# Discover the Value of Digital Twins

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# Today's Agenda

- About Mindset
- Frame of Reference
- What is a Digital Twin?
- Use Cases for Digital Twins
- Architecture of a Digital Twin
- SAP Components of a Digital Twin
- Future of Digital Twins

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### About Us

Mindset is the technology partner of choice for leading global organizations that want to leverage exceptional user experience (UX) on the SAP platform.



# Reimagine the SAP Experience with Mindset

**Experience Design Thinking** Fiori & Beyond **Platform Accelerators** SAP S/4HANA SAP BTP LoB Cloud Industry Integration People **SAP** Functional **SAP** Developers

Scrum & Project Mgmt.

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https://www.ispot.tv/ad/1IHu/progressive-auto-safe-driver-trophy





# How might Snapshot affect my rate?



With Snapshot, we measure a variety of factors related to your driving, including things such as the time of day you drive, sudden changes in speed (hard brakes and rapid accelerations), the amount you drive, and, for customers using the mobile app in some states, how you're using your mobile phone while driving.

Most Snapshot customers earn a discount based on their safe driving. However, riskier driving based on these factors indicate a greater likelihood of being in an accident and may result in a higher rate at renewal — depending on the state you live in and when you signed up for Snapshot.

See our state details page for more information.



"Apple is democratizing healthcare, providing on-demand access to accurate sensors and software that can help consumers develop real healthcare literacy and inform how daily choices impact their health."

> Dr. Leslie A. Saxon Professor of Medicine, Clinical Scholar, Keck School of Medicine, USC

"Products that seek to provide deeper health insights, like the Apple Watch, have the potential to be significant in new clinical care models and shared decision making between people and their healthcare providers."

> Dr. Ivor Benjamin Immediate Past President of the American Heart Association



	High and Low Heart Rate Notifications	Irregular Rhythm Notification	ECG App	Low Cardio Fitness Notifications	Blood Oxygen Level	Fall Detection
Sensors	Optical heart sensor	Optical heart sensor	Electrical heart sensor	Optical heart sensor and location	Optical heart sensor	Accelerometer and gyroscope
Apple Watch Series 3	0	0	٥	0	۲	۵
Apple Watch SE	0	0	0	0	۲	0
Apple Watch Series 4 and 5	ø	۲	0	0	۲	ø
Apple Watch Series 6 or later	ø	ø	ø	٥	۲	ø
Apple Watch Ultra	0	ø	0	0	٢	ø





#### Autopilot explained

Find out how this futuristic feature helps drivers to keep a safe distance

#### Ultrasonic sensors

Resuming cruise control If you are at a standstill for a long time, tapping the accelerator will re-engage autopilot mode and the car will accelerate by itself to your preset speed. A total of 12 long-range ultrasonic sensors are placed around the car and detect objects that are up to five metres (16 feet) away.

> Forward-facing camera The forward-facing camera reads road signs to ensure the Model S is travelling at a legal speed at all times.

Radar

This emits waves that bounce back

build a picture of its surroundings.

off nearby objects, helping the car to

#### Adjusting autopilot

A stalk by the steering wheel enables the driver to manually adjust the distance between the Model S and another car.

#### Electric braking system

The Model S uses the information from the sensors and radar to judge how much space it has between itself and an object in front. When that space reduces, the brakes are automatically applied.



# What is a Digital Twin?



# What is a Digital Twin?

Think of a Digital Twin as a digital instantiation of a real-life object.

