling: **2/5** — Arene not yet in production
- D3 OTA Maturity: **3/5**
- D4 FuSa Architecture: **4/5** — the world's largest production-quality system
- D5 Compute Concentration: **2/5**

Snapshot Total: 14/25 (AR2, AI²-ML L1)

> Note: Toyota's five-dimension scores have been revised following domain-expert review. The original public-data sample had under-estimated its architecture maturity; the corrected scores align Toyota with the relevant peer group of traditional incumbents (e.g., Volkswagen). Toyota's measured pace reflects strategic choice—the cost of architectural change scales with the world's largest production base—rather than a deficit of capability.

Architecture Confirmed Roadmap (2027)

- **Arene OS** — Woven by Toyota's in-house vehicle OS, first production wave targeted H2 2026 (roadmap)
- Next-generation BEV platform + Arene integration
- × NVIDIA (DRIVE) + additional compute partnerships
- Solid-state batteries (commercialization roadmap 2027–28)
- Woven City as validation ground

Roadmap 5-Dimensional Scoring

- D1: 3/5, D2: 3/5, D3: 4/5, D4: 4/5, D5: 3/5
- **Roadmap Total: 17/25 (AR2.5, AI²-ML L1–L2)**

Roadmap Risk Rating: MEDIUM (Arene OS has slipped repeatedly; the H2 2026 timeline requires validation; Toyota's history shows slower software-roadmap delivery, though its execution discipline is exceptional)

Key Architectural Decisions

1. **Arene OS** — Woven by Toyota's in-house vehicle OS, benchmarked against Tesla's Auto OS, with a conservative production timeline
2. Multi-powertrain strategy (hybrid + BEV + hydrogen) — the architecture must accommodate multiple powertrains, constraining the pace of centralization
3. Woven by Toyota (formerly Woven Planet) — software and autonomous-driving subsidiary
4. Scale-first: the world's largest production volume implies far-reaching consequences for any architectural change, mandating caution
5. NVIDIA DRIVE partnership to close the compute gap

Evolution Trajectory

2018 current generation → 2021 Woven Planet founded → 2023 reorganized as Woven by Toyota → 2025 Arene development advances → H2 2026 first Arene production wave (roadmap) → 2027 new BEV

platform + Arene

Evidence Chain

- **Tier 1**: Toyota Motor Corp Annual Report (TSE: 7203) FY2024, FY2025
- **Tier 2**: Toyota Financial Results Briefings + mid-to-long-term strategy materials
- **Tier 3**: Woven by Toyota / Arene OS technical releases
- **Tier 4**: *Nikkei*, *Reuters* — Arene coverage

3.21 Hyundai (Korea / Pragmatic Modernizer + Pleos Group-Wide Software Stack)

Note: Hyundai's software brand has been unified as **Pleos** (encompassing Pleos Connect infotainment + Pleos Vehicle OS + Gleo AI large-model assistant), superseding the earlier "ccOS". Pleos is shared across Hyundai / Kia / Genesis.

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	E-GMP + ★ Pleos (Vehicle OS + Connect)
Latest	★ Pleos Connect production version unveiled (Apr 29–30, 2026)
Way-to-Play	Pragmatic Modernizer + Group-Wide Software Unification

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **2/5** — E-GMP domain-controller based, Pleos architecture in progress
- D2 SW-HW Decoupling: **3/5** — ★ Pleos Vehicle OS in-house, on an AAOS foundation
- D3 OTA Maturity: **2/5**
- D4 FuSa Architecture: **3/5**
- D5 Compute Concentration: **2/5**

Snapshot Total: 12/25 (AR1.5, AI²-ML L1–L2)

Architecture Confirmed Roadmap (2027)

- ★ **Pleos Connect** — Q2 2026 debut (GRANDEUR in Korea, May), phased global rollout (including IONIQ 3 in Europe)
- ★ **Pleos Vehicle OS** — a proprietary vehicle OS on the E&E architecture, advancing SDV performance and extensibility
- ★ **Gleo AI** — an LLM-driven integrated voice agent (vehicle control + navigation + information search)
- ★ **Pleos Playground** — an open developer platform + App Market (AAOS SDK + Plug & Play)
- Target: approximately 20 million vehicles (Hyundai + Kia + Genesis) deploying Pleos Connect by 2030
- × Google + Uber + Samsung + Naver + SOCAR + Unity — ecosystem partnerships
- Group-wide software centralization (AVP Division leading)

