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2023年数字化汽车报告

聚焦消费者真实需求

首篇

2023年数字化汽车报告首篇

- ✓ 普华永道思略特第十一期数字化汽车年度报告
- ✓ 聚焦美国、欧盟和中国的全球消费者市场调研（n=3000）
- ✓ 基于区域结构分析，做出量化的市场预测（2023-2035年）
- ✓ 与全球车企和供应商高管、知名专业学者和行业分析师展开访谈

首篇

理解消费者偏好及其启示

- 消费者视角 — 不断变化的出行偏好
- 对汽车行业参与者的启示 — 界面、订阅和补能

下篇

评估全球出行市场动态

- 市场展望 — 技术和出行模式的渗透
- 技术 — 互联、电动、无人驾驶技术的进步
- 法规 —关键政策落地的脚步放缓还是加速？

为应对不断变化的消费者偏好，汽车行业参与者需要加快提升其用户界面和商业模式

首篇摘要

1. 消费者偏好

- 我们的**消费者调查**（德国、美国和中国，样本容量为3,000人）反映了当前**汽车出行方面的偏好**，并与**专家意见**进行了对比
- 在**汽车互联服务**方面，消费者首先希望做好**基本工作**—最优先考虑的是**安全+导航，智能手机车内投射**越来越重要，**汽车按需功能**也是如此；专家对**信息娱乐和生活方式**的重要性的评价高于消费者；在**德国和美国**，对全套车载互联服务的**支付意愿约20欧元/月，在中国约40欧元**，专家的估计更为保守
- **德国人对BEV汽车仍持犹豫态度—仅35%**的人表示考虑购买；**美国**的接受程度更高，**达50%**；**中国对BEV的接受度超过90%**
- **德国和美国消费者对L4级自动驾驶车的信任度较低，60-70%的人表示不信任**，而**中国只有15%**；但另一方面，希望使用L4级的德国消费者对**使用无人驾驶出租车的支付意愿高于**使用由司机驾驶的出租车；**在美国和中国支付意愿则较低**
- **购买新车/二手车被视为首选**；汽车**订阅**模式**获得青睐；在线购车在中国得分最高**（36%，德国为10%）
- **相较于去年，**消费者倾向于**更频繁使用公共交通**，但**对个人拥车表现出类似的意愿**；对汽车**共享/网约车意愿较低**

2. 对汽车行业的影响

- **汽车行业玩家**在**互联、电动、自动和智慧出行**方面面临着**战略挑战**。首篇的重点围绕**三个关键点**展开：

A 完善用户界面

随着**软件定义汽车**打开了众多新市场大门，**主机厂**需要明确将在哪些**消费者生活领域**发挥作用，关注**哪些体验差异化**（奢华vs便利），以及如何构建一个**对应的服务组合**。**投资**决策应基于**直接用户收入之外的价值创造**，为技术领域在**自建/联盟/外购**之间找到一个平衡视角

B 对汽车销售模式的重新思考

主机厂受益于**不断增长的汽车订阅需求**--预计到**2035年欧洲将从30万辆增长到200-400万辆**。为达**盈利，主机厂 需要在消费者的需求**（车型的灵活性、透明的定价）和智能化**资产生命周期管理之间达到平衡**，以获得**最大的剩余价值**

C 引领汽车行业发展

在**电池和双向充电方面**出现了**新的商业模式**。到2035年，**德国将有约500万辆双向汽车，车辆到家庭/微电网**的市场**潜力**为**2-2.5亿欧元，车辆到电网**的方案为**7-9亿欧元**--假设**生态系统参与者充分协调**

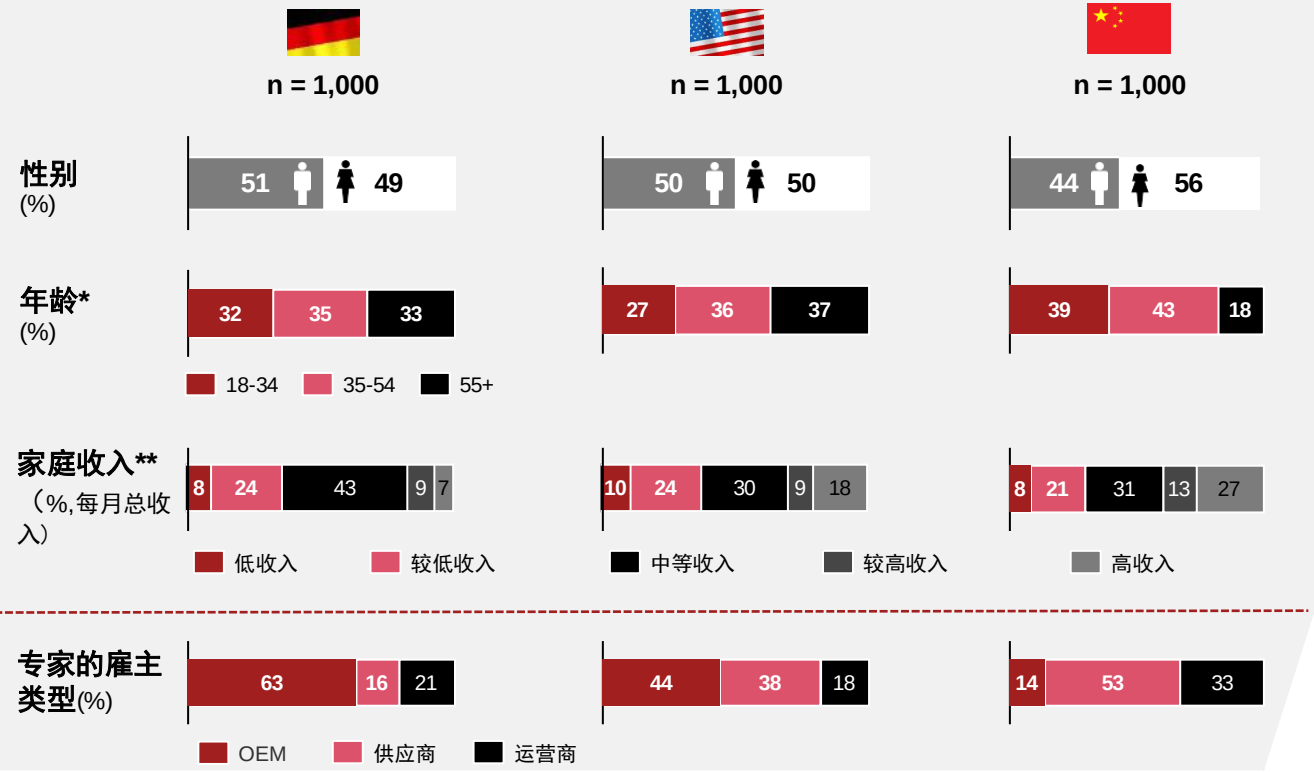
注：关于所述议题背后的详细假设和资料来源请参阅相关章节

目录

对3,000名来自德国、美国和中国的消费者调研反映了消费者对CASE技术的最新看法

消费者调研概述

3 区域 | **15** 问题 | **3,000** 受访者 | **50** 专家



主要发现

- **安全和导航仍是最重要的**互联服务功能—按需功能越来越受欢迎
- **在德国和美国，支付意愿为每月约20欧元，而在中国，约为40欧元**—专家估算结果更为保守

- **德国受访者对BEV汽车仍持质疑态度**—只有35%的人愿意考虑购买，但在美国则更为接受，约50%
- **在中国，绝大多数人倾向于BEV汽车，**超90%的人考虑这种选择—而只有80%的人考虑ICE

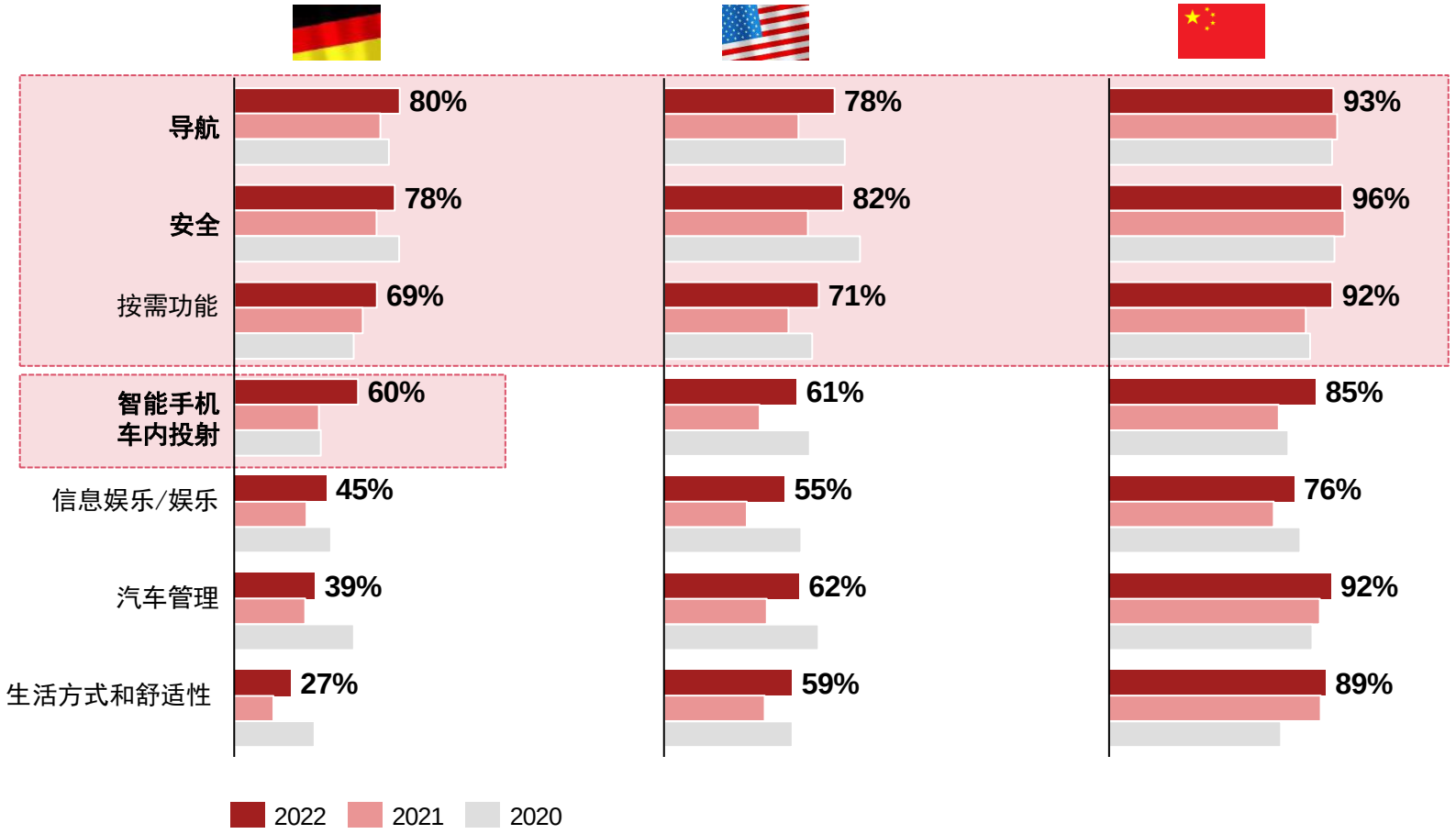
- **德国/美国受访者对L4级自动驾驶汽车持质疑态度—60-70%的人表示不信任，**而中国仅15%
- **在美国和中国，对**无人驾驶出租车与人工司机驾驶出租车的**支付意愿低于德国**

- **购买新车或二手车仍是首选，**但**汽车订阅**模式**正获得青睐**
- 消费者希望主要通过**更多的步行/骑自行车、改用电动车和使用更多的公共交通**来减少**二氧化碳**

*统一年龄段; **低收入(<1,6T 欧元, <2T 美元, <12T 元人民币), 较低收入(1,6-3,3T 欧元, 2-4T 美元, 12-25T 元人民币), 中等收入(3,3-6,6T 欧元, 4-8T 美元, 25-51T 元人民币), 较高收入(6,6-8,3T 欧元, 8-10T 美元, 52-64T 元人民币), 高收入(>8,3T 欧元, >10T 美元, >64T 元人民币)

安全和导航仍然是最重要的互联服务功能—汽车按需功能越来越受欢迎

互联服务 — 消费者重视程度



问题：“您最重视哪些互联服务功能？”

所有地区的受访者仍**最看重安全**和**导航**功能

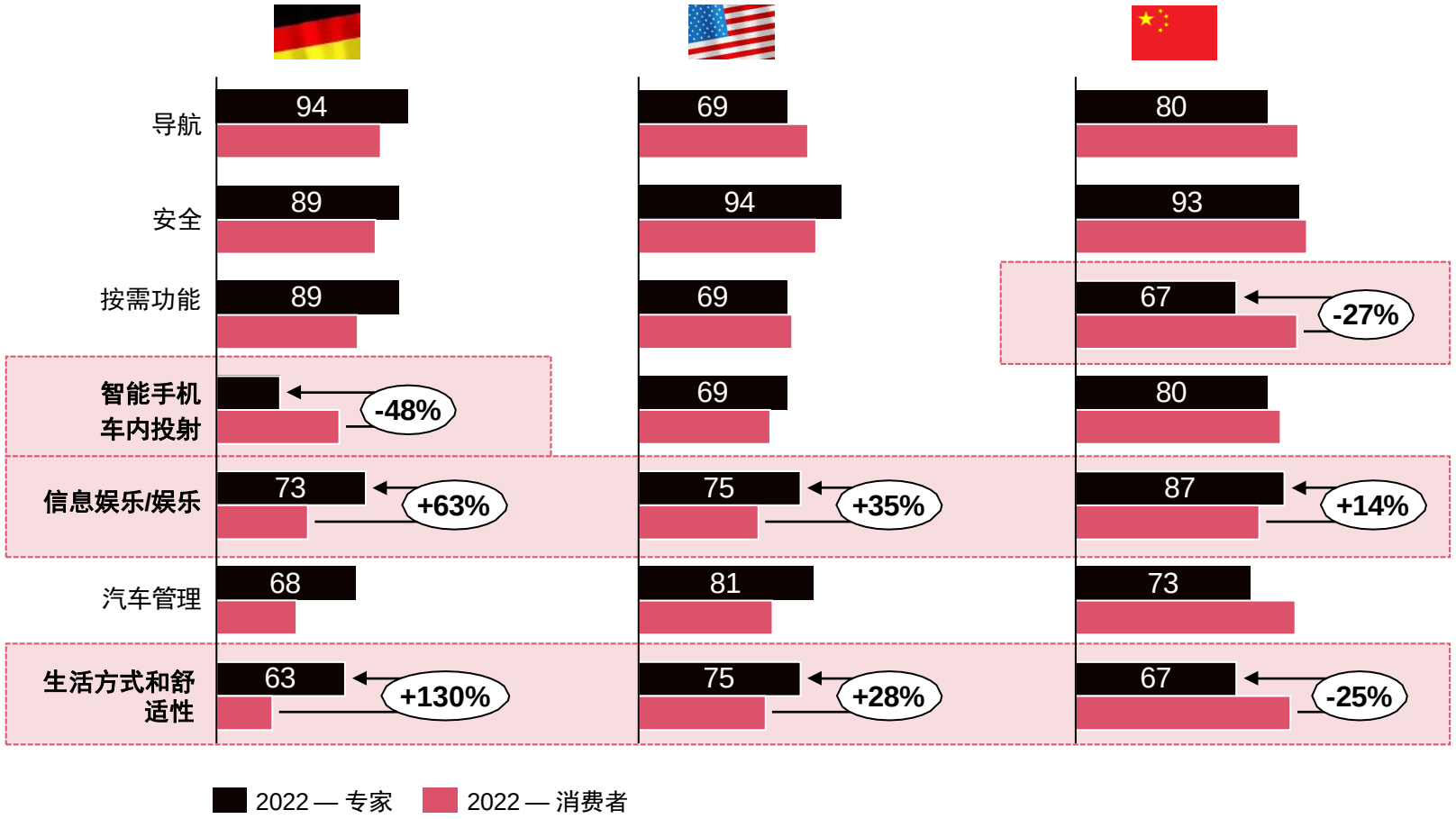
在**德国**，重视**智能手机车内投射**的受访者数量**明显增加**。”

信息娱乐/娱乐对年轻消费者更为重要

资料来源：普华永道思略特消费者研究

专家对信息娱乐的重视高于消费者 — 但在中国，他们低估了按需功能的相关性

互联服务 — 专家重视程度



问题： *“您最重视哪些互联服务功能？”*

专家**最看重安全、导航和娱乐功能**

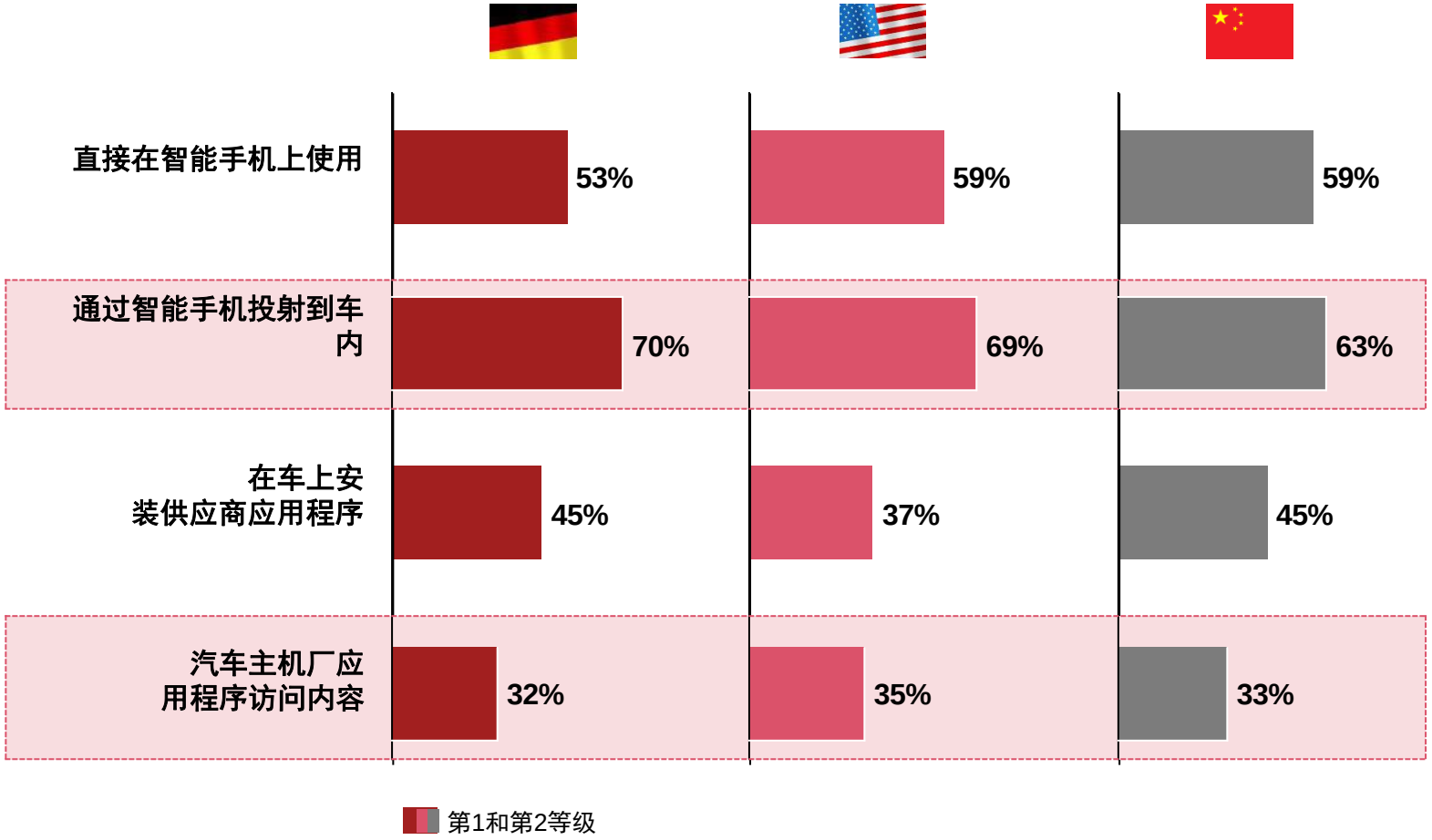
德国专家在评估重要程度时**不重视车内手机投射**功能

中国专家在评估重要程度时，相对而言不太重视**按需功能**和**生活方式及舒适性。”**

资料来源: 普华永道思略特专家调查研究; n=50

智能手机投射到汽车的受重视度最高；用于服务访问的汽车主机厂应用程序不太受欢迎

车载互联服务和媒体/娱乐



问题： *“您更倾向于用什么方式在车内使用娱乐功能？”*

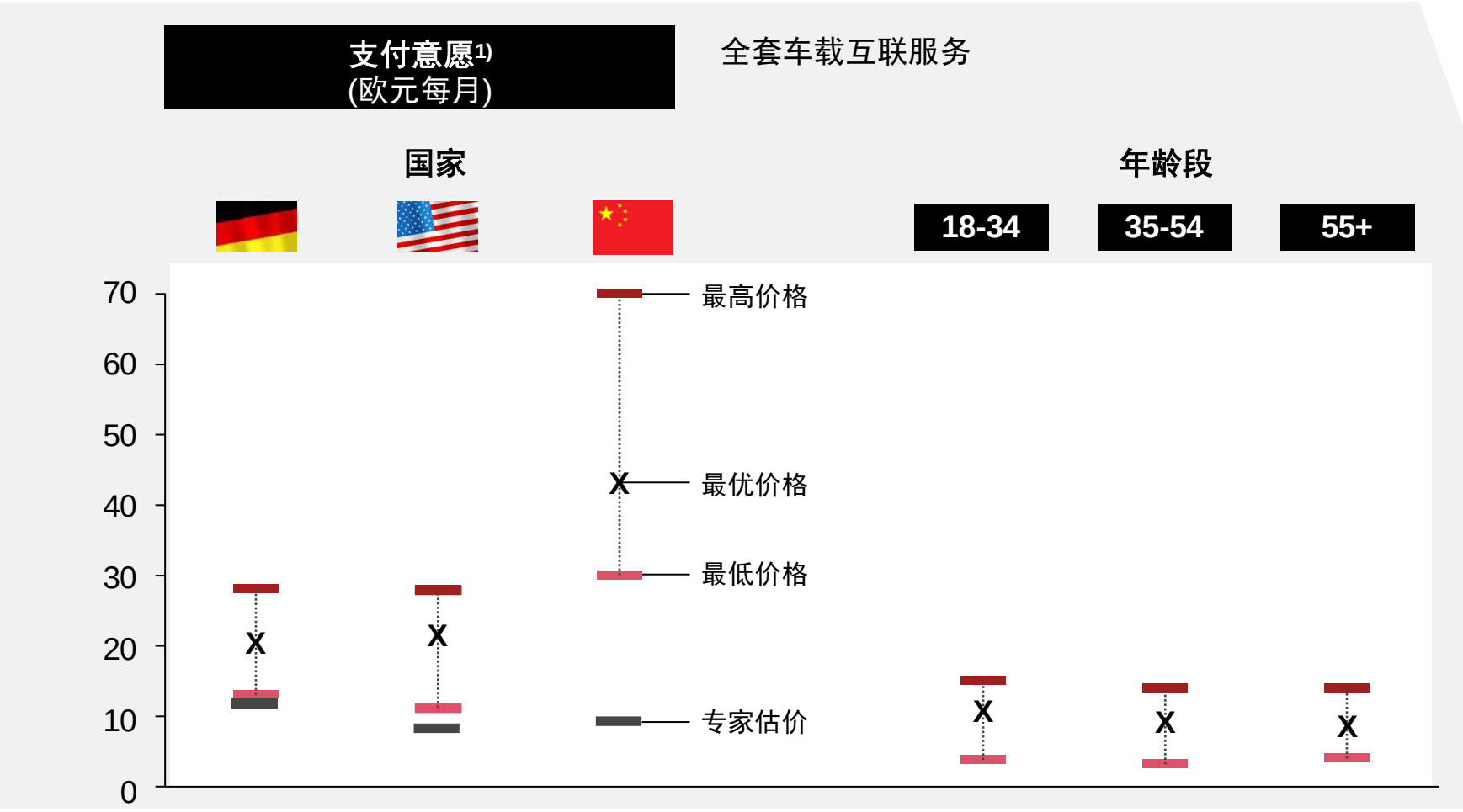
所有国家的受访者表示**首选**的方式是**智能手机投射**

通过**汽车主机厂应用程序**使用娱乐功能的方式**不太受欢迎**。”

资料来源：普华永道思略特消费者研究；由于四舍五入，分项之和可能不等于100%

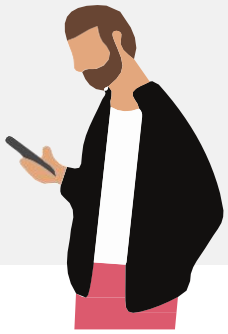
德美受访者表示针对互联服务的可接受价格约为20欧元/月的费用，在中国则是其两倍（40欧元/月）

互联服务 — 平均支付意愿[1)]



问题: *“您认为全套车载互联服务价格为多少时*

- *过于便宜?”*
- *物有所值?”*
- *略微昂贵?”*
- *过于昂贵?”*



中国的支付意愿差值明显高于德国、美国的水平

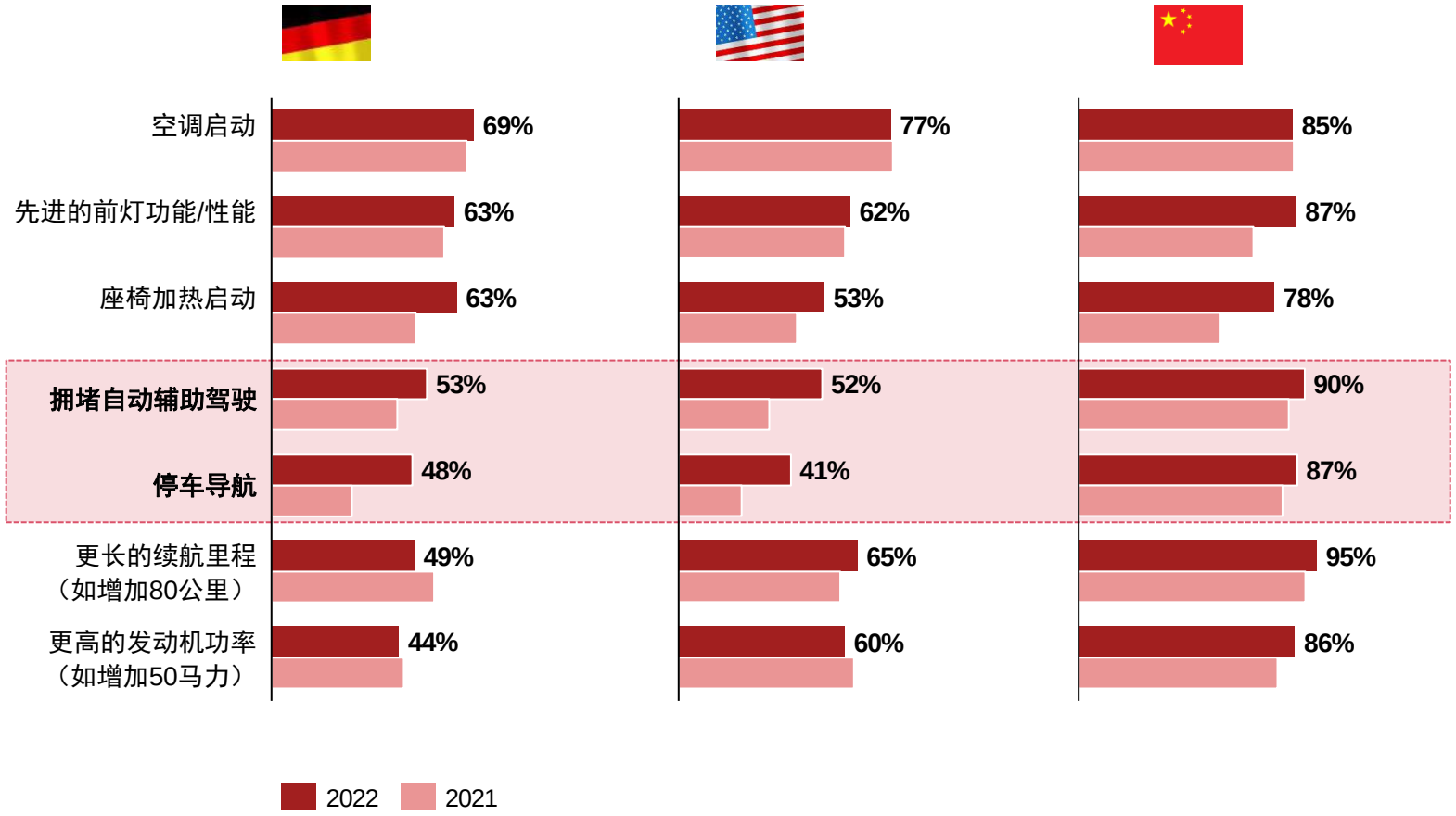
专家不太看好消费者支付意愿—尤其是在中国。”

