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JUNE · 2026

Quiet by default

A design perspective on the modern car cabin.

Contents

CHAPTER ONE

The diagnosis

1.1 The story in one number

In 2022 the Swedish magazine Vi Bilägare ran a simple test: twelve cars, four routine cabin tasks, each performed at 110 km/h.

The oldest car won. A 2005 Volvo V70 with physical buttons finished the tasks in the time it took to cover 300 metres. A 2022 MG Marvel R, running the same functions through a touchscreen, took 1,400 metres (Fig. 1).

That gap of 1,100 metres is the number this report is about. It is how much further a driver travels with their attention divided, on the simplest jobs in the cabin, once the controls move onto a screen. Hardware two decades out of production beat everything new at the one thing a cabin interface is for: letting the driver act without looking away. The test was a magazine exercise rather than a controlled study, and the drivers had time to learn each car first, which makes the touchscreen gap a conservative read, not an inflated one.

It is not an outlier. The chapters that follow find the same result in crash data, in regulatory testing and in consumer research, across every market we examined. One number opens the report because it is the cleanest form of a finding that holds across all of them. In a moving car, engagement is a cost, not an objective.

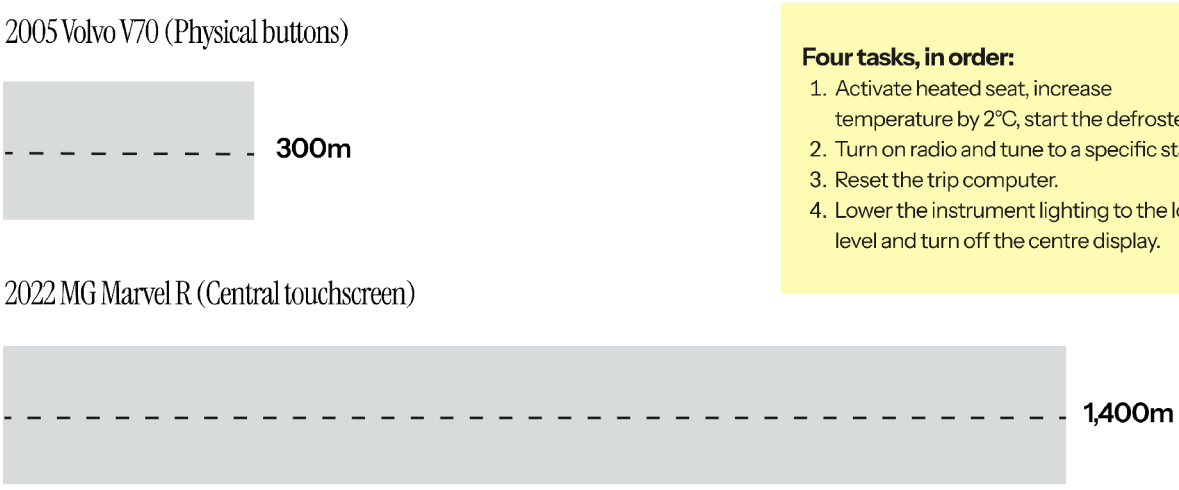
AUTOMOTIVE INTERFACE DESIGN

Engagement is the wrong objective in a vehicle cabin.

we are systematic

FIG. 1 · IN CABIN TEST – 110KM/H

The distance covered while the driver looks away



Four tasks, in order:

1. Activate heated seat, increase temperature by 2°C, start the defroster.
2. Turn on radio and tune to a specific station.
3. Reset the trip computer.
4. Lower the instrument lighting to the lowest level and turn off the centre display.

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Source: Vi Bilägare, 2022 in-cabin task test at 110 km/h.

FIG. 2 · THE EVOLUTION OF THE DRIVER INTERFACE

The touchscreen-first cabin is not yet a settled design choice

Touchscreen expands → | Trend slows →

2007	2012	2013	2018	2023	2023–4	2024	2025
Ford SYNC	**Tesla Model S**	**Cadillac CUE**	**Mercedes MBUX**	**Volvo EX30**	**Mercedes Hyperscreen, BMW Curved, Lucid Air**	**Hyundai Ioniq 9**	**VW ID. 2**
Small in-dash screen alongside console buttons	17-inch portrait touchscreen, the landmark	Secondary controls move to touchscreen	Dual-screen dashboard	Launches with no instrument cluster	Continuous glass dashboards	Returns key controls to hardware	Public commitment to physical buttons

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Compiled from manufacturer press materials and trade-press reporting.

1.2 A car is not a phone

The story of how the car dashboard became a tablet is short and recent.

Before 2012, in-vehicle screens were small and did one thing each. Sat-nav lived in the centre stack. Radio displays were segmented LCDs the size of a chocolate bar. Climate controls were physical. Ford SYNC in 2007 and BMW iDrive before it kept the screen small and the controls on the wheel or the console.

Then the Tesla Model S launched in 2012 with a single 17-inch portrait touchscreen running almost everything in the car. It was the first time a production vehicle had made the dashboard look like a tablet. The Model S was reviewed as a tech product rather than a car, and the format was widely copied. Cadillac's CUE in 2013 moved most secondary controls onto a touchscreen and was widely panned. Mercedes MBUX dual-screen launched in 2018. Hyundai, Volkswagen and Volvo moved in the same direction. By 2023 the Volvo EX30 launched with no instrument cluster at all. The Mercedes Hyperscreen, the BMW Curved Display and the Lucid Air all turned the dashboard into one continuous panel of glass (Fig. 2).

Two things happened at the same time. The hardware got cheaper, brighter and bigger. And the people designing what went on the hardware had careers shaped by mobile apps and consumer software. Their design vocabulary was the vocabulary of those products: surface content the user did not ask for so they discover something new; stack information in a feed with no natural end; use notifications to bring lapsed attention back; measure success in time-on-screen and session length. That vocabulary works on a phone because on a phone attention is free.

In a car, attention is not free. Thomas Schäfer, the chief executive of Volkswagen Passenger Cars, told *Top Gear* in 2026: "There was a spirit of iPhone-ish kind of design and utilisation that you could see coming through in many companies. It was a little bit difficult to get the designers off that idea" (via *Gizmodo*, 2026). The design language was inherited, not chosen. It was inherited from a context where the cost of distraction was zero and applied to one where the cost of a wrong decision is measured in safety, regulatory and potential liability terms, not screen time.

> We will never, ever make this mistake any more. ... It's a car. It's not a phone: it's a car.

