



Artificial Intelligence

How industries are becoming more and more 'Data-/AI-driven' and 'fully autonomous'

Artificial Intelligence and Industries, 2023

Dr. Evangelos Avramakis, Swiss Re

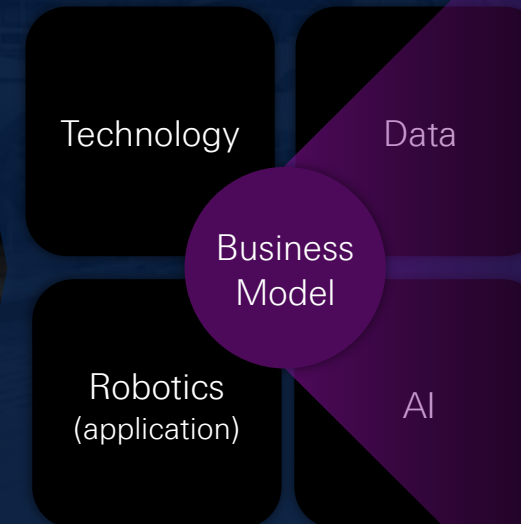
What are the **key tech-related themes** driving industries?

Industries

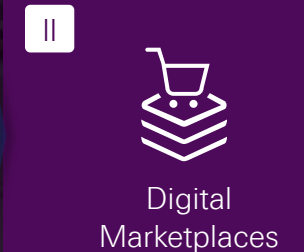
Mining & extraction
Energy generation
Industrial Manufacturing /Automation
Automotive
Electricity and Utilities
Agriculture
Financial Services
Cement / Non-metallic mineral products
Iron, Steel, Basic Metals + Chemicals
Transportation
Food production
Life Sciences & Healthcare
Electronics
Construction equipment
Telecommunication
Wholesale, Retail
Tech



Key Tech-Drivers

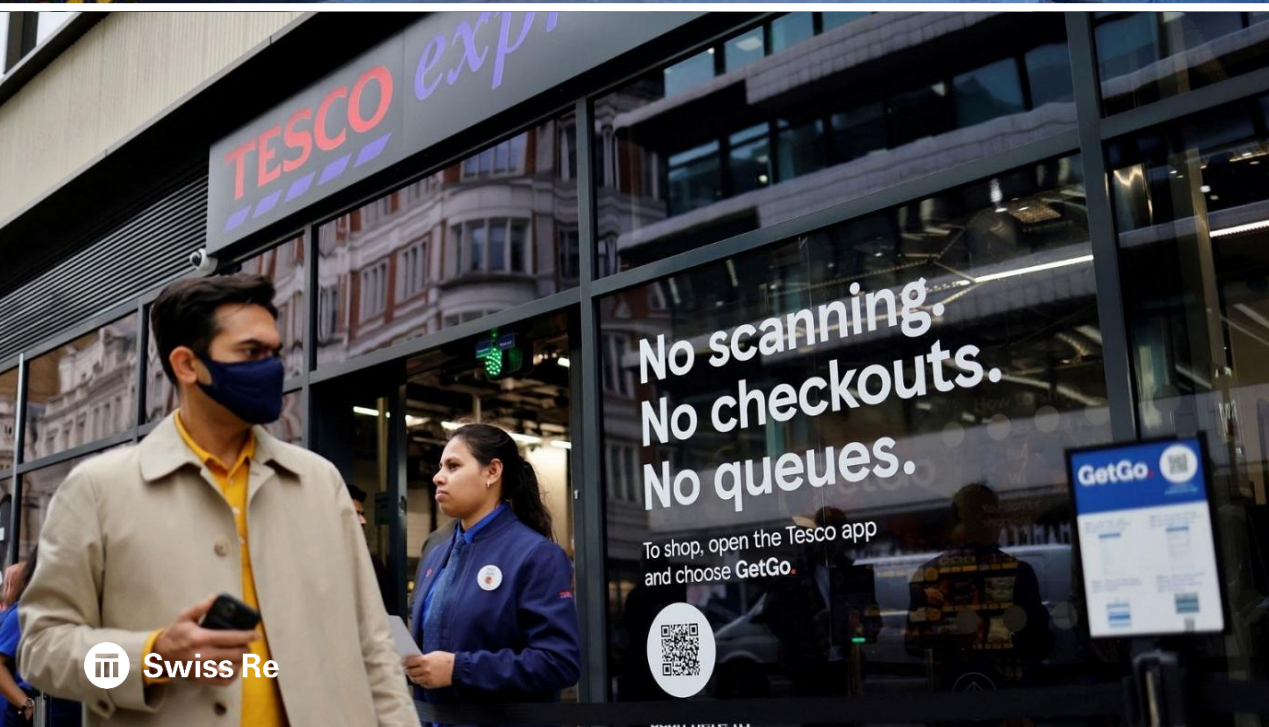


Key Themes





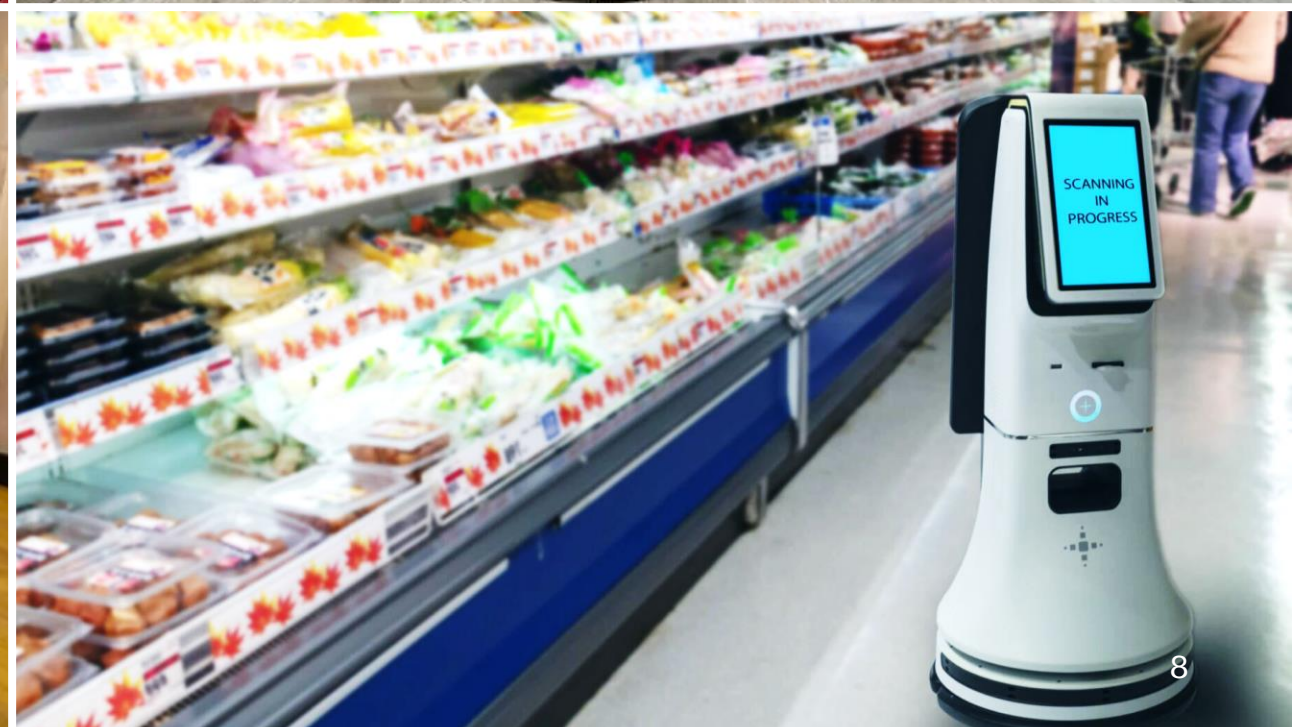
Source: [Aldi opens its first checkout-free store in Greenwich, London | Metro News](#)





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Image Sources: Cooler Screens (accessed: 26.09.2021)
Cooler Screens and Walk in Front_1 (vimeo.com)