- Customers
- Employees
- Products
- Equipment / Assets
- Facilities / Locations





## What is a Digital Twin?

Digital Twins have data associated with them to represent their existence:

- Base properties
- History of usage and interactions
- Related entities (other twins)
- Predicted behavior, performance, etc





## What is a Digital Twin?

Digital Twins can have operations associated with them to provide business value:

- Predicted behavior, performance, etc
- Event-based reactions
- Sales or service recommendations
- Association to groups or like populations



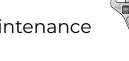


# Use Cases for Digital Twins



## Use Cases for Digital Twins

Predictive maintenance



Performance optimization





Supply chain optimization



Product Design / Prototyping

Employee performance optimization

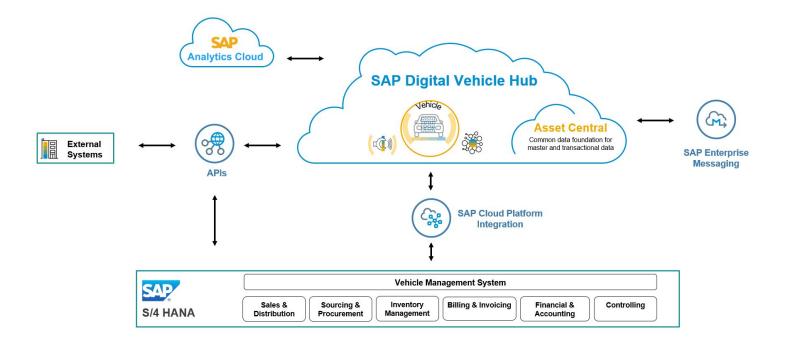


Smart house / city planning



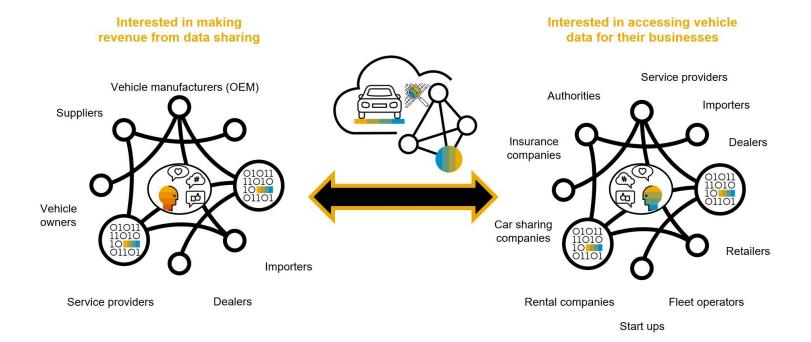


#### Use Case - Digital Vehicle Twin



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## Use Case - Digital Vehicle Twin





# Architecture of a Digital Twin



## Architecture of a Digital Twin



Sensors

Artificial Intelligence / Machine Learning



Datastores (Big Data, NoSQL, SQL, etc)





Data Integration (Streaming, Real-time, Batch)

Pervasive security





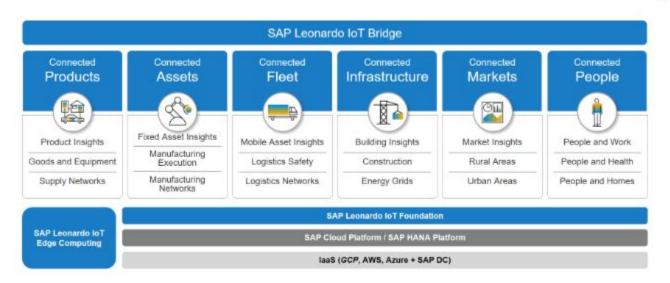
Visualization



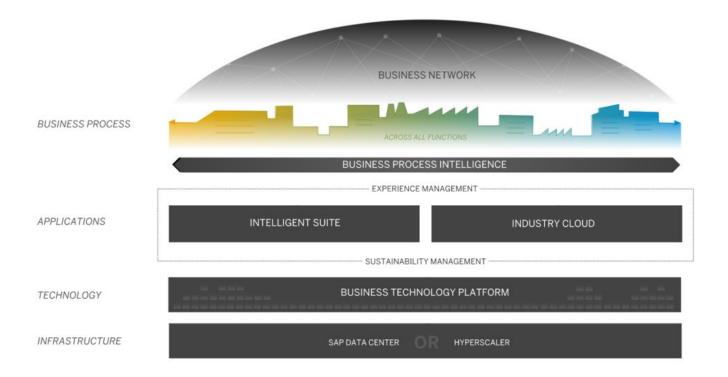






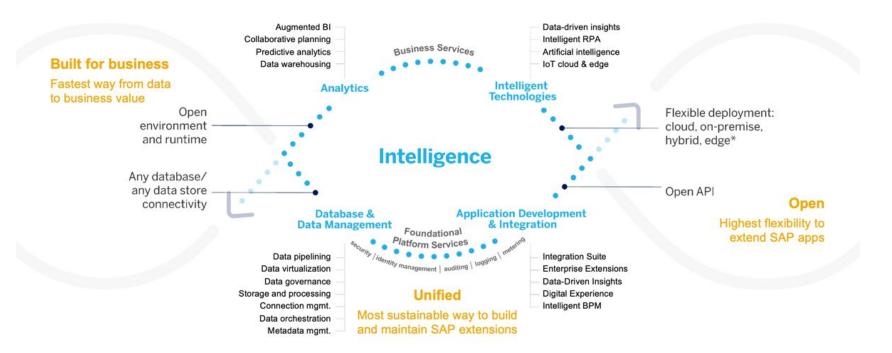




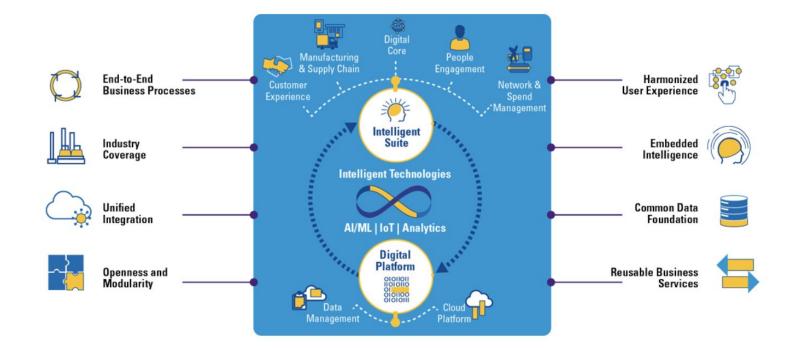














# Future of Digital Twins



## **Future of Digital Twins**

what is the projected adoption of digital twins in the next 5 years

The adoption of digital twins is projected to grow significantly in the next five years. According to a report by MarketsandMarkets, the global digital twin market size is expected to grow from USD 3.1 billion in 2020 to USD 48.2 billion by 2026, at a CAGR of 58.9% during the forecast period.

This growth can be attributed to several factors, including the increasing demand for predictive maintenance and the growing adoption of the Internet of Things (IoT) and advanced analytics. The COVID-19 pandemic has also accelerated the adoption of digital twins, as businesses are looking for ways to optimize their operations and reduce costs.

The manufacturing industry is expected to be one of the largest adopters of digital twins, followed by the healthcare, automotive, and aerospace industries. In addition, the use of digital twins is expected to expand to other industries, such as construction, energy and utilities, and agriculture.

Overall, the adoption of digital twins is expected to continue to grow in the next five years, as more businesses realize the benefits of this technology and as the technology itself becomes more advanced and accessible.





2027

2028 2029 2030

**North America Digital Twin Market** 

size, by solution, 2020 - 2030 (USD Billion)

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GRAND VIEW RESEARCH

35.4%

N. America Market CAGR 2023 - 2030

www.grandviewres

"Digital twins are a game-changer for manufacturing, allowing businesses to optimize their operations and reduce costs."

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- Forbes

"The future is now with digital twins. We are already seeing how they can revolutionize the way we design, build, and operate physical systems, and this is just the beginning." - Stephane Marouani, Senior Vice President, Digital Manufacturing, PTC

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# Thank you!



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