最优价格随年龄增长而略有下降

注: 1) 价格计算采用价格敏感度测试模型（van-Westendorp-方法论）
资料来源: 普华永道思略特消费者调研；汇率： 美元/欧元 0.93, 人民币/欧元 0.14 (15.02.2023); 普华永道思略特2022年专家调研; n=50

按需功能中自动驾驶功能，如拥堵自动辅助驾驶/停车导航正获得更多青睐

汽车按需功能 — 消费者重视程度



问题: "对您来说，[...]按需功能的重要程度如何？"

自动驾驶功能 — 拥堵自动辅助驾驶或停车导航 — 相较于前一年更受消费者重视

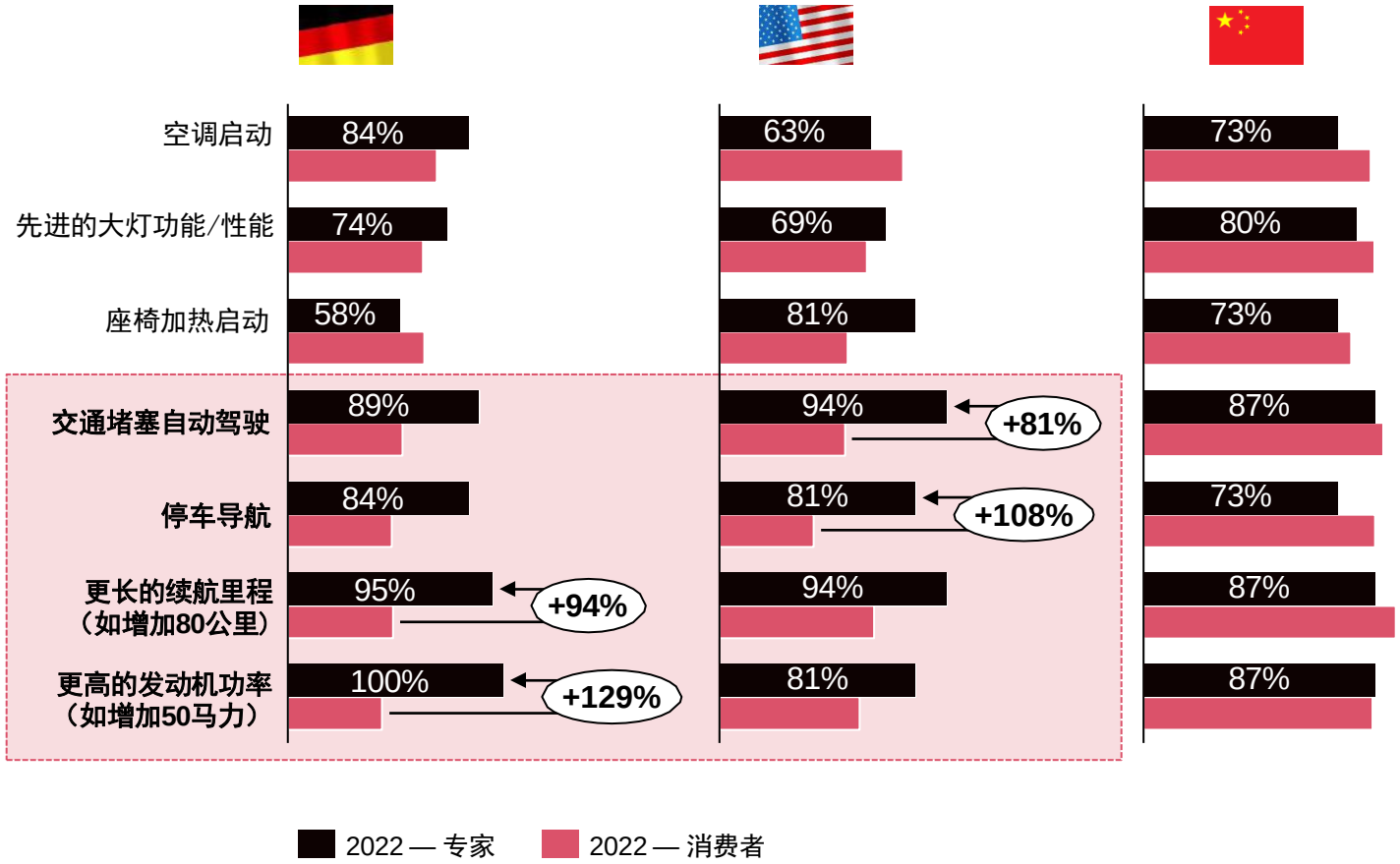
空调启动仍被视为最重要的汽车按需功能。"

拥堵自动辅助驾驶功能对年长的消费者更为重要

资料来源：普华永道思略特消费者研究

德国和美国的专家比消费者更重视自动驾驶功能的吸引力

按需功能 — 专家重视程度



提问：“对您来说，该项按需功能的重要程度如何？”

专家们认为**更长的续航里程**和**交通堵塞自动驾驶**是**最重要**的功能

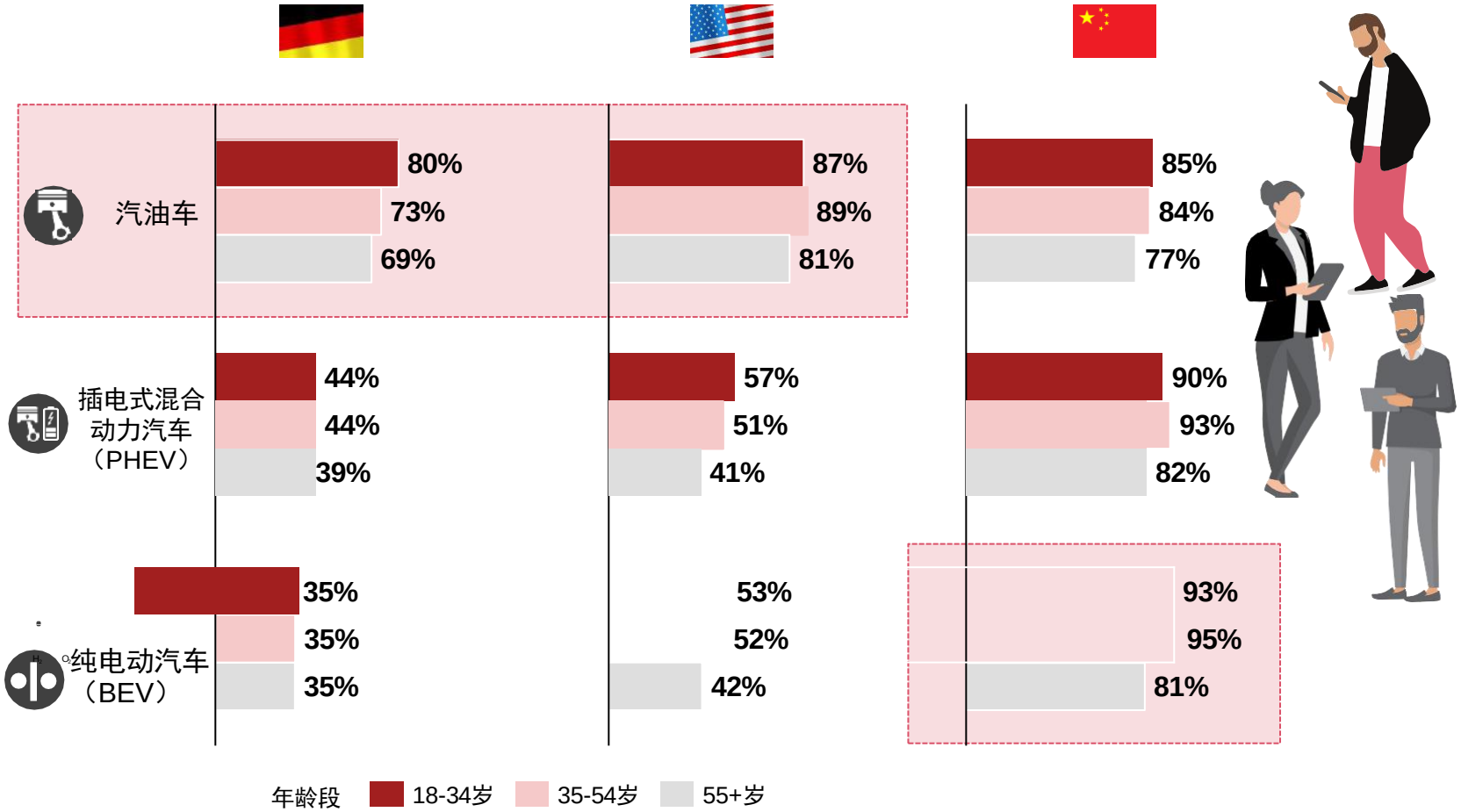
与消费者相比，专家们比较看好按需的**发动机功率**。”

美国和中国的专家在评估空调启动的重要程度时更为保守

资料来源：普华永道思略特消费者研究

从动力系统的偏好来看，德国和美国的消费者坚持使用传统汽油，而中国消费者则更喜欢纯电动汽车

被调研者对可能再次购买的发动机类型比例（%）



提问： *“假设你想购买/租赁/订阅一辆乘用车，你考虑以下类型发动机的可能性有多大？”*

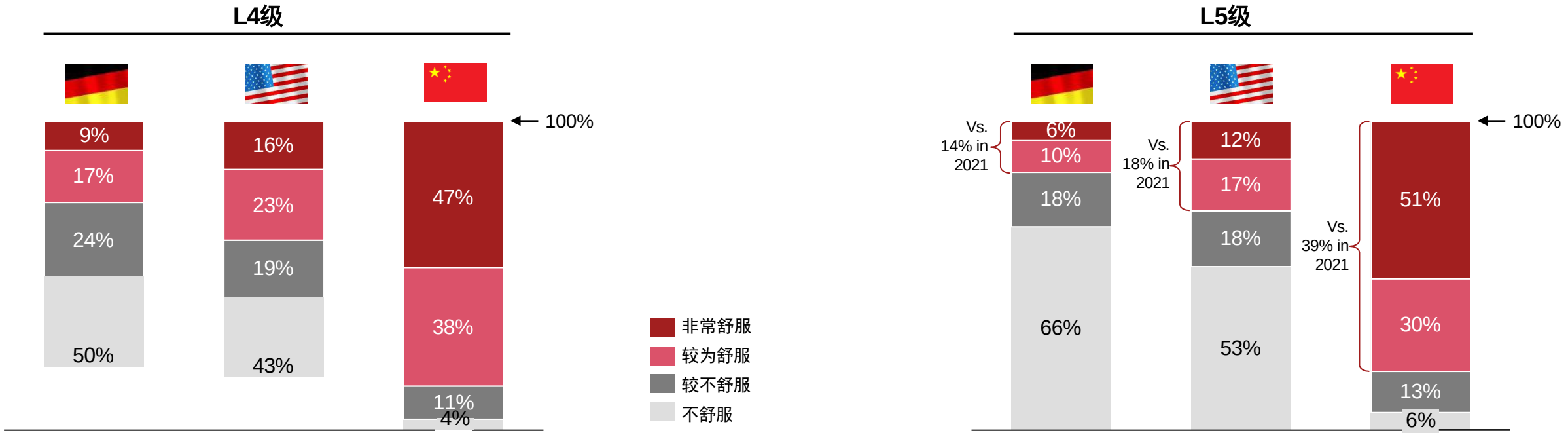
在美国和德国，汽油是最受欢迎的发动机类型，其次是插电式混合动力汽车，它比纯电动汽车略微更受欢迎。**中国消费者**表现出相反的偏好，**纯电动汽车是最受欢迎的**，领先于混合动力和燃油机。”

汽油发动机出人意料地对年轻消费者更有吸引力

资料来源：普华永道思略特消费者研究

德国和美国的消费者对自动驾驶的接受程度仍然很低—中国消费者则持更开放的态度

自动驾驶 — 消费者的态度



提问：*“你觉得使用自动驾驶汽车有多舒适(L4级[1])”*

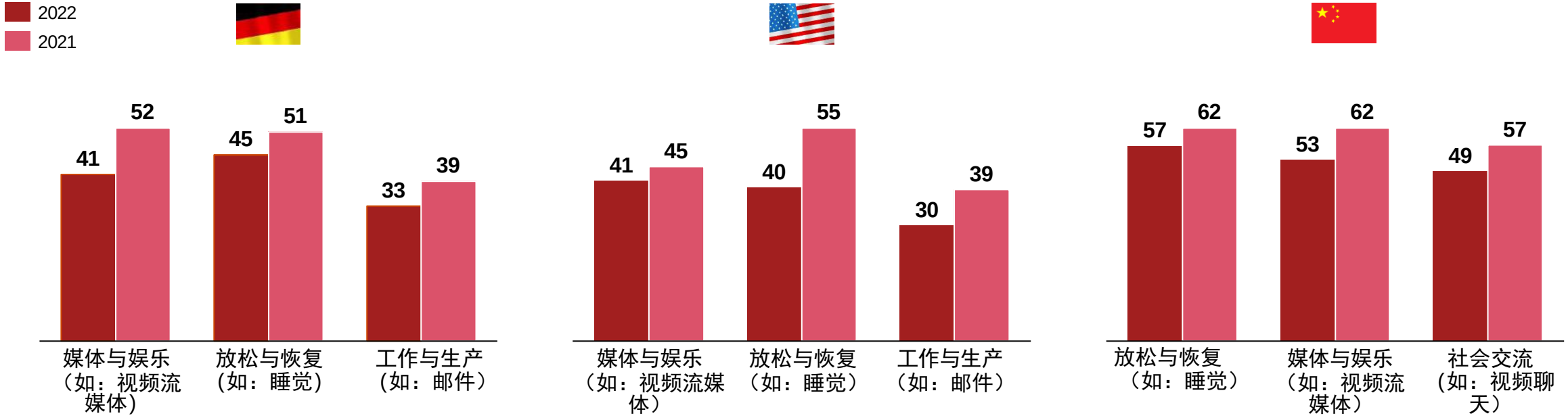
”总的来说，与2020年相对较低的数字相比，使用自动驾驶汽车的意愿已经恢复，这是因为当时的负面头条新闻，如事故和网络安全威胁导致的。对 “全自动”汽车（L5级）的怀疑态度仍然比L4级强。

提问：*“你觉得使用完全自动驾驶汽车有多舒服(L5级[1])”*

仍然有一个方向盘和踏板，但不需要人类的行动或监督，除非在更复杂的情况下，如恶劣的天气或不寻常的环境。
1）可以在任何道路和人类可以谈判的任何条件下完全自动操作。没有方向盘或踏板。你所要做的就是向车辆指定一个目的地。资料来源：普华永道战略与消费者研究2022

消费者希望利用在自动驾驶汽车上的时间获得娱乐放松，德国、美国的驾驶者工作偏好高，中国驾驶者更愿意社交

自动驾驶 — 对使用获得的时间的三大偏好



提问： *“在驾驶完全自主的车辆时，你会将获得的时间用于哪些活动？”*

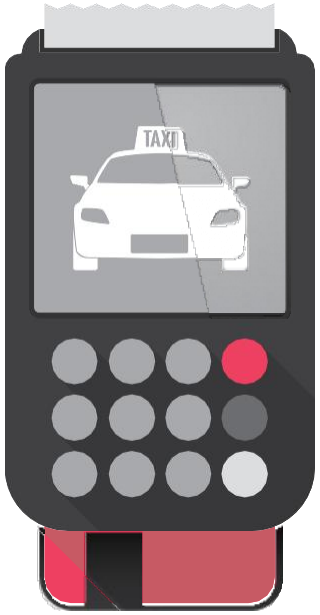
”与2021年相比，利用不开车所获得的时间的意向下降了--在德国和美国，这种下降很明显。媒体和娱乐以及放松仍然是主要的意向活动。”

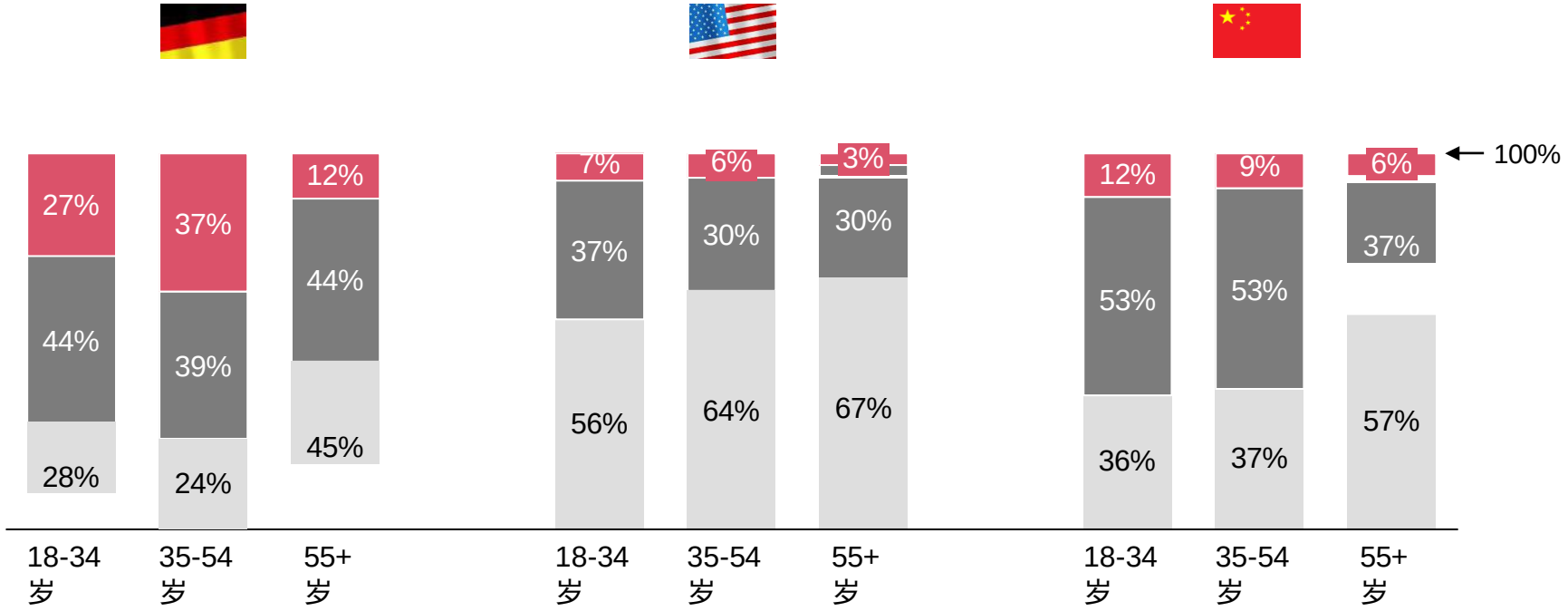
资料来源:普华永道战略与消费者研究2020，样本数量n=3,000 (1,000 德国, 1,000 美国, 1,000 中国);
普华永道2021年战略与消费者研究；第一个问题样本数量n=3,000 (1,000 德国, 1,000 美国, 1,000 中国);第二个问题样本数量n=1604 (383 德国；356 美国, 865 中国)

约60%的美国公民希望为无人驾驶出租车支付更少的费用；只有5%的人希望支付更多的费用，而在德国则是30%

自动驾驶 — 支付意愿

提问： *“当考虑到一次普通的出租车乘坐及其价格时，与这次出租车乘坐相比，你愿意为自动驾驶支付多少费用？”*





我愿意支付更多
我愿意支付相同的费用
我愿意少付

虽然年轻的德国受访者愿意为自动驾驶汽车支付更多费用，但年长的德国人却不太愿意这样做。

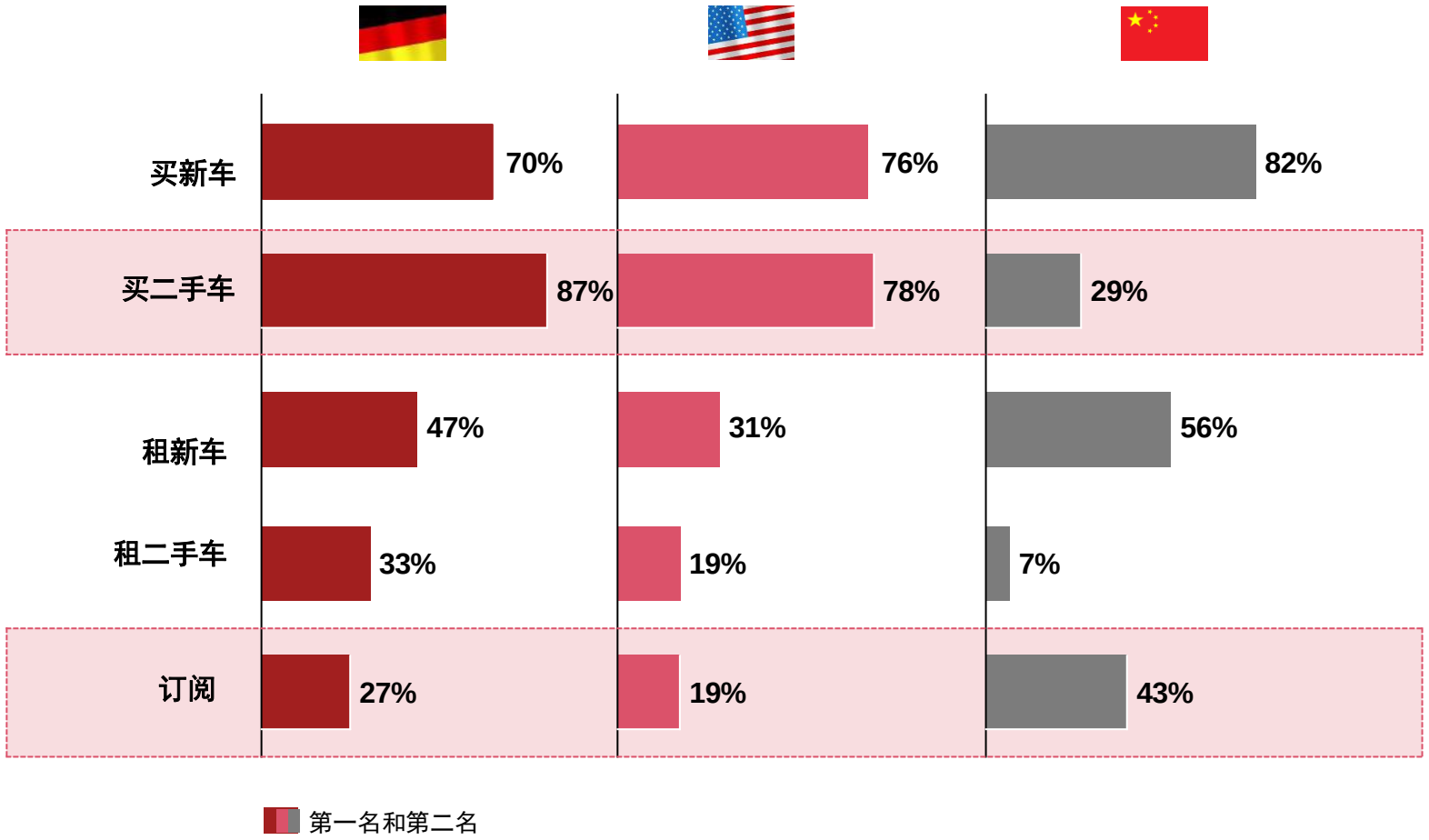
美国和中国的受访者绝大多数都打算为自动驾驶汽车支付更少的费用--在那些希望支付更少费用的人中，比司机驾驶的出租车降价40-50%是常态。”

1) 5公里/3英里车程的额外费用(传统汽车的费用是10欧元/10美元/40元人民币)

资料来源:普华永道2021年战略与消费者研究;第一个问题样本数量n=198 (57 德国，141 美国)，第二个问题样本数量n=1604 (383 德国；356美国；865 美国会使用AV的受访者

大多数受访者倾向于购买新车或二手车；但汽车订阅正在引起人们的兴趣

购买/租赁/订阅汽车的排名



问题：“如果你在未来一到两年内需要购买、租赁或订阅一辆乘用车，你对以下获得汽车的方式如何排序？”

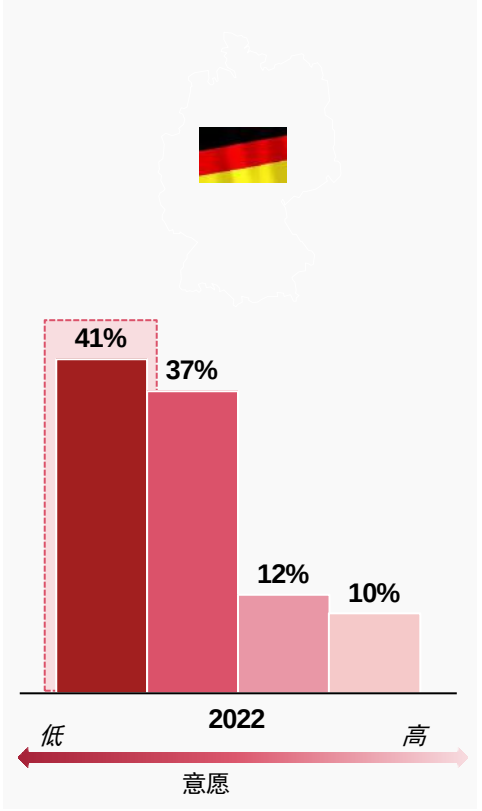
购买二手车的意向正在增长，特别是在德国和美国。

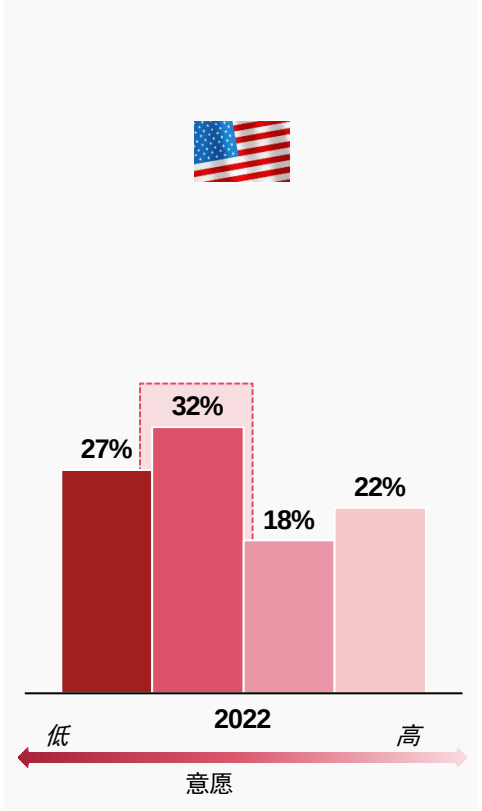
汽车订阅越来越受欢迎--尤其是在中国。2022年，德国和美国对汽车订阅的偏好强烈增加（德国27%对14%，美国19%对15%）。”

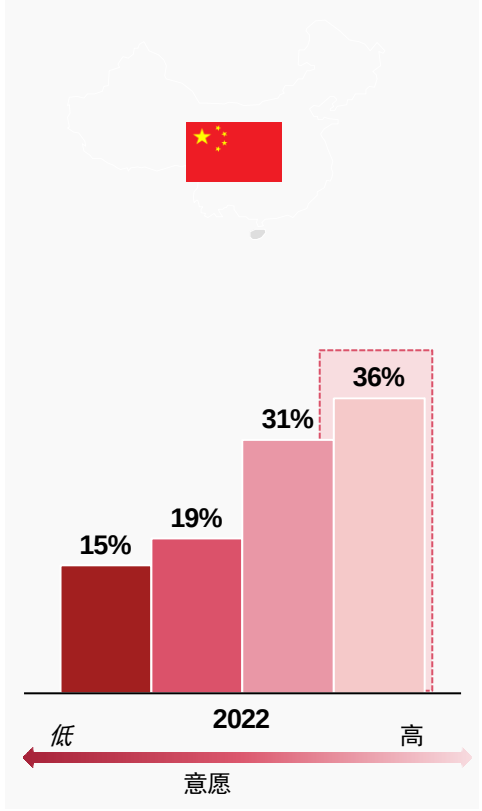
资料来源：思略特&消费者研究 |由于四舍五入，分项之和可能不等于100%

中国的网上购车意愿非常高，德国相当低，美国则介于两者之间

网上购车的意愿







- 我所有事情都想在商店里做
- 我愿意在网上选配，但在商店里签字和试车
- 是的，我觉得在网上配置和签署很舒服，但我更愿意在商店进行试驾
- 是的，我觉得在网上完成所有步骤很舒服

