

A Circular Economy Concept for the Tire Industry



SUMITOMO
RUBBER INDUSTRIES

External Changes

- Accelerating Efforts to Achieve Carbon Neutrality in Light of Expanding Impacts of Climate Change
- Labor/Human Rights Issues & Other Societal Problems
- Transformation of Mobility Society with Rise of CASE/MaaS

Our Response

- Promoting ESG Management to Fulfill “Our Purpose” as Defined in “Our Philosophy”

Purpose

The Reason for
Our Existence

Through innovation we will create
a future of joy and well-being for all.

- Long-Term Sustainability Policy
“Driving Our Future Challenge 2050”
Efforts to Create a Circular Economy Business Model

SUSTAINABLE VALUE RING
TOWANOVA

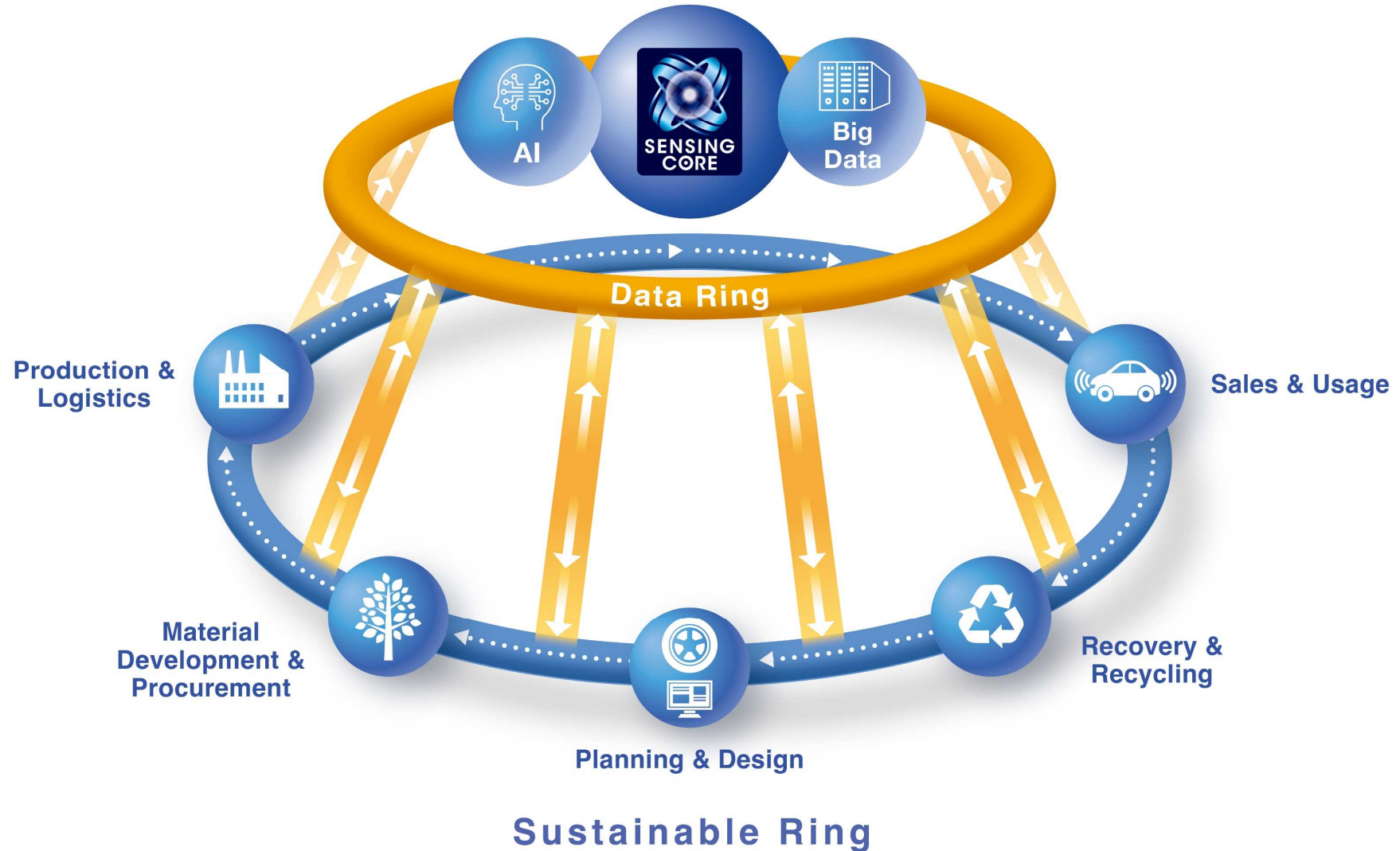
Two Rings to Support a Sustainable Future for Mobility Society

3. TOWANOWA

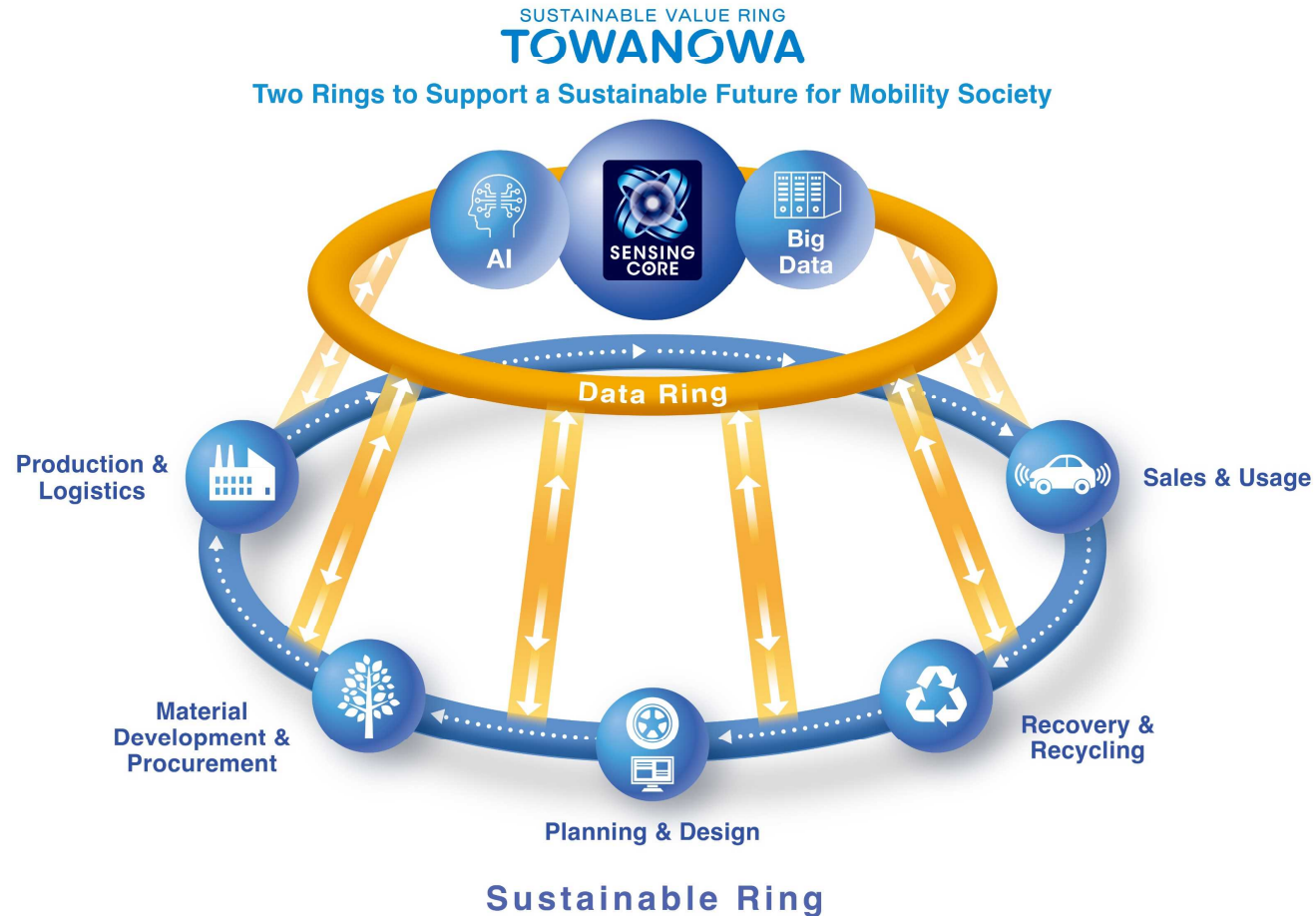
The Circular Economy Concept of the Sumitomo Rubber Group

SUSTAINABLE VALUE RING **TOWANOWA**

Two Rings to Support a Sustainable Future for Mobility Society

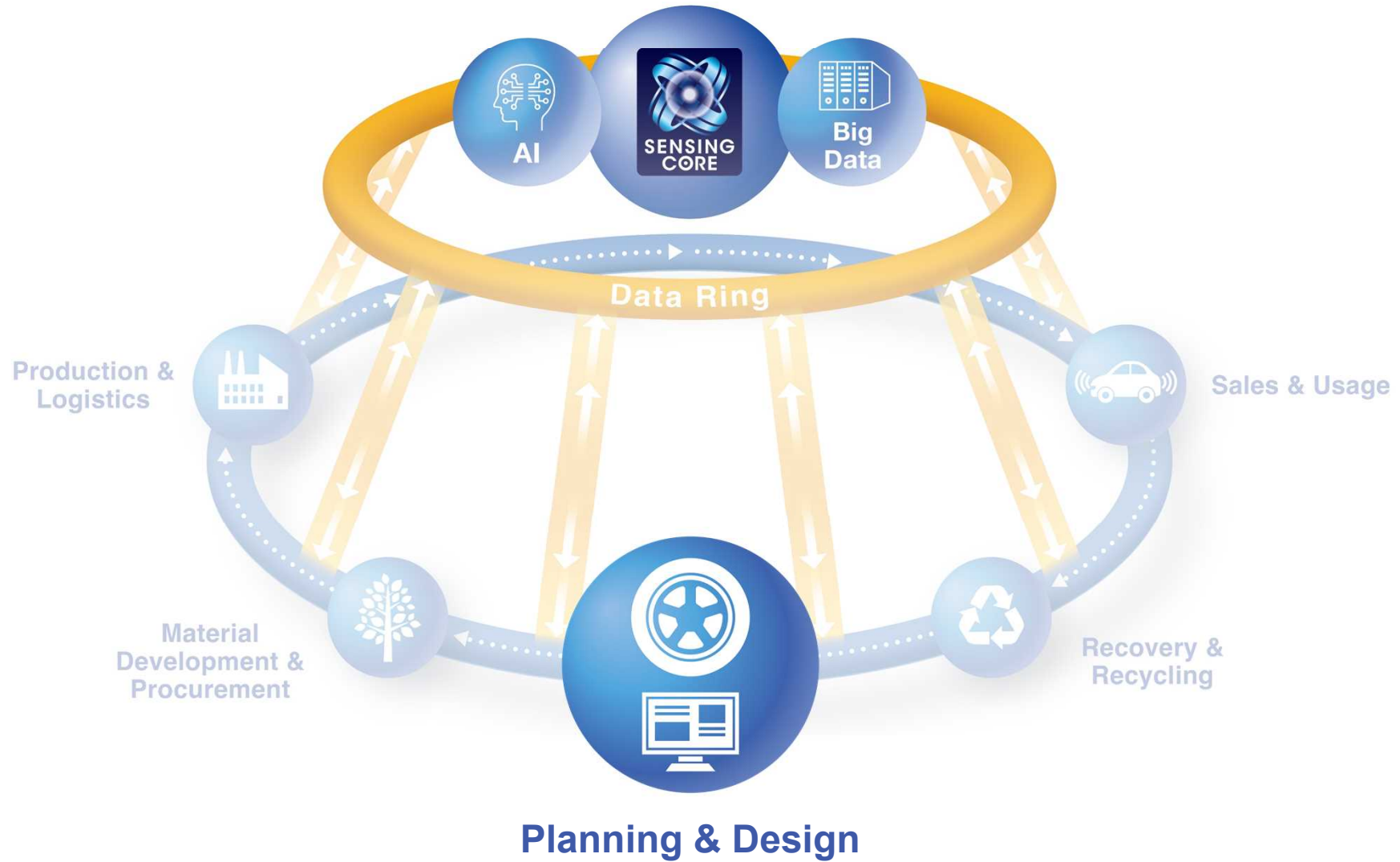


4. TOWANOWA Overview



**Contributing to the Creation of Joy & Well-Being for a Sustainable Society
with an Everlasting (TOWA) Value Ring (WA) in Our Tire Business**

5. Process (Planning & Design)

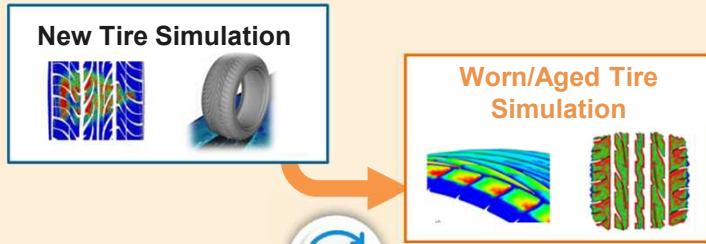


5. Process (Planning & Design)



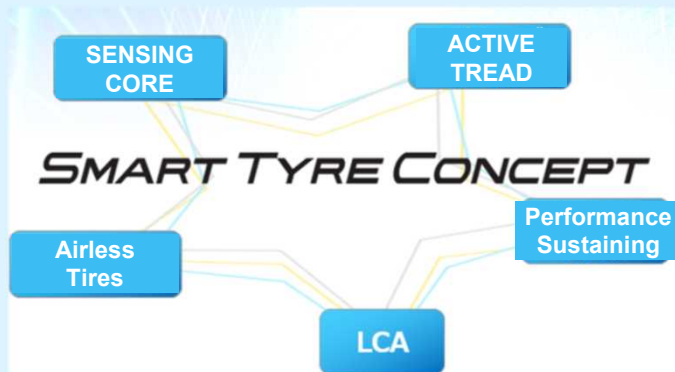
Data Ring

- **Tire Lifetime Simulation**
⇒ Tire Lifetime Performance Design
- **Data Amassed with SENSING CORE**
⇒ Tire Long-Life Design
- **Model-Based Development (MBD) & Design AI**
⇒ Lightweight & Fuel-Efficient Tire Design



Sustainable Ring

- Evolution of SMART TYRE CONCEPT
⇒ Resource Conservation / Longer Lasting Performance / Greater Overall Safety



Value Provided

- ✓ Higher Performance + Efficient Resource Usage
 - Lightweight Tires
 - Greater Fuel Efficiency
 - Longer Tire Life
- ✓ Targets for 2027 (vs. 2019 Levels)
 - 20% Reduction in Tire Weight
 - 30% Reduction in Rolling Resistance
- ⇒ Next-Gen EV Tire to Launch in 2027

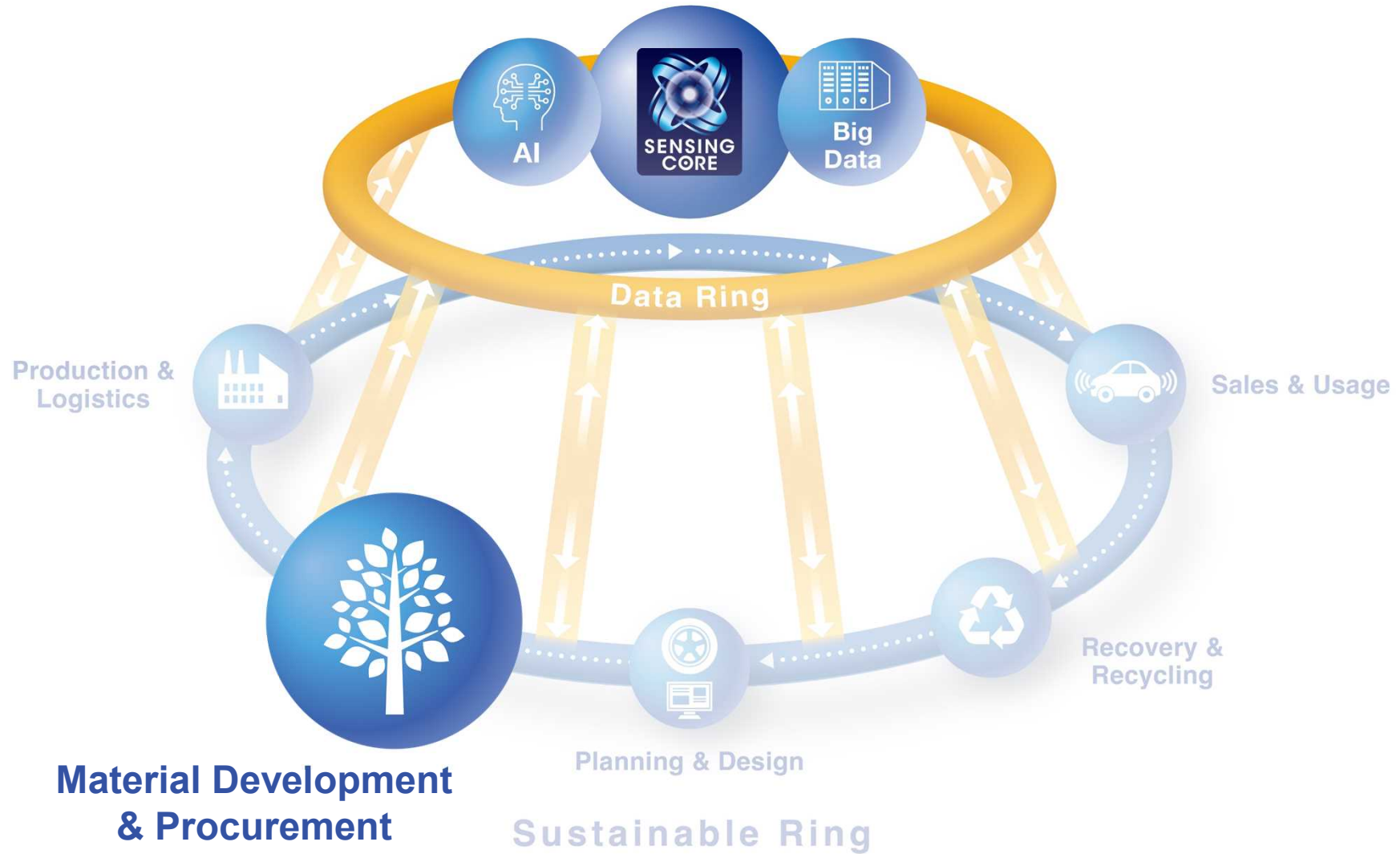


e.SPORT MAXX



e.ZIEX

6. Process (Material Development & Procurement)

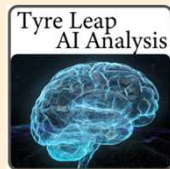


6. Process (Material Development & Procurement)



Data Ring

- **ADVANCED 4D NANO DESIGN**
⇒ High-Performance Material Design
 - **Tyre Leap AI Analysis**
- ⇒ Rubber Performance Decline Prediction
 - **WAVEBASE (Cloud Platform)**
- ⇒ Accelerating Material Development



Sustainable Ring

- Promoting the Proliferation & Advancement of Sustainable Materials
 - Modifying Natural Rubber for Better Performance & Productivity
- (Advanced Sustainable Materials)



Liquid Farnesene Rubber



Cellulose Nanofiber

Value Provided

- ✓ Promoting Resource Circulation While Reducing CO₂ Emissions
 - Utilizing Sustainable Materials
 - Sustainable Natural Rubber Procurement
- ✓ Targets for Sustainable Material Content

• 2030: 40%

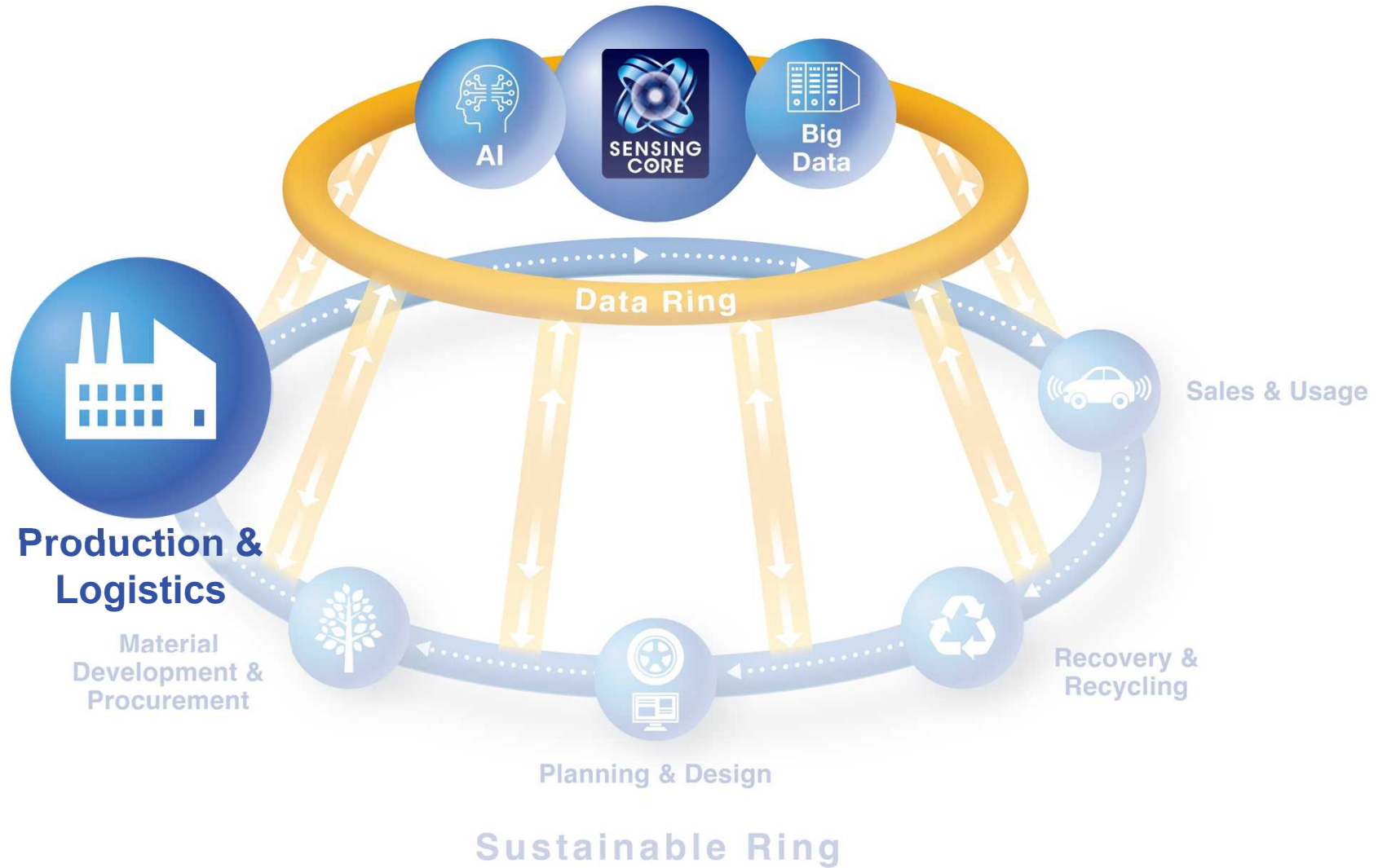
• 2050: 100%

Biomass Materials + Recycled Materials



Realizing Tires Made from 100% Sustainable Materials

7. Process (Production & Logistics)

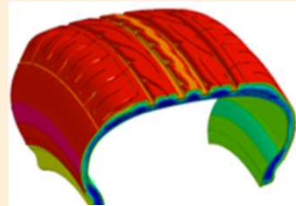


7. Process (Production & Logistics)



Data Ring

- **Tire Manufacturing Simulation**
 - ⇒ Improving Development Stage Quality/Precision
- **AI/IoT Platform**
- ⇒ Predictive Maintenance & Energy Savings
- **Digital Data Infrastructure**
- ⇒ Advanced Supply/Demand Predictions



Curing Simulation



Sustainable Ring

- Improved Tire Quality & Development Efficiency
- Reduced CO₂ Emissions During Tire Production
 - Reduced Tire Production/Supply Loss



Value Provided

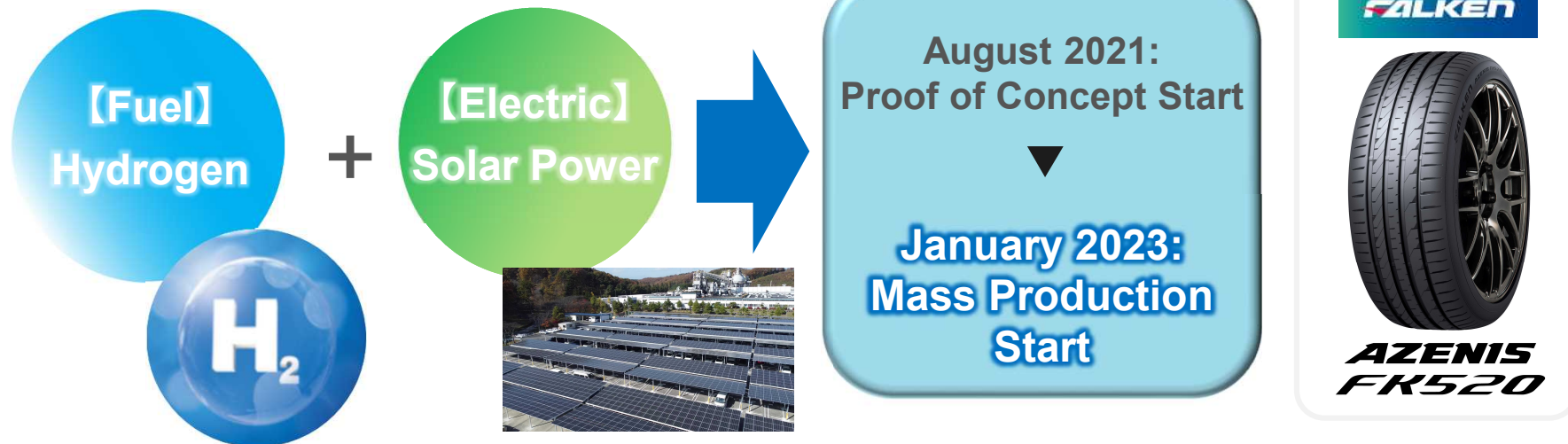
- ✓ Realizing Just-in-Time Supply
- **Efficient Tire Freshness Management**
 - Reining in Inventory Congestion
 - More Efficient Logistics
- ✓ Targets for 2030 (vs. 2021 Levels)
 - **10% Reduction in CO₂ Emissions During Transport**
 - **Domestic Modal Shift Rate: 30%**



Utilizing Hydrogen for Tire Production

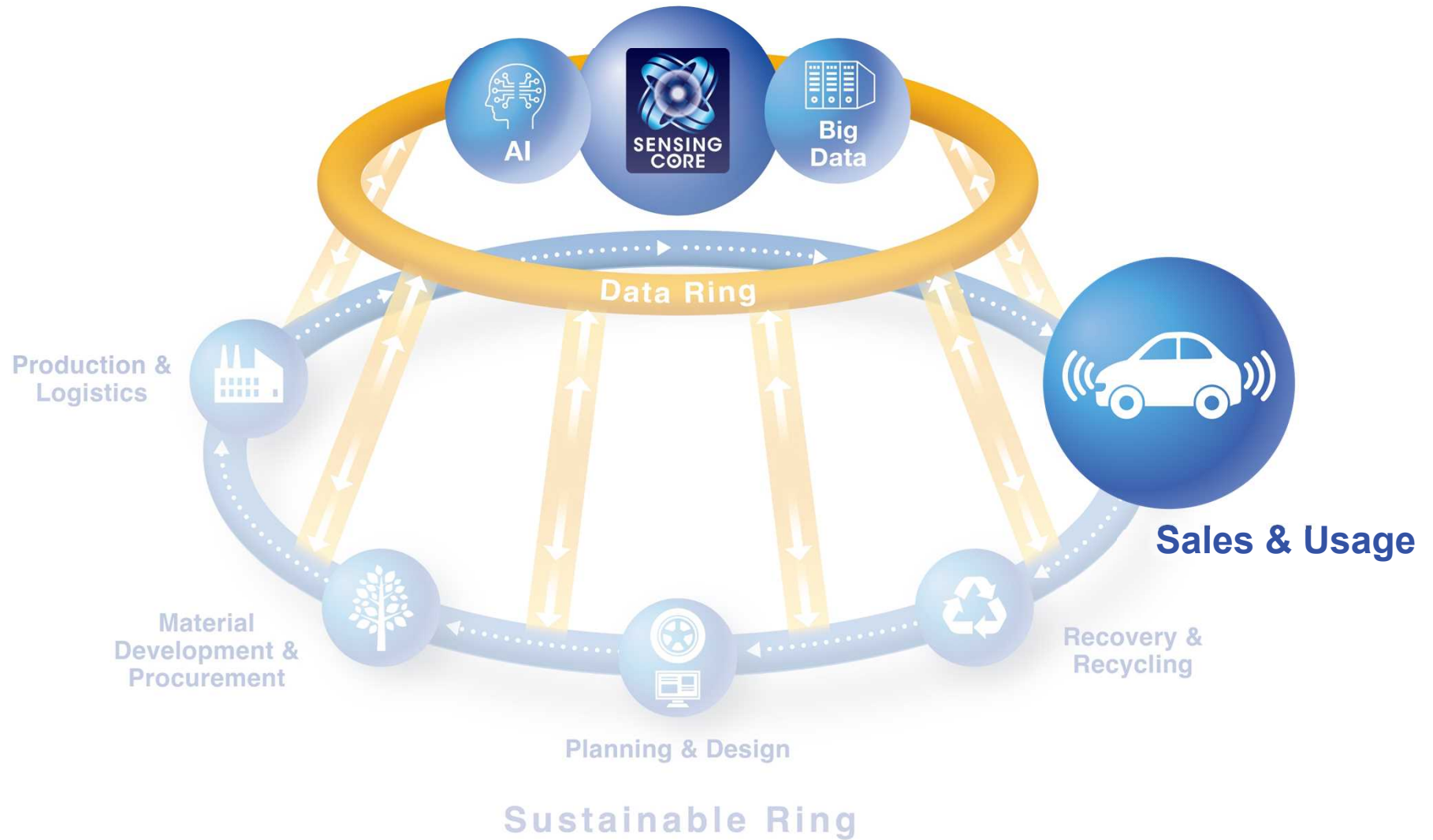
Our Shirakawa Factory has achieved Carbon Neutrality* (Scopes 1 & 2) on its NEO-T01 Production Line thanks to the use of **Natural Energy (Hydrogen Boilers + Solar Power)**.

*Total (Net) Emissions of Carbon Dioxide & Other Greenhouse Gases (GHG) = Zero
(After Subtracting GHG Absorbed Through Tree Planting & Forest Management Activities, etc. from GHG Emissions)



We are now examining the possibilities for expanding this technology from Shirakawa Factory (Fukushima Prefecture) to our factories around the world toward achieving full Carbon Neutrality by the year 2050.

8. Process (Sales & Usage)



8. Process (Sales & Usage)



Data Ring

- SENSING CORE
 - Tire Pressure Monitoring System (TPMS)
 - Radio Frequency ID Tags (RFID)
- ⇒ Building a Business Model to Take Full Advantage of Data



TPMS (Tire Pressure Monitoring System) RFID (Radio Frequency ID)



Sustainable Ring

- Maintenance Service Solutions
 - Robust Lineup of Tires to Meet Diverse Needs
 - Tires Featuring Advanced Safety Technology
- ⇒ Tires Featuring ACTIVE TREAD Technology



Changing Properties Depending on Moisture & Temperature

Value Provided

- ✓ Optimal Tire Management Service
 - Tire Pressure Management
 - Detecting Signs of Wheel Detachment
 - Detecting Tire Wear Progression



Optimal Tires for Customers

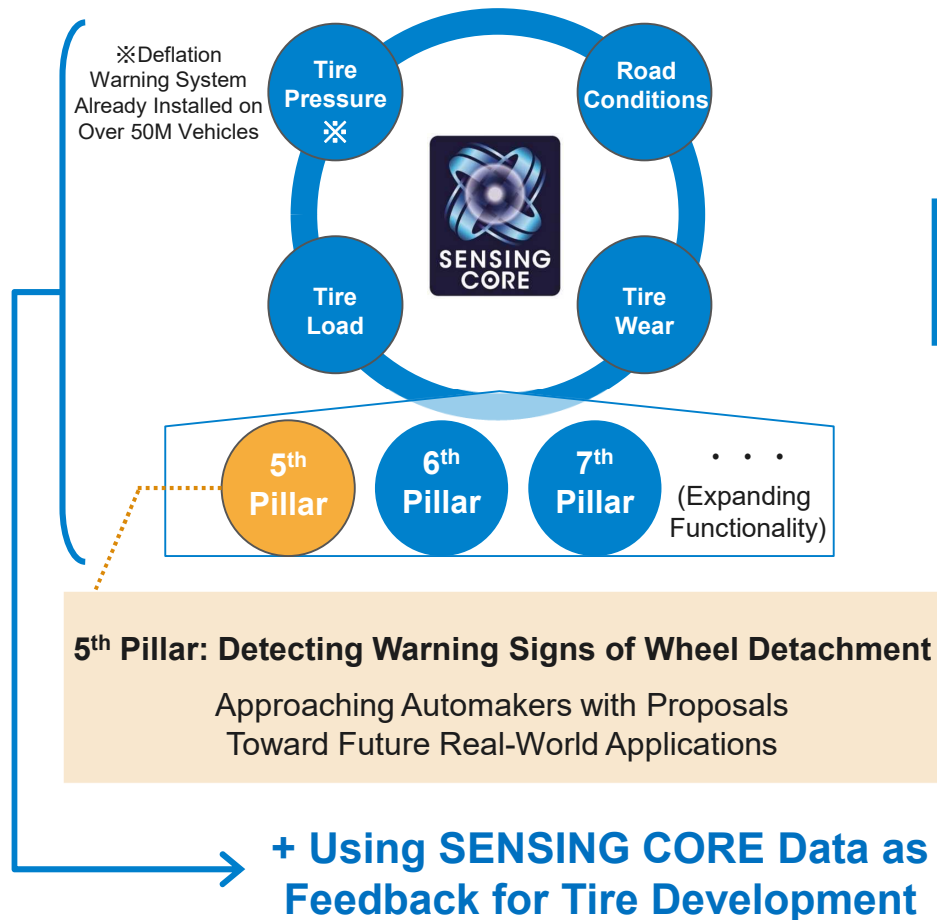
- Fuel/Energy Efficiency
- Longer Tire Life
- Greater Safety



Next-Gen Tire Featuring ACTIVE TREAD Technology (2024 Launch)

8-1. SENSING CORE

SENSING CORE Functionality



Value Provided by SENSING CORE

Detecting Road Conditions & Signs of Wheel Detachment to **Prevent Accidents & Breakdowns**