Andreas Mindt, Head of Design, Volkswagen, to Autocar, 2025

1.3 Engagement equals risk

Every additional second of attention spent on a screen in a moving car has a measurable cost. Bryan Reimer's AHEAD consortium at MIT AgeLab has spent over a decade building the framework that quantifies it. The design response is not better measurement, but treating attention as the most expensive resource in the cabin. Alongside the Swedish Vi Bilägare result from the report's opening, the numbers below converge across countries and methodologies.

The UK. The Transport Research Laboratory ran a controlled simulator study for IAM RoadSmart in 2020. Drivers using touch controls on Apple CarPlay or Android Auto kept their eyes off the road for as long as sixteen seconds at a stretch, more than 500 metres at motorway speed and well beyond NHTSA's guidelines. Touch control slowed reaction times by more than half, worse than texting, cannabis or driving at the drink-drive limit. Drivers underestimated their own eyes-off-road time by up to five seconds (TRL, *Interacting with Android Auto and Apple CarPlay when driving*, PPR948, 2020).

The US. Virginia Tech Transportation Institute's 2016 PNAS paper drew on hours of in-cabin video from real crashes and near-crashes. Interacting with a touchscreen-style in-vehicle device was associated with odds of a crash or near-crash about 4.6 times higher. Reaching for an object raised the odds to 9.1, reading or writing to 9.9 and handheld phone dialling to 12.2 (Dingus et al., PNAS 113(10), 2016). The touchscreen risk sits in the same band as the deliberate distractions (Fig. 3).

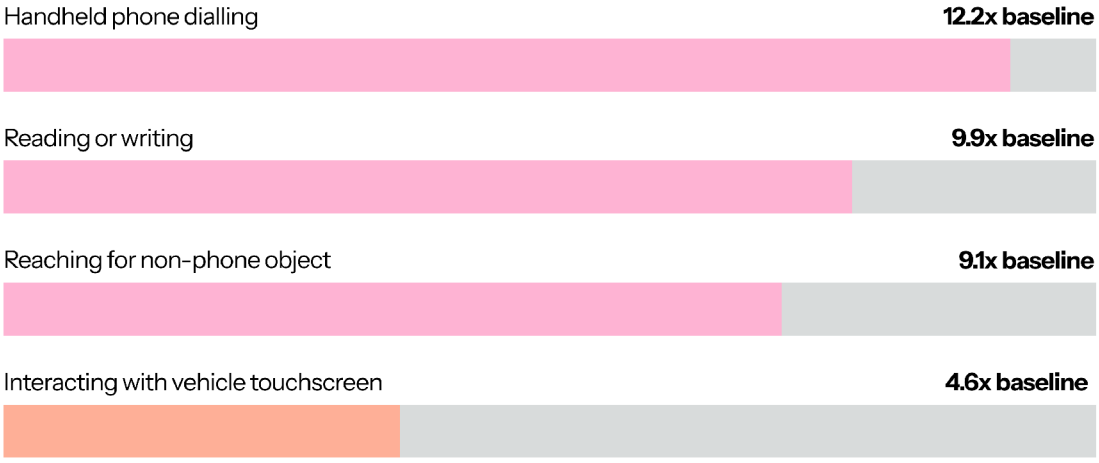
The AAA Foundation for Traffic Safety tested 30 production OEM infotainment systems against a cognitive demand scale in 2017. None generated low demand; 23 of the 30 produced high or very high demand. Programming a destination took an average of 40 seconds while the car was moving (Strayer et al., AAA Foundation for Traffic Safety, 2017). The finding is systemic (Fig. 4).

Consumer quality. The J.D. Power 2025 US Initial Quality Study scored infotainment at 42.6 problems per 100 vehicles, the most problematic category in the study (J.D. Power, 26 June 2025).

Regulation. Euro NCAP's 2026 rating scheme, which applies to cars tested from January 2026, scores driver monitoring at up to 25 points within its Safe Driving stage, up from around two in the previous scheme. Separately, a car cannot earn the related driving-controls points unless indicators, hazard lights, horn, wipers and the eCall SOS function work through physical controls, not the touchscreen alone (Euro NCAP, announced March 2024; protocol 2025). Engagement-equals-risk is no longer an academic claim but a published industry standard.

FIG. 3 · CRASH AND NEAR CRASH ODDS

Touchscreens sit in the same risk band as deliberate distractions



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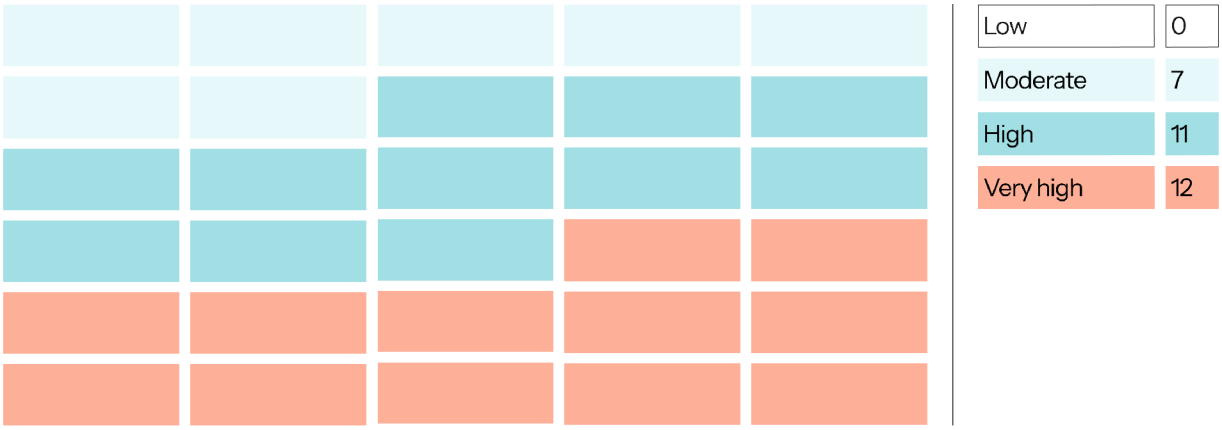
Source: Dingus et al., *PNAS* 113(10), 2016. Naturalistic driving data, Virginia Tech Transportation Institute.

FIG. 4 · INFOTAINMENT SYSTEM COGNITIVE DEMAND

None of 30 systems tested generated low demand

Each cell is one production system, scored on a cognitive-demand scale.
Twenty-three of the thirty landed in the high or very-high bands.



