Volkswagen’s bold plan to create a new car operating system

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FRANKFURT, GERMANY—The cars we drive are increasingly defined as much by the software they run as their engines or chassis. It started slowly. Discrete electronic control units started to appear under the hood, controlling fuel management or anti-lock brakes. New functions required new code, run on new little black boxes, metastasizing to the point where today, a new car might have up to 70 different modules, with software from as many as 200 different vendors. If that sounds like a recipe for disaster, it can be. Which is why Volkswagen Group—parent company to brands like VW, Audi, and Porsche—is saying “enough!”

Internal competition versus economies of scale

“Software is extremely complex nowadays. Each function is connected with everything—in the car, in the cloud, with the dealers—and we see that too many projects are in too much trouble. The process chain is not stable anymore; there’s so much inefficiency to this process,” explained Christian

Senger, who is responsible for VW Group's Digital Car and Services division. The problem is partly one by design; Ferdinand Piech specifically wanted Audi, Porsche, and Volkswagen to each develop software independently, the idea being that internal competition could improve the breed.

But it has led to balkanization. "Today, we build more than 10 million cars a year. But they are running on roughly eight different electronic architectures. In mechanical engineering, I would call us a platform champion," Senger said, referring to VW Group's strength in using a small number of common architectures—MQB for transverse-engined vehicles, MLB Evo for premium models, and now MEB for smaller electric vehicles—across multiple brands. "We defined how global industrialization of brands and markets really works. In software, there is no reason for having eight different architectures," he said, contrasting VW Group's current situation with the Android OS, where the same software runs on $60 smartphones as well as $1,000 smartphones.

Consequently, VW Group is now going to take a similar approach to software, consolidating it all under one new internal group, similar to the way that financial services or the ride-hailing Moia exist alongside individual vehicle brands. And that means in the future, a single unified automotive OS will run on everything from a VW Polo to an Audi A8. With thoughts of existing infotainment operating systems like Android, Automotive Grade Linux, or QNX, I asked Senger to clarify.

A single car OS across all 12 VW Group brands

"What is an operating system in the automotive world? Today we have an extremely different setup if it's infotainment, if it's the chassis, the powertrain," Senger explained, and that has led to some odd critical dependencies in some cars. For instance, some models simply won't run if the infotainment

system is broken; the navigation GPS provides the vehicle's master time counter, and without that, the powertrain won't function. "Whenever we exchange something, we have an impact on everything. What we are now doing with these so-called enabling functions is taking them out of customer functions, putting it in a middleware software layer. And this is what we call an operating system," he explained.

Eventually, that's going to mean a single software stack common across VW Group's vehicles—everything from the instrument displays and the infotainment to powertrain and chassis management (think traction and stability control or advanced driver assistance systems), plus a common connected car infrastructure and cloud. However, each brand will still get to develop its own UX in the same way that Porsche and Audi can build very different-looking vehicles from the same MLB Evo toolbox.

An Android-based infotainment system

Senger also revealed that VW Group will be using Android for future versions of the MIB infotainment platform, in large part because of the robust third-party app ecosystem with that OS versus Linux. "I think we need to open up. So Android will come in cars, giving customers access to this enormous ecosystem. But really be careful how much Android you're talking about. There are some brands really using Google's automotive services; this is not our strategy. When you do this, you get a great package of function and services, no doubt. But you also have to open up all the car's sensor data [to Google], and when I say all, it really is *all* sensor data," Senger told me.

However, it will be a while yet before the full effects of this strategy are felt. Senger says that the as-yet unnamed organization should be fully staffed—somewhere between 5,000

to 10,000 employees—by 2025. But future vehicle architectures will feature many fewer discrete black boxes and suppliers; instead of 70 different modules, most of those functions will be handled by a small number of multiple-domain controllers connected by ethernet instead of the pre-connected car CAN bus, an approach that is just now starting to be used in MEB-derived electric vehicles like the ID.3.

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