Roadmap 5-Dimensional Scoring

- D1: 3/5, D2: 4/5, D3: 4/5, D4: 3/5, D5: 3/5
- **Roadmap Total: 17/25 (AR2.5, AI²-ML L2)**

Roadmap Risk Rating: LOW (Pleos Connect production version unveiled; Q2 2026 GRANDEUR debut confirmed; group scale and execution discipline are strong)

Key Architectural Decisions

1. ★ **Pleos as the group software brand** — Vehicle OS + Connect + Gleo AI + Playground, full-stack
2. ★ **Pleos Vehicle OS on the E&E architecture** — a centralized software platform shared across Hyundai / Kia / Genesis
3. ★ **Gleo AI** — an LLM-integrated agent embedded in the cockpit
4. ★ **Pleos Playground + App Market** — third-party openness (AAOS SDK + Plug & Play)
5. AVP (Advanced Vehicle Platform) Division — the SDV nucleus, led by Chang Song
6. Group coordination: three brands (Hyundai / Kia / Genesis) sharing Pleos, amortizing R&D across scale

Evolution Trajectory

2021 E-GMP (IONIQ 5) → 2023 SDV development initiated → March 2025 Pleos brand announced (Pleos 25 conference) → 2025 CEO Investor Day (New York) → April 29–30, 2026 Pleos Connect production version unveiled → Q2 2026 GRANDEUR debut → 2027+ global rollout

Evidence Chain

- **Tier 1**: Hyundai Motor Co Annual Report (KRX: 005380) FY2024, FY2025
- **Tier 2**: Hyundai CEO Investor Day 2025 (New York), 2026
- **Tier 3**: ★ Pleos Connect production version unveiling (Apr 29–30, 2026, UX Studio Seoul)
- **Tier 3**: Pleos 25 developer conference (Mar 27–28, 2025)
- **Tier 4**: *InsideEVs*, *The Truth About Cars*, *Reuters* — Pleos coverage

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3.22 Kia (Korea / Pragmatic Modernizer + EV9 Flagship + Group Pleos Sharing)

Architecture Snapshot (2026-01-31)

Field	Value
Current Platform	E-GMP + group Pleos (shared with Hyundai)
Flagship	EV9 (flagship three-row SUV) + EV series
Way-to-Play	Pragmatic Modernizer + PBV Commercial Expansion

5-Dimensional Scoring (Snapshot)

- D1 Centralization: **2/5**
- D2 SW-HW Decoupling: **3/5** — shared Pleos Vehicle OS
- D3 OTA Maturity: **2/5** — EV9 supports partial OTA
- D4 FuSa Architecture: **3/5**
- D5 Compute Concentration: **2/5**

Snapshot Total: 12/25 (AR1.5, AI²-ML L1–L2)

Architecture Confirmed Roadmap (2027)

- ★ **Shared Pleos Connect + Vehicle OS** (unified with Hyundai group, rolling out from 2026)
- **CEO Investor Day 2026** (Apr 9, 2026) — SDV strategy and medium-term targets

- **PBV (Purpose Built Vehicle)** — modular commercial-vehicle platform (PV5 and others)
- EV series expansion (EV3 / EV4 / EV5 / EV9)
- × Google + Uber ecosystem (at group level)
- Autonomous-driving highway L2++ → L3 roadmap

Roadmap 5-Dimensional Scoring

- D1: 3/5, D2: 4/5, D3: 4/5, D4: 3/5, D5: 3/5
- **Roadmap Total: 17/25 (AR2.5, AI²-ML L2)**

Roadmap Risk Rating: LOW (sharing the Hyundai-group Pleos stack; EV9 already in production; the PBV platform unveiled; group coordination reduces single-point risk)

Key Architectural Decisions

1. ★ **Sharing the group Pleos software stack** — unified Vehicle OS + Connect with Hyundai, amortizing R&D
2. ★ **CEO Investor Day 2026** (Apr 9, 2026) — SDV and electrification medium-term strategy
3. **PBV (Purpose Built Vehicle)** — modular commercial-vehicle platform (PV5); software-defined commercial vehicles
4. EV9 (flagship three-row SUV) — E-GMP + high-tier ADAS + OTA
5. EV matrix: EV3 (entry) → EV9 (flagship), covering the full price spectrum
6. Group coordination: shared E-GMP + Pleos with Hyundai / Genesis, scale-advantaged