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Source: Strayer et al., *Visual and Cognitive Demands of Using In-Vehicle Information Systems*, AAA Foundation for Traffic Safety, Phases V and VI, 2017 and 2018.

None of the 30 vehicle infotainment systems produced low demand.

Strayer et al., AAA Foundation for Traffic Safety, 2017

CHAPTER TWO

The partial reversal

2.1 Second thoughts

Senior designers at several carmakers have begun, in public, to question the touchscreen-first cabin.

The first OEM to put a senior designer on camera was Hyundai. SangYup Lee, then Executive Vice President and Head of Hyundai and Genesis Global Design, told *Top Gear* in November 2024: "It's a safety issue. ... When you have your eyes on the road and your hands on the wheel, and you get into this one layer, second layer, third layer, it's dangerous. Having HVAC controls on the touchscreen doesn't really make sense." His colleague Simon Loasby added that "all those major functions, without looking away and from a tactile perspective, you find it and don't have to look away from the road" (Lee and Loasby to Top Gear, 25 November 2024). Hyundai's North American design vice president, Ha Hak-soo, gave a similar focus-group account to *Korea JoongAng Daily*: drivers "get stressed, annoyed and steamed" when they have to hunt through a touchscreen for a control they need quickly.

Polestar has gone further on stated principle, though it pays to be precise about which Polestar. The articulated alternative comes from the 2020 Polestar Precept, a concept car. Polestar set out the principle on the Precept HMI page: the HMI "only displays what's needed, when it's needed. Vivid, colourful, gamified screens seem to be all the rage when it comes to 'improving the in-car experience'. But they catch the eye in a distracting way and make it harder to see the road in darkened driving conditions" (polestar.com). The principle is stated for a concept. The shipped Polestars have not fully delivered it.

Volvo shows how far there is to go between stated principle and shipped product. The EX30 holds a five-star Euro NCAP rating and Volvo's stated commitment is to information minimalism. The trade-press long-term reviews are unsparing. The glovebox opens by touchscreen icon. Mirror adjustment is on the touchscreen. There is no instrument cluster. *What Car?* noted that during the magazine's range test the glovebox could not be opened once the car's battery was flat (Top Gear Report No 9, 2026; Edmunds long-term test, 2026; What Car? EX30 review by Steve Huntingford).

Putting controls back is not the same as fixing the problem. A volume knob still fails if the driver has to look to find it. An indicator stalk still fails if its behaviour changes with mode. The car that makes a show of returning buttons while keeping its glovebox behind a touchscreen icon has changed its marketing, not its design. The real question is what produces a cabin that stays quiet even when the screen is unavoidable.

ON THE RECORD

"It's a safety issue. ... When you have your eyes on the road and your hands on the wheel, and you get into this one layer, second layer, third layer, it's dangerous. Having HVAC controls on the touchscreen doesn't really make sense."

SangYup Lee, then Executive Vice President and Head of Hyundai and Genesis Global Design · Top Gear, 25 November 2024

"All those major functions, without looking away and from a tactile perspective, you find it and don't have to look away from the road."

Simon Loasby, Head of Hyundai Design Centre · Top Gear, 25 November 2024

Drivers "get stressed, annoyed and steamed" when they have to hunt through a touchscreen for a control they need quickly.

Ha Hak-soo, Hyundai design vice president · Korea JoongAng Daily, November 2024

"Precept's HMI only displays what's needed, when it's needed. Vivid, colourful, gamified screens ... catch the eye in a distracting way and make it harder to see the road in darkened driving conditions."

Polestar, on the 2020 Polestar Precept · polestar.com

"There was a spirit of iPhone-ish kind of design and utilisation that you could see coming through in many companies. It was a little bit difficult to get the designers off that idea."

Thomas Schäfer, CEO Volkswagen Passenger Cars · Top Gear via Gizmodo, 2026

2.2 Voice is not an easy escape

Often, the proposed escape from the touchscreen problem is voice.

The case is most cleanly articulated by Wassym Bensaid, Rivian's chief software officer, at TechCrunch Disrupt in October 2024: "It's a bug. It's not a feature. Ideally, you would want to interact with your car through voice. The problem today is that most voice assistants are just broken." Mercedes is pursuing a similar bet with the MBUX Virtual Assistant. The Chinese OEMs are pursuing it harder, with cockpit AI that proposes content, surfaces recommendations and converses.

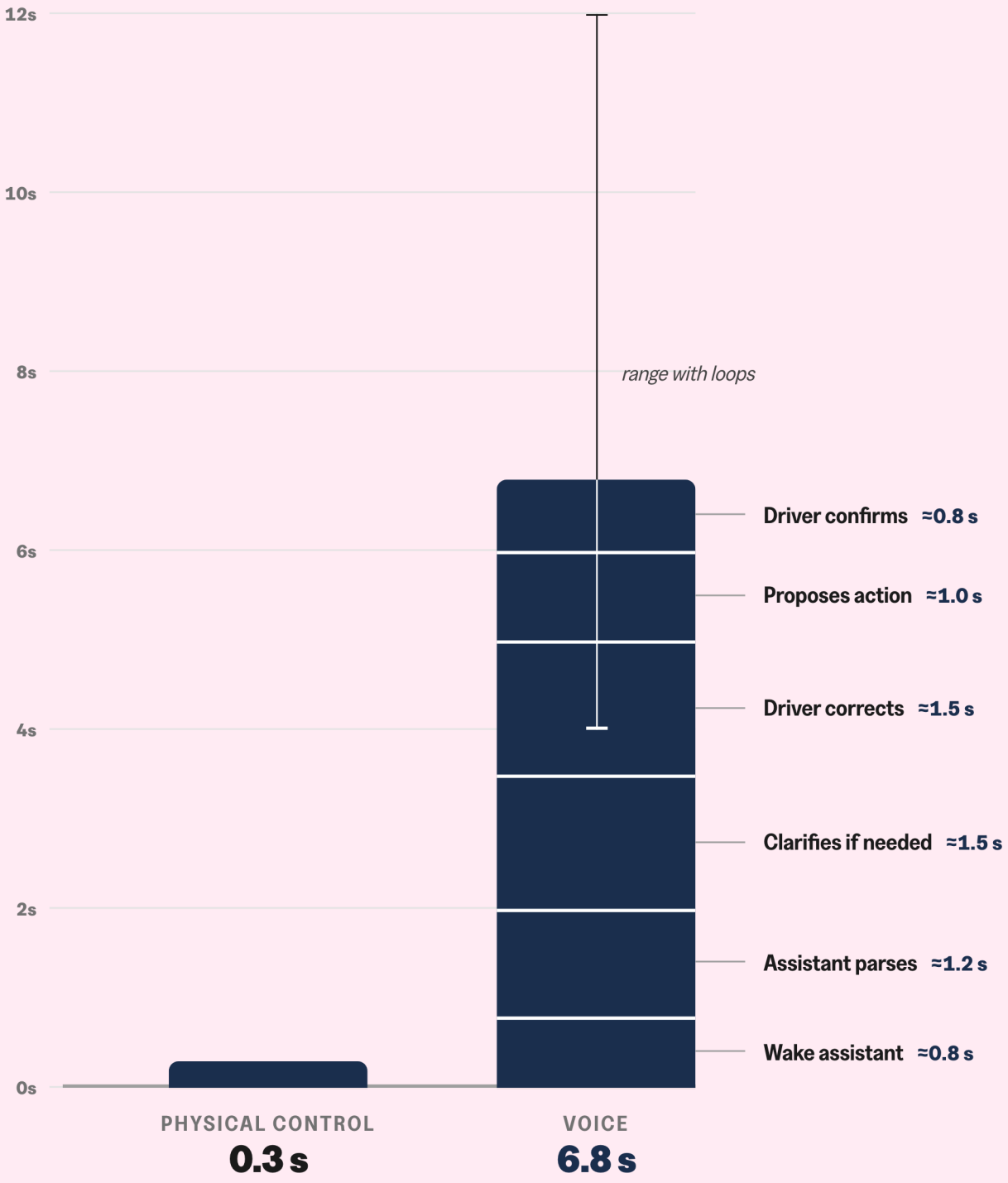
Most voice assistants in cars today are broken because they spend the attention budget the screen would have spent and frequently more of it. Voice beats touch only when its loop is the shorter one, but in production systems, the voice loop is almost always longer: the driver wakes the assistant, the assistant parses, it sometimes clarifies, the driver corrects, the assistant proposes, the driver confirms, and a non-trivial fraction of the time the loop runs again.