On demand
robo-coffee-
shops

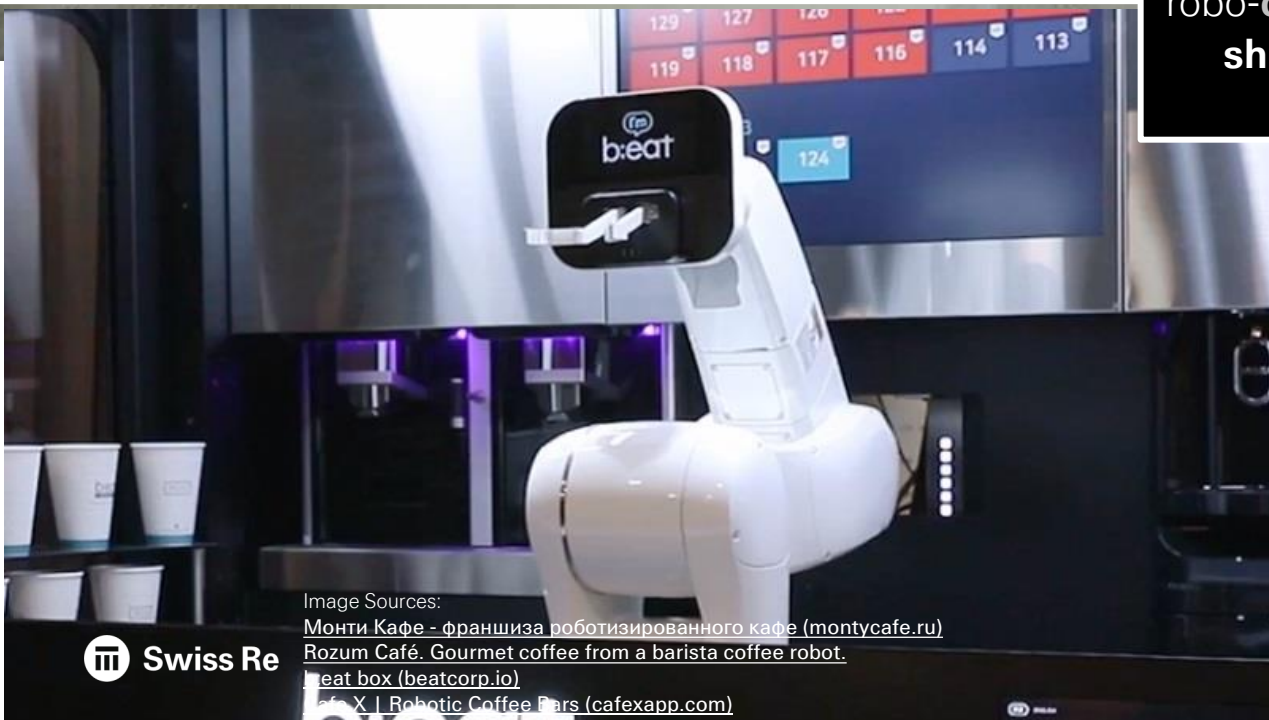


Image Sources:

Монти Кафе - франшиза роботизированного кафе (montycafe.ru)

Rozum Café. Gourmet coffee from a barista coffee robot.

beat box (beatcorp.io)

CAFEX | Robotic Coffee Bars (cafexapp.com)



Image Sources:

McDonald's komt met robot die je maaltijden bezorgt | Gewoonvoorhem
New McDonald's In Phoenix Run Entirely By Robots - News Examiner

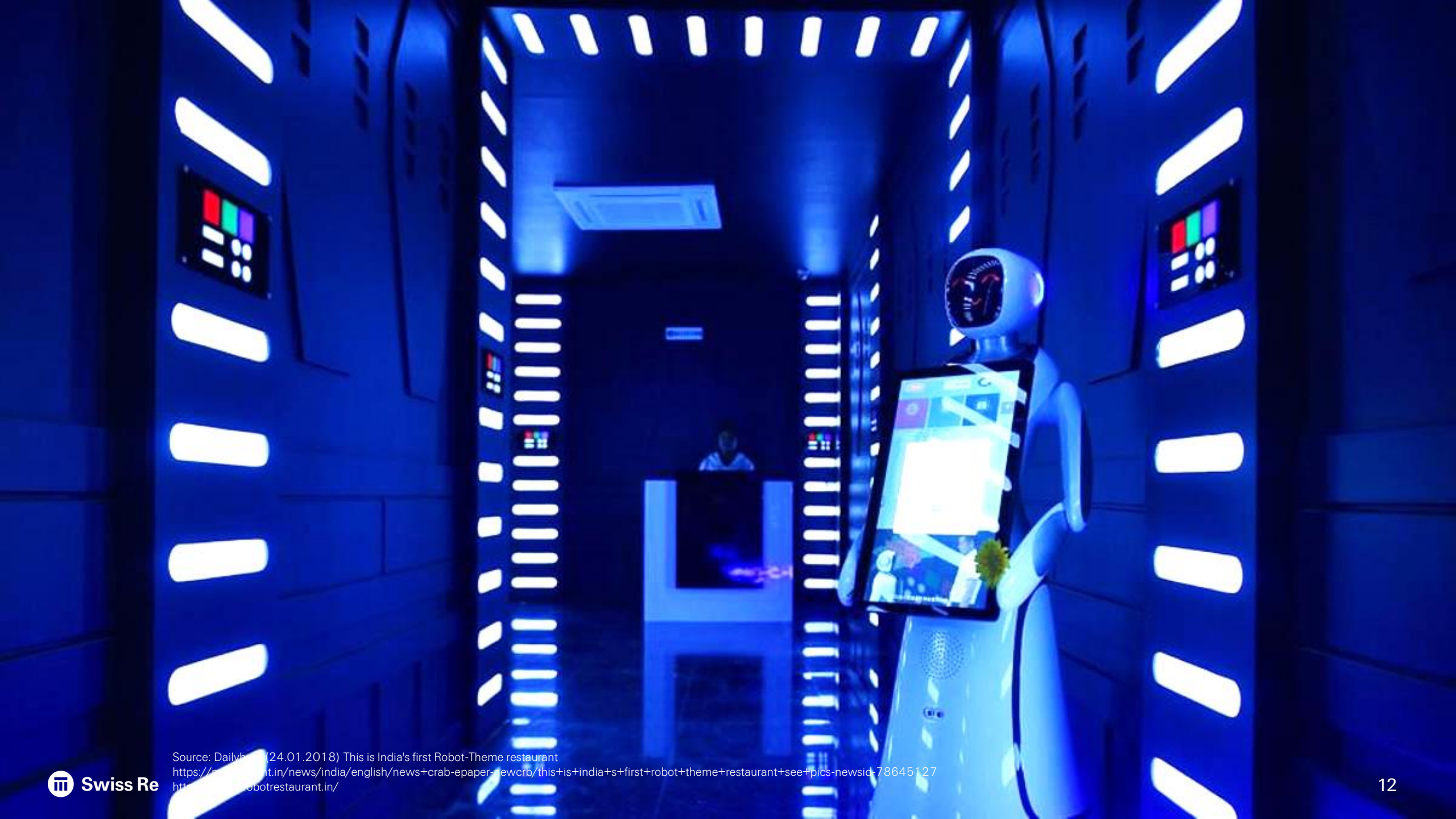


Robotic waiters drive unmanned economy



Swiss Re

Source: Shin Watanabe (14.04.2020) Robotic waiters and nurses drive China's unmanned economy. Nikkei Asia
<https://asia.nikkei.com/Business/China-tech/Robotic-waiters-and-nurses-drive-China-s-unmanned-economy>



Source: Daily News (24.01.2018) This is India's first Robot-Theme restaurant
<https://www.dailynews.in/news/india/english/news+crab+paper+newcrb/this+is+india+s+first+robot+theme+restaurant+see+pics-newsid-78645127>
<http://www.robotrestaurant.in/>