提问： *“你会在网上购买你的下一辆车吗？*

各国在网上购车的意愿**有很大的不同**。

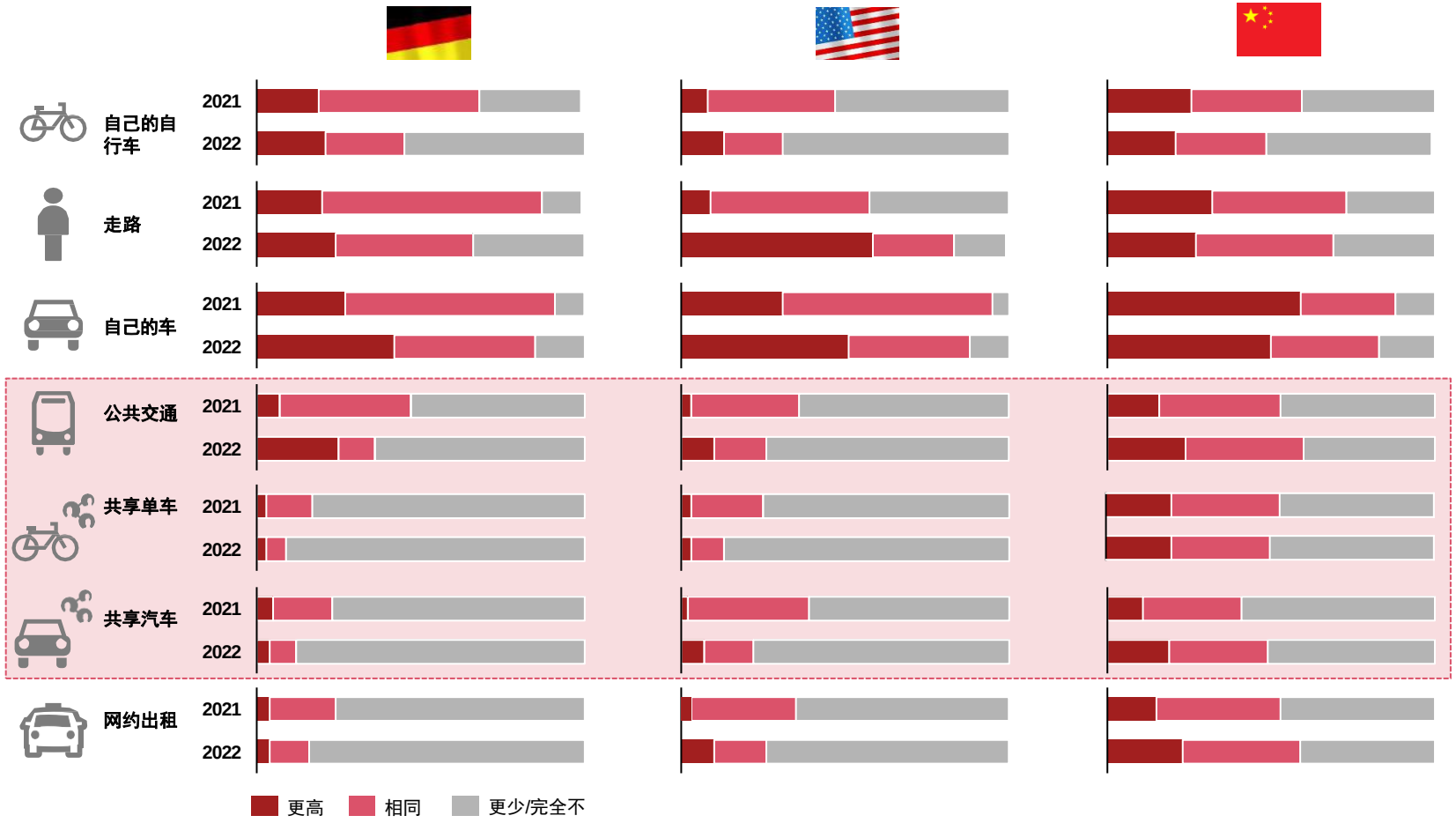
在中国，人们对在网上完成某些步骤甚至整个购买过程的态度**特别开放**

相比之下，**德国**的大多数人对商店的流程感到**更舒服。**”

资料来源：普华永道思略特消费者研究

即使COVID-19的直接风险下降，开自己的汽车仍然很受欢迎；在中国，共享模式的使用越来越多

COVID-19限制后的移动模式（%）



提问： “COVID-19已经暂时改变了我们在许多方面的出行方式。一旦我们摆脱了这种大流行病，你打算如何使用[.....]的交通方式？”

”

使用自己的汽车仍然被视为最方便的交通方式—**德国和美国**的需求增幅最大。

在中国，消费者计划更多地使用**共享模式**

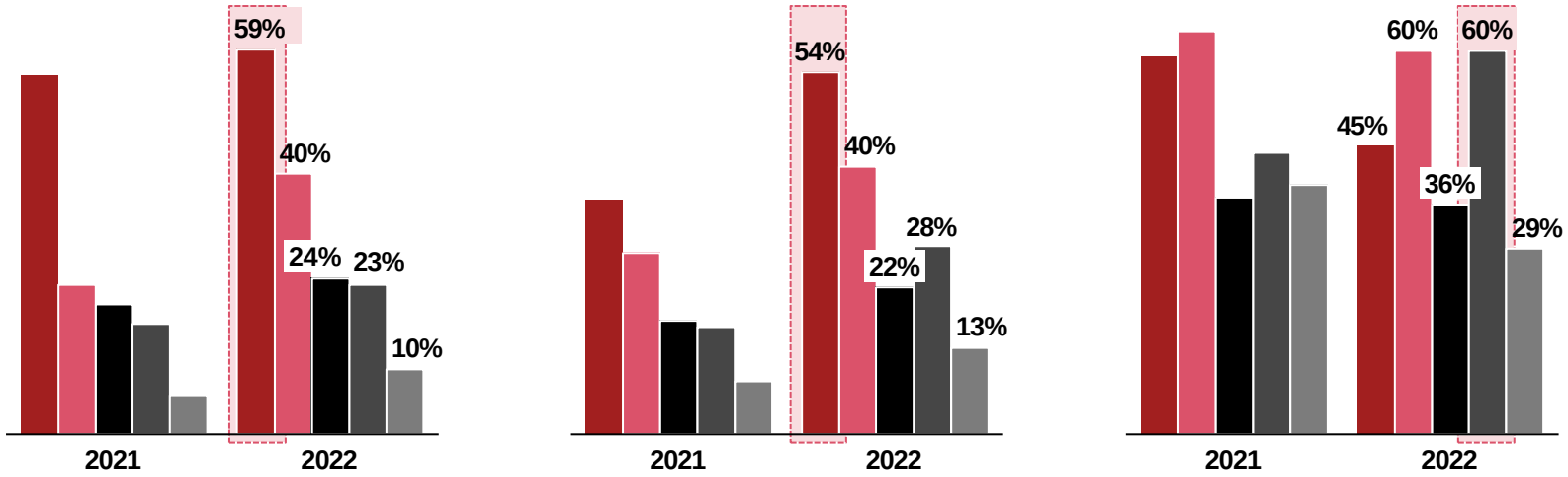
在**所有地区**，计划**更多使用公共交通工具**的人数都在**增加。**”

资料来源：普华永道思略特消费者研究

价格和可获得性是迄今为止鼓励消费者使用可持续交通的首要驱动因素

鼓励可持续交通模式的因素

提问：“什么会鼓励你更频繁地使用可持续交通（如共享自行车、共享汽车、公共交通工具）？”



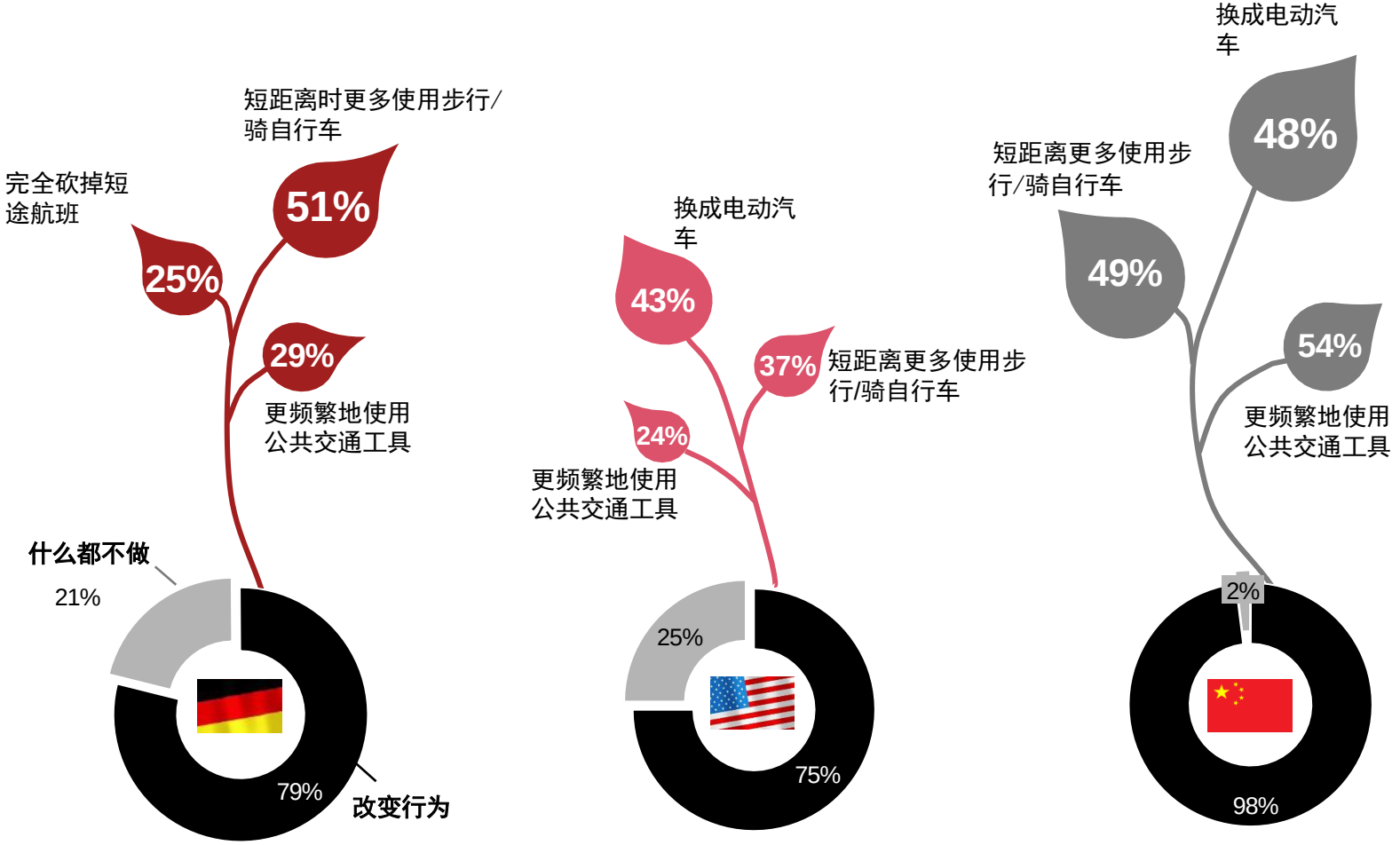
在**德国**，表示**更好的可获得性**是说服他们使用可持续交通的一个重要因素的消费者数量急剧增加。

美国的受访者强烈关注**更便宜的价格**，而在**中国**，**用户友好的使用方式最有可能鼓励受访者**使用可持续交通。”

资料来源: 2021年和2022年普华永道思略特消费者研究; 样本数量n=3,000 (1,000 德国, 1,000 美国, 1,000 中国)

每个国家都有不同的优先级来减少二氧化碳。在德国，更多的是步行；在美国，改用纯电动汽车；在中国则是公共交通

对减少二氧化碳贡献最大的三个国家



提问： *“你想做哪些主要的个人改变来促进减少二氧化碳的排放？”*

为**减少二氧化碳做出贡献**的**意愿很高**，特别是在**中国**（98%）—**在美国**有强劲的**增长**（75%，而去年是52%）。

主要的贡献是更经常地**步行/骑自行车**完成**短途旅行**，**改用电动车**，或更经常地**使用公共交通工具**。”

资料来源：普华永道思略特消费者研究

目录

“完善用户界面”

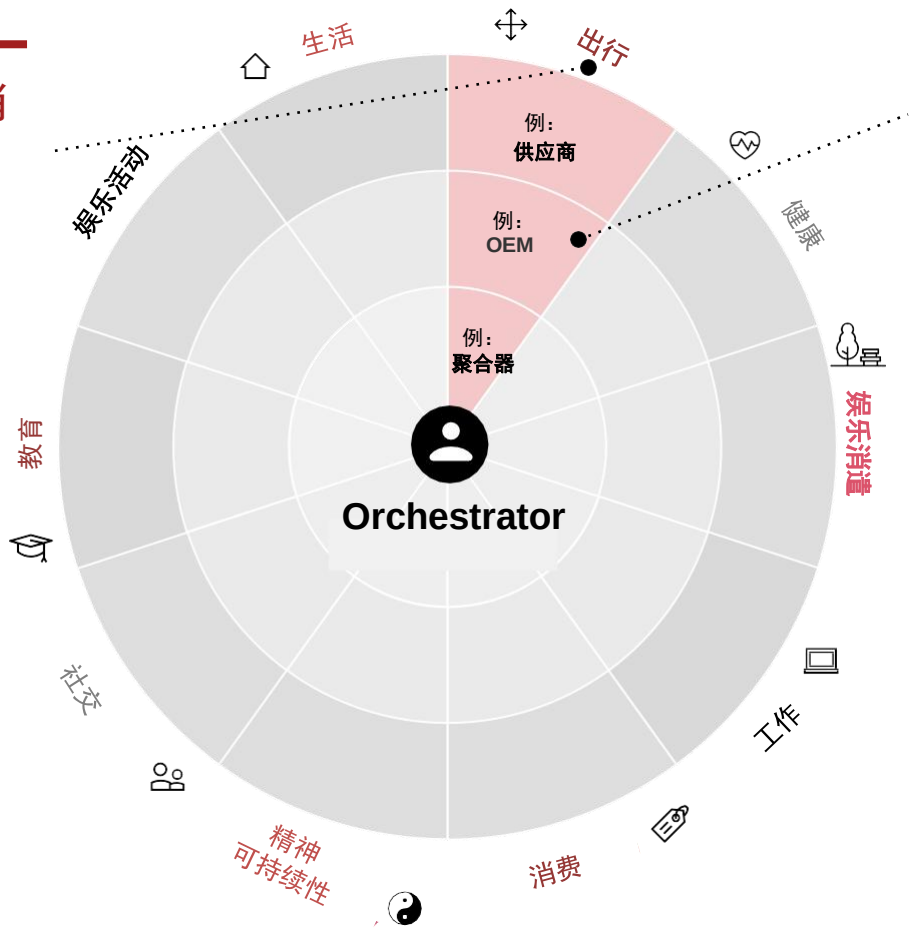
汽车参与者的业务要超越汽车本身 — 维持用户触达至关重要

重塑商业模式，满足以人为本的出行需求

出行需求

出行生活场景中的人类需求决定了消费者需求

- **出行需求**受长期经济、政治和社会趋势以及年代变化的影响
- 个人消费者位于生态系统的中心（**企业对人**）
- 消费者的需求可被归纳为十个不同的**生活场景**
- 在这些生活领域内，**生态系统**围绕特定消费者需求以“企业对企业”和“企业对消费者”的形式出现



出行方式

优秀的**出行生态系统参与者**对于四个关键议题理解透彻：

体验的差异化

例： 奢华，便利…

数字服务组合的范围

例：生活场景覆盖，小众定位. . .

价值杠杆

例： 营收，净利润优化…

价值链整合

例：纵向/横向整合，合作…

资料来源：思略特，普华永道Ecosystemizer

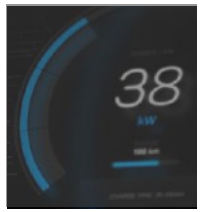
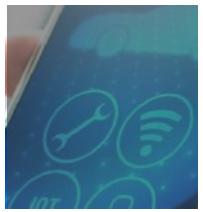
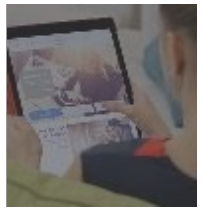
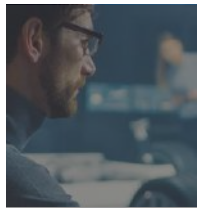
完善数字化用户界面意味着为不同的客户需求创造差异化的体验

差异化体验 — 示例

资料来源：思略特分析

汽车企业需在创造价值的数字服务组合中权衡

数字服务组合的范围 — 示例

	出行	娱乐	工作	健康
 车载功能服务	**用户访问** — 特斯拉蓝牙钥匙 **灯光** – 宝马远光助手 **摄像头** – 特斯拉哨兵模式	**声音** — 宝马立体声系统 **智能汽车助手** —阿里巴巴、沃尔沃/戴姆勒 **AI虚拟形象** — Fetch.ai 自主代理		
 用户旅途服务	**自动驾驶** — 特斯拉自动驾驶升级 **先进的导航功能** —梅赛德斯-奔驰路况通系统	**游戏** — 特斯拉游戏中心 **娱乐** — 特斯拉卡拉OK **音乐流媒体** — 宝马Spotify，蔚来Radio **车内AR游戏** — 奥迪/holoride合作伙伴	**加密汽车钱包** — 多种试点功能 **车内办公室** — 梅赛德斯me互联服务系统 **智能办公室连接** — 宝马IFTTT系统	**乘客安全** — 蔚来驾驶疲劳提示 **情景照明** — 梅赛德斯奔驰ambient情景系统 **冥想** — 保时捷Feel-Good-Coach专注提升幸福感 **应急助手** — 通用OnStar guardian安全平台
 用户非旅途服务	**停车场搜索与支付** — 大众we park平台 **P2P 租车/共享汽车** — Sono motors应用程序 **即插即充** — 大众/Ionity **自动泊车与充电** — 博世自动代客泊车功能	**运用非同质化代币（虚拟货币）** — 劳斯莱斯幻影系列 **Web3客户忠诚度计划** — 宝马/Coinweb		
 B2B/数字服务	**预测性维修** — 博世，Carmen **数字车险** — 宝马CarData汽车数据系统 **汽车数字应用商城** — Caruso，Otonomo，汉兰达		**车队管理/诊断** — 戴姆勒互联业务 **行车记录/定位跟踪** — 戴姆勒互联业务 **物流最后一公里** — 蔚来delivery in trunk	**道路救援** — Urgently/Otonomo **安全交通规划** — 梅赛德斯Data/London

服务组合的权衡

- **差异化** vs. **收入潜力**
- **覆盖率** vs. **盈利能力**
- **协同**增效 vs. **风险对冲**
- 直接**控制** vs. **开放式**合作伙伴
- **数字优先** vs. BEV/**AD可用性**

资料来源：思略特分析

在整个价值链和车辆生命周期中，数字服务所释放的价值超出了直接的用户收入

数字服务价值杠杆 — 示例

营收: 直接营收与客户终身价值	**服务盈利**	互联服务激活费用和/或与每月订阅的有关持续性收入	**60-70%** *受访者愿意支付180美元/年的互联服务套餐*
	售后服务的激活	在服务期内解锁个性化功能或激活内置硬件，达到追加销售的效果	**35-50%** *受访者表示对售后服务感兴趣*
	品牌忠诚度	对引导体验的满意度更高，并通过订阅服务增加 "粘性"	**45-55%** *受访者对自己订阅的品牌具有更高的忠诚度*
	售后服务忠诚度	预测性维修所带动的原厂配件销售和车间运输给经销商带来更多的收入	**30-40%** ***受访者****在免费试用后转为付费订阅*
	平台访问/数据销售	授权第三方访问自有平台或将（匿名的）数据/洞察货币化的直接收入	**50-60%** *的公司表示他们向第三方出售数据*
净利润: 运营支出/资本支出优化	**研发优化**	分析客户偏好/行为相关数据并及时调整汽车参数和功能	**30-40%** *的附加收入潜力是基于消费者洞察*
	变体管理	激活按需功能，以减少特定型号的变体数量	**20-30%** *的成本缩减可通过减少变体的方式实现*
	零件库存管理	对预测性维修服务进行高阶规划，优化库存管理	**20-30%** *的库存缩减可通过需求预测实现*
	产品召回	通过车载系统在线升级技术修复汽车的潜在技术问题，以防止召回事件的发生	**30-40%** *的召回事件可通过车载系统在线升级技术部分/全部预防*

启示

- 生态系统商业案例应**超越以汽车为中心**的商业案例
- 应该在整个客户生命周期中考虑**直接收入潜力、间接收入潜力**以及**汽车本身以外的商业机会**
- **B2B产品**展现出显著的**直接用户经济潜力**
- 除外部机会以外还存在着大量**内部机会**，例如提升流程和组合的效率

资料来源：思略特分析 + 专家讨论

主机厂被迫与技术公司合作，以提供引人注目的数字服务—冒着失去控制的风险

价值链整合 — 合作选择的范围

主机厂控制 → 技术公司参与

I 无技术公司参与

操作系统和所有应用程序都由主机厂开发

对主机厂的完全控制，没有标准化，降低了开发速度，与竞争者相比，减少了产品

II 操作系统供应

由供应商提供标准化的技术栈。例如：安卓汽车操作系统

更高的开发速度，易于整合外部应用程序（如Spotify），标准化的设置无法调整

III 内容镜像

通过使用车内的应用程序显示苹果/谷歌的内容，例如安卓汽车

可以提供需求量大的应用（如谷歌地图）。主机厂应用较少使用

IV 使用汽车数据的技术播放器内容

将汽车数据用于外部创建的内容，例如汽车使用案例，如汽车功能的自动化

高端用户体验，交互设计与智能手机相似，但主机厂失去了对数字客户体验的控制权

V 数字体验的外部开发

下一步?

整个汽车软件是由技术供应商开发的

所有的数字业务都从主机厂手中拿走了；汽车只是硬件，而技术供应商可以获得所有相关数据

根据用户的实际期望创造最先进的数字体验应该是首要任务

重新思考汽车销售

短租及长租仍是市场主流，汽车订阅模式在中国市场刚刚起步，填补了长期租赁和短期租赁服务之间的空白，分时租赁逐渐退出市场

汽车租赁产品的主要模式

	长期租赁	车辆订阅	短期租赁	分时租赁
费用	**低**，提供较少的附加服务并且租赁期限长	**高**，具备较高的便利性	**高**，较高灵活性，提供丰富的附加服务	**最高**，最灵活的租赁方式并涵盖附加服务
包含的服务				
限定车型及配置	✓	~	×	✓
预付款	✓	~	~	~
风险相关的额外收费（例如：事故记录）	✓	×	×	×
保险、税费及注册费用	×	~	✓	✓
保养及维修	×	~	✓	✓
允许额外的驾驶员	~	✓	~	~
灵活退改	×	~	~	✓
车型更换	×	~	✓	~
上门取还	×	✓	~	✓
残值保障	×	~	✓	~
全数字化用户旅程	~	~	✓	~
租赁期限 （中国平均数值）	1个月 — 趋势 ← Ø 1年 — 3–5年	3天 — Ø 1个月 — 1年	1 天 — Ø 7天 — 1年	10分钟 — 趋势 → Ø 1小时 — 1周

✓/ ~ / × = 通常包含该服务/ 通常视服务提供商具体情况而定/ 通常不包含该服务

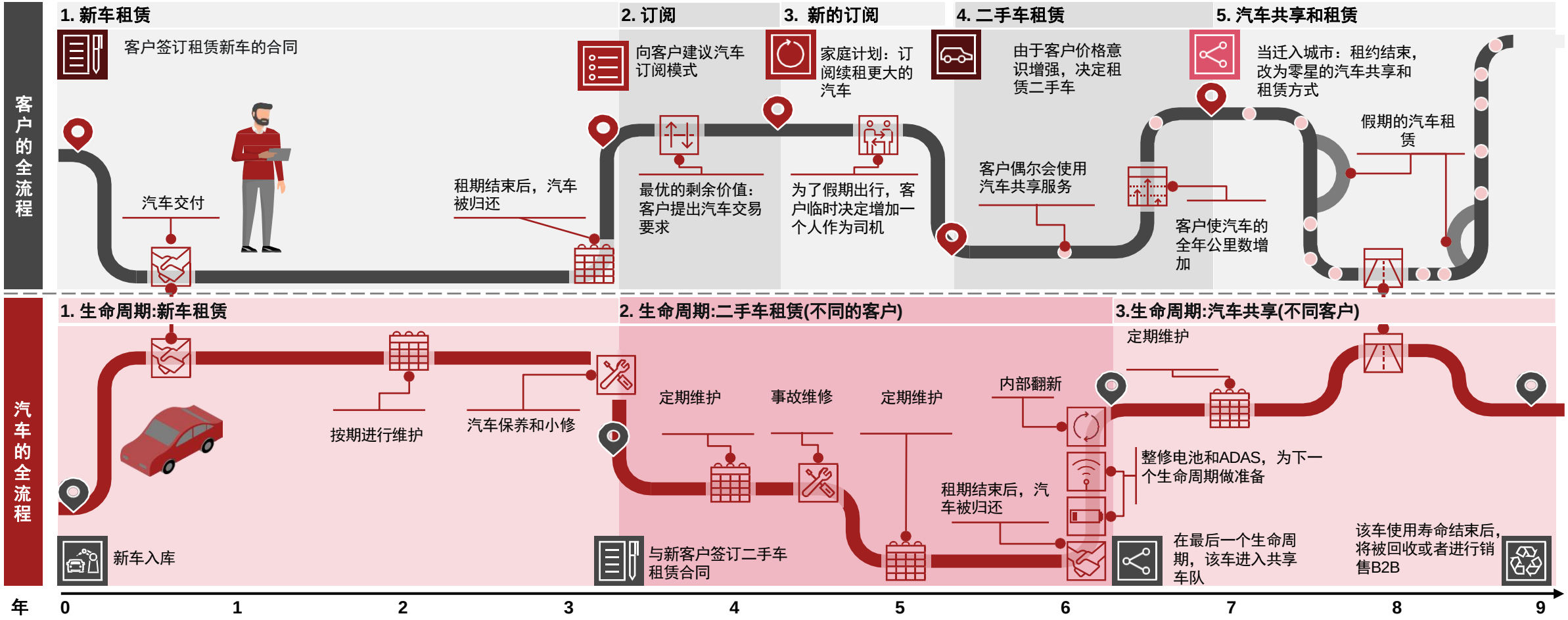
- 目前，中国市场汽车订阅服务主要由**主机厂（新能源品牌）提供**，且在国内少数大城市运营，通常将提供完善的**“管家式”服务**作为卖点
- 订阅服务期限相较德国市场**更短**，例如极氪订阅提供3天/7天/15天的“尝鲜订阅”及1至12个月的“常规订阅”，而德国市场订阅服务期限通常在1个月至6年
- 主机厂将短期订阅服务作为**产品的宣传渠道**，高意向购车用户可通过订阅的方式进行产品及服务的深度体验，进而推动销售转化

- 曾经风头无两的分时租赁业务，在2021年陷入**倒闭潮**
- 国内目前仅有iGo等少数企业仍在少数城市运营分时租赁，但也面临车辆、运营、补能等方面的**成本压力，盈利难**
- 以GoFun为代表的知名分时租赁平台多数已**转为短租模式及长租模式**