The AAA Foundation has measured the cognitive workload of native OEM voice systems against the same scale used for visual-manual tasks and reported workload at the high or very high end (Strayer et al., 2017, 2018). MIT AgeLab production-vehicle research with the Insurance Institute for Highway Safety has found that voice interfaces do not automatically reduce attentional demand; workload depends on how the interface is built, not on whether it is voice or touch (Mehler, Kidd, Reimer et al., *Ergonomics*, 2016; see Fig. 5).

Two design observations follow. First, that's a high bar most current systems don't clear. Second, a conversational assistant that proposes content, surfaces recommendations or asks questions the driver did not ask first is a recommendation engine, not a control surface. It is spending the driver's attention budget on the company's behalf. Voice earns its place only when the driver's hands and eyes are both busy, when it is genuinely faster than reaching for a control, and when it offers nothing the driver did not ask for.

FIG. 5 · VOICE IS NOT AN EASY ESCAPE

The voice loop is almost always longer than the physical control loop



Illustrative; inspired by Strayer et al., AAA Foundation for Traffic Safety, 2017 and 2018; Mehler, Kidd, Reimer et al., *Ergonomics*, 2016.

It’s a bug. It’s not a feature.

Wassym Bensaid, Chief Software Officer, Rivian

CHAPTER THREE

What good looks like

3.1 Six rules for a quiet cabin

The aviation industry made this transition forty years ago. The Airbus A310 entered service in 1983 under Bernard Ziegler against a principle the trade press called “dark, quiet cockpit”: information is not displayed until something goes wrong; a screen stays black until a system condition warrants notifying the pilot (Learmount, *FlightGlobal*, 2012; Novacek, *Avionics News*, October 2003). The principles are now codified. 14 CFR § 25.1322 specifies a three-tier alerting hierarchy of warning, caution and advisory and restricts the use of the alerting colours so they are not confused with other functions. The regulation (§ 25.1322(c)②) requires that warnings and cautions engage two senses; AC 25.1322-1, a means of compliance, notes that advisories are normally provided through a single sense. SAE Aerospace Recommended Practice 4102/4 sets out an alerting test that broadly requires a system to attract attention, identify the condition and guide the response.

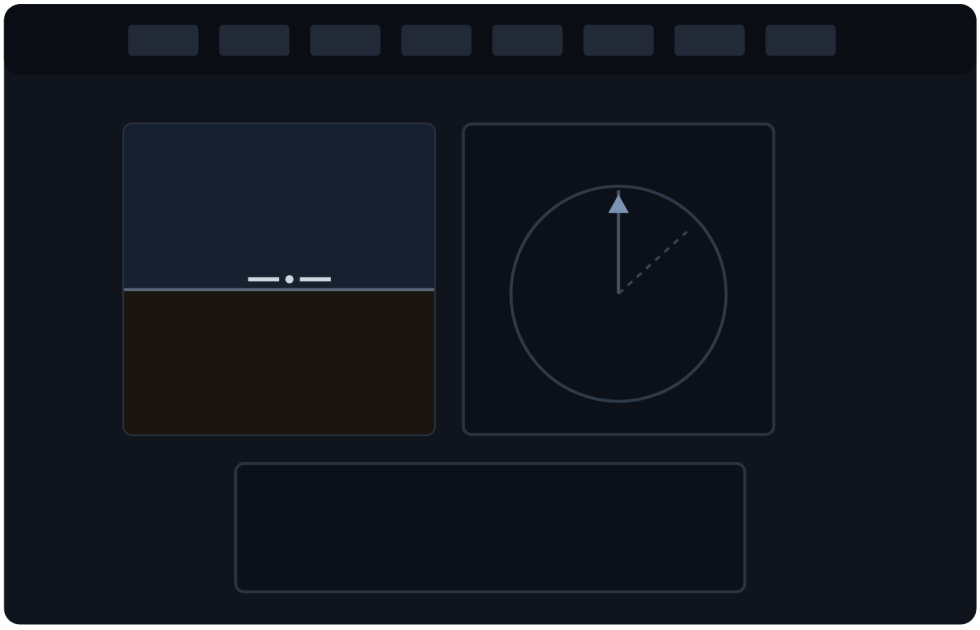
The FAA’s “sterile cockpit” rule (14 CFR § 121.542, 1981) prohibits non-essential crew activity during critical phases of flight, which it defines as taxi, take-off, landing and other operations below 10,000 feet except cruise. It governs what crew members are allowed to do, not interface design. The “dark, quiet cockpit” is the design philosophy (Fig. 6).