Functional
Robots

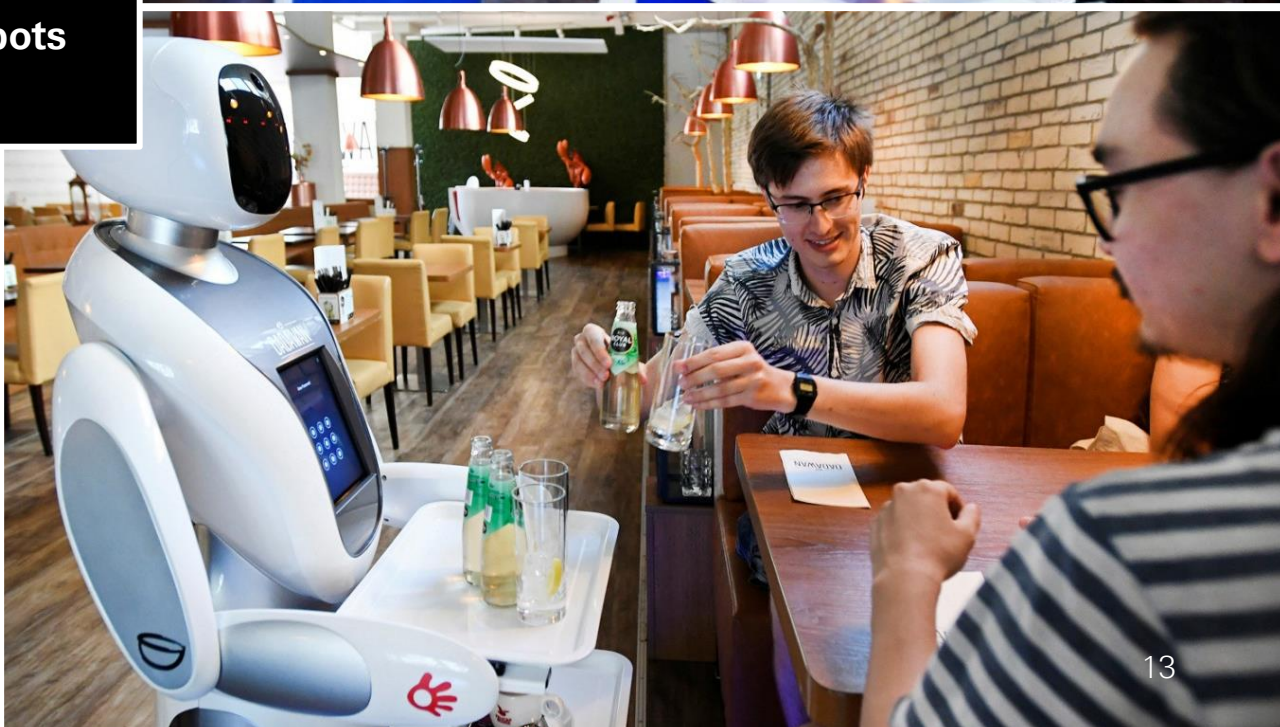
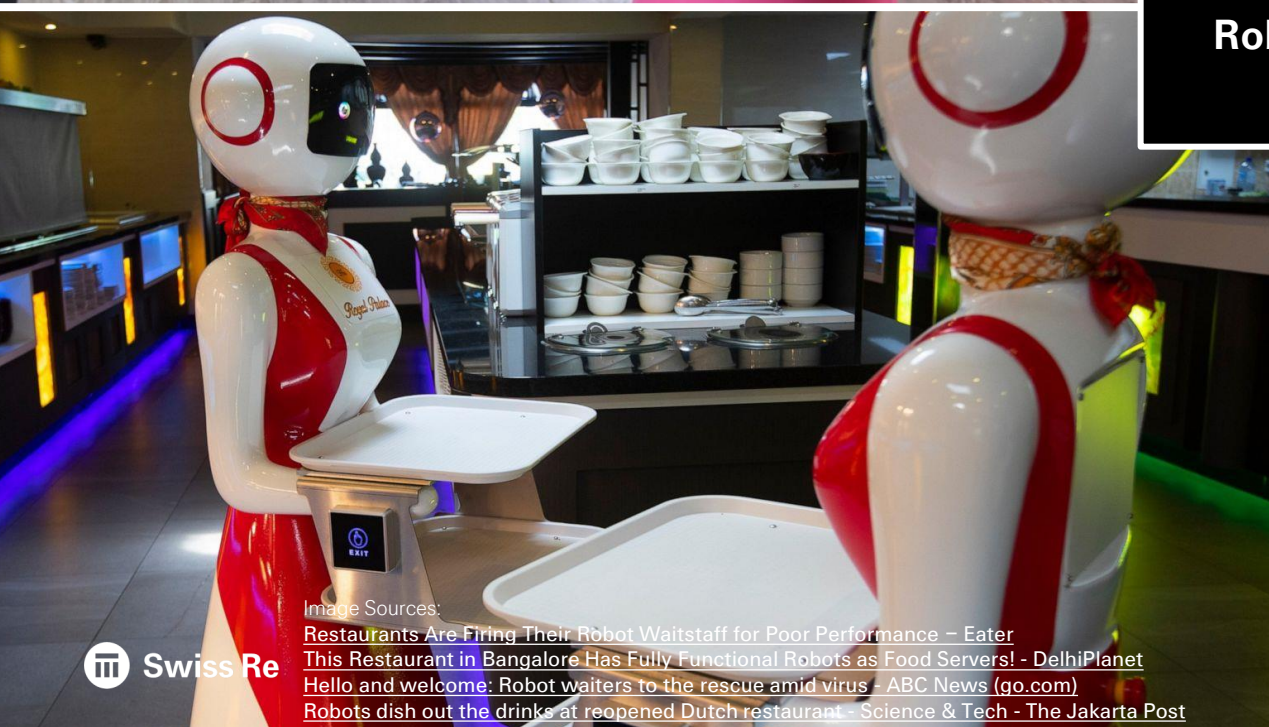


Image Sources:
[Restaurants Are Firing Their Robot Waitstaff for Poor Performance – Eater](#)
[This Restaurant in Bangalore Has Fully Functional Robots as Food Servers! - DelhiPlanet](#)
[Hello and welcome: Robot waiters to the rescue amid virus - ABC News \(go.com\)](#)
[Robots dish out the drinks at reopened Dutch restaurant - Science & Tech - The Jakarta Post](#)