信息来源：普华永道思略特分析

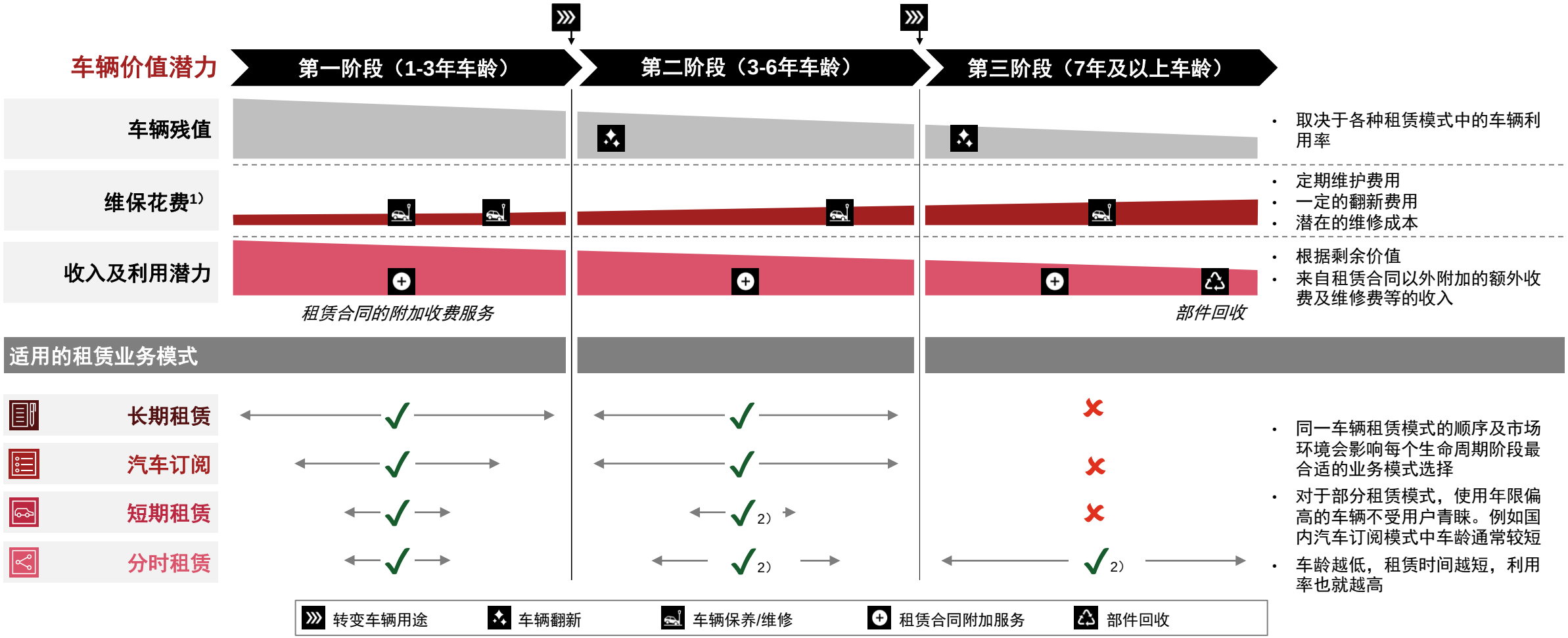
随着汽车订阅等替代所有权模式的出现，主机厂们（OEMs）需要强化他们的车辆生命周期管理技能

客户订阅和资产全流程 — 示例



车辆生命周期管理有助于提高车辆利用率及收入，尤其可以帮助处于第二和第三阶段的车辆提高价值

汽车租赁的 “3x3” 车辆生命周期管理



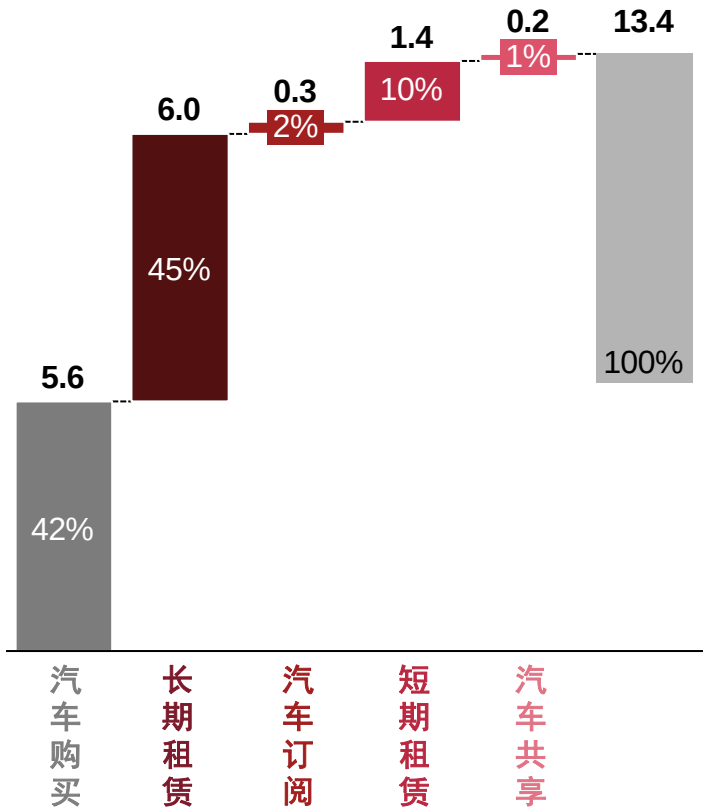
1) 按照主机厂规定的维保周期及基于实际使用的维修及翻新
2) 取决于监管部门对于车龄的限制
信息来源：普华永道思略特分析

替代所有权模式呈上升趋势，如果资产生命周期管理得当，主机厂将获得潜在的收益

汽车所有权模式拆分和盈利能力 — 指标

2023年所有权模式拆分[百万 辆]

欧洲地区，40个国家



汽车订阅
在欧洲，预期到**2035年**增长到**200-400万辆**[1)]

长期租赁
在欧洲，预期到**2035年**增长到**700-800万辆**[1)]

所有权模式的盈利能力[2)]

传统汽车所有权 → 替代所有权

所有权模式	汽车购买	长期租赁	汽车订阅	短期租赁	汽车共享
LCP 1 第1-3年	7%	-115%	-91%	10-15%	<5%
LCP 2 第4-6年	9%	83%	78%	—	<5%
LCP 3 第7-9年	11%	76%	71%	—	<5%
总计	5-7%	10-15%	10-15%	10-15%	<5%

长期租赁、汽车订阅和短期租赁的整体盈利潜力高于购买

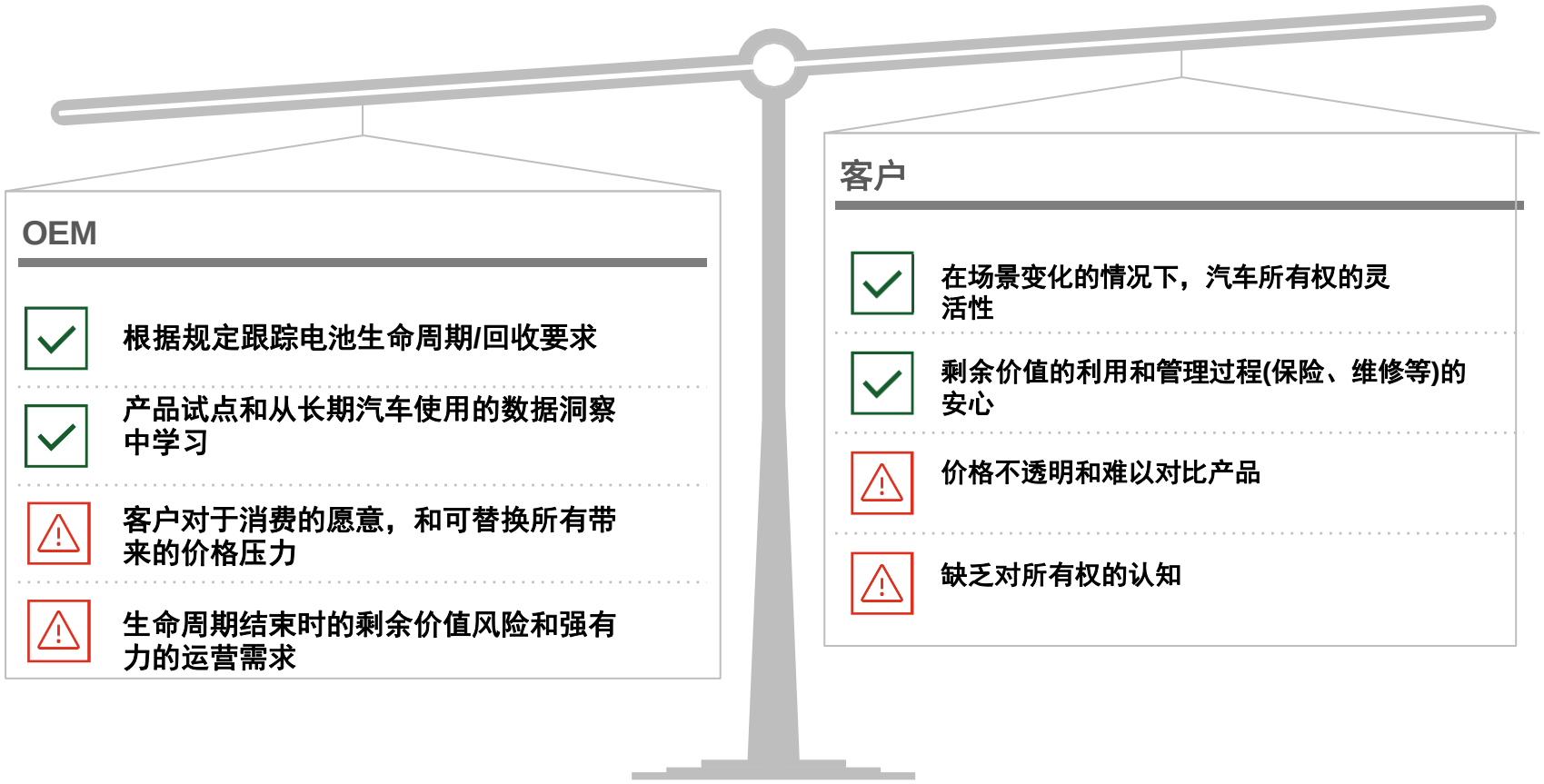
各LCP盈利能力不同—*从相对稳定到急剧增长。对于租赁，只有一个LCP*

不是单一的考虑，而是一个合并的产品组合视角，这对主机厂们（OEMs）来说是**至关重要的**

1) 所有权模式发展的预期占比是取决于竞争模式的占比;LCP: 生命周期阶段;
2) 盈利能力预测是基于平均中产阶级乘用车所有权模式的个体考虑 (价格 5.35万 欧元)
资料来源：思略特分析

更加灵活的所有权模式为主机厂和客户带来了收益和风险，需要一个双赢的解决方案

车辆认购收益和风险展望



OEM

- ✓ 根据规定跟踪电池生命周期/回收要求
- ✓ 产品试点和从长期汽车使用的数据洞察中学习
- ⚠ 客户对于消费的愿意，和可替换所有带来的价格压力
- ⚠ 生命周期结束时的剩余价值风险和强有力的运营需求

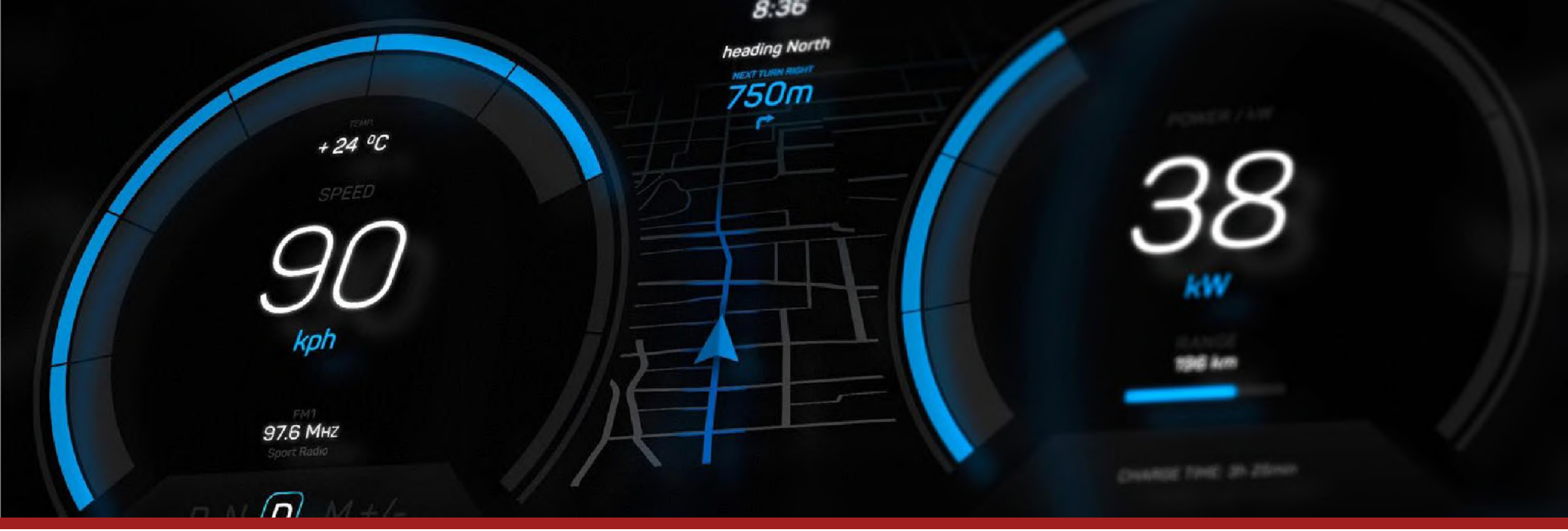
客户

- ✓ 在场景变化的情况下，汽车所有权的灵活性
- ✓ 剩余价值的利用和管理过程(保险、维修等)的安心
- ⚠ 价格不透明和难以对比产品
- ⚠ 缺乏对所有权的认知

关键思考

- 替代所有权模式需要为客户和主机厂创造**双赢局面**
- 目前，该模式主要是在主机厂的**战略议程中发挥作用**
- 强大的**客户中心**和高效率的**资金流**
- 需要**以客户为中心**和有效的**二手车资产管理**来实现**盈利**

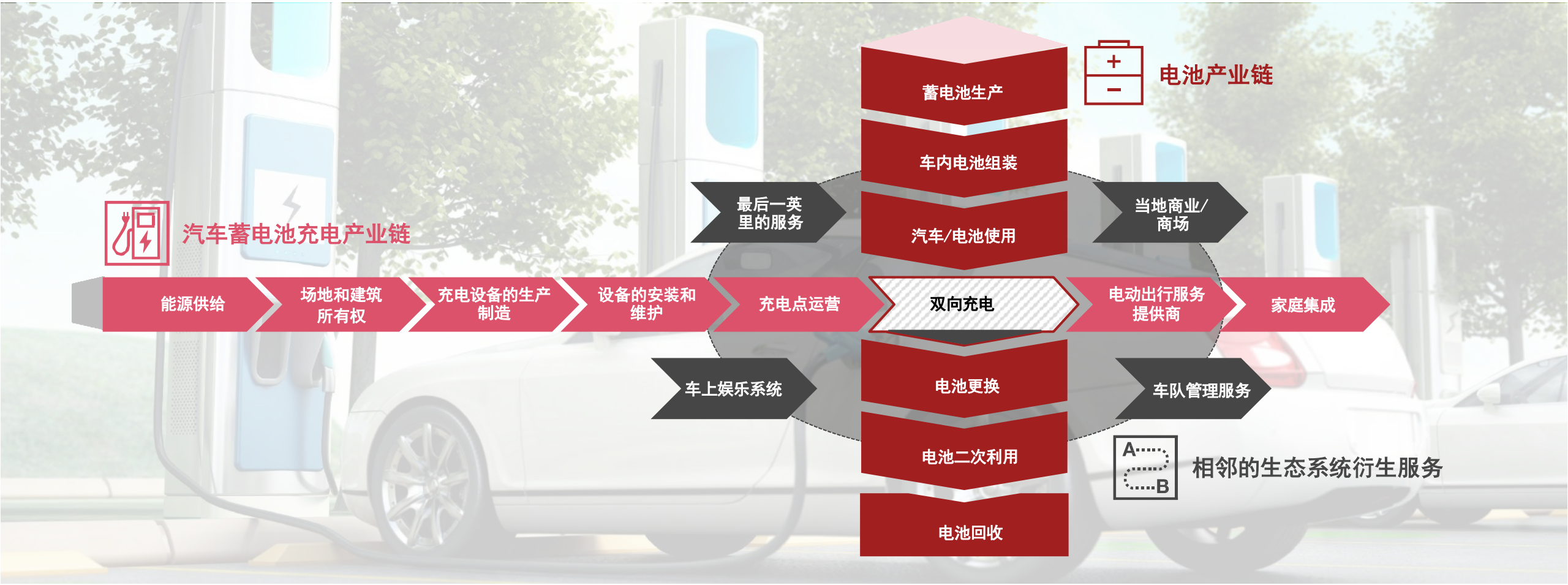
主机厂可能会利用现有的零售网络和优惠的购车条件来区别自己与竞争者


8:36
heading North
NEXT TURN RIGHT
750m
+ 24 °C
SPEED
90
kph
FM1
97.6 MHz
Sport Radio
38
kW

不仅是汽车

电动汽车的兴起为获取汽车以外的价值提供了大量的机会—如电池和补能

汽车以外的价值池 — 聚焦电动车



基础建设和车辆的渗透是双向充电用例成功实现的关键因素

双向充电设备 — 德国市场预估

2030年，双向充电桩市场概况

私人区域
250万

180万

住宅和公寓楼

70万

办公楼

公共区域
19万

16万

停车场

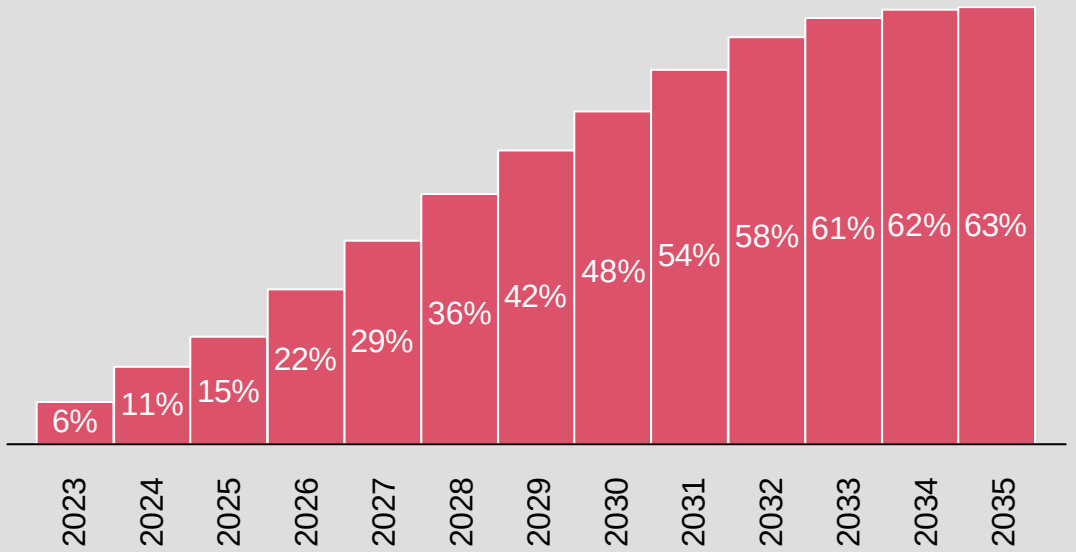
3万

充电中心

到2030年，德国共有270万个双向充电桩

具备双向充电能力的车辆 (#)

德国具备双向充电能力的车辆数量
（占电动汽车总数的比例）



到2030年，德国共有490万辆具有双向充电能力的车辆

资料来源: 普华永道s思略特研究(2022): “Der E-Mobility-Check: Wie bereit ist Deutschland?”;普华永道思略特

表前生产型消费者的用例取决于多方面的外部因素，在短期内限制了主流选择

生产型消费者充电商业模式对比 — 德国

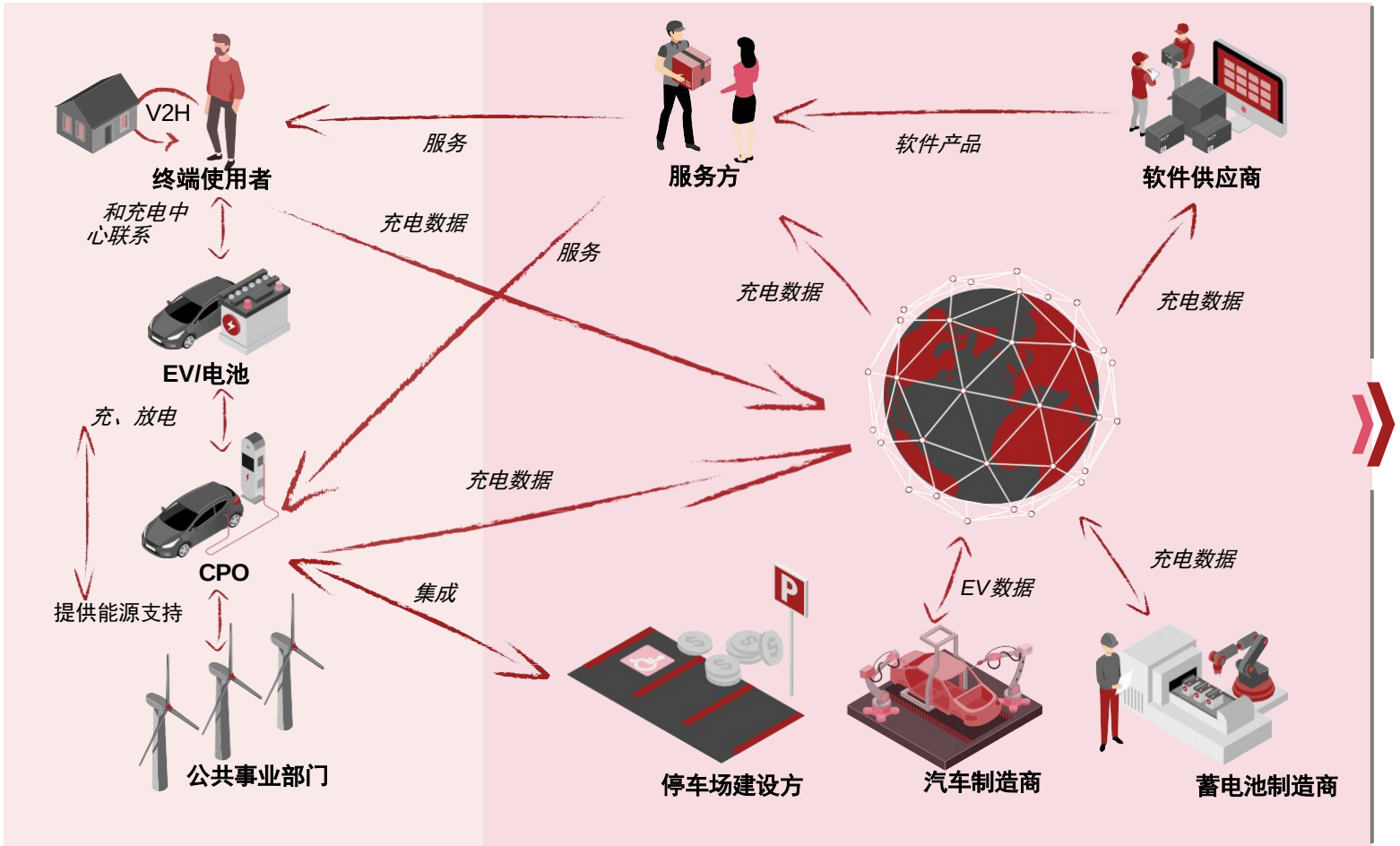
	表后		表前
应用领域(部分)	V2L 	V2H/B 	V2G/VGI 
用例(部分)	自供电优化 自消耗优化		错峰调节 电力市场交易
业务潜力	为生产型消费者的表后活动提供支持，2030年收入有望达到**2-2.5亿欧元**[1]		到为生产型消费者的表前活动提供支持，2030年收入有望达到**7-9亿欧元**[2]
赋能和局限 — 消费者需求	• **预计短期内会有大量的**EV**用户需求，**例如将车辆作为家庭光伏系统的额外存储，或作为停电时的应急电源（主要在美国）		• EV用户需求由**赚钱/省钱驱动，**但目前**没有全面的解决方案以及公平的能源定价，**从而限制了采用率
赋能和局限 — 电力技术	• 需要提高**具备双向充放电功能的车辆和基础设施**（例如，电动汽车充电桩）**的渗透率，**从而达到足够的规模 • 需要制定**标准和协议**（互连、通信、车辆和充电站的安全与功能）以确保兼容性		
赋能和局限 — 监管	• 由于闭环的微生态系统的复杂性不高，**表后市场预计在2024年将得到全面支持**		• 由于利益相关方复杂性高、需要欧盟范围的解决方案（以智能电表为参考），**预计在2028年之前不会得到全面支持**
赋能和局限 — 经济	• **降低技术成本**（车辆和基础设施）以实现主流用户的利润和使用 • 全面的**辅助服务**将是重要的推动因素		• 需要**灵活的V2G收费**:ToU(使用计价)或ToD(每天计价)的定价机制 • 必须在某个时间点设定**最低千瓦时数，以便公用事业**提供商在管理电网时**作为参照**

当表前市场在欧洲范围内仍然需要更多的监管调整时，表后市场在短期内拥有较高的市场成熟度

V2L:车辆对外放电功能 (例如，电动自行车，其他EV等)　V2H/B:车辆对住宅/建筑供电　V2G/VGI:车辆与电网互充/ 车辆电网集成
1) 仅包括家庭（V2H）和公共充电点运营商的电网优化软件；2) 仅包括家庭和公共充电点运营商的电力市场交易软件
资料来源：普华永道思略特分析

实现和扩大生产型消费者用例需要充电和电池相关方的高效协作

充电和电池生态系统参与者协作



规模扩大面临的主要挑战

- 相关方对中心和主要参与者在不可控范围内(e.g. 主机厂在充电过程案例中发现卖点)
- 清算和结算的交易成本相对较高(单个交易的价值相对较低)
- 各相关方不同的利益点和优先事项（如认证二手车（CPO）希望加大使用范围，而主机厂希望提升充电效率）

一个非集中化的协作方法是否解决这些挑战？

主要相关方　　扩展生态系统的参与方

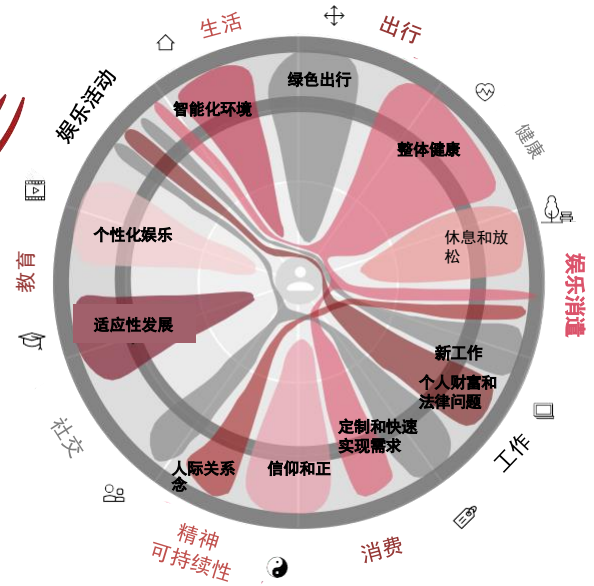
资料来源：普华永道思略特

对汽车行业参与者的启示：超越核心业务的全面生态系统建设路径是未来成功的关键

一方面

- 生态系统可以基于提供**差异化的产品服务形成锁定效应**
- **生命周期总价值**可以通过全旅程覆盖来提升
- 与传统价值创造方法相比，更能实现**高速增长**和**高收益潜力**

生态系统



另一方面

- **构建和管理生态系统是复杂的**
- 理论上讲，无数的潜在产品**使选择过程复杂化**
- 以产品为中心的视角可能会有**错失市场或消费者需求的风险**（尤其在新兴领域）

成功因素

- ✓ **明确生态系统角色—协调者、实现者或者赋能者**
- ✓ **构建产品组合并合理安排资源**
- ✓ 当选择合适的产品时保持**全面和迭代的方法**
- ✓ **积极管理产品组合**，根据连贯、一致和多层次的生态系统逻辑**明确优先级**

资料来源：普华永道思略特Ecosystemizer

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strategy&
Part of the PwC network

Digital Auto Report 2023

What consumers really want

VOLUME 1

Digital Auto Report 2023 – Volume 1

- ✓ Eleventh annual Digital Auto Report, developed by Strategy& and PwC
- ✓ Global consumer survey with a focus on the US, EU and China (n = 3,000)
- ✓ Quantitative market outlook up to 2035, based on regional structural analysis
- ✓ Interviews with industry executives at OEMs and suppliers, and with leading academics and industry analysts

This report: Volume 1

Understanding consumer preferences and implications

- Consumer view – changing mobility preferences
- Implications for auto players – interface, subscription and charging

Coming up next: Volume 2

Assessing global mobility market dynamics

- Market outlook – penetration of technologies and mobility types
- Technology – shifting gears in connected, electric, automated
- Regulation – slowdown or acceleration of key policies?