The six rules below define what we mean by a cabin that is quiet by default. They were developed through our automotive HMI design work led by Coy Chen, including our engagement with Snapp Automotive, and generalised beyond it. Three driving contexts produce three design responses: in motion, at rest, and configured away from the car. The rules below speak primarily to the in-motion case, where attention is most expensive. The thread is that the cabin is treated as the workplace of someone with a legal duty of care, not as a consumer surface. They are observable, specifiable and testable. They are not aesthetic preferences.

FIG. 6 · AVIATION SOLVED THIS FORTY YEARS AGO

The flight deck stays dark until a condition warrants the pilot's attention

A Normal operation · dark, quiet



B Something needs attention · one light on

Illustrative example. Quotation: Paul Novacek, Avionics News, October 2003. Flight-deck reference: Dassault Falcon EASy.

Good design reduces what the driver has to check and confirm.

Coy Chen, Partner & Lead Designer · We Are Systematic

1

The screen adapts to the road

At a roundabout entry, junction approach or hard braking event, the screen shows what the driver immediately needs and holds back the rest. Map and safety overlays stay. Content surfaces, recommendation cards and notification stacks drop away (Fig. 7).

2

The safety overlay is always visible

Map, lane-keeping and blind-spot warnings, and the alert layer hold their place. Secondary tasks (settings, content, search) sit in drawers covering 30 to 40 per cent of the screen while moving. A full-screen settings modal is a parked-only pattern: the driver cannot afford a screen change mid-task (Fig. 8).

3

The hands own the controls they use most

Position is part of the contract with the driver's hand. Indicators, hazards, wipers and volume sit where muscle memory can find them without looking. A stalkless indicator that rotates with the steering wheel breaks the contract every time the driver enters a roundabout. The cheapest control in the cabin is the one the hand already owns (Fig. 9).

4

An icon is recognisable in a single glance

A label is readable in under two seconds. NHTSA's voluntary 2-second / 12-second driver-distraction guidelines are the reference point: a single off-road glance under two seconds, total task time under twelve, non-binding and not a regulation (NHTSA, 2013). The design target is tighter. Primary-status pictograms resolve in roughly 0.8 seconds; labels clear two seconds at speed without exception (Fig. 10).

5

Design for what the driver wants

The driver wants the windscreen cleared, the cabin cooler or the destination changed, not fan speed 3, vent to face, 19 °C and recirculation off. Collapse parameter sprawl into intent: three or four named outcomes, one tap each. This is where machine assistance earns its place, as an intent inferrer (Fig. 11).

6

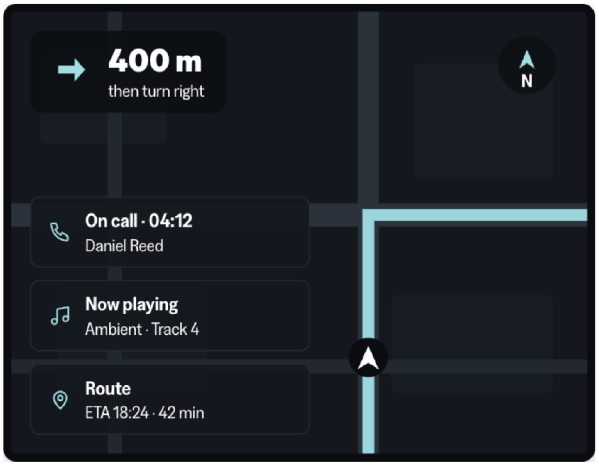
Show state where state lives

A pictograph of the car with one door drawn open communicates "driver-side door open" faster than an icon plus label. Where the system has spatial state, the spatial analogue beats the symbolic. Blind spots and lane markers shown spatially on a car avatar do the same job for active safety. Pair with audio sparingly: a chime should promise caution-level urgency or higher. Use it for low-priority pings and drivers learn to ignore it (Fig. 12).

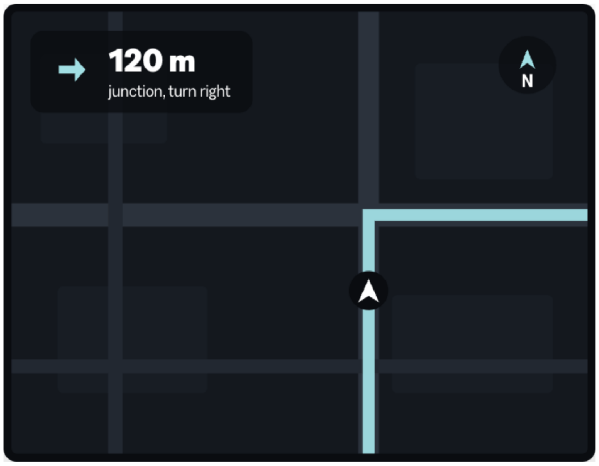
FIG. 7 · RULE 1: THE SCREEN ADAPTS TO THE ROAD

At high load, the screen shows only what is needed

A: Low load, cruising, content is visible



B: High load, junction approach



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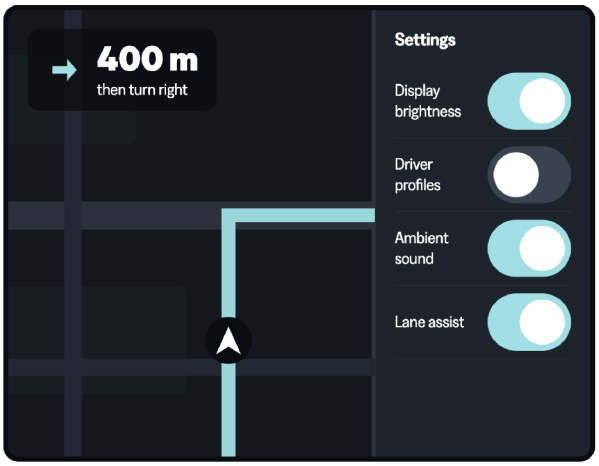
Illustrative example, not real UI. Aviation precedent: phase inhibition (ECAM, EICAS) suppresses lower-priority alerts at the moment of highest workload. Generic automotive HMI illustration. Demonstrates the design rule; not a representation of any specific product.