Evolution Trajectory

2021 E-GMP (EV6) → 2023 EV9 (flagship) → 2024 PBV strategy (PV5) → 2025 Pleos as group software → April 9, 2026 CEO Investor Day → 2026 Pleos Connect rollout → 2027+ PBV in production + L3

Evidence Chain

- **Tier 1**: Kia Corp Annual Report (KRX: 000270) FY2024, FY2025
- **Tier 2**: ★ Kia CEO Investor Day 2026 (Apr 9, 2026)
- **Tier 3**: EV9 + PBV (PV5) launches
- **Tier 3**: Group Pleos Connect sharing (Apr 2026)
- **Tier 4**: *InsideEVs*, *Reuters* — Kia SDV coverage

Appendix A Complete Scoring Tables — 22 OEMs × 5 Dimensions × Dual Time Horizon

A.1 Overview Table (Snapshot + Roadmap + Risk)

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================================================================================
   Complete Scoring Overview, 22 OEMs (Method A: five-dimension equal-weight sum)
   Assessment windows: Snapshot as of 2026-01-31 | Roadmap as of 2027-07
================================================================================
```

#	OEM	Region	Snapshot	AR	Roadmap	AR	Risk
1	Tesla	USA	23/25	AR4	23/25	AR4	LOW
2	GM	USA	13/25	AR1.5	16/25	AR2.5	MEDIUM
3	Ford	USA	12/25	AR1.5	16/25	AR2.5	MEDIUM
4	Rivian	USA	19/25	AR3	21/25	AR3.5	LOW
5	Lucid	USA	16/25	AR2.5	20/25	AR3.5	MEDIUM
6	Xpeng	China-New	20/25	AR3	24/25	AR4	LOW
7	NIO	China-New	20/25	AR3	24/25	AR4	LOW
8	Li Auto	China-New	19/25	AR3	24/25	AR4	LOW
9	Xiaomi	China-New	19/25	AR3	23/25	AR4	LOW
10	Huawei HIMA	China-New	22/25	AR4	25/25	AR4	LOW
11	BYD	China-Leg	17/25	AR2.5	20/25	AR3.5	LOW
12	Geely	China-Leg	15/25	AR2	20/25	AR3.5	MEDIUM
13	GWM	China-Leg	16/25	AR2.5	19/25	AR3	MEDIUM
14	SAIC	China-Leg	14/25	AR2	18/25	AR2.5	MEDIUM
15	VW Group	Europe	13/25	AR1.5	17/25	AR2.5	LOW
16	BMW	Europe	15/25	AR2	19/25	AR3	LOW
17	Mercedes	Europe	17/25	AR2.5	20/25	AR3.5	LOW
18	Stellantis	Europe	13/25	AR1.5	17/25	AR2.5	MEDIUM
19	Renault	Europe	12/25	AR1.5	15/25	AR2	MEDIUM
20	Toyota	Japan/Kor	14/25	AR2	17/25	AR2.5	MEDIUM
21	Hyundai	Japan/Kor	12/25	AR1.5	17/25	AR2.5	LOW
22	Kia	Japan/Kor	12/25	AR1.5	17/25	AR2.5	LOW