Addressing changing consumer preferences requires auto players to gear up their user interfaces and business models

Executive summary – Volume 1

1. Consumer preferences

- Our **consumer survey** (n = 3,000 in Germany, US, China) captures current **preferences in auto & mobility** and is contrasted with **expert opinions**
- In respect of **connected services**, consumers first want to **get the basics right** – the highest priority is **safety + navigation**, **phone mirroring is** gaining importance, **on-demand car functions** as well; experts rate the importance of **infotainment and lifestyle** higher than consumers do; **willingness to pay** for full set of connected services **stands at ~€20 / months in GER and the US, and at ~€40 in China** – experts give more conservative estimates
- **Germans still hesitant about BEV** cars – **only 35%** would consider getting one; more openness in the **US ~50%**; **China very open to BEVs** with **>90%**
- **Low trust towards L4 automated vehicles** in **GER and US** with **60-70% feeling uncomfortable** vs. **15% in China;** but on the other hand, Germans who want to use L4 have a **higher willingness to pay to use robo-taxis than to use** driver-driven taxis; in the **US and China willingness to pay is lower**
- **Purchasing a new/used car preferred**; **subscription** models **gain traction; online car purchase scores highest in China** (36% vs.10% in Germany)
- Consumers intend to **use public transport more often than last year**, but show **similar intentions for own car; less interest** in **sharing / hailing**

2. Automotive implications

- **Auto players** face **strategic challenges** with regard to **connected, electric, automated & smart mobility**. Volume 1 focuses on **three key aspects**:

A **Getting the user interface right**

As **software-defined vehicles** open the door to many new markets, **OEMs** need to be clear in **which consumer life areas** they want to play, **which experience differentiators** to focus on (luxury vs. convenience), and how to build a **corresponding service portfolio**. **Investment** decisions should be based on **value creation beyond direct user revenues,** with a balanced view on **build vs. buddy vs. buy** for tech components

B **Rethinking vehicle sales**

OEMs benefit from a **rising demand for car subscriptions -** expected to grow from **0.3m to 2-4m units by 2035 in Europe**. To reach **profitability. OEMs need to balance consumer needs** (model flexibility, transparent pricing) with smart **asset lifecycle management** for maximum **residual value**

C **Going beyond the vehicle**

New business models emerge around **batteries and bi-directional charging**. With **~5m bi-di cars in Germany** by 2035, market **potential is €160-220m for vehicle-to-home / microgrid and €470-550m for vehicle-to-grid solutions –** assuming **successful orchestration** of **ecosystem players**

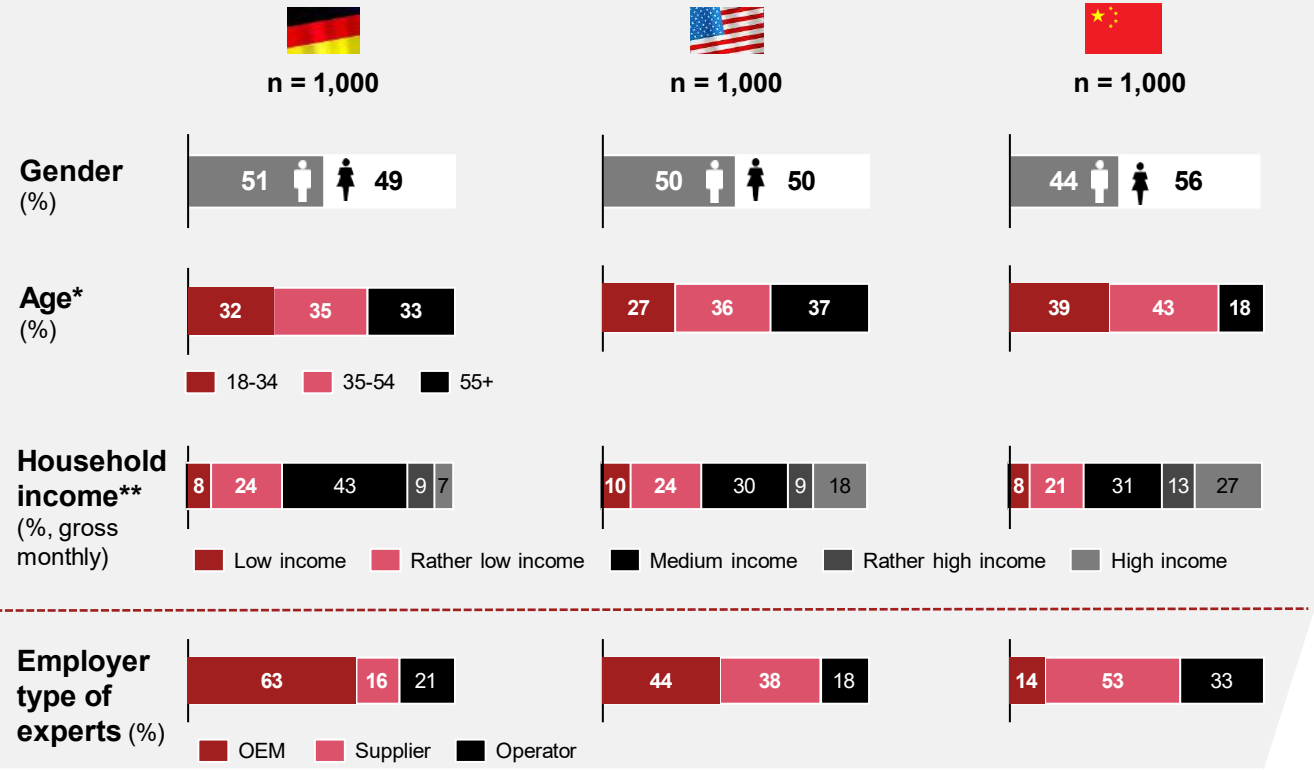
Note: Please refer to respective section for detailed assumptions and sources behind stated propositions

Contents

Latest consumer attitudes within CASE are reflected in a survey of 3,000 respondents in Germany, US and China

Overview of consumer survey

3 regions | **15 questions** | **3,000 respondents** | **50 experts**



Key results

- **Safety + navigation remain the most important** connected services features – on-demand functions gaining popularity
- **Willingness to pay at ~20€ per month in Germany and the US, while at ~40€ in China** – experts more cautious

- **Germans still sceptical about BEV** cars – only 35% would consider getting one, but more openness in the US ~50%
- **In China, overwhelming preference for BEV** with >90% considering such option – vs. only 80% considering ICE

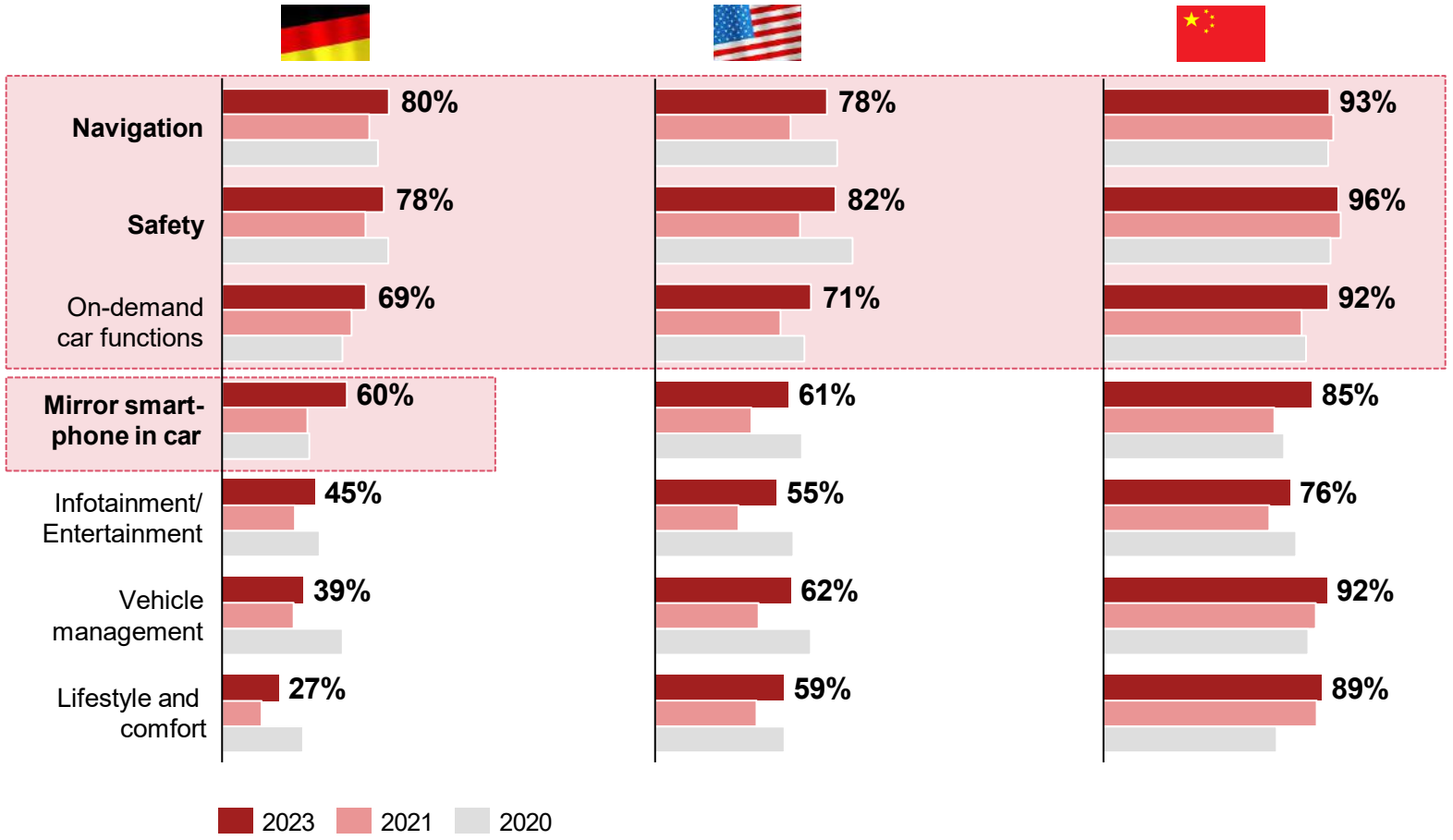
- **German / US respondents sceptical about L4 automated cars** – 60-70% uncomfortable vs. 15% in China
- **Willingness to pay** for robo-taxis vs. driver-driven taxis is **lower in the US and China than in Germany**

- **Purchasing a new or used car still preferred option**, but car **subscription** models are **gaining traction**
- Consumers want to reduce **CO_2** mainly through **more walking/cycling, switching to electric car, and using more public transport**

*Age brackets harmonized; **Low income (<1,6T EUR, <2T USD, <12T YUAN), Rather low income (1,6-3,3T EUR, 2-4T USD, 12-25T YUAN), Medium income (3,3-6,6T EUR, 4-8T USD, 25-51T YUAN), Rather high income (6,6-8,3T EUR, 8-10T USD, 52-64T YUAN), High income (>8,3T EUR, >10T USD, >64T YUAN)

Safety and navigation remain as most important connected services features – on-demand car functions on the rise

Connected services – Share of participants rating feature as important



Question: *"Which connected service categories are particularly important to you?"*

Safety and **navigation** still **most important** feature for respondents across all regions.

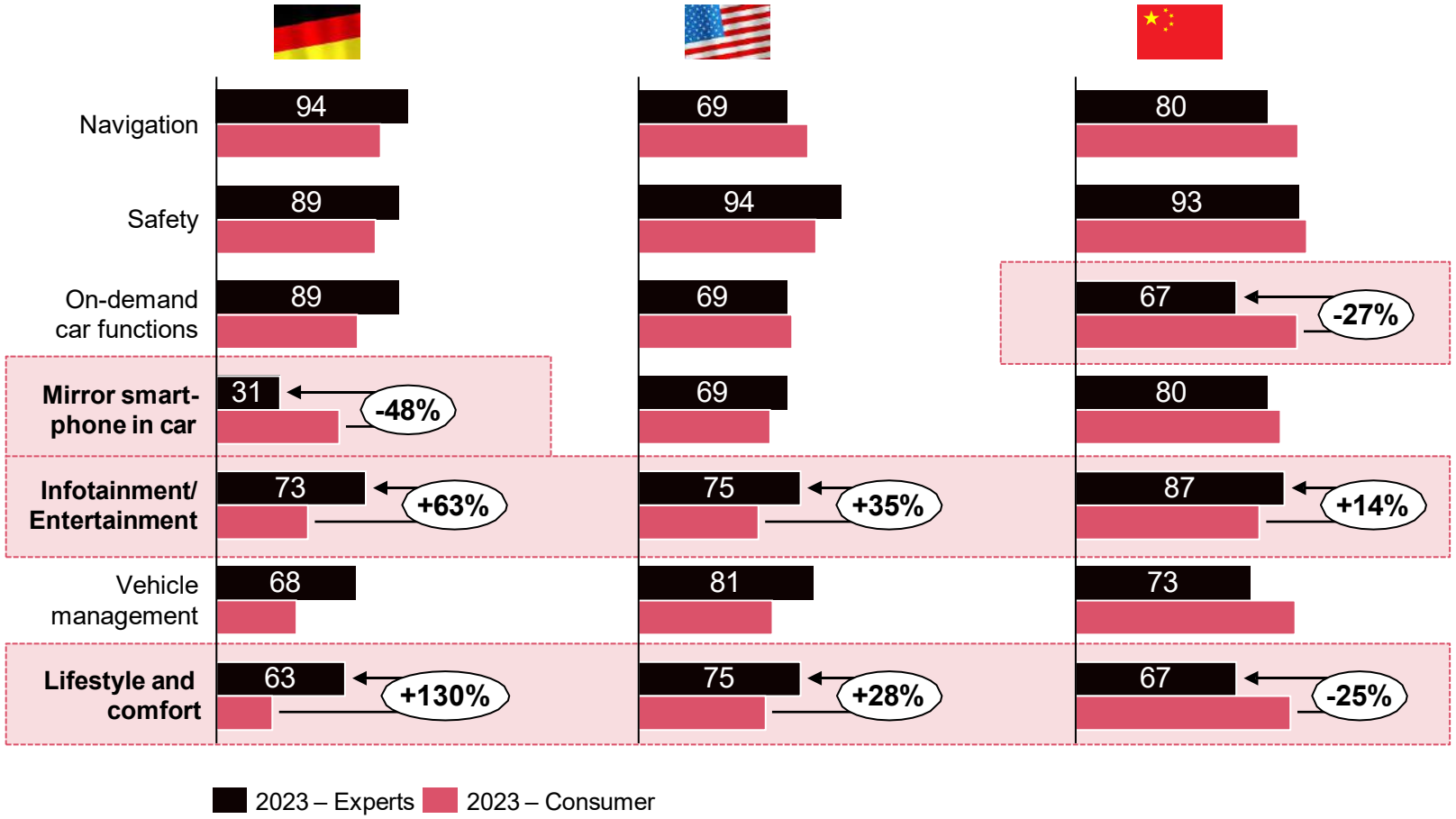
Significant increase in the number of participants in Germany who rate **smartphone mirroring as important**"

Infotainment/entertainment more important for younger consumers

Source: PwC Strategy& consumer research

Experts rate infotainment higher than consumers do –in China, they underestimate relevance of on-demand functions

Connected services – Share of experts rating feature as important



Question: *"Which connected service categories are particularly important to you?"*

Safety, navigation and entertainment are considered the **most important** by experts.

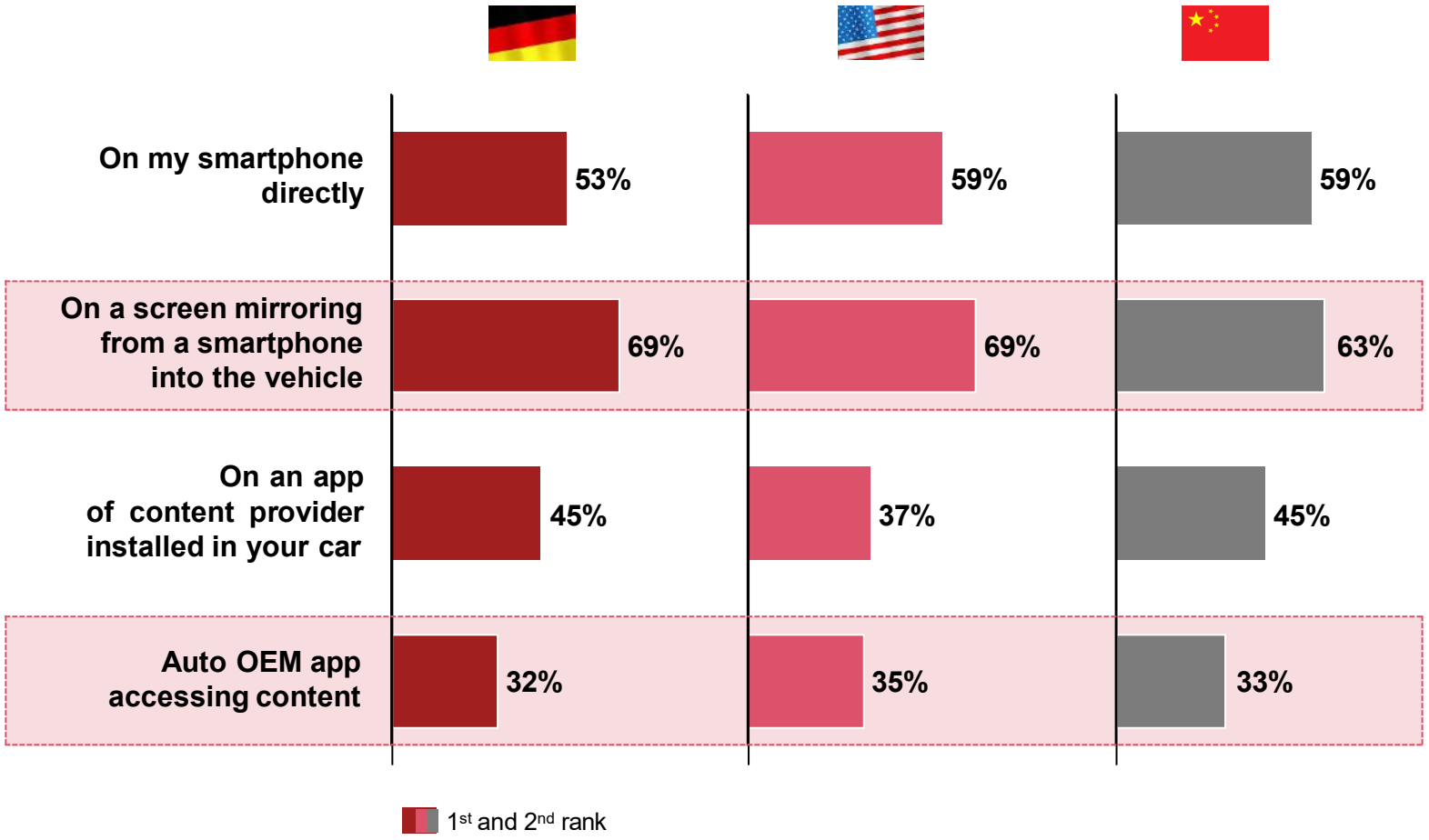
Experts in **Germany** are rather **less enthusiastic** when assessing the importance of **mirroring smart-phones**

Experts in **China** are comparatively less upbeat when assessing the importance of **on-demand functions** and **lifestyle & comfort services."**

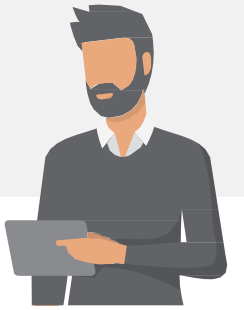
Source: PwC Strategy& expert survey

Smartphone mirroring to the car has highest rating; Auto OEM apps for service access are less popular

Connected services and media/entertainment in the car



Question: *"How would you prefer to enjoy connected services and media/ entertainment in your car?"*



Highest **preference** across all countries is for smartphone **mirroring.**

Media/entertainment via an **auto OEM application** is **less popular**."

Source: PwC Strategy& consumer research; Difference to 100%: no/low likelihood

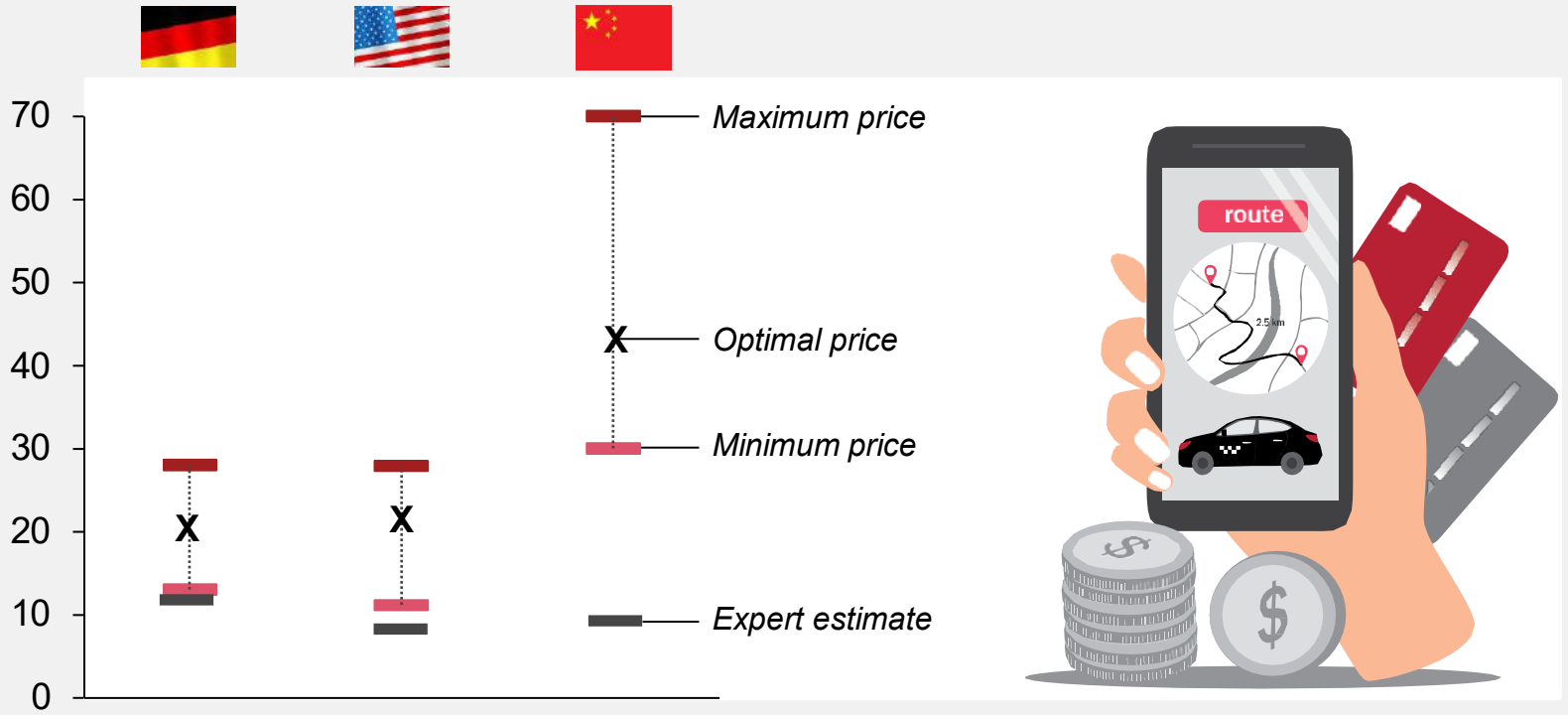
Willingness to pay for connected services around 20€/month in Germany and the US but twice as much in China (40€)

Connected services – Median willingness to pay[1)]

Willingness to pay[1)]
(monthly in €)

…for a **full set of connected services** in the vehicle that "**perfectly fit your needs**"

By nationality



Question: *"At what price would you consider a full set of relevant connected services*

- *Too cheap?"*
- *A good value for money?"*
- *Starting to get expensive?"*
- *Too expensive?"*

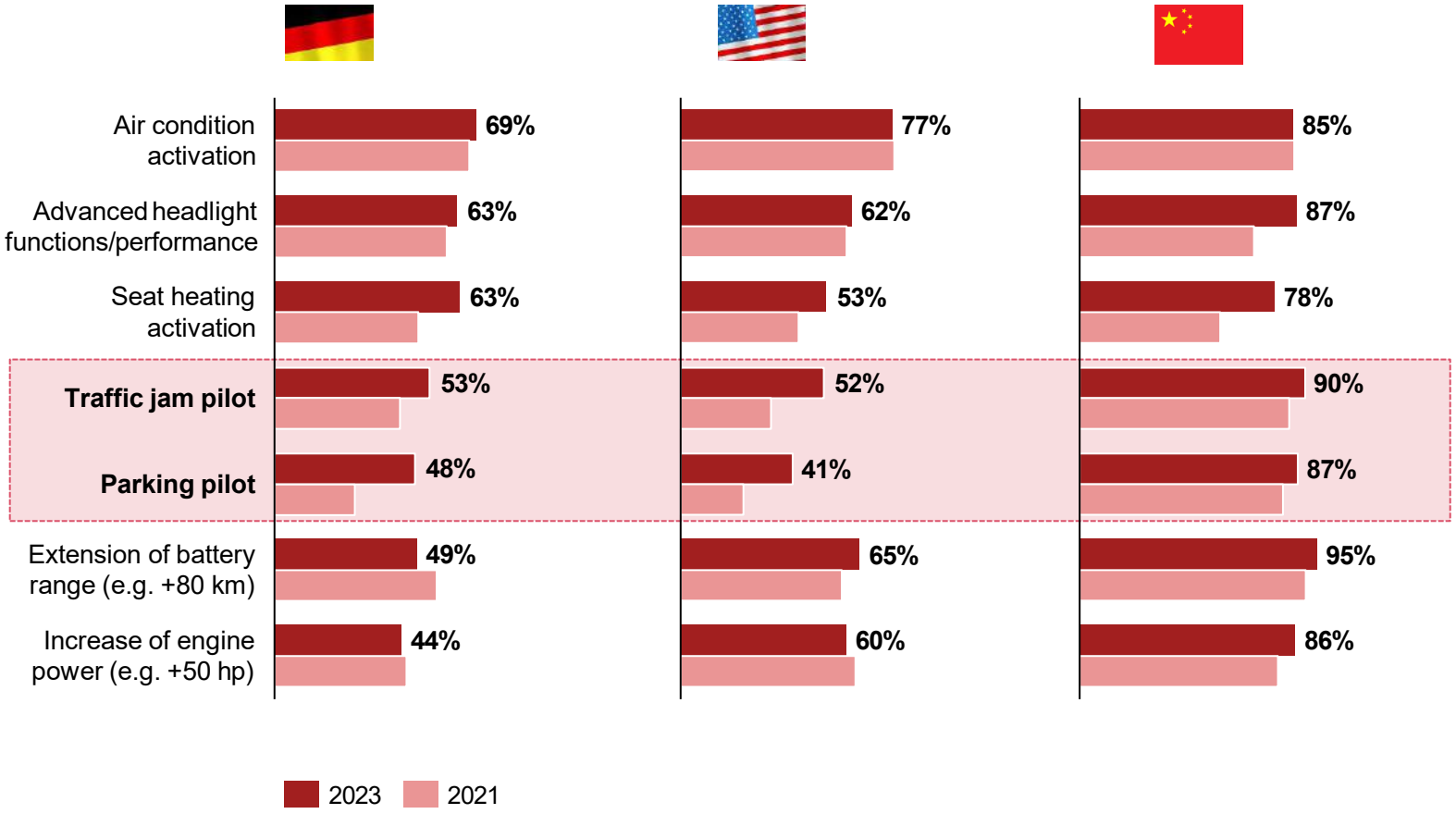
High spread of willingness to pay in China indicates **strong polarisation of luxury vs. budget customers** ➔ differentiated service packaging needed

Higher optimal price in China indicates that **consumers envision more benefits** from the "perfect connected service bundle" than in the US/GER – **expert view** more **conservative on prices**."

Notes: 1) Calculation of price points based on van-Westendorp-methodology
Source: PwC Strategy& consumer research; Exchange rates: USD/EUR 0.93, YUAN/EUR 0.14 (15.02.2023); PwC Strategy& expert survey research 2023; n=50

Among on-demand functions, automated driving features such as traffic jam pilot / parking pilot are attracting more interest

On-demand car functions – Share of participants rating function as important



Question: *"How important would be on-demand car function [...] to you?"*

Automated driving functions – traffic jam pilot or parking pilot – attract considerably more interest vs. previous year.