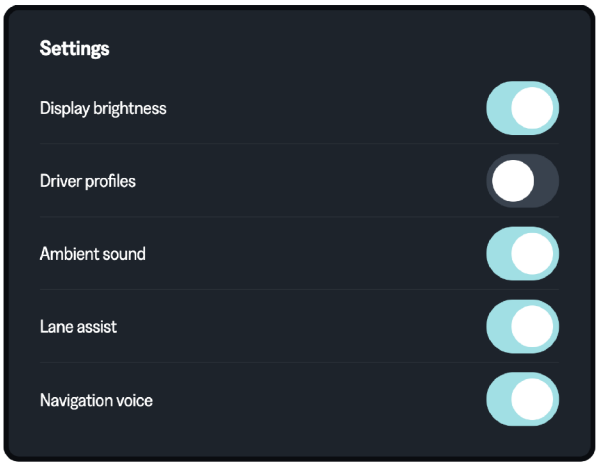
FIG. 8 · RULE 2: THE SAFETY OVERLAY IS ALWAYS VISIBLE

Secondary tasks sit in a drawer. They never replace the safety layer.

A: When driving, secondary items in drawer



B: Only when vehicle is parked



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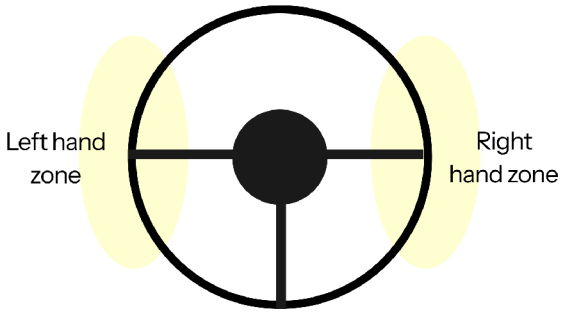
Illustrative example, not real UI. Aviation precedent: 14 CFR § 25.1322 restricts the use of the alerting colours so they are not confused with branding or content. Generic automotive HMI illustration. Demonstrates the design rule; not a representation of any specific product.

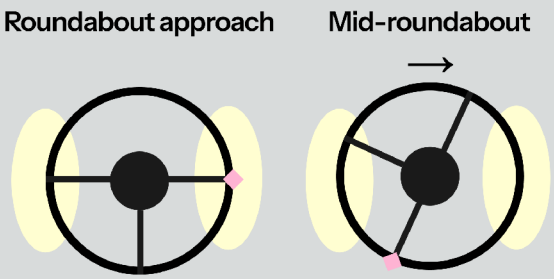
FIG. 9 · RULE 3: THE HANDS OWN THE CONTROLS THEY USE MOST

The hand zones are reserved for the controls used most

A: Primary controls should stay in hand zones



B: Fail example: stalkless indicator in steering wheel



An indicator that rotates with the steering wheel leaves the hand zone when the car enters a roundabout. A fixed stalk stays in the same place.

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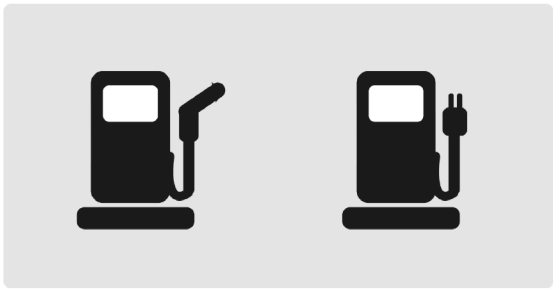
Anonymised production example.

FIG. 10 · RULE 4: AN ICON OR LABEL IS RECOGNISABLE IN A SINGLE GLANCE

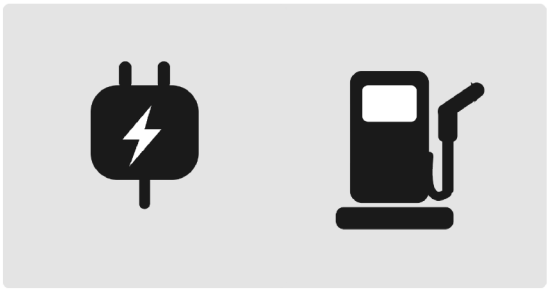
An icon or symbol must be understood in <2 seconds

A: Detailed, not enough differentiation



Cars and maps commonly use a very similar icon for fuel pumps and EV chargers: the icons are indistinguishable at a glance especially in a crowded or high cognitive load situation.

B: One clean shape, high differentiation



The 'electric plug' pattern is clearly different allowing drivers of EV or ICE to rely on recognition over cognition.

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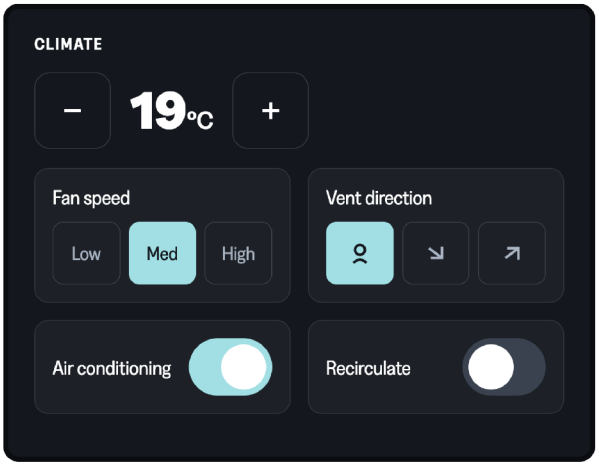
Illustrative. Threshold per NHTSA Visual-Manual Driver Distraction Guidelines, Phase 1, 2013. Aviation precedent: SAE ARP 4102/4 alerting test.

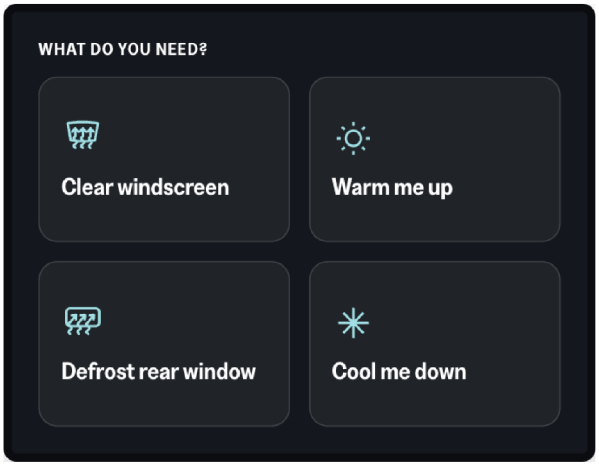
FIG. 11 · RULE 5: DESIGN FOR WHAT THE DRIVER WANTS