```
--------------------------------------------------------------------------------
22-OEM Snapshot mean AR: 2.34  (five-dimension equal-weight sum, transparent)
22-OEM Roadmap  mean AR: 3.05
Regional means (Snapshot): China-New 3.20 > USA 2.50 > China-Legacy 2.25
                           > Europe 1.80 > Japan/Korea 1.67
================================================================================
```

A.2 Five-Dimension Detail Scores (Snapshot 2026-01-31)

D1 = Centralization, D2 = SW-HW Decoupling, D3 = OTA Maturity, D4 = Functional Safety, D5 = Compute Concentration

OEM	D1	D2	D3	D4	D5	Total	AR
Tesla	5	4	5	4	5	23	AR4
GM	2	3	3	3	2	13	AR1.5
Ford	2	2	3	3	2	12	AR1.5
Rivian	4	4	4	3	4	19	AR3
Lucid	3	3	3	4	3	16	AR2.5
Xpeng	4	4	4	3	5	20	AR3
NIO	4	4	4	3	5	20	AR3
Li Auto	4	4	4	3	4	19	AR3
Xiaomi	4	4	4	3	4	19	AR3
Huawei HIMA	4	5	5	4	4	22	AR4
BYD	3	3	4	4	3	17	AR2.5
Geely	3	3	3	3	3	15	AR2
GWM	3	3	3	4	3	16	AR2.5
SAIC	2	3	3	4	2	14	AR2
VW Group	2	2	3	4	2	13	AR1.5
BMW	3	2	3	4	3	15	AR2
Mercedes	3	3	3	5	3	17	AR2.5
Stellantis	2	3	3	3	2	13	AR1.5
Renault	2	2	2	3	3	12	AR1.5
Toyota	3	2	3	4	2	14	AR2
Hyundai	2	3	2	3	2	12	AR1.5
Kia	2	3	2	3	2	12	AR1.5

A.3 Five-Dimension Detail Scores (2027 Confirmed Roadmap)

OEM	D1	D2	D3	D4	D5	Total	AR
Tesla	5	5	5	3	5	23	AR4
GM	3	3	4	3	3	16	AR2.5
Ford	3	3	4	3	3	16	AR2.5
Rivian	5	4	4	4	4	21	AR3
Lucid	4	4	4	4	4	20	AR3
Xpeng	5	5	5	4	5	24	AR4
NIO	5	5	5	4	5	24	AR4
Li Auto	5	5	5	4	5	24	AR4
Xiaomi	4	5	5	4	5	23	AR4
Huawei HIMA	5	5	5	5	5	25	AR4
BYD	4	4	4	4	4	20	AR3
Geely	4	4	4	4	4	20	AR3
GWM	4	4	4	4	3	19	AR3
SAIC	3	4	4	4	3	18	AR2.5

VW Group	3	3	4	4	3	17	AR2.5
BMW	4	3	4	4	4	19	AR3
Mercedes	4	4	4	4	4	20	AR3
Stellantis	3	4	4	3	3	17	AR2.5
Renault	3	3	3	3	3	15	AR2
Toyota	3	3	4	4	3	17	AR2.5
Hyundai	3	4	4	3	3	17	AR2.5
Kia	3	4	4	3	3	17	AR2.5

A.4 Methodological Corrections in This Edition

This edition (Working Paper 2026-02) introduces a set of fundamental, transparency-oriented corrections to the scoring method relative to earlier internal drafts, all publicly recorded:

Correction	Description
Removal of opaque D4 weighting	Earlier drafts applied additional weighting (+2 to +6, without a uniform rule) to the functional-safety dimension of 8 incumbent OEMs (Europe / Japan-Korea). This edition removes it entirely, restoring equal-weight five-dimension summation for full reproducibility.
D4 three-sub-dimension scoring	D4 = redundant-architecture depth + certification level (ASIL D / SOTIF / UN-R157) + production L3 validation.
D4 evidence-based revisions (3)	Mercedes 4→5 (world's only production L3 + UN-R157) GWM 3→4 (EU KBA approval + 5-layer redundancy) Tesla 3→4 (system-safety strength; limited certification visibility is a particularity of its vision-only path)
Toyota five-dimension revision	The original public-data sample under-estimated Toyota's architecture maturity; after domain-expert review, the scores were aligned with peer incumbents (e.g., VW).
Total → AR linear mapping	Uniform binning, replacing the earlier firm-by-firm subjective judgment.

Following the removal of weighting, the scores of certain European and Japanese/Korean incumbents are lower than in earlier drafts—this does not reflect a stricter standard, but the elimination of unjustified "courtesy points," subjecting all 22 firms to a single ruler. Any reader may independently recompute each firm's total and AR from the five-dimension detail scores in Appendix A.2 and the mapping rules in §1.3.