COVID-19 Robots



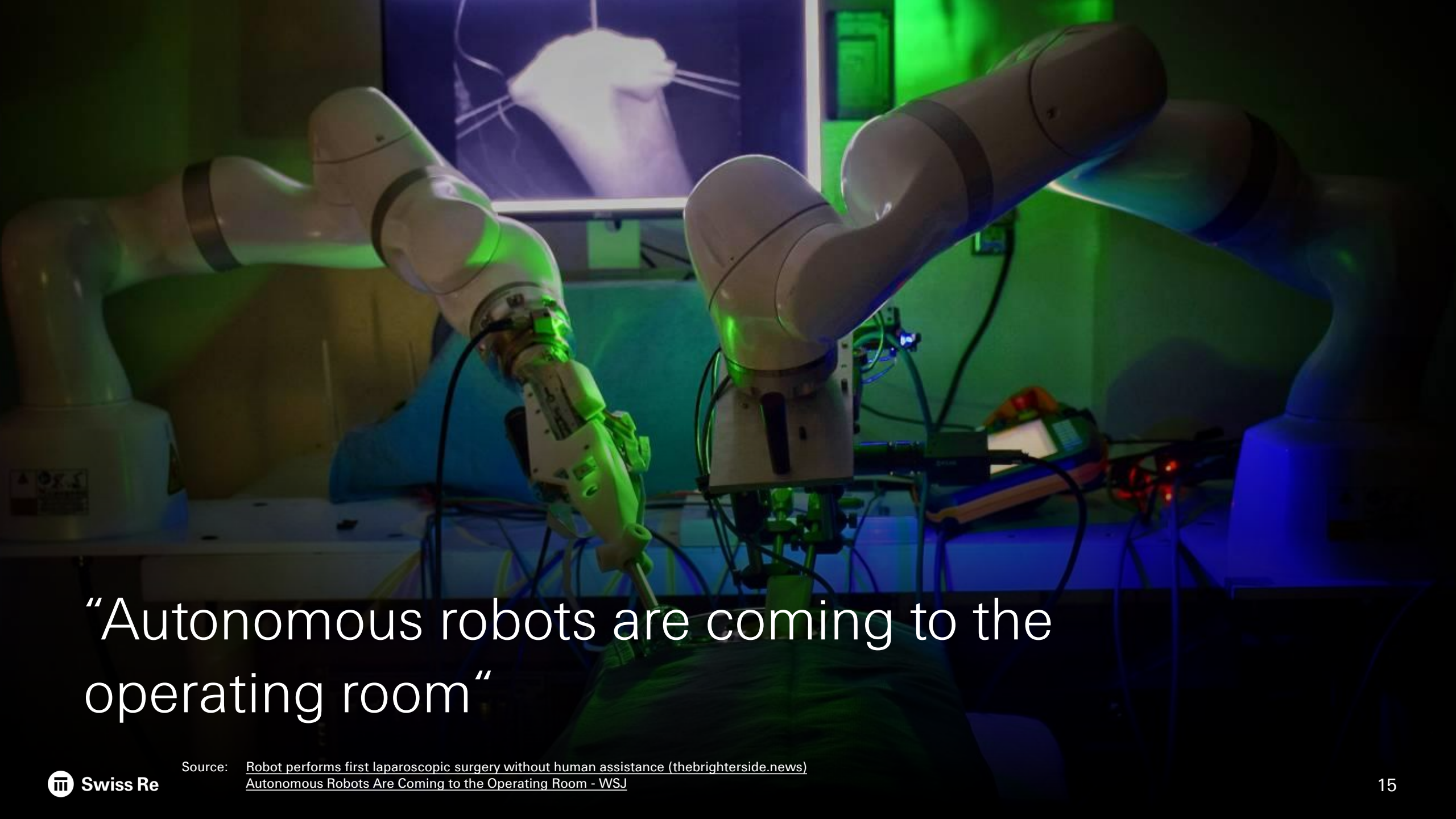
Image Sources:

<https://www.reuters.com/article/us-health-coronavirus-italy-robots/tommy-the-robot-nurse-helps-keep-italy-doctors-safe-from-coronavirus-idUKKBN2J07Y>

<https://techcrunch.com/2020/03/20/robot-nurse/>

<https://diligentrobots.com/>

<https://www.cnbc.com/2020/03/23/video-hospital-in-china-where-covid-19-patients-treated-by-robots.html>



“Autonomous robots are coming to the operating room”

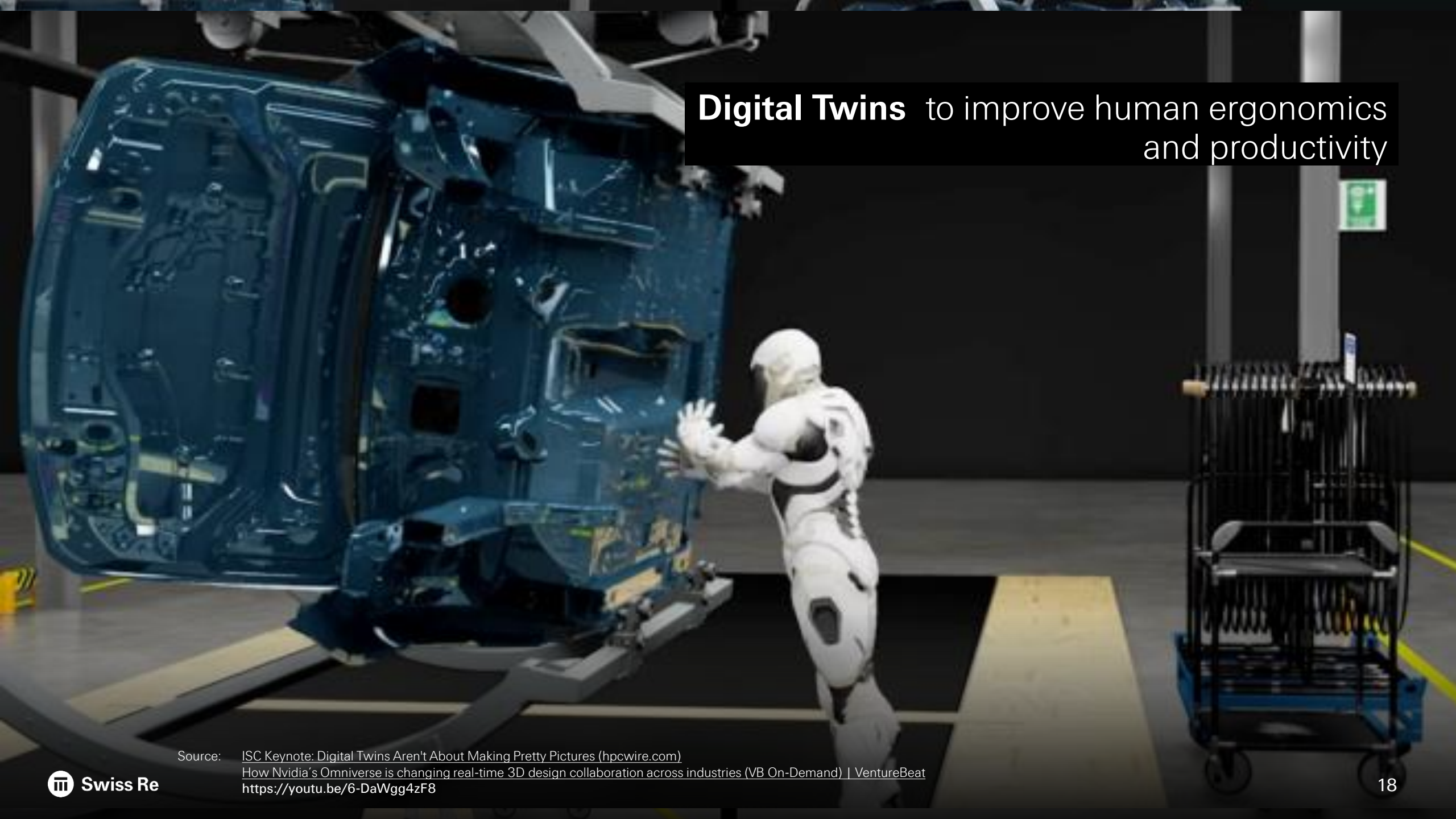
A photograph of a car body on an assembly line. Several orange robotic arms are visible, some in the foreground and some in the background, working on the car. The car is silver and appears to be in the final stages of assembly. The background is a factory setting with various equipment and structures.

Digital Twins

BMW opens first virtual factory in the
using NVIDIA Omniverse to virtually
produce its next-gen EVs

“The goal is to create a simplified workflow where any change in the physical factory will update the virtual factory, and where any change in the virtual factory will update the 3D databases used by BMW’s design teams.”