Reduce interactions into named outcomes

A: Parameter-led, multiple interactions



B: Intent-led, one tap



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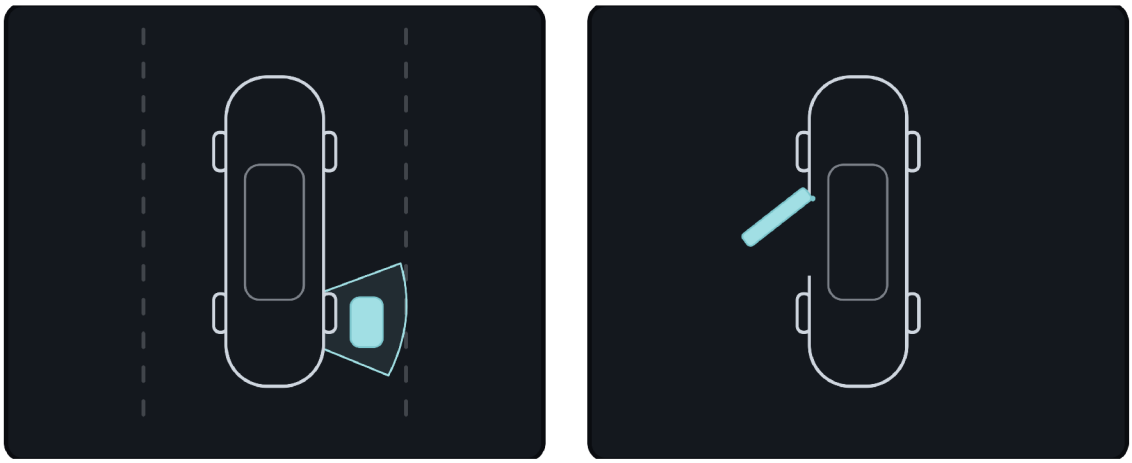
Illustrative example, not real UI. Aviation precedent: ECAM displays the corrective procedure when the fault is announced, not the parameter set. Generic automotive HMI illustration. Demonstrates the design rule; not a representation of any specific product.

FIG. 12 · RULE 6: SHOW STATE WHERE STATE LIVES

A spatial state beats a symbol the driver has to translate



Example: the avatar isn't aesthetic; it's a twin of the car providing the driver with a 1:1 mental analogue, reducing cognitive load and translation cost. Instead of reading a small icon to see if the door is open or the lights are on, the user simply glances at the avatar. If the avatar's door is open, the car's door is open.

was

Illustrative example, not real UI. Aviation precedent: 14 CFR § 25.1322(c)(2) two-senses requirement. Audible chimes are reserved for caution-level urgency or higher. Generic automotive HMI illustration. Demonstrates the design rule; not a representation of any specific product.

CHAPTER FOUR

What this means

4.1 The commercial case

If you build automotive software for sale in Europe, your buyers will be asking questions in 2026 they have never asked before. By January, vehicles sold with key functions buried in touchscreens lose Euro NCAP rating points. By July, every new vehicle sold in the EU must carry attention-monitoring systems that warn the driver when their eyes leave the road. By December, national laws implementing a new EU directive will treat in-vehicle software as a "product", bringing your screen designs within a strict, no-fault liability regime. That regime applies only to products placed on the market after 9 December 2026, and the precise position depends on each member state's implementing law. The three pressures stack and reinforce each other and together they reprice innovation risk in the cabin: an unevidenced interface decision now carries potential regulatory and legal cost, not just usability cost.

Differentiation

Volkswagen, Hyundai and Polestar have publicly committed to a calm cabin. The brands still pushing maximum screen and AI-driven personalisation (Mercedes-Benz with the MBUX Virtual Assistant, Rivian's voice-first bet, BMW's Panoramic Vision) are competing for the buyer who wants the cabin to be impressive. The underserved opportunity is the brand in between: stated calm-cabin principle, not yet shipped. Closing the gap between stated principle and shipped cabin is design work, not messaging. The rules in Chapter 3 are the specification. The Volvo EX30 is the worked example: *Top Gear* concluded that "cars are not like mobile phones" and *Edmunds* called it "a tech nightmare". The tech got in the way of nearly everything a driver needs to do.

Euro NCAP

From January 2026, a car cannot earn the Safe Driving driving-controls points unless indicators, hazard lights, horn, wipers and the eCall SOS function are on physical controls (Euro NCAP, announced March 2024). The weighting for driver monitoring rises to 25 points, from around two in the previous scheme (Euro NCAP, 2025). If you supply HMI software to any OEM selling into Europe, the rating penalty is now a line item your customer's product team is answering for internally.

Product liability By 9 December 2026, EU member states must transpose a new Product Liability Directive (Directive (EU) 2024/2853) into national law. It defines a “product” to include software (Article 4①), bringing vehicle software such as an HMI within a strict, no-fault liability regime, and applies only to products placed on the market after that date. Article 9 makes evidence easier to obtain: a claimant who presents facts and evidence sufficient to support the plausibility of the claim can ask a court to order disclosure of relevant evidence. Disclosure is limited to what is necessary and proportionate, is subject to safeguards for confidential information and trade secrets, and can be ordered against either side. The practical effect is that design and test records sit closer to discovery than they did before. A documented, evidence-based design process is no longer good practice alone; it could end up being part of the product’s legal defence.

GSR2: advanced driver distraction warning

From 7 July 2026, every new vehicle sold in the EU must carry an Advanced Driver Distraction Warning system, which detects visual distraction by monitoring where the driver is looking and warns when their eyes leave the road for too long (Regulation (EU) 2019/2144; Commission Delegated Regulation (EU) 2023/2590). An HMI that pulls the driver’s eyes off the road is creating the very state the vehicle is now legally required to flag.

The procurement question your buyers will be asking by the third quarter of 2026 is no longer “how many physical buttons”. It is “what does your screen do when the driver does not need it, and what does it not do when the driver does”.

The overuse of touchscreens is an industry-wide problem, with almost every vehicle-maker moving key controls onto central touchscreens, obliging drivers to take their eyes off the road.

Matthew Avery, Director of Strategic Development, Euro NCAP · via European Transport Safety Council, March 2024

4.2 The next question

What this means if you build, integrate or specify automotive HMI software is straightforward. By late 2026, your customers should be asking for three measurable things in their RFPs: how much the interface distracts the driver, how long a navigation or route-guidance task takes to complete (SAE J2364, the fifteen-second static-method rule for in-vehicle navigation task accessibility), and whether you can prove your design choices to an auditor (ASPICE 4.0, the December 2023 industry-standard process assessment). All three sit closer to the quiet-by-default discipline this report describes than to anything the consumer-mobile design canon produced.