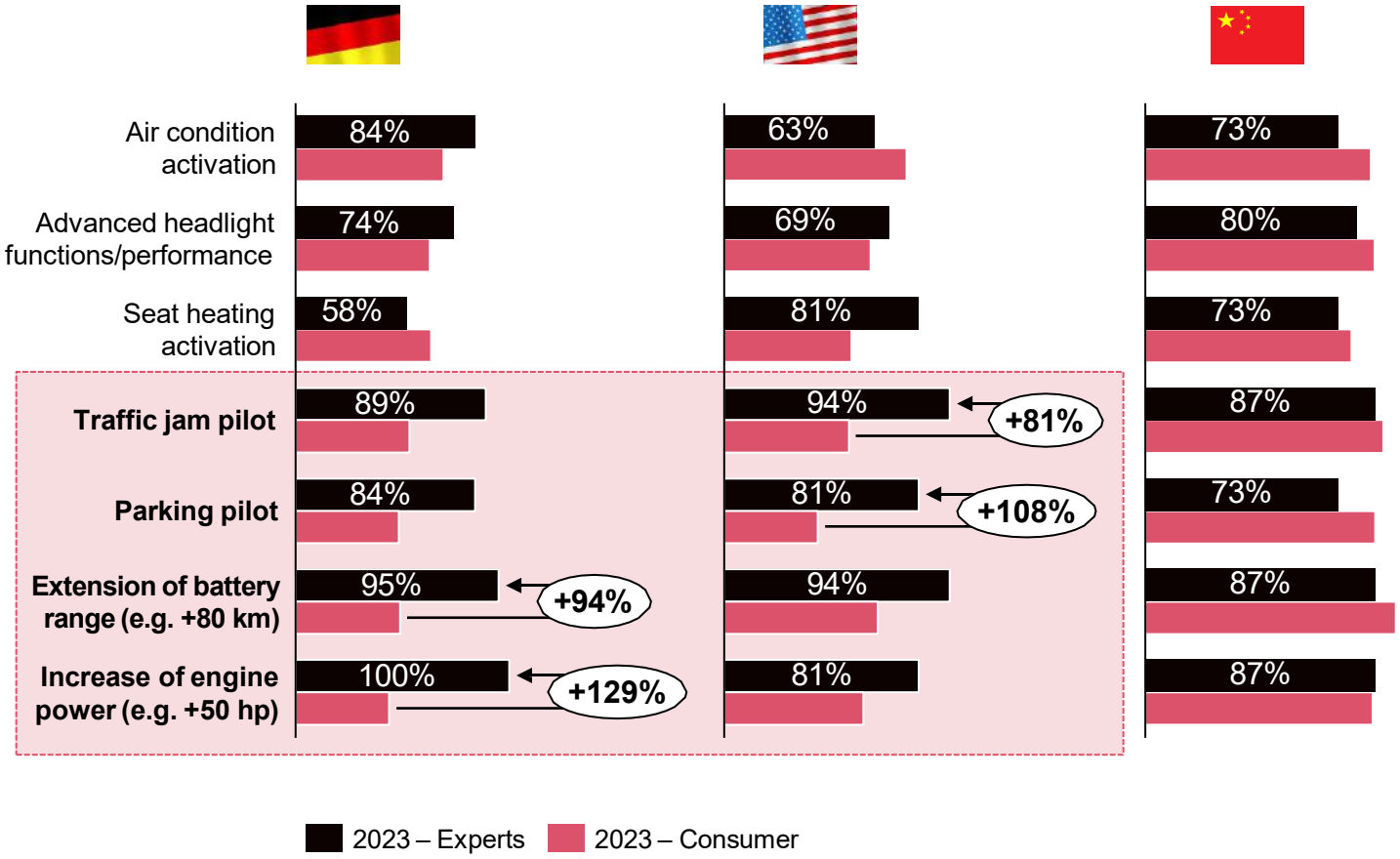
Air condition activation is still viewed as the most important on-demand car function."

Traffic jam pilot more important for older consumers

Source: PwC Strategy& consumer research

Experts in Germany / US attach even more importance than consumers to automated driving function attractiveness

On-demand car functions – Share of experts rating function as important



Question: *"How important would be on-demand car function [...] to you?"*

Extension of battery range and traffic jam pilot are considered the **most important** functions among experts

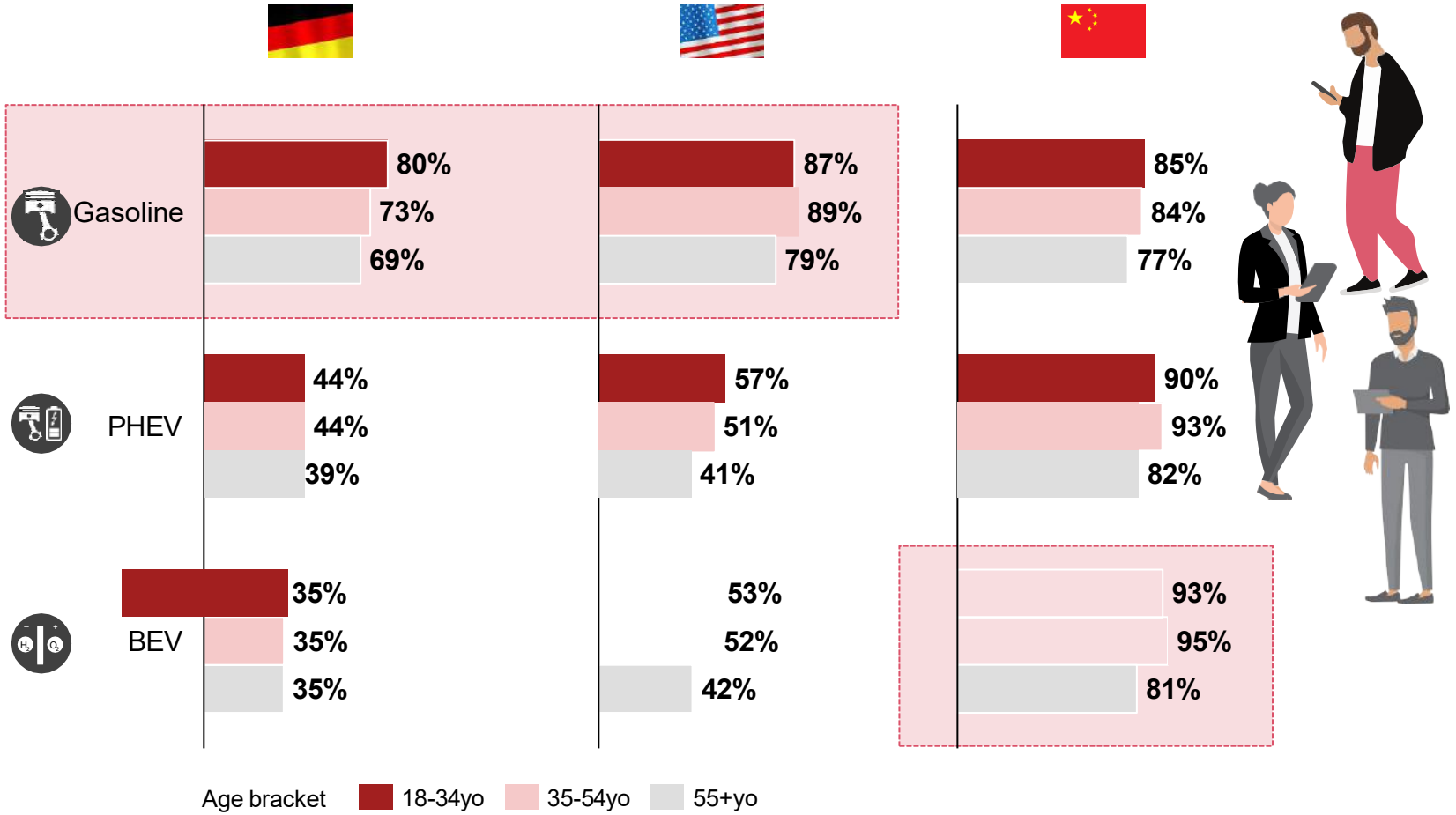
When compared with consumers, experts are particularly bullish about on-demand **engine power."**

Experts in US & China are more conservative in assessing the importance of air conditioning activation

Source: PwC Strategy& expert survey

Looking at powertrain preferences, German and US consumers stick with gasoline, while Chinese prefer BEV

Share of participants rating engine types as likely for next purchase (%)



Question: *"Assuming you wanted to buy/lease/subscribe to a passenger car, how likely are you to consider the following types of engines?"*

Gasoline is most popular engine type in **USA and Germany**, followed by PHEV engines, which are slightly more popular than BEVs.

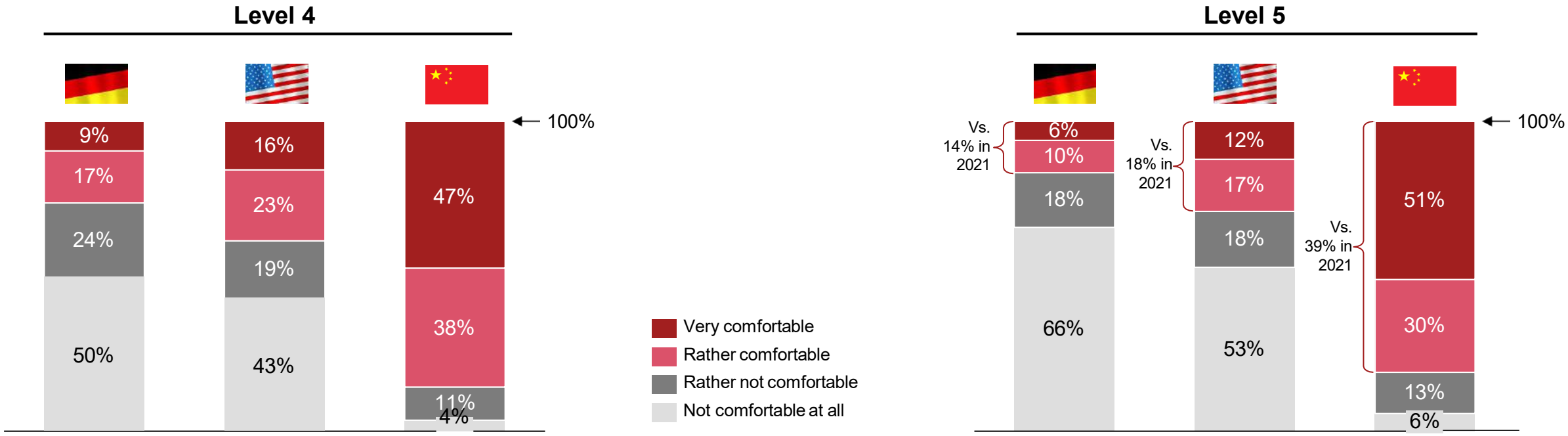
Chinese consumers exhibit opposite preferences with **BEVs being most popular,** ahead of hybrid and ICE engines."

Gasoline engine surprisingly more attractive for younger consumers

Source: PwC Strategy& consumer research

Consumer acceptance of automated driving remains low in Germany and the US – more openness in China

Automated driving – Consumer attitudes



Question: *"How comfortable would you feel using an autonomous vehicle (Level 4[1])"*

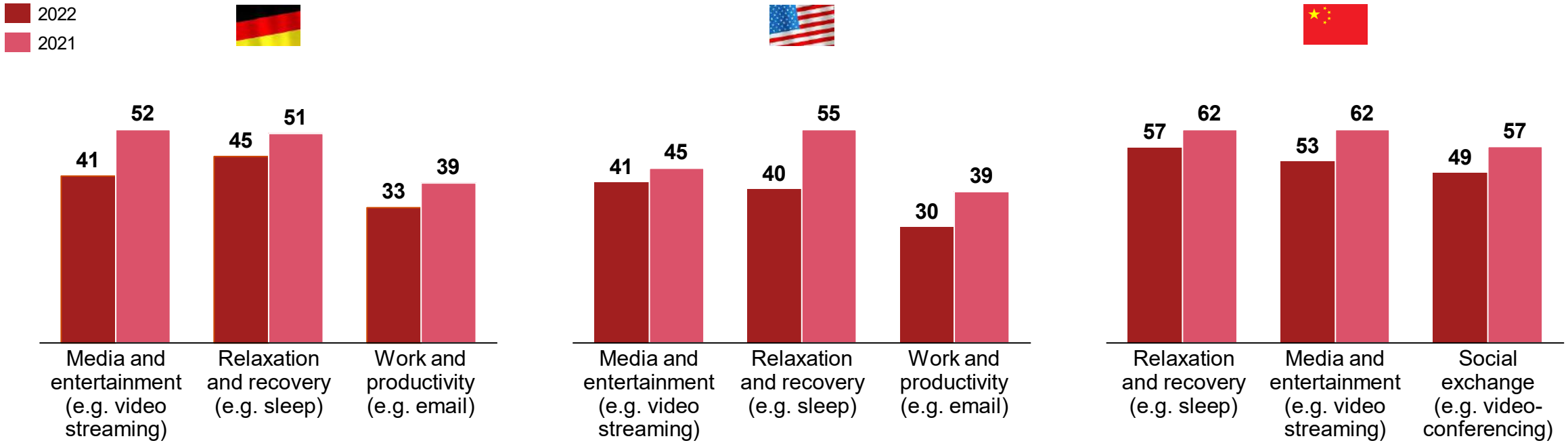
In general, willingness to use automated cars has recovered in comparison with relatively low 2020 figures, which resulted from negative headlines at the time e.g. following accidents and cybersecurity threats. Scepticism towards "fully automated" vehicles (Level 5) still stronger than for Level 4.

Question: *"How comfortable would you feel using a fully autonomous vehicle (Level 5[2])"*

1) There is still a steering wheel and pedals, but no human action or supervision is required, except in more complex cases such as inclement weather or an unusual environment
2) Can operate fully automatically on any road and under any conditions that a human could negotiate. There is no steering wheel or pedals. All you have to do is specify a destination to the vehicle
Source: PwC Strategy& consumer research

On an robo-ride, people want to be entertained or relax – in GER / US they also want to work, but in China prefer to socialize

Automated driving – Top 3 preferences for usage of time gained



Question: *"For which activities would you use the time gained while driving in a fully autonomous vehicle?"*

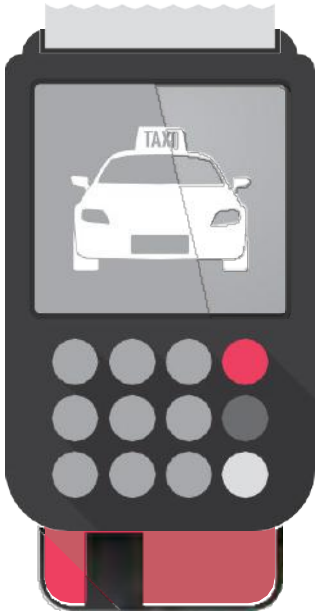
"The intention to use time gained from not driving went down compared to 2021 – the reduction was significant in Germany and the US. Media & Entertainment as well as relaxation are still the main intended activities."

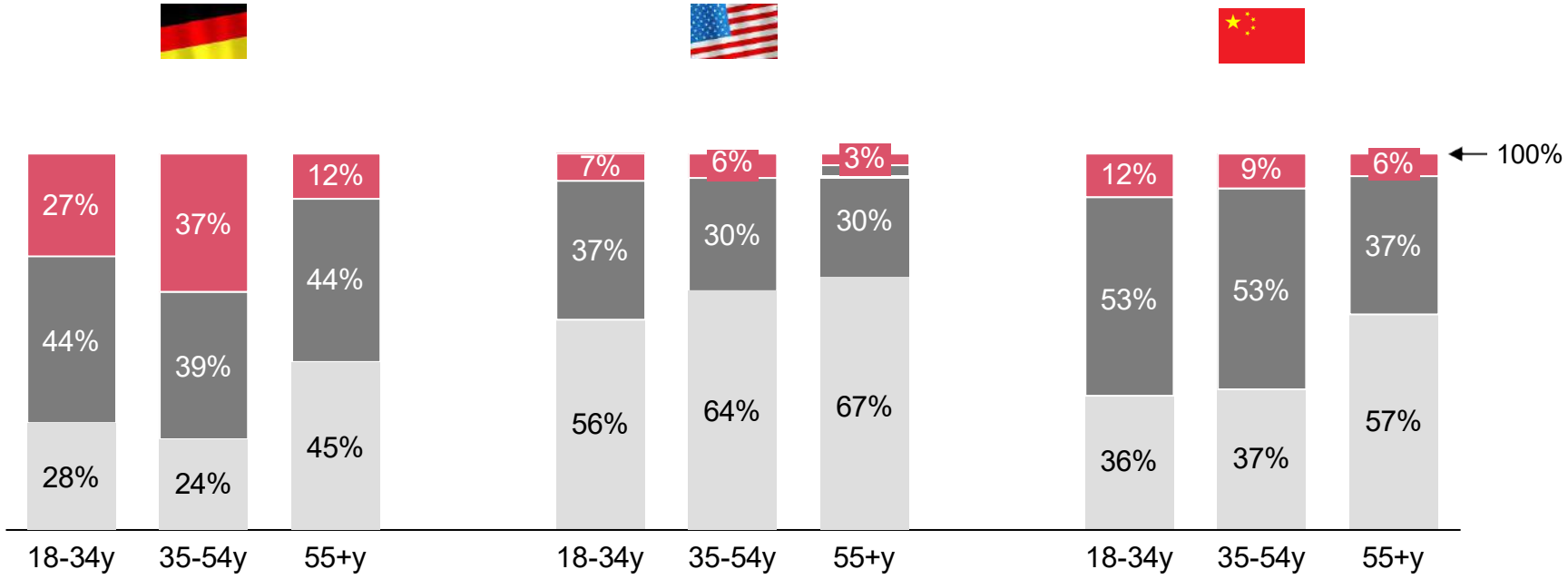
Source: PwC Strategy& consumer research

~60% of US citizens want to pay less for a robo-taxi vs. a driver-driven taxi; only ~5% want to pay more vs. ~30% in Germany

Automated driving – Willingness to pay

Question: *"When considering an average taxi ride and its price, what would be your willingness to pay for an autonomous ride compared to this taxi ride?"*





I'm willing to pay more
I'm willing to pay the same
I'm willing to pay less

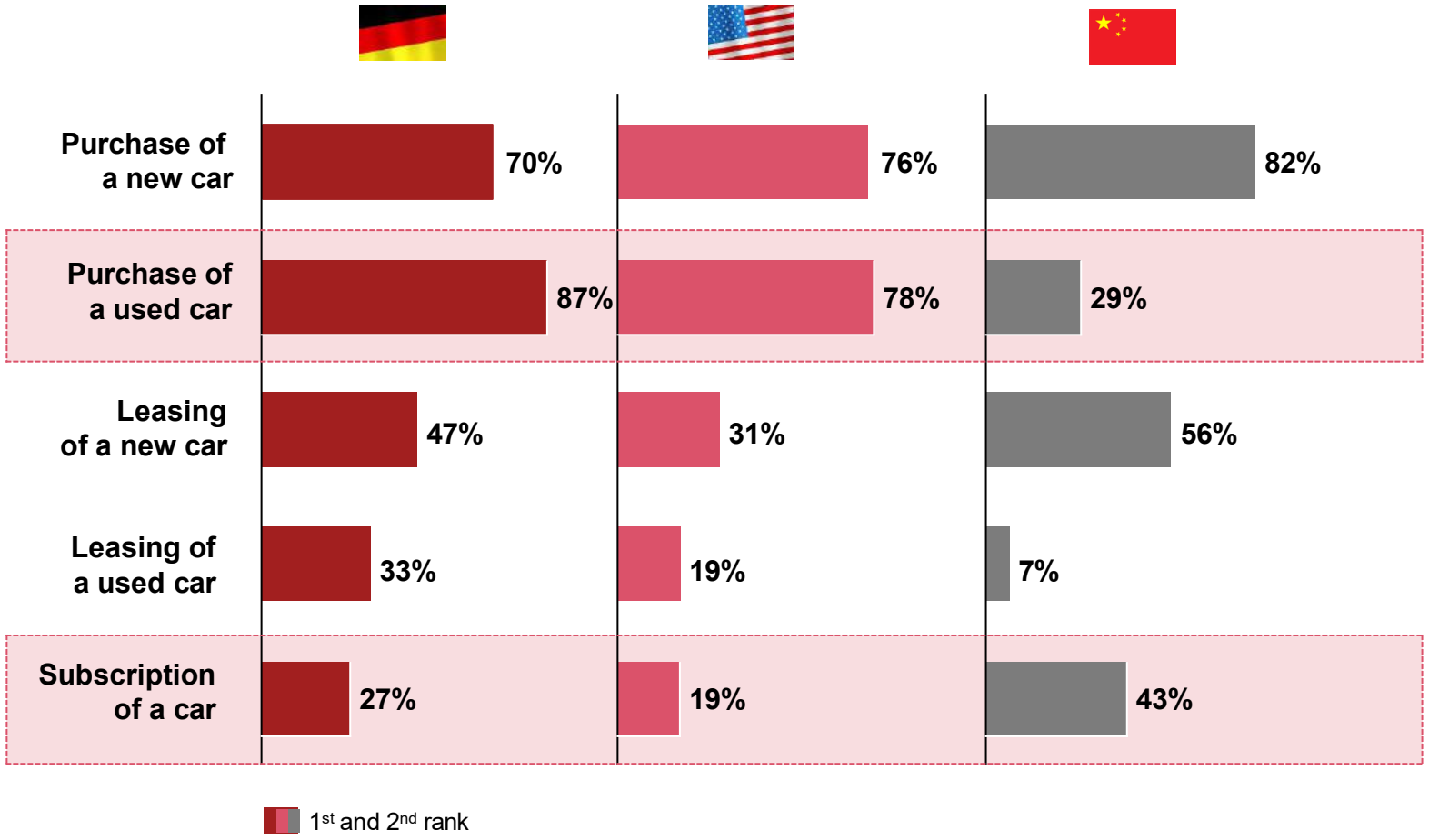
"While younger German respondents are willing to pay more for an autonomous ride, older Germans are less inclined to do so.

US and Chinese respondents overwhelmingly intend to pay less for an automated ride – among those who want to pay less, a 40-50% price cut from driver-driven taxis is the norm."

Source: PwC Strategy& consumer research

Majority of respondents prefer to purchase a new or used car; but car subscription models are attracting interest

Ranking of buying/leasing/subscribing to a car



Question: *"How would you rank the following ways of acquiring a car if you needed to purchase, lease, or subscribe to a passenger car in the next one to two years?"*

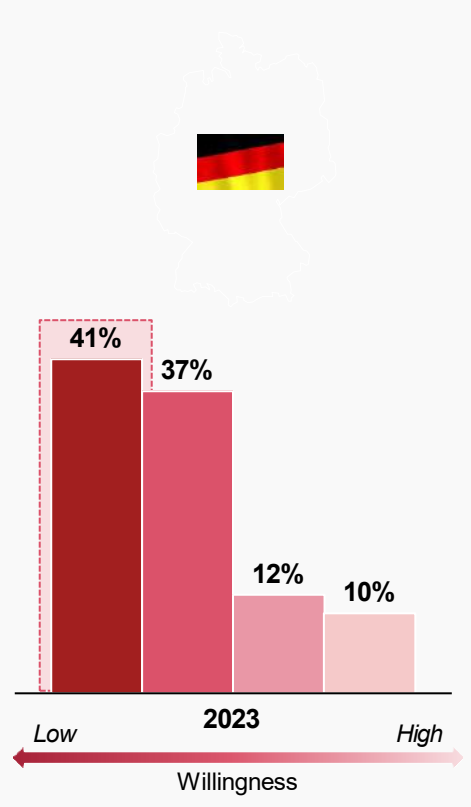
The **intention to purchase a used car is growing,** especially in Germany and the US.

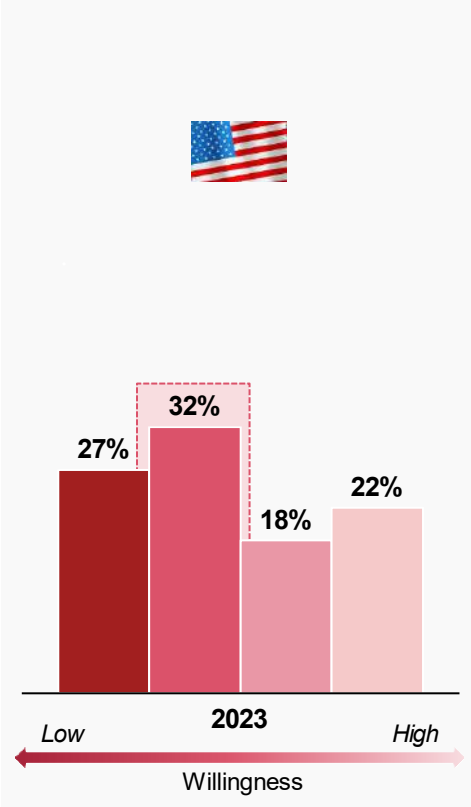
Subscription is gaining in popularity – especially in China. The preference for subscription increased strongly in Germany and the US in 2023 (27% vs. 14% in Germany and 19% vs. 15% in US)."

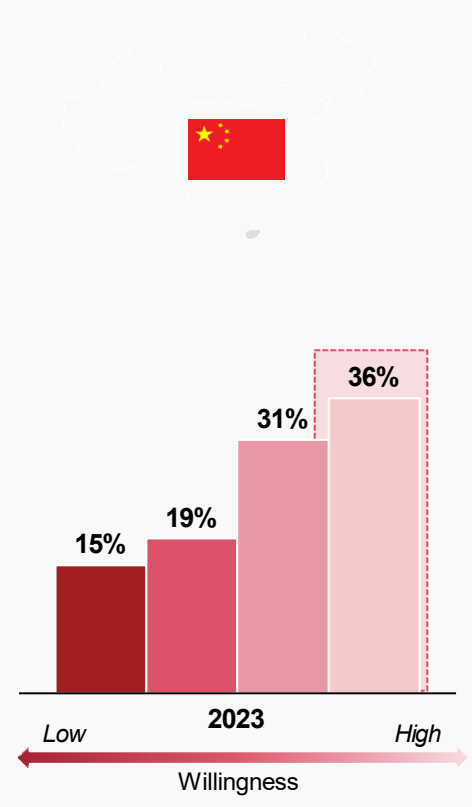
Source: PwC Strategy& consumer research | Difference to 100%: no/low likelihood

Readiness for online car purchases very high in China, while rather low in Germany – the US falls in between

Willingness to make car purchases online







- I would rather do everything at the store
- I would configure it online, but sign and test drive it at the store
- Yes, I feel comfortable configuring and signing online, but I would prefer to do a test drive at the store
- Yes, I feel comfortable with doing all steps online

Question: *"Would you buy your next car online?*

The willingness to **buy a car online varies significantly across countries**.

In China, people are **particularly open** to completing certain steps or even the entire buying process online.

In contrast, the majority **in Germany** feel **more comfortable** with store processes."