A.5 Record of Key Data Corrections (Factual)

Item	Original record	Corrected (this edition)
Li Auto LEEA version	5.0	3.0
Mercedes architecture	single-layer	MMA (hardware) + MB.OS (software), two-layer
Huawei HIMA	four brands	five brands (SAIC Shangjie added)
Rising (Feiyan)	attributed to Geely	SAIC
Hyundai software	ccOS	Pleos (Vehicle OS + Connect + Gleo AI)
Stellantis partners	× Microsoft only	FaSTLAne 2030 + Wayve / Qualcomm / Applied Intuition
Lucid capital raise	unquantified	$1.05B (Uber 11.5 % stake)

Appendix D Complete Source Inventory (22 OEMs × Multi-Tier Evidence)

This inventory lists the core public sources underpinning the scoring of the 22 OEMs. All scoring strictly follows the source pyramid of Chapter 1: each five-dimension score is supported by at least two Tier 1–3 sources. The full citation set exceeds 150 entries; this inventory presents the representative core sources.

D.1 United States (5)

Tesla - T1: Tesla 10-K FY2024/FY2025 (SEC); Q1 2026 Production/Deliveries (Apr 2, 2026) - T2: Q1 2026 Shareholder Deck (Apr 22, 2026; OCF $3.9B / FCF $1.4B) - T3: AI Day 2022/2023; Samsung Texas $16.5B AI5 foundry contract (Jul 2025); Cybercab Dallas/Houston testing (Apr 2026) - T4: Electrek, The Verge — sustained coverage

GM - T1: GM 10-K FY2024; Q1 2026 Earnings (Apr 28, 2026; revenue $43.6B); Cruise wind-down announcement (Dec 2024) - T2: Q1 2026 Earnings Deck; China Q1 2026 Sales (Apr 3, 2026)

Ford - T1: Ford 10-K FY2024; Q1 2026 Earnings (Apr 29, 2026; revenue $43.3B / net income $2.5B) - T2: Ford Pro software subscription data (879K, +30 % YoY) - T3: BlueCruise Europe expansion (Nov 2025); T4: Skunk Works coverage (Reuters)

Rivian - T1: Rivian 10-K FY2024; Q1 2026 Results (Apr 30, 2026); VW–Rivian announcement (Nov 12, 2024); DOE $4.5B loan (Apr 2026) - T2: VW Group China Investor Update (Apr 23, 2026); T3: R2 reveal (Mar 2024)

Lucid - T1: Lucid 10-K FY2024/FY2025; Q1 2026 ($282.5M); $1.05B raise announcement (Apr 14, 2026); Uber SEC Form 3 (11.5 %) - T2: Investor Day 2026 (Mar 12, 2026); T3: Uber/PIF 35K announcement (Apr 14, 2026, PR Newswire) - T4: Electrek, 24/7 Wall St

D.2 China New Players (5)

Xpeng - T1: 20-F FY2024 (Apr 16, 2025) / FY2025 (Apr 16, 2026; deliveries 429,445 +125.9 % / revenue ¥76.7B +87.7 %) - T2: Q4/FY2025 Earnings Call (Mar 20, 2026); T3: VLA 2.0 (Mar 2, 2026); Auto China Tech (Apr 24, 2026); Turing chip (Aug 2024); T1: VW–Xpeng (Jul 2023)

NIO - T1: 20-F FY2025 (Apr 10, 2026); Q1 2026 (May 21, 2026; revenue ¥25.53B); HKEX 9866 + SGX - T3: NIO IN 2024 (Jul 27, 2024; NX9031); ES9 + ONVO L90 Auto China (Apr 2026)

Li Auto - T1: 20-F FY2025 (Apr 10, 2026); Q4/FY2025 (Mar 12, 2026; revenue ¥112.3B) - T3: i8 launch (Aug 20, 2025; VLA + MindGPT); MindVLA-o1 (NVIDIA GTC 2026)

Xiaomi - T1: HKEX Annual Reports 2024/2025 (Apr 28, 2026); T2: FY2025 Q4 Deck (Mar 24, 2026; revenue ¥457.3B +25 %) - T3: SU7 Ultra + YU7 Auto China; Lei Jun annual address; T4: LatePost, 36Kr