1 · Distraction reduction. The interface reduces total visual distraction during driving load (junction approach, roundabout entry, hard braking), not only when the car is still.

2 · Task-completion time. Navigation and route-guidance tasks complete within the SAE J2364 fifteen-second rule, measured statically by the standard's bench method.

3 · Audit-ready traceability. Design decisions, prototype testing and behavioural assumptions are documented to ASPICE 4.0 (VDA QMC, December 2023) audit standard.

Five operational questions worth answering, before the procurement team puts them in writing: what does your interface do at a roundabout entry that it does not do at a service station? What does your alerting layer reserve for safety? Where do your primary controls sit relative to the driver's resting hand? What is the longest single-glance time to recognise any primary status indicator? What does your system do when a low-priority notification arrives during a hard braking event?

These are answerable questions. They are also the questions on which the next generation of vehicle HMI will be evaluated, rated and, in time, litigated. Your screen is not a phone, and your screen is not a feed. The driver is not a "user", the driver is the person legally responsible for the car. Design for that, and the cabin gets quiet.

This is one of the defining product problems in mobility today. The constraints are tight and the stakes are real. The cabin is a place where small craft decisions accumulate into large outcomes for the person behind the wheel. The teams that treat the cabin as a design problem rather than a content surface will define what the inside of a car feels like for the next decade. Done well, the cabin is a place the driver wants to be.

The driver is not a “user”,
the driver is the person
legally responsible for the car

we are systematic

References

PRIMARY RESEARCH AND REGULATORY SOURCES

NHTSA. *Visual-Manual Driver Distraction Guidelines for In-Vehicle Electronic Devices, Phase 1.* Federal Register, 26 April 2013; clarifications 16 September 2014.

Dingus, T.A., Guo, F., Lee, S., Antin, J.F., Perez, M., Buchanan-King, M. and Hankey, J. (2016). "Driver crash risk factors and prevalence evaluation using naturalistic driving data." *PNAS* 113(10): 2636-2641.

Strayer, D.L., Cooper, J.M., Goethe, R.M., McCarty, M.M., Getty, D.J. and Biondi, F. (2017 and 2018). *Visual and Cognitive Demands of Using In-Vehicle Information Systems, Phases V and VI.* AAA Foundation for Traffic Safety.

Transport Research Laboratory (2020). *Interacting with Android Auto and Apple CarPlay when driving.* PPR948. For IAM RoadSmart, the FIA and the Rees Jeffreys Road Fund.

Mehler, B., Kidd, D., Reimer, B., Reagan, I., Dobres, J. and McCartt, A. (2016). "Multi-modal assessment of on-road demand of voice and manual phone calling and voice navigation entry across two embedded vehicle systems." *Ergonomics.* MIT AgeLab / IIHS.

Euro NCAP. *Overall Assessment Protocol v10.0,* June 2025 (driver monitoring scored up to 25 points within the Safe Driving stage). *Safe Driving: Driver Engagement protocol v1.0,* March 2025. Physical-controls requirement for indicators, hazard lights, horn, wipers and the eCall SOS function announced March 2024.

Regulation (EU) 2019/2144; Commission Delegated Regulation (EU) 2023/2590 (Advanced Driver Distraction Warning).

Directive (EU) 2024/2853 on liability for defective products. In force 8 December 2024; transposition by 9 December 2026.

14 CFR § 25.1322; FAA Advisory Circular AC 25.1322-1. 14 CFR § 121.542 (the "sterile cockpit" rule).

SAE International. *Aerospace Recommended Practice ARP 4102/4: Flight Deck Alerting System.* 1988, reaffirmed 2007.

SUPPORTING REFERENCES: TRADE PRESS AND ON-RECORD STATEMENTS

Vi Bilägare (2022). *Physical buttons outperform touchscreens in new cars, test finds.* In-cabin task test at 110 km/h, twelve cars.

J.D. Power (2025). *2025 U.S. Initial Quality Study,* released 26 June 2025.

Novacek, P. (2003). "Design Displays For Better Pilot Reaction." *Avionics News,* October 2003, pp. 44-47.

Adams, C. (2002). "Making Flying EASy." *Aviation Today / Avionics Magazine,* 1 February 2002.

Learmount, D. (2012). "Airbus's fly-by-wire pioneer Bernard Ziegler wins Flightglobal Lifetime Achievement Award." *FlightGlobal,* 9 July 2012.

Polestar Precept HMI page, polestar.com (statements attributed to Polestar, on the 2020 Polestar Precept concept).

Executive statements: Andreas Mindt to Autocar, 2025; Thomas Schäfer to Top Gear via Gizmodo, 2026; SangYup Lee and Simon Loasby to Top Gear, 25 November 2024; Ha Hak-soo to Korea JoongAng Daily, November 2024; Wassym Bensaid at TechCrunch Disrupt, 30 October 2024; Matthew Avery via European Transport Safety Council, March 2024.

Trade-press long-term tests: Top Gear long-term review of Volvo EX30 (Report No 9, 2026); Edmunds long-term test, 2026; What Car? EX30 review by Steve Huntingford.

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we are systematic

About We Are Systematic

We Are Systematic is a UK-based strategic UX consultancy. We do evidence-based design work for organisations building safety-critical, regulated or operationally demanding products: automotive HMI, IoT and AI products, financial systems and energy infrastructure. The throughline across our work is that the surface most users interact with is the smallest visible part of a much larger system, and the design decisions on that surface carry consequences far beyond aesthetics. Our job is to reduce the risk in those decisions: to help teams get the high-stakes ones right before they are expensive to change.

Our work is partner-led. Every engagement is owned by a senior practitioner with direct accountability to the client. We do not subcontract strategy, research or design judgement. We produce written, designed and operational outputs rather than recommendations that ask the client to interpret them.

Quiet by default is our view on the state of in-vehicle interface design as of 2026. It is the latest in our published research, following European airline apps: state of UX 2026 and UK public EV charging apps: state of UX 2025. It is drawn from our own automotive and in-vehicle HMI work, including our engagement with Snapp Automotive and a vehicle manufacturer, and from the evidence-based design discipline our team brings to complex, safety-relevant products.

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Quiet by default

A design perspective on the modern car cabin.