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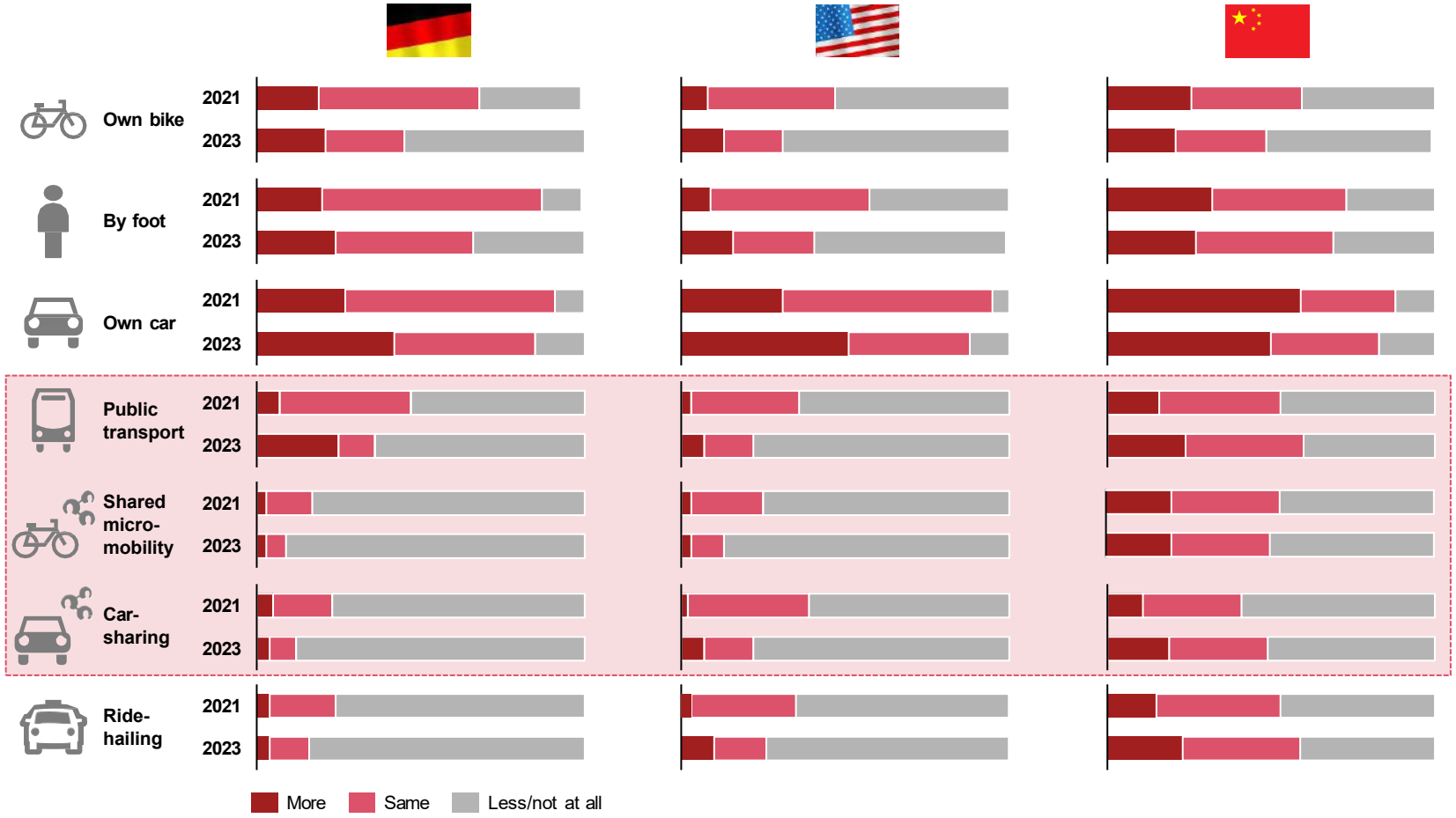
Source: PwC Strategy& consumer research

Even as immediate COVID-19 risks decline, using one's own car remains popular; increasing use of shared modes in China

Mobility pattern after COVID-19 restrictions (%)



Question: *"COVID-19 has temporarily changed our mobility behavior in many aspects. How do you plan to use modes […] of transport once we have left the pandemic behind us?"*

Using one's own car is **still seen** as the **most convenient** means of transportation – with highest increase in demand **in Germany** and the **US.**

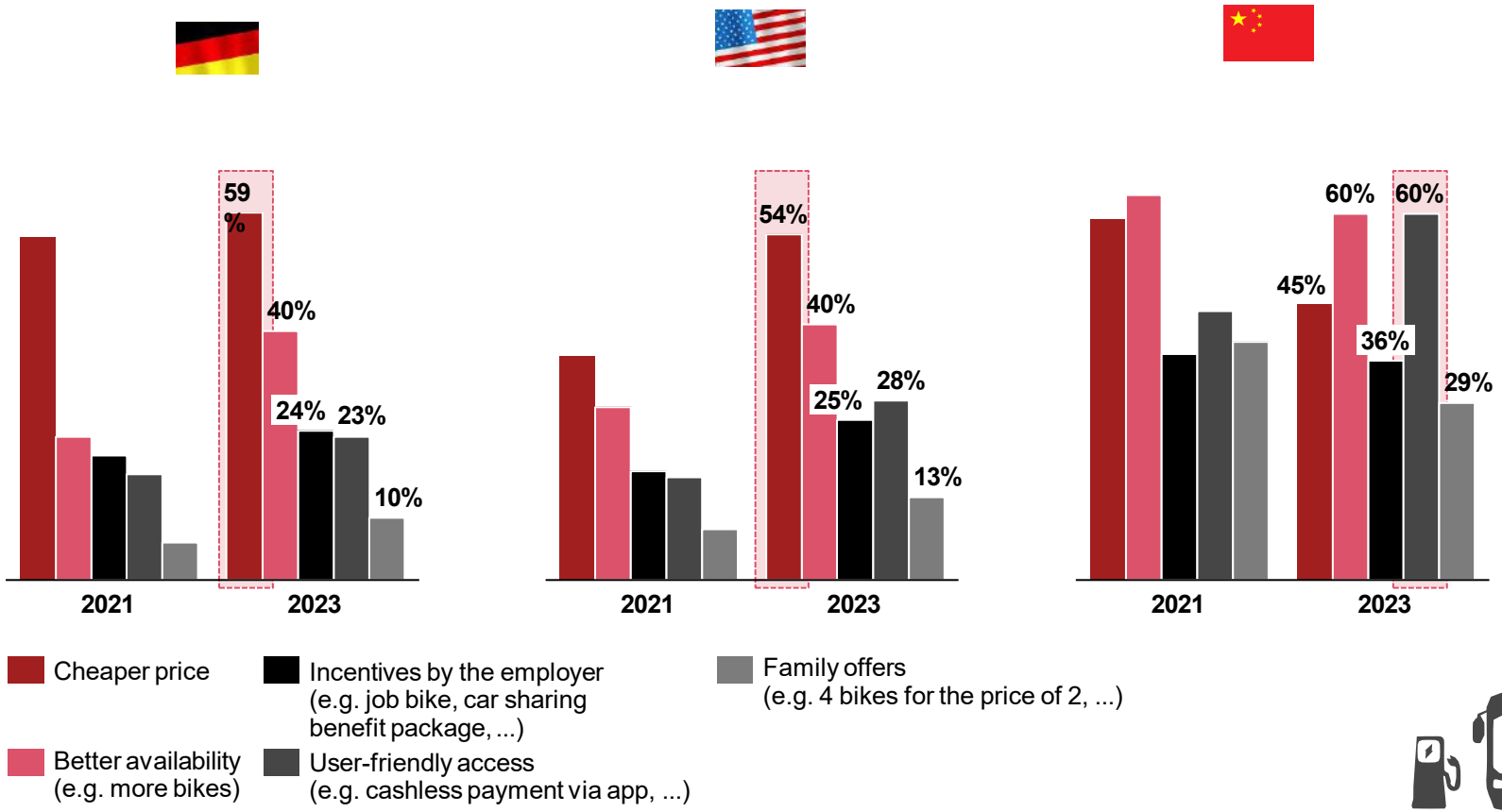
In China, consumers plan to use **shared modes** more.

Across all regions, the number of people planning to use **public transport more has increased."**

Source: PwC Strategy& consumer research

Price and availability are by far the top drivers for encouraging consumers to use sustainable transport

Factors encouraging sustainable transportation modes



Question: *"What would encourage you to use sustainable transportation (e.g. bike sharing, car sharing, public transportation) more frequently?"*

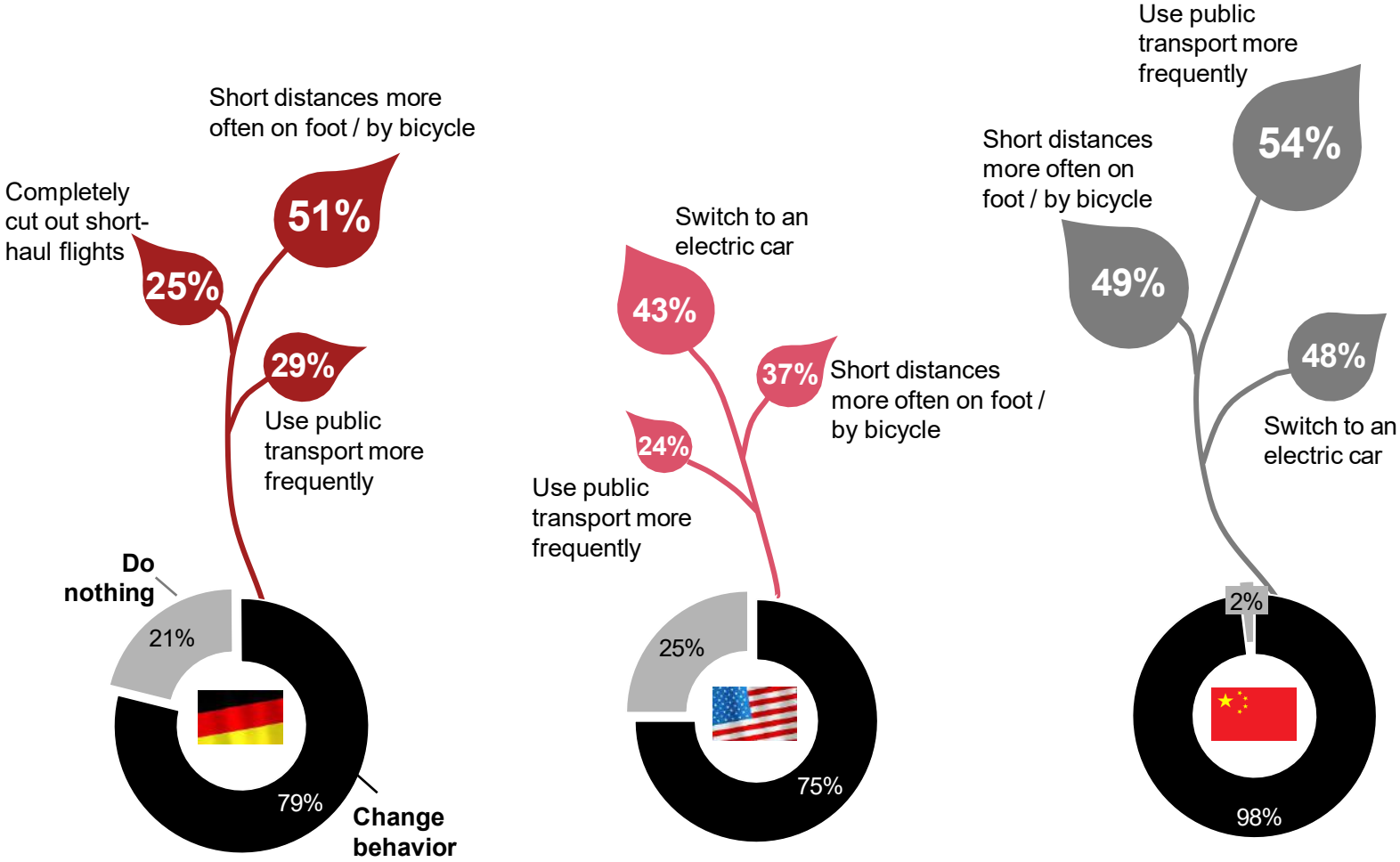
In **Germany**, there has been a sharp increase in the number of consumers who say that **better availability** is an important factor in persuading them to use sustainable transport.

US respondents focus strongly **on cheaper prices**, whereas **user-friendly access** is **most likely to encourage respondents** to use sustainable transport in **China."**

Source: PwC Strategy& consumer research

Every country has different priorities to reduce CO2: In GER more walking, in the US switch to BEV, in CN public transport

Top-3 contributions to CO_2 reduction



Question: *"What major personal changes would you like to do to contribute to a reduction in CO_2 emissions?"*

High willingness to **contribute** to **CO_2** reduction, especially in **China** (98%) – strong **increase in the US** (79% vs. 52% last year)

Main contributions will be completing **short-distance journeys** more often **on foot / by bicycle, switching** to an **electric car**, or **using public transport** more frequently."

Source: PwC Strategy& consumer research

Contents

1. Consumer preferences – connected, electric, automated and smart
2. **Implications for auto players – interface, subscription and charging**

Getting the user interface right

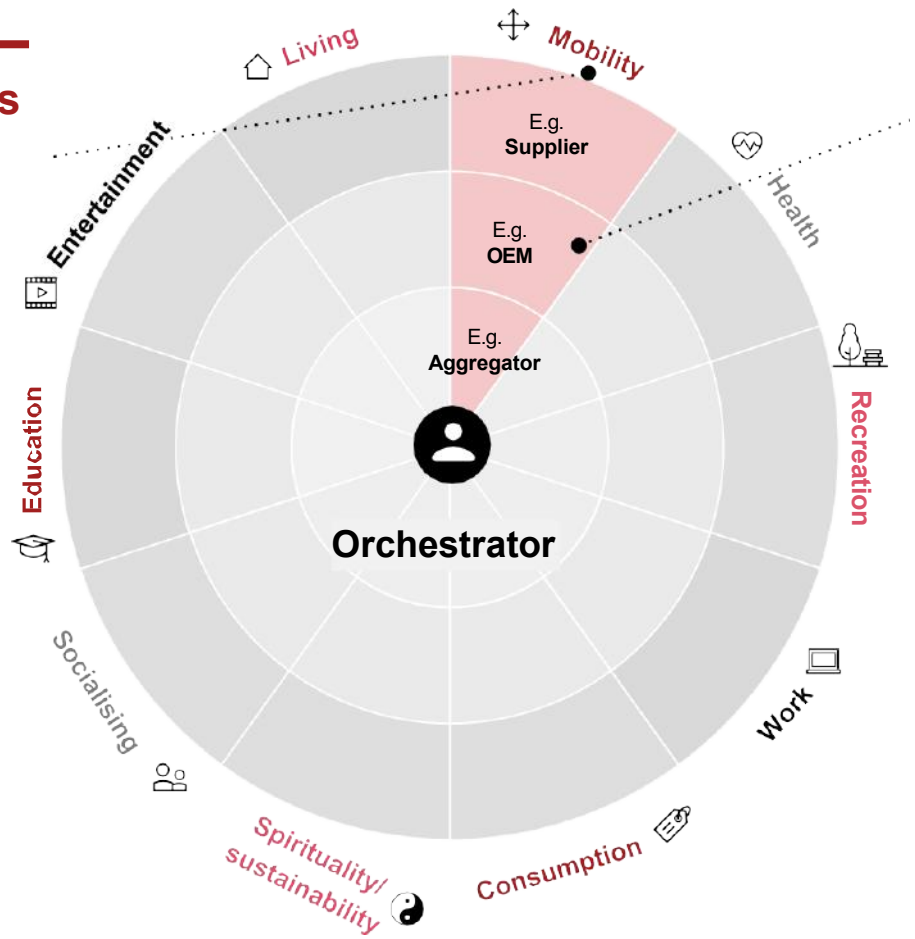
The relevant market for automotive players is expanding beyond the car itself – maintaining user access is crucial

Redefining business models to meet human-centric mobility needs

Mobility demand

Human needs in **mobility Life Areas** determine customer requirements

- **Mobility demand** is influenced by long-term economic, political and social trends as well as generational changes
- The individual user is located at the center of the ecosystem approach **(business to human)**
- Consumer needs can be grouped into ten distinct **Life Areas**
- Within these Life Areas, **ecosystems** emerge in the form of business-to-business and business-to-consumer relationships around specific customer needs



Mobility solutions

Successful **mobility ecosystem players** are clear on four key topics:

Experience differentiators

E.g. luxury, convenience, …

Digital portfolio scope

E.g. life area coverage, niche positioning, …

Value levers

E.g. top-line, bottom-line optimization, …

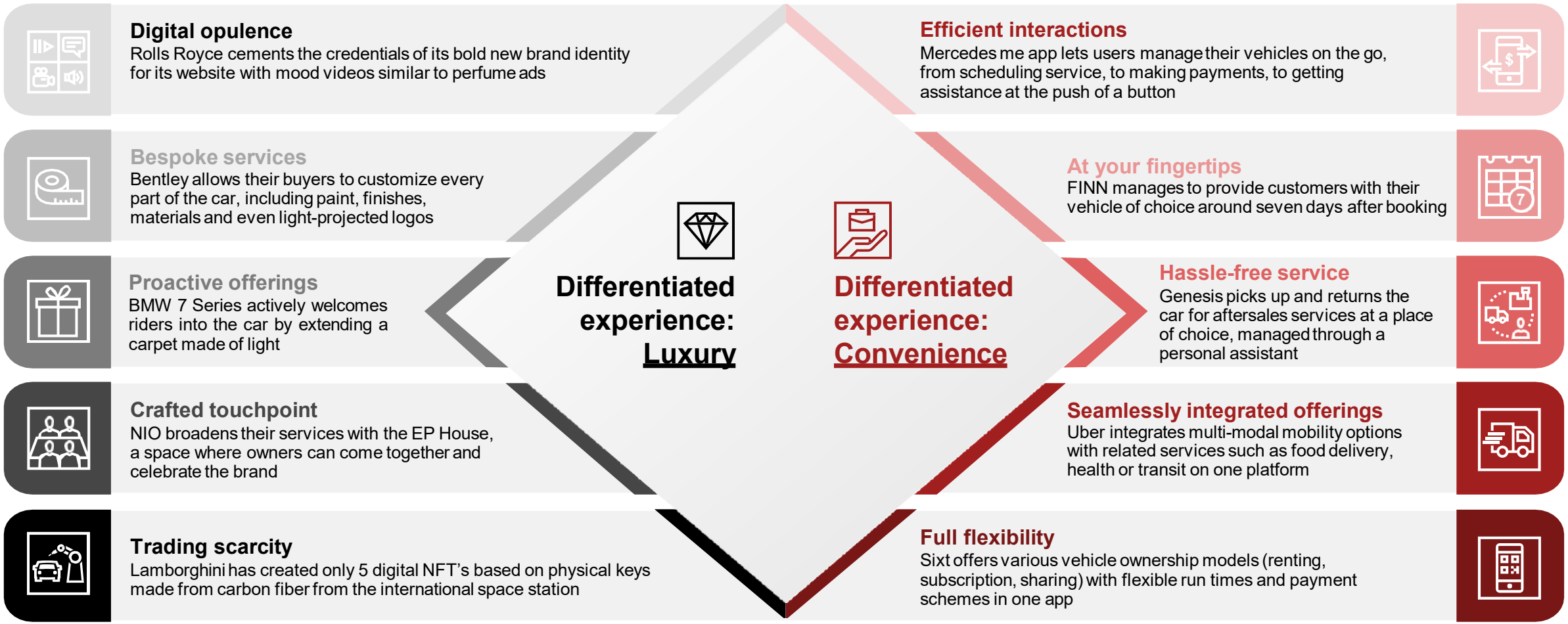
Value chain integration

E.g. vertical/horizontal integration, partnering, …

Source: Strategy&, PwC Ecosystemizer

Getting the digital interface right means creating a differentiated experience for diverse customer needs

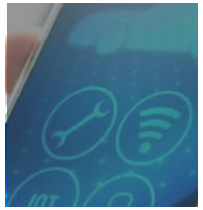
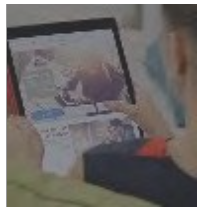
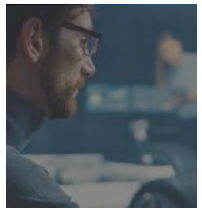
Experience differentiators – Examples



Source: Strategy& analysis

A value-creating digital service portfolio requires automotive players to balance multiple trade-offs

Digital portfolio scope – Examples

	Mobility	Entertainment	Work	Health
 **Vehicle Function -as-a-Service**	**Access** – Tesla virtual bluetooth keys **Light** – BMW high beam assist **Camera** – Tesla sentry mode **Autonomous driving** – Tesla autopilot upgrade **Advanced navigation** – MB live traffic	**Sound** – BMW e-engine sound pack **Intelligent car assistant** – Alibaba, Volvo/Daimler **AI Avatar** – Fetch.ai autonomous agents		
 **Consumer onboard services**		**Gaming** – Tesla arcade, Racing **Entertainment** – Tesla caraoke **Music streaming** – BMW Spotify, NIO Radio **In-car AR gaming** – Audi/holoride partnership	**Crypto Car Wallet** – Various pilots **In-car Office** – Mercedes me connect	**Passenger safety** – NIO fatigue warning **Mood-based lightening** – Mercedes-Benz ambient **Meditation** – Porsche Feel-Good-Coach
 **Consumer offboard services**	**Parking search and pay** – VW we park **P2P car/ride sharing** – Sono motors app **Plug and charge** – VW/Ionity **Automated park and charge** – Bosch Autom. Valet Parking	**NFT Collections** – Roll Royce Phantom **Web3 Loyalty Program** – BMW/Coinweb	**Smart Office Connection** – BMW IFTTT	**Emergency assistant** – GM OnStar guardian
 **B2B/data services**	**Predictive maintenance** – BOSCH, Carmen **Car data based insurance** – BMW CarData **Car data marketplace** – Caruso, Otonomo, High M.		**Fleet mgmt./diagnostics** – Daimler connect business **Driver's log/GPS tracking** – Daimler connect business **Last Mile Logistics** – NIO delivery in trunk	**Roadside assistant support** – Urgently/Otonomo **Safer traffic planning** – Mercedes Data/London

Portfolio Trade-offs

- **Differentiation** vs. **revenue** potential
- **Reach** vs. **profitability**
- **Synergy** focus vs. **risk hedging**
- Touchpoint **control** vs. **open** partners
- **Digital first** vs. BEV/ **AD availability**

Source: Strategy& analysis

Along the value chain and vehicle life cycle, digital services unlock value beyond direct user monetization

Value levers of digital services – Examples

Top-line: Direct revenue and customer lifetime value	**Services monetization**	Connected services activation fees and/or recurring revenues related to monthly subscriptions	**60-70%** *are willing to pay 180$/year for connectivity service set*
	Post-purchase activations	Upselling effect during the ownership cycle by unlocking personalization features or activating built-in hardware	**35-50%** *are interested in post-purchase activations*
	Brand loyalty	Higher satisfaction with on-board experience and creation of 'stickiness' through subscription services	**45-55%** *are more loyal to brands to which they have a subscription*
	After-sales Loyalty	Higher revenues for dealers from original parts sale and workshops traffic triggered by predictive maintenance	**30-40%** *switch to paid subscription after free trial*
	Platform access/ data sales	Direct revenues from granting third parties access to own platform or monetizing (anonymized) data/insights	**50-60%** *of companies indicate that they do sell data to third parties*
Bottom-line: OpEx/CapEx Optimization	**R&D optimization**	Leverage of real time data on customer preferences/behaviors for timely adjustment of vehicle specifications and features	**30-40%** *additional revenue potential based on customer insights*
	Variant management	Reduction of the number of model-specific variants by activating on-demand vehicle features	**20-30%** *cost reduction potential through variant reduction*
	Parts inventory management	Optimized inventory management through advanced planning of upcoming repairs enabled by predictive maintenance	**20-30%** *inventory decrease due to demand forecasting*
	Recall campaigns	Prevention of recall campaigns by leveraging OTA updates to fix potential technical issues within the circulating fleet	**30-40%** *of incidents can partly/fully be prevented by OTA*

Implications

- Ecosystem business cases should extend **beyond vehicle-centric** business cases
- **Direct and indirect revenue** potential, and **opportunities beyond vehicle offerings,** should be considered along the customer life cycle
- **B2B offerings** offer significant **direct monetization potential**
- In addition to external opportunities, a significant amount of **internal opportunities** exist, e.g. to increase efficiency in processes & portfolio

Source: Strategy& analysis + expert discussion

OEMs are forced to partner with technology players to deliver compelling digital services – risking a loss of control

Value chain integration – Range of partnership options

I – No tech player involvement

Operating system and all applications are developed by the OEM

Full control for OEM, no standardization, slower development, reduced offering compared to market leaders

II – Operating system supply

Standardized tech stack is provided by supplier, e.g. Android Automotive OS

Faster development, easier integration of external applications (e.g. Spotify), standardized setting cannot be adjusted by OEM

III – Content mirroring

Apple/Google content is displayed by using apps within the vehicle, e.g. Android Auto

Common mobile apps (e.g. Google Maps) are **immediately available in-vehicle**; less use of OEM native apps / content

IV – Tech player content using vehicle data

Usage of car data to enrich 3rd party in-vehicle apps, e.g. for usage based insurance or location based commerce

Compelling user experience on par with mobile app UX, but **OEM apps loose advantage** of specific driver / vehicle insights

V – External development of the digital experience

Next ?

Entire automotive software is developed by tech supplier

Data governance between involved stakeholders crucial to avoid **downgrading of OEM** to pure hardware provisioning

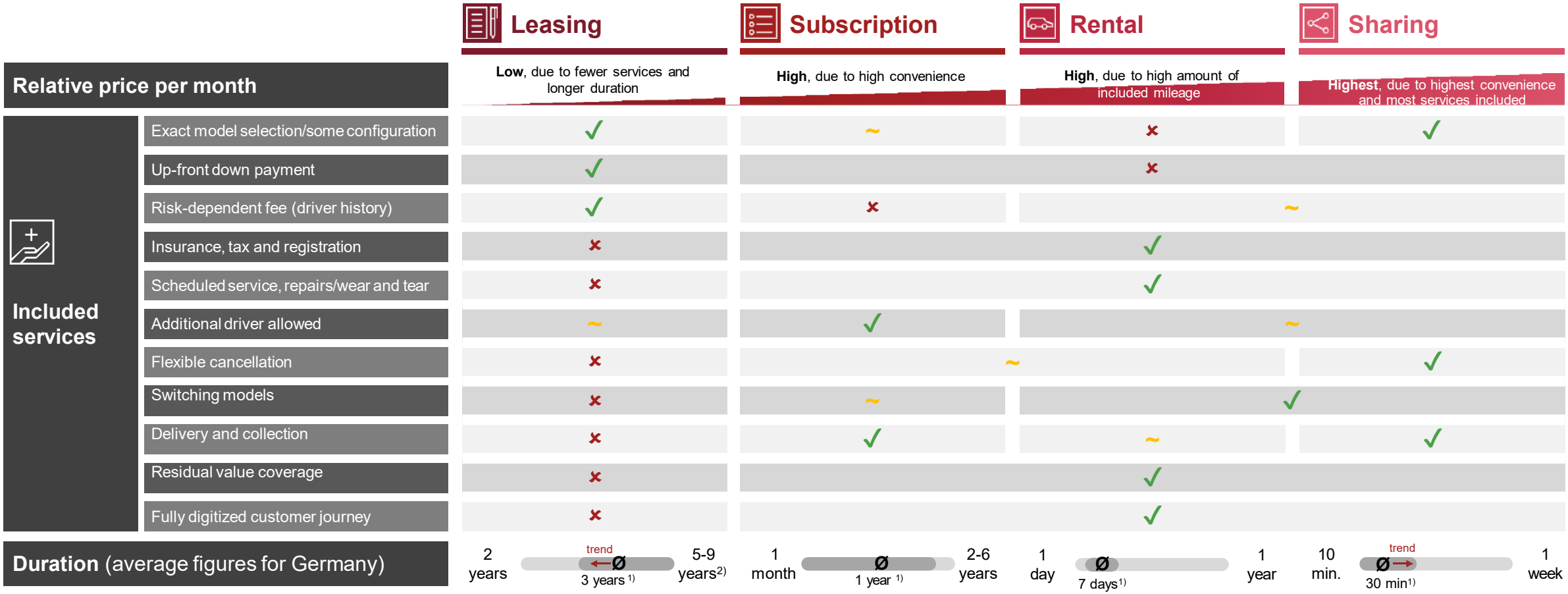
A winning digital experience requires customer proximity, tech capabilities and effective data governance

Source: Strategy& analysis

Rethinking vehicle sales

Subscription fills the gap between leasing and rental offerings – resulting overall in four major vehicle ownership archetypes