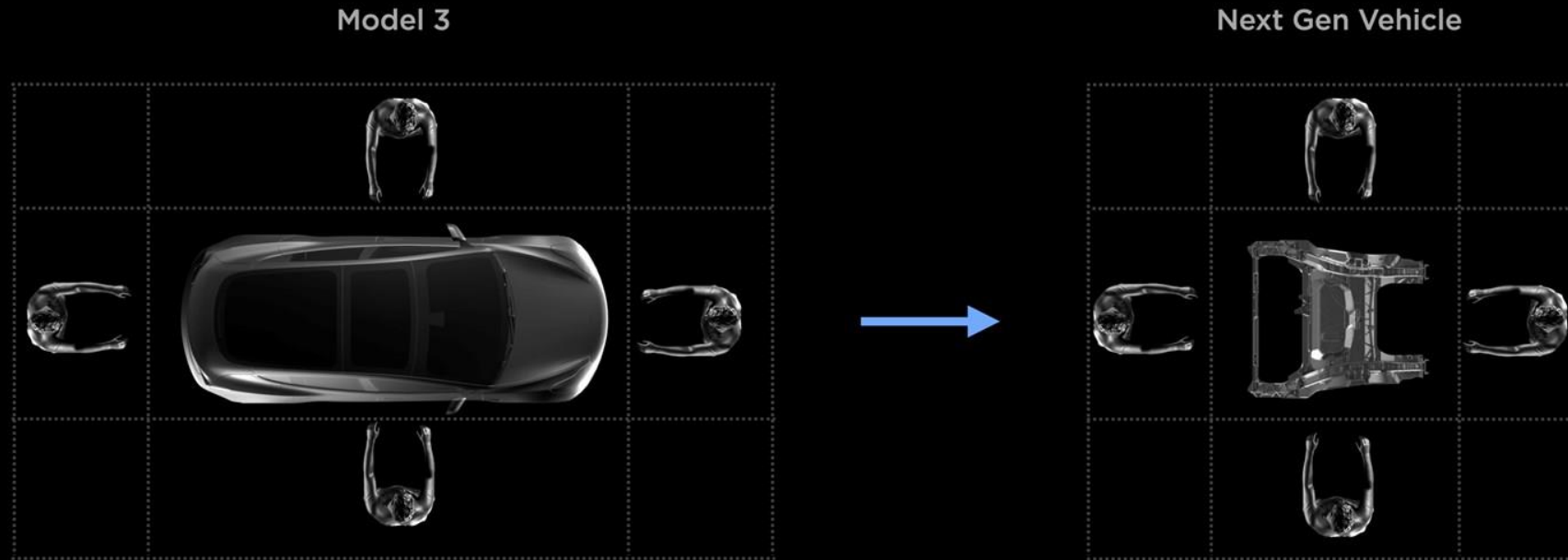




Digital Twins to improve human ergonomics and productivity

Source: [ISC Keynote: Digital Twins Aren't About Making Pretty Pictures \(hpcwire.com\)](https://www.hpcwire.com/isc-keynote-digital-twins-arent-about-making-pretty-pictures/)
[How Nvidia's Omniverse is changing real-time 3D design collaboration across industries \(VB On-Demand\) | VentureBeat](https://www.vb.on-demand.com/how-nvidia-s-omniverse-is-changing-real-time-3d-design-collaboration-across-industries)
<https://youtu.be/6-DaWgg4zF8>