Huawei HIMA - T1: Huawei 2025 Annual Report (Mar 27, 2026); partner cross-validation (Seres 601127 / BAIC BluePark 600733 / JAC 600418 / Chery / SAIC 600104) - T3: HDC 2024/2025; ADS 4 Qiankun Event (Apr 22, 2025); Auto China (Apr 24, 2026); T4: Xinhuanet / People's Daily Online

D.3 China Legacy Transitioners (4)

BYD - T1: 2025 Annual Results (Mar 27, 2026) / Q1 2026 (Apr 28, 2026; revenue ¥150.23B); HKEX + SSE 002594 - T3: Tianshen Eye (Feb 2025); Auto China extreme fast-charge; T4: Yicai / Caixin

Geely - T1: HKEX 0175 Annual Reports 2024/2025 (Apr 29, 2026); Zeekr 20-F (NYSE); Volvo OMX - T2: 2025 Annual Results Presentation (Mar 18, 2026); T4: Caixin / Economic Observer

GWM - T1: HKEX 2333 + SSE 601633; 2025 Annual Report (Mar 27, 2026) / Q1 2026 (Apr 24, 2026) - T3: HAOMO.AI; WEY V9X Auto China; T4: 36Kr / Caixin

SAIC - T1: 2026 Q1 Report (Apr 30, 2026) / 2025 Annual Report; SSE 600104 - T2: Investor Sales Volume; T3: IM AD; vehicle-wide digital chassis (Auto China 2026); HIMA joining (May 2025)

D.4 Europe (5)

VW Group - T1: VW AG Annual Report 2024/2025 (Frankfurt); VW–Rivian (Nov 12, 2024); VW–Xpeng (Jul 2023) - T2: VW Group China Investor Update 2026 (Apr 23, 2026; CEA / CARIZON / GAIA, three PDFs); CMD materials - T3: CARIZON ID.Unyx 07 L2+ NoA; T4: Handelsblatt / Automobilwoche / Caixin

BMW - T1: BMW Group Annual Report 2024/2025 (Frankfurt) - T2: Annual Conference 2026 (Mar 12, 2026); T3: Neue Klasse (IAA 2023/2025); iX3 production (2025); T4: Automobilwoche / Reuters

Mercedes-Benz - T1: Mercedes-Benz Group Annual Report 2024/2025 (Frankfurt) - T2: Capital Market Day / Annual Results 2026; T3: MB.OS + CLA launch (2025); Drive Pilot L3 (Germany / California / Nevada); T4: Automobilwoche / Reuters

Stellantis - T1: Stellantis N.V. Annual Report 2024/2025 (NYSE: STLA; gross margin 5.79 %) - T2: Investor Day 2026 — FaSTLAne 2030 (May 21, 2026) - T3: × Applied Intuition / × Qualcomm / × Wayve (all May 21, 2026); × Microsoft (Apr 16, 2026) - T4: Reuters / Automotive World / GlobeNewswire (May 21, 2026)

Renault - T1: Renault Group Annual Report 2024/2025 (Euronext Paris) - T2: Strategy Day 2026 — futuREady (Mar 10, 2026); T3: Ampere (2023 / 2024 IPO cancellation); × Google / × Qualcomm; T4: Reuters / Automotive News Europe

D.5 Japan / Korea (3)

Toyota - T1: Toyota Motor Corp Annual Report (TSE: 7203) FY2024/FY2025 - T2: Financial Results Briefings + mid-to-long-term strategy; T3: Woven by Toyota / Arene OS; T4: Nikkei / Reuters

Hyundai - T1: Hyundai Motor Co Annual Report (KRX: 005380) FY2024/FY2025 - T2: CEO Investor Day 2025 (New York) / 2026; T3: Pleos Connect production version (Apr 29–30, 2026); Pleos 25 conference (Mar 27–28, 2025); T4: InsideEVs / The Truth About Cars

Kia - T1: Kia Corp Annual Report (KRX: 000270) FY2024/FY2025 - T2: CEO Investor Day 2026 (Apr 9, 2026); T3: EV9 + PBV (PV5); group Pleos Connect (Apr 2026); T4: InsideEVs / Reuters

D.6 Cross-OEM Shared Sources (Industry Baselines)

- Standards: ISO 26262, ISO 21448 (SOTIF), ISO 21434, UNECE R155/R156, ISO/PAS 8800, AUTOSAR R24-11
- Industry research: Wards Intelligence SDV ScoreCard; McKinsey / Roland Berger / BCG SDV reports; S&P Global Mobility
- Silicon: NVIDIA GTC 2025/2026; Qualcomm Snapdragon Digital Chassis releases; Mobileye investor materials
- Standards bodies: SAE J3016, COVESA, CNCF