Vehicle ownership archetypes

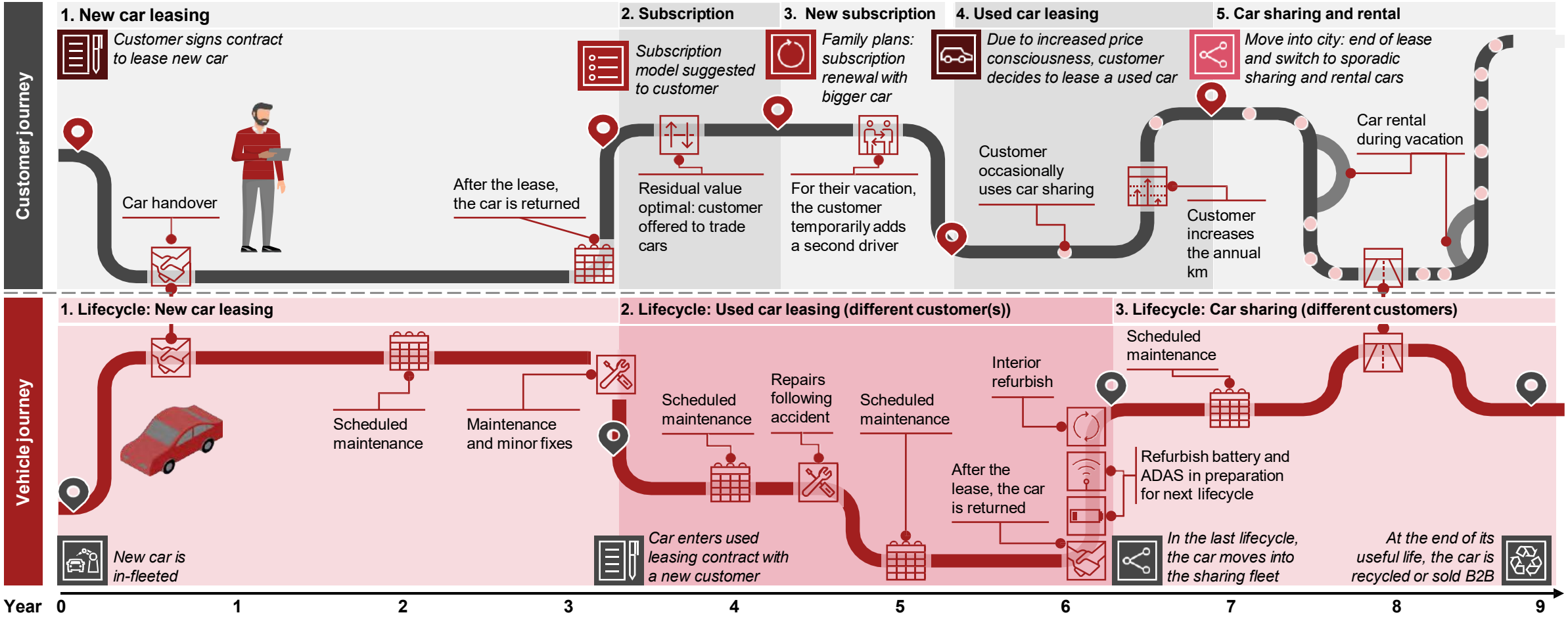


✓/ ~ / ✗ = Usually included / Depends on provider / Usually not included

1) Based Strategy& analysis; 2) Depending on specific regulatory environment allowing "prolonged lease"
Source: Strategy& analysis

As alternative ownership models such as subscription emerge, OEMs need to sharpen their vehicle lifecycle mgmt. skills

Subscription customer and asset journey – Example



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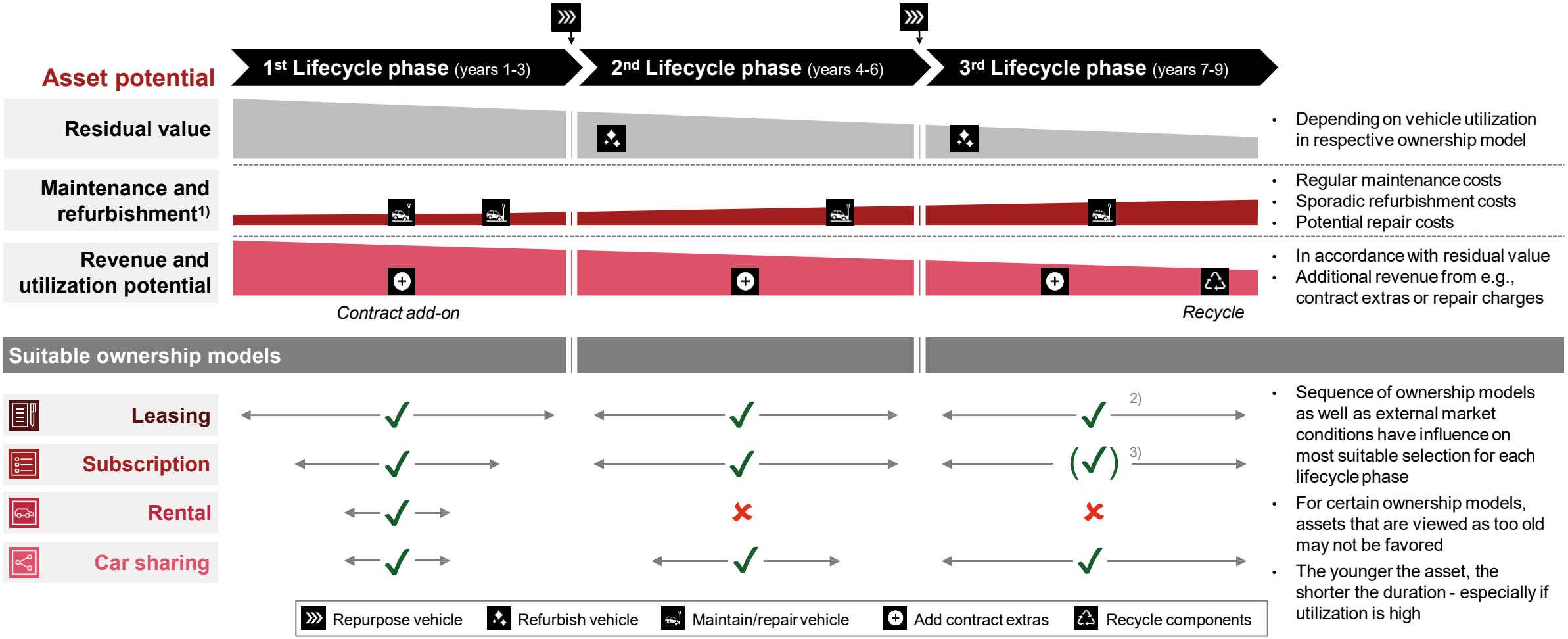
Source: Strategy& analysis

Holistic vehicle lifecycle management aims to increase revenue and utilization, especially during 2nd and 3rd phase

Subscription "3x3" asset lifecycle



- Depending on vehicle utilization in respective ownership model
- Regular maintenance costs
- Sporadic refurbishment costs
- Potential repair costs
- In accordance with residual value
- Additional revenue from e.g., contract extras or repair charges
- Sequence of ownership models as well as external market conditions have influence on most suitable selection for each lifecycle phase
- For certain ownership models, assets that are viewed as too old may not be favored
- The younger the asset, the shorter the duration - especially if utilization is high

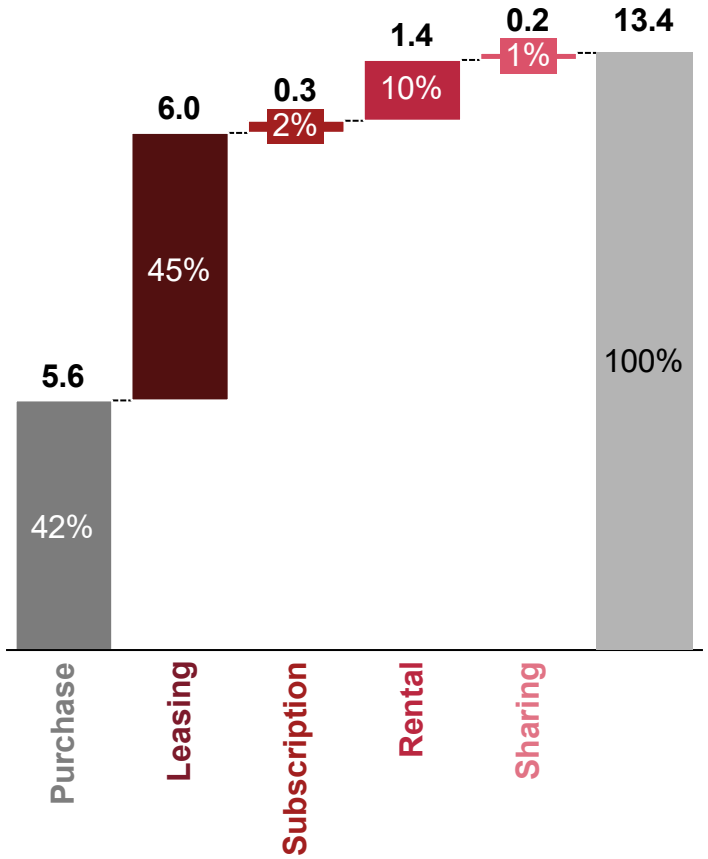
1) Annual OEM-prescribed maintenance/service intervals and use-based repairs – sporadic refurbishment;
2) Depending on specific regulatory environment allowing "prolonged lease"; 3) As low-budget option
Source: Strategy& analysis

Alternative ownership models are on the rise and offer profit potential for OEMs – if the asset life cycle is managed well

Vehicle ownership model split and profitability – Indicative

Ownership model split 2023 [m units]

Region Europe, 40 countries



Subscription has potential to grow to **2-4m units by 2035** in Europe[1)]

Leasing has potential to grow to **7-8m units by 2035** in Europe[1)]

Profitability of ownership models[2)]

Traditional car ownership → Alternative ownership

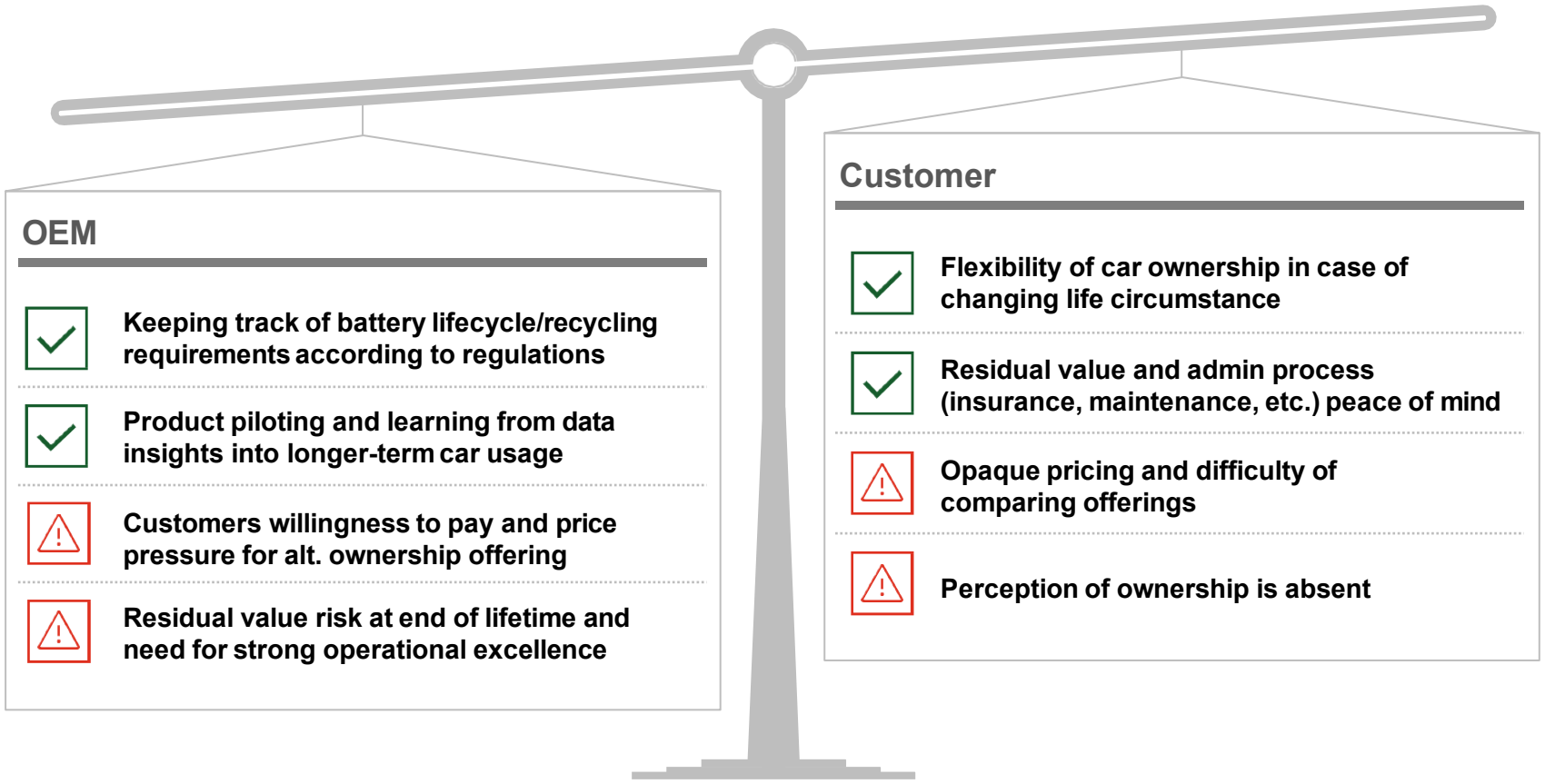
Ownership models	Purchase	Leasing	Subscription	Rental	Sharing
LCP 1 year 1-3	7%	-115%	-91%	10-15%	<5%
LCP 2 year 4-6	9%	83%	78%	–	<5%
LCP 3 year 7-9	11%	76%	71%	–	<5%
Total	**5-7%**	**10-15%**	**10-15%**	**10-15%**	**<5%**

- ***Overall profitability potential higher for leasing, subscription and rental than for purchase***
- ***Profitability across LCPs varies*** – *from relatively constant to a sharp increase. With rental, there is only one LCP.*
- *It is not individual consideration but a **merged portfolio view that is crucial for OEMs***

1) Estimate of share development for ownership model depends on shares of competing models; LCP: Life cycle phase;
2) Profitability estimate based on individual consideration of ownership model for average middle class passenger EV (price 53.5k EUR)
Source: Strategy& analysis

More flexible ownership models offer benefits and risks for OEMs and customers – a win-win solution is required

Vehicle subscription benefit and risk perspective



Key takeaways

- Alternative ownership models need to create a **win-win situation** for customers and OEMs
- Currently, they mostly **play into the strategic agenda of OEMs**
- Strong **customer centricity** and efficient **asset management** of used cars are **needed** to reach **profitability**

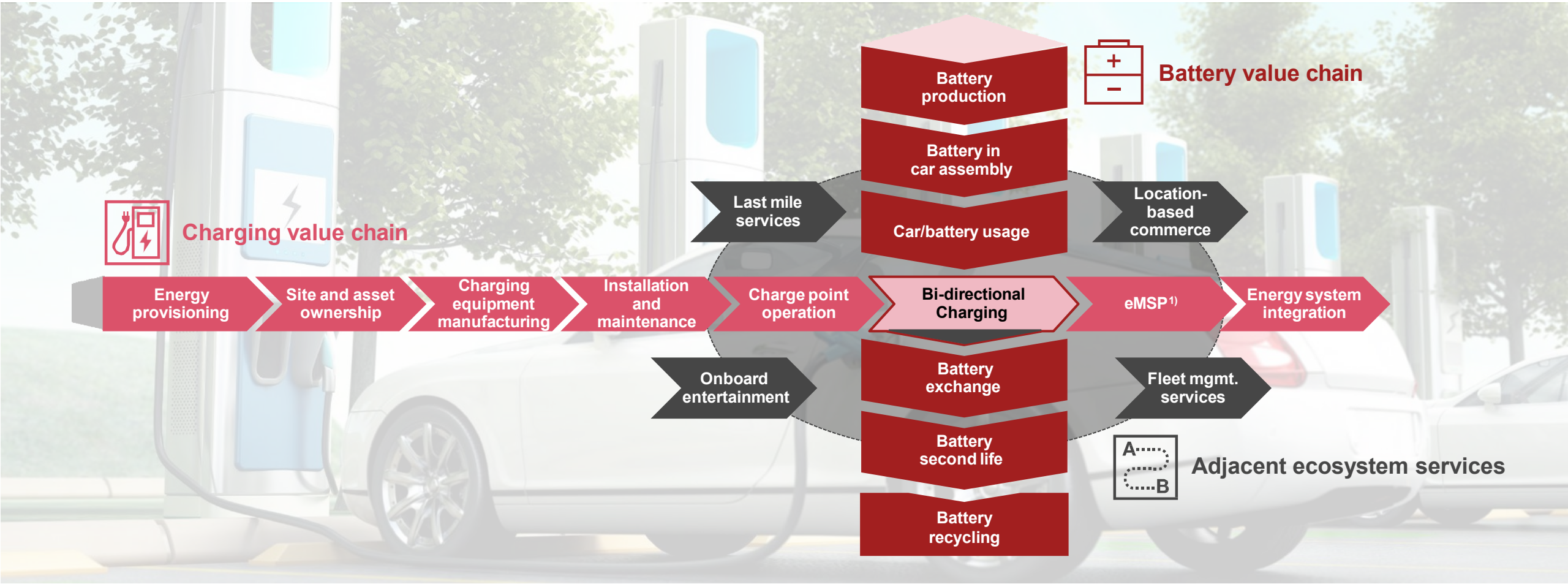
OEMs may leverage their **existing retail network** and **preferential vehicle acquisition conditions** to differentiate themselves from start-up competitors

Source: Strategy& analysis

Going beyond the vehicle

Rise of e-mobility provides ample opportunities to capture value beyond the vehicle – e.g. with batteries and charging

Value pools beyond the vehicle – Focus e-mobility



Source: Strategy& analysis

Infrastructure and vehicle penetration are key requirements for successful realization of bi-directional charging use cases

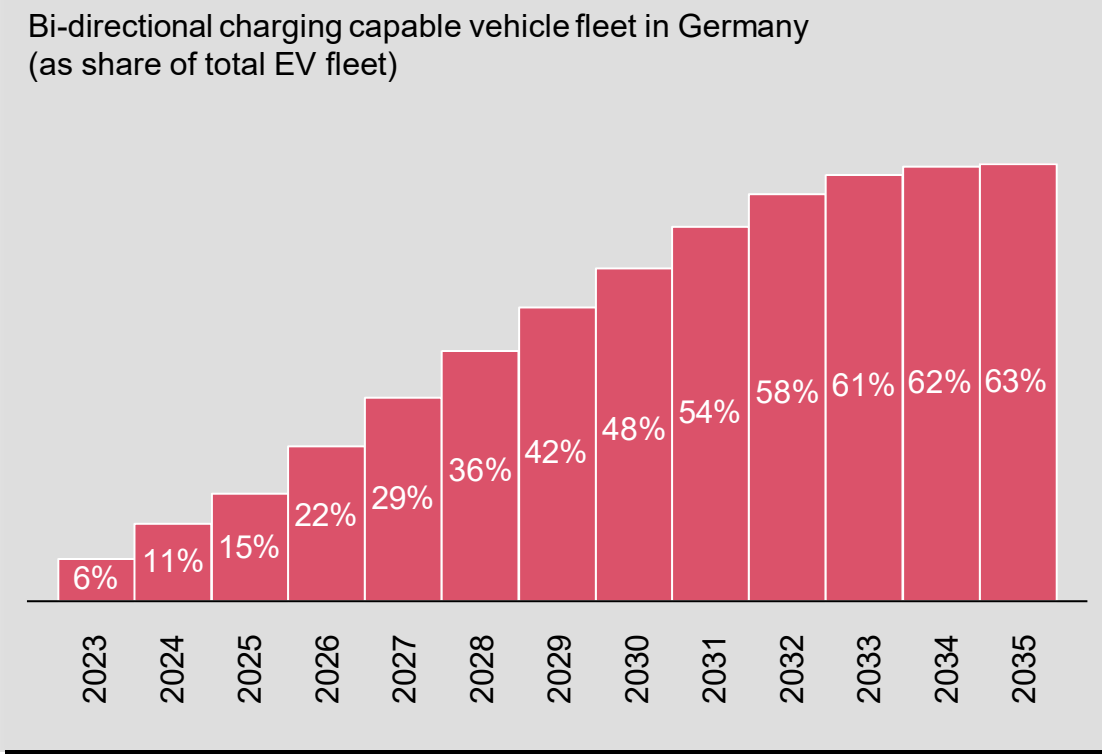
Bi-directional charging – Market simulation Germany

Bi-directional sockets by 2030

	1.8m	**0.7m**
Private 2.5m	**Home and apartment buildings**	**Office**
	0.16m	**0.03m**
Public 0.19m	**Parking**	**Charging hubs**

Total 2030: 2.7 million bi-directional sockets

Bi-directional charging-capable vehicle fleet (#)



Total 2030: ~5 million bi-directional vehicles

Source: PwC Strategy& Study (2022): "Der E-Mobility-Check: Wie bereit ist Deutschland?"; Strategy& analysis

Front-of-meter prosumer use cases depend on a multitude of external factors that limit mainstream adoption in short term

Prosumer charging business model comparison – Germany

		Behind the meter		Front of meter	
	Application Area	**V2L** 	**V2H/B** 	**V2G / VGI** 	
	Use Cases	**Self-supply optimization**	**Consumption optimization**	**Load shifting**	**Power market trading**
	Enabler Revenues	Potential for software enablers: **€160-220m**[1] in 2030		Potential for software enablers: **€470-550m**[2] in 2030	
Enablers & Limitations	**Customer Demand**	• **Short-term: Growing EV user demand** to use vehicle e.g. as additional storage for home PV or emergency power bank (in the US)		• **Mid-term**: EV user demand driven by **incentive to earn/save money**, but **depending on available solutions & attractive pricing**	
	Energy Tech	• Need for **penetration of bi-directional capable vehicles and infrastructure** (i.e. EV charger) to reach "critical mass" • Need for development of **standard protocols** (interconnection, communication, vehicle and charging station safety & functionality)			
	Regulation	• **Fully supportive behind-the-meter regulation expected by 2024** due to limited complexity of "closed" micro-ecosystem		• **Fully supportive regulation not expected before 2028 at EU level** due to high stakeholder complexity (smart meter as reference)	
	Economics	• **Tech cost reduction** (vehicle / infrastructure) required for scale up • Availability of comprehensive **ancillary services** as important enabler		• Need for **flexible V2G tariffs**: Time-of-Use or Time-of-Day pricing • **Minimum number of kwh** must be available at a certain point in time **for utility providers to rely upon** when managing the grid	

While **front of meter** still requires more **regulatory alignment** at European level, **behind the meter** already has a **high market readiness in the short term**

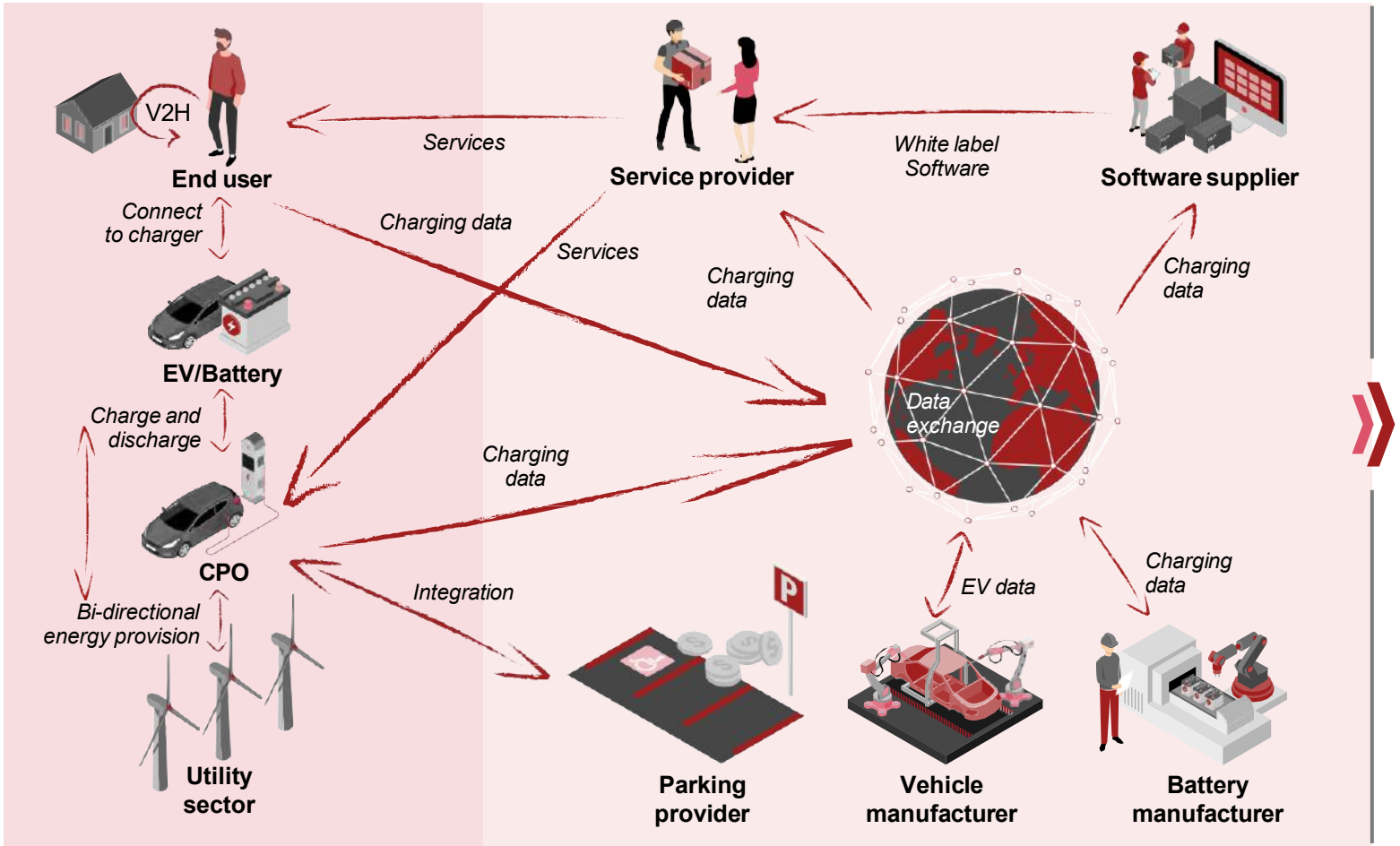
V2L: Vehicle-to-load (e.g. e-bike, another EV, etc.) V2H/B: Vehicle-to-home / building V2G/VGI: Vehicle-to-grid / vehicle-grid-integration PV: Photovoltaic

1) Includes software for grid optimization of households (V2H) and public charge point operators only; 2) Includes software for power market trading for households and public charge point operators only

Source: Strategy& analysis

Realization and scale-up of prosumer use cases require efficient charging and battery stakeholder coordination

Charging & battery ecosystem stakeholder activation



Main scale-up challenges

Stakeholder fear of losing control points to a central, dominant player (e.g. OEMs see USP in unique charging experience)

Relatively **high transactions costs** for clearing and billing (given comparatively low value of single transactions)

Different interests and priorities across parties (e.g. CPOs want to maximize utilization, whereas OEMs want to maximize charging availability)

Can a decentralized coordination approach help to solve these challenges?

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Charging stakeholders
Enabling ecosystem partners

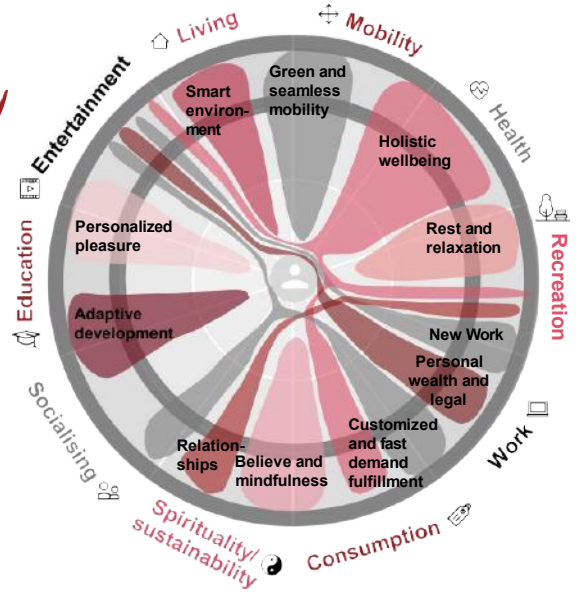
Source: Strategy& analysis

Implication for automotive players: Holistic ecosystem approach beyond core business is key to future success

Ecosystems…

On the one hand…

- Ecosystems can create lock-in effects based on **differentiated offerings**
- **Customer lifetime value** can be increased through holistic journey coverage
- **Faster growth** and **higher earning potential** can be achieved when compared with traditional approaches to value creation



On the other hand…

- Building & managing ecosystems is **complex**
- Theoretically, unlimited number of potential offerings **complicates the selection process**
- Product-centric view carries risk of **missing market/customer needs** (particularly for more advanced topics)

Success factors

- ✓ **Be clear about own ecosystem role – whether orchestrator, realizer or enabler**
- ✓ **Build offering portfolio** and **allocate resources** accordingly
- ✓ Maintain a **holistic and iterative approach** in the selection of suitable offerings
- ✓ **Actively manage the portfolio** and **prioritize clearly** according to a coherent, consistent and multi-layered ecosystem logic

Source: Strategy&, PwC Ecosystemizer

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