More People Can Work Simultaneously on Next Generation Vehicle



44%

Operator Density
Improvement

30%

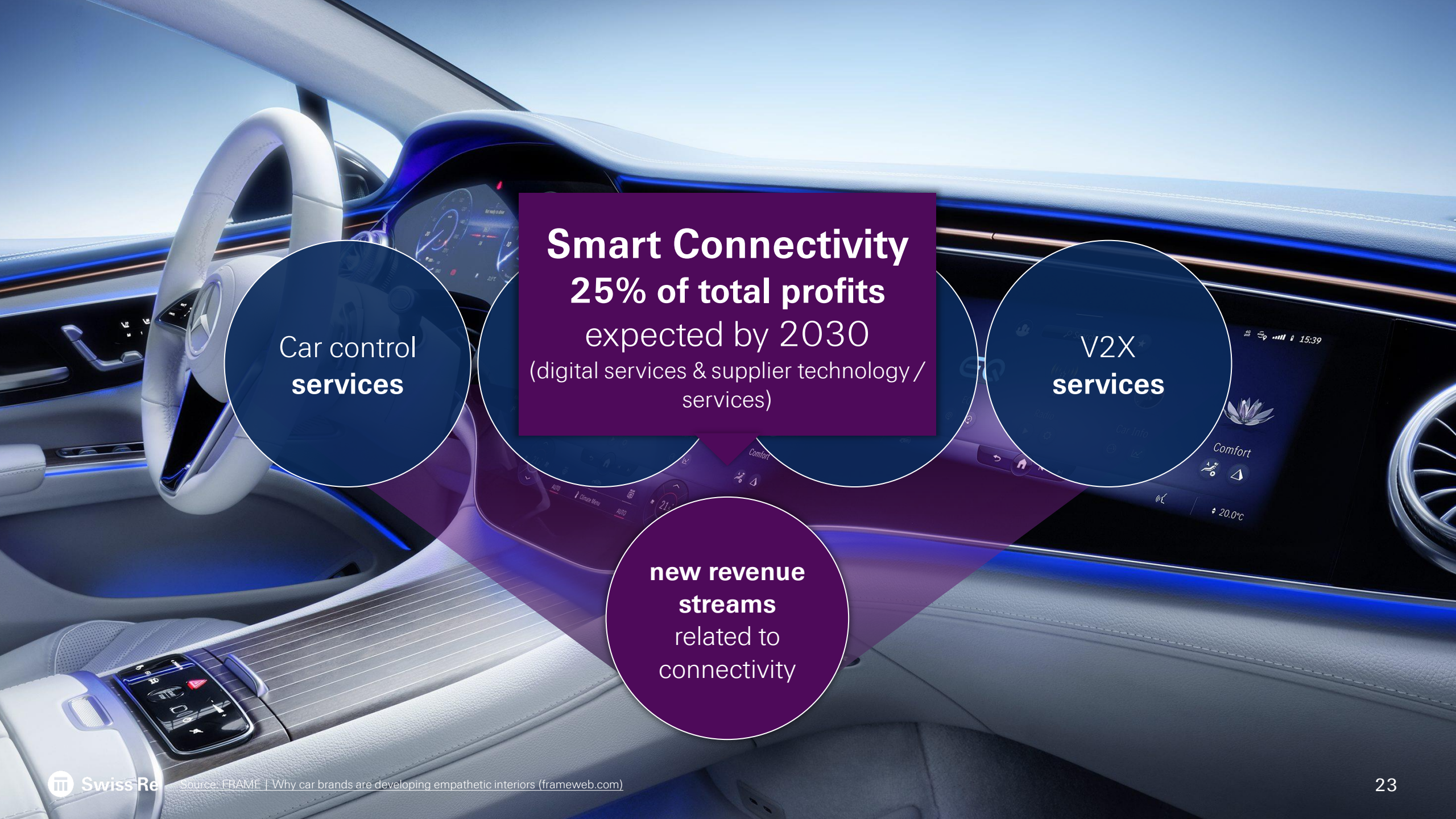
Space Time
Efficiency
Improvement

End-to-End integration becoming the new normal for the automotive industry

Industrial Platformisation

higher productivity
=
staying competitive

Digital TWIN and
“Augmentation” the new realities



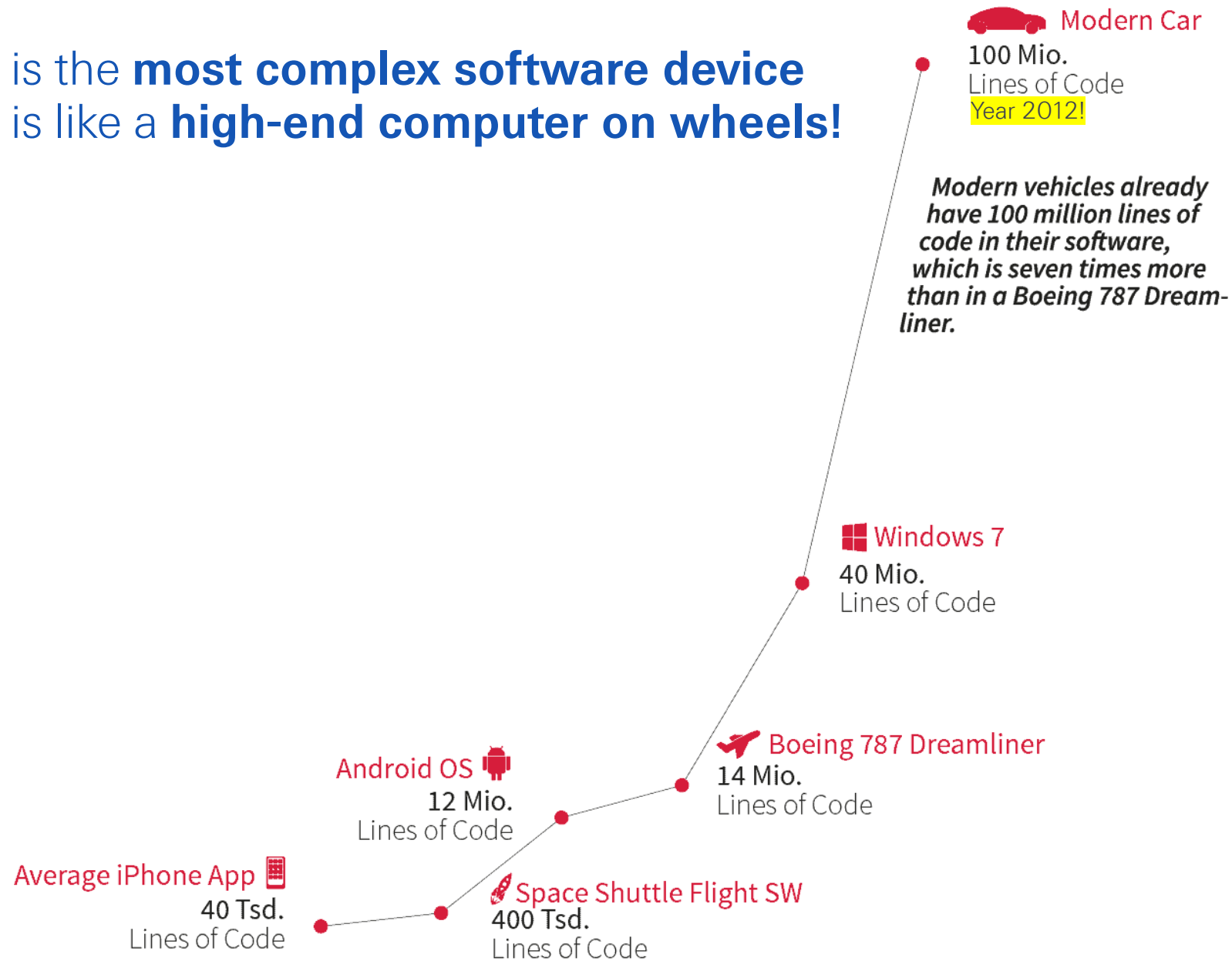
Car control
services

Smart Connectivity
25% of total profits
expected by 2030
(digital services & supplier technology /
services)

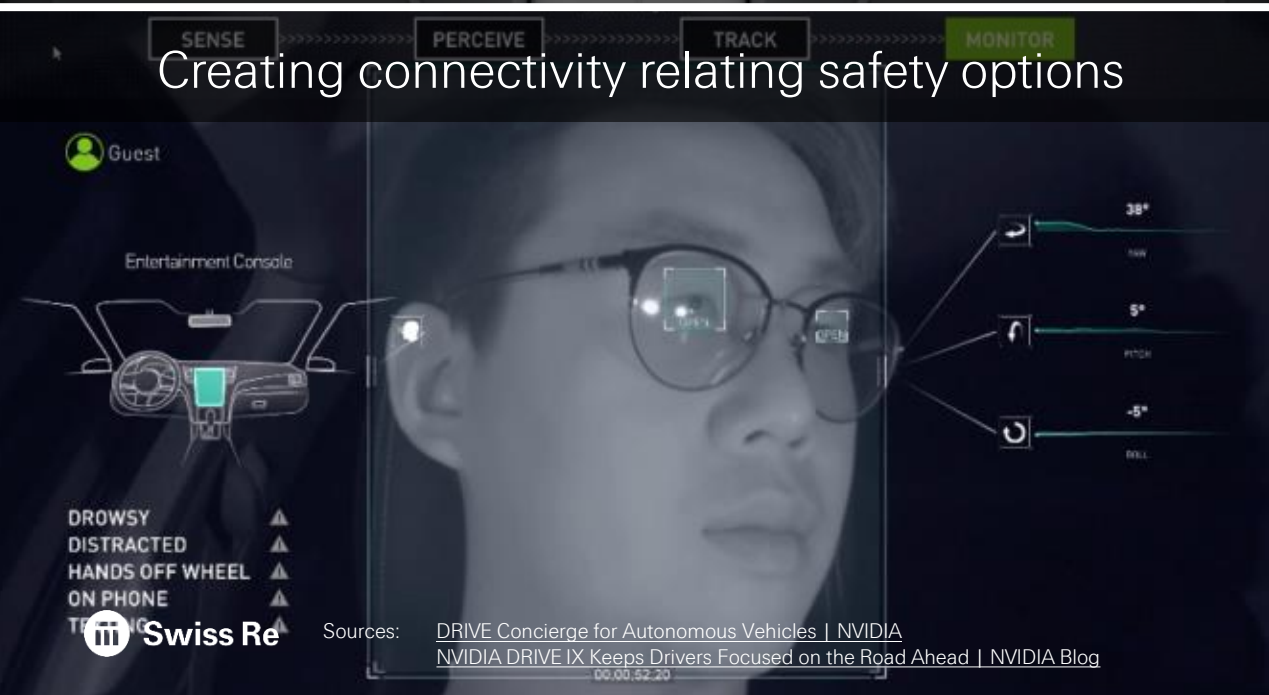
V2X
services

**new revenue
streams**
related to
connectivity

A car is the **most complex software device**
A car is like a **high-end computer on wheels!**



Level 5 autonomous car has around **1'000 Mio** lines of code in 2025





Autonomous
Last-Mile
Delivery

"Store-hailing is orders of magnitude faster and better than delivery"

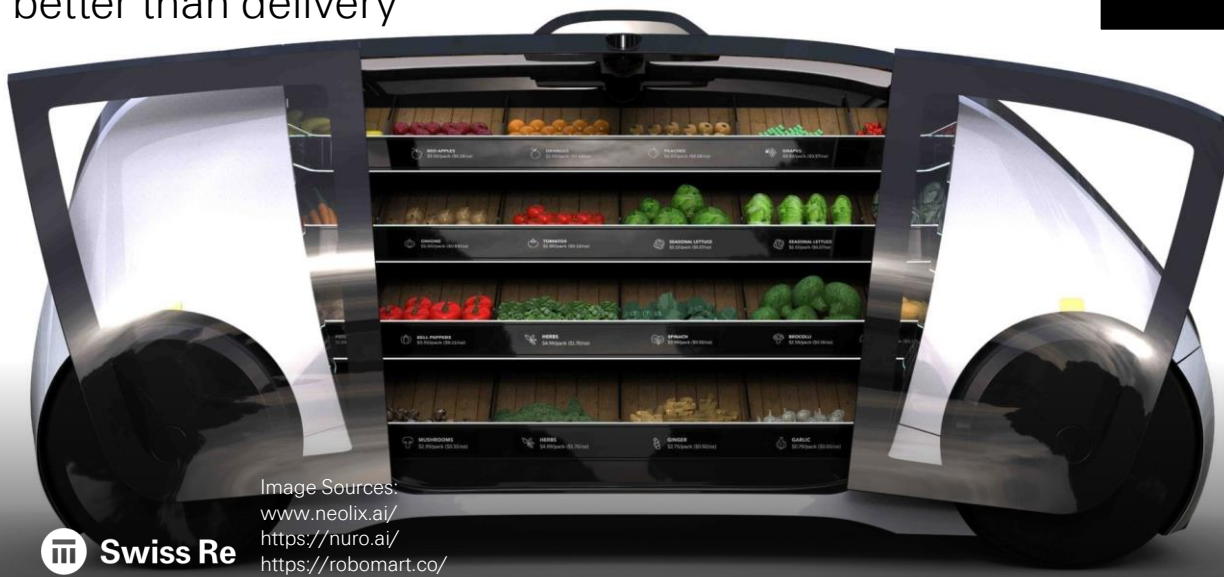
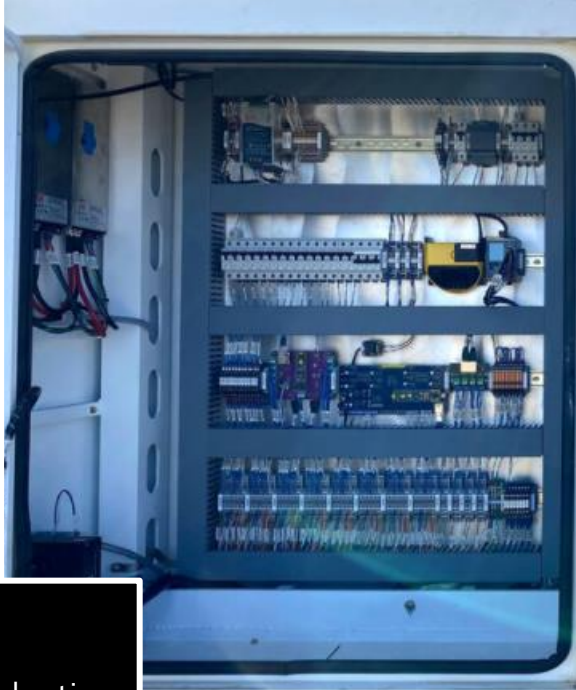
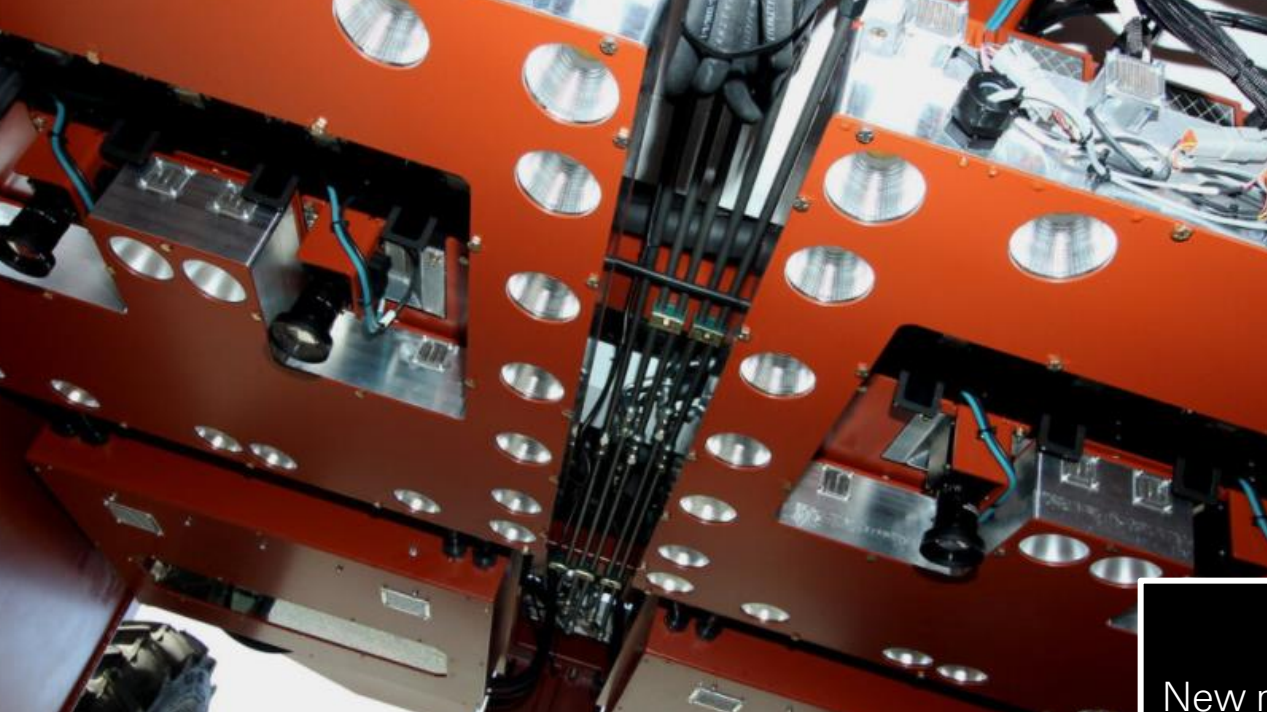


Image Sources:
www.neolix.ai/
<https://nuro.ai/>
<https://robomart.co/>
<https://www.udelv.com/>

AI-powered weed

destroying
startup laser-
blasting
machine saves
time and cuts
pesticide use






New robotics use cases



Source: Taylor Soper (01.09.2021) AI-powered weed destroying startup harvests \$27M round, farmers say laser-blasting machine saves time and cuts pesticide use. GeekWire
<https://www.geekwire.com/2021/carbon-robotics-raises-27m-ai-powered-weed-destroying-machine-used-farmers/>
<https://carbonrobotics.com/autonomous-weeder>



Fifth Season salad kits are packed with super fresh greens **grown in a tech-forward vertical farm.**

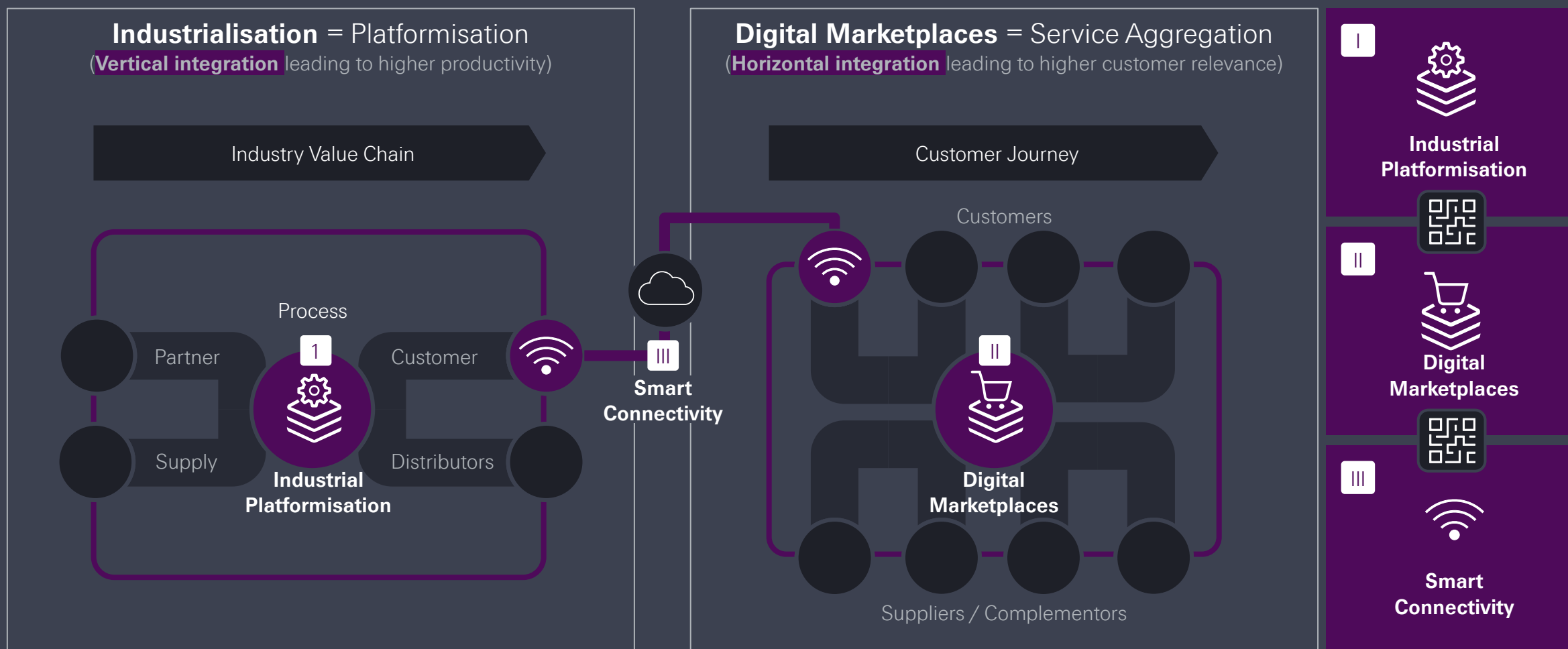


Flying autonomous robotic drones



picking fruits
like nectarines,
plums, pears,
apples, etc.



Summary of key developments: **key transformation themes** to be emerging



So what – what are key drivers **shaping & transforming** various industries

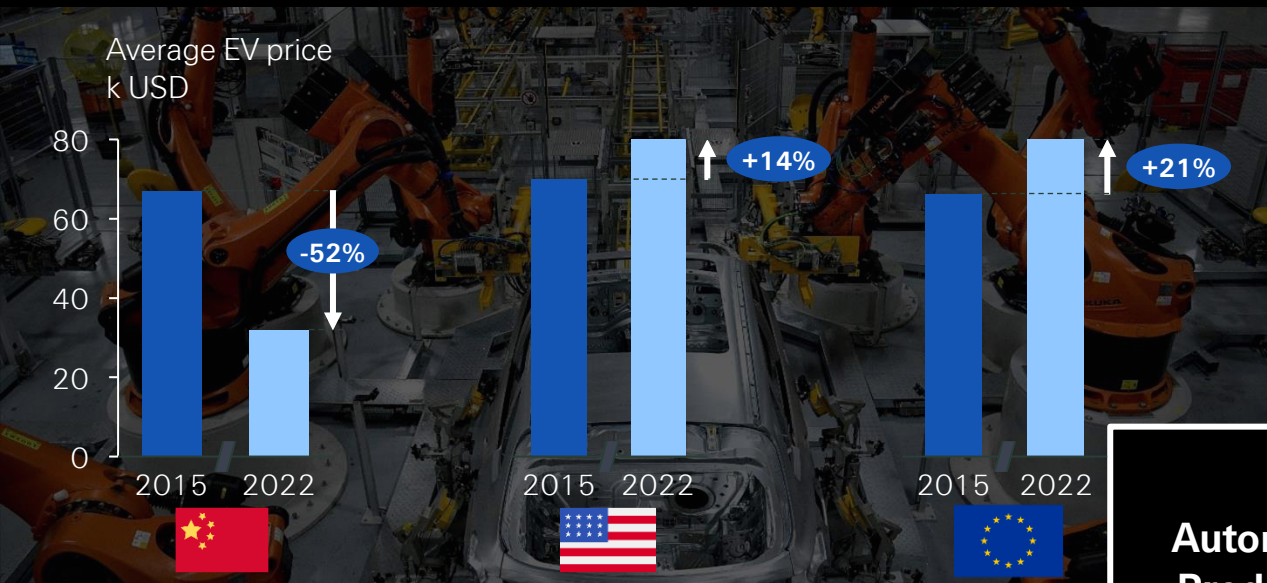
		Raw-Material Players			Industrialisation Players						Data-Savvy Players							
		Mining & Extraction	Cement and non-metallic minerals	Iron, steel and basic metals	Energy Generation	Industrial Manuf. ring /Automation	Automotive	Electricity and Utilities	Agriculture	Construction Equipment	Food production	Financial Services	Transportation	Life Sciences & Healthcare	Electronics	Telecommu- nication	Wholesale and Retail	Tech
	Industry																	
	Key Industry Drives																	
	Platform business	?	?	?														
	Digital Transformation																	

Industrial Platformisation

Digital Marketplaces

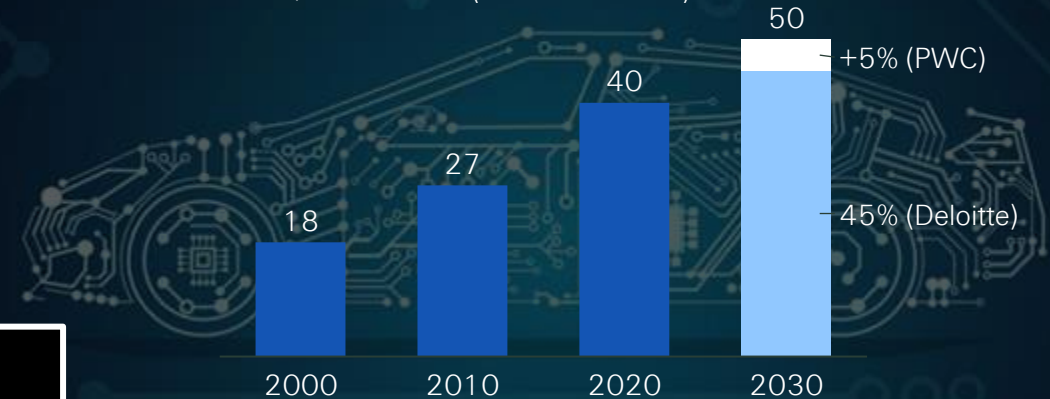
New data-driven business models

Production Costs – Governments & Incentives



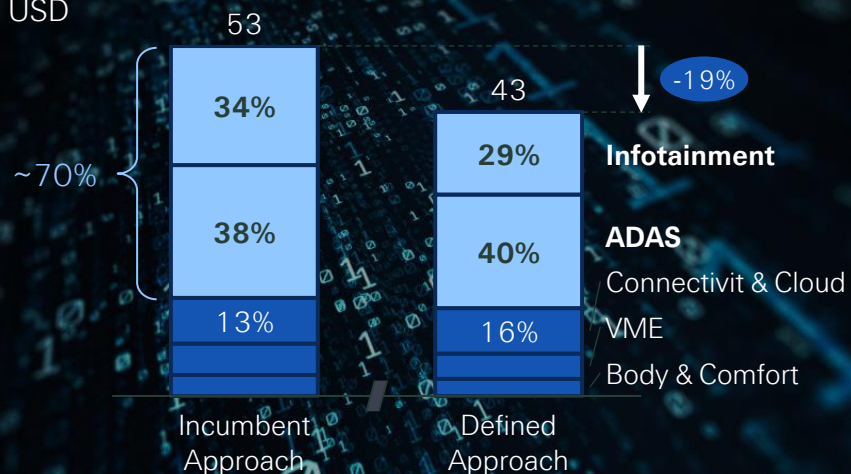
Significant Increasing Electronics Costs

Cost of car's electronics,
% of total costs; >3% CAGR (2020 to 2030)



Key Software Component Costs

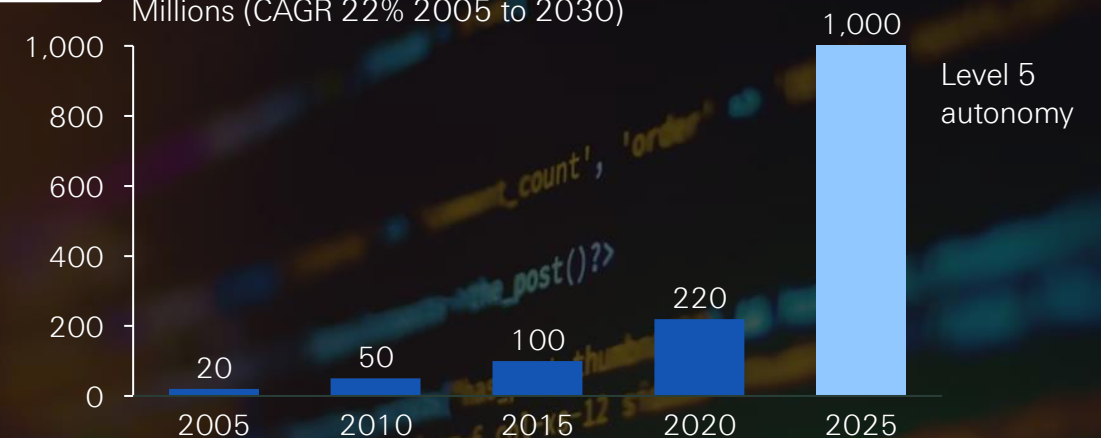
Costs by vehicle domain, 2030
bn USD



Automotive Production Drivers

Exponential Growth in Lines of Code

Lines of Software Code per Model
Millions (CAGR 22% 2005 to 2030)



Source(s): Robotics Outlook BCG (2021), Production costs China, US, Europe Ptolemus (2023), Electronic Costs (Deloitte / PWC), Vision digitalisierte Automobilindustrie 2030 (2021)

Thank you!

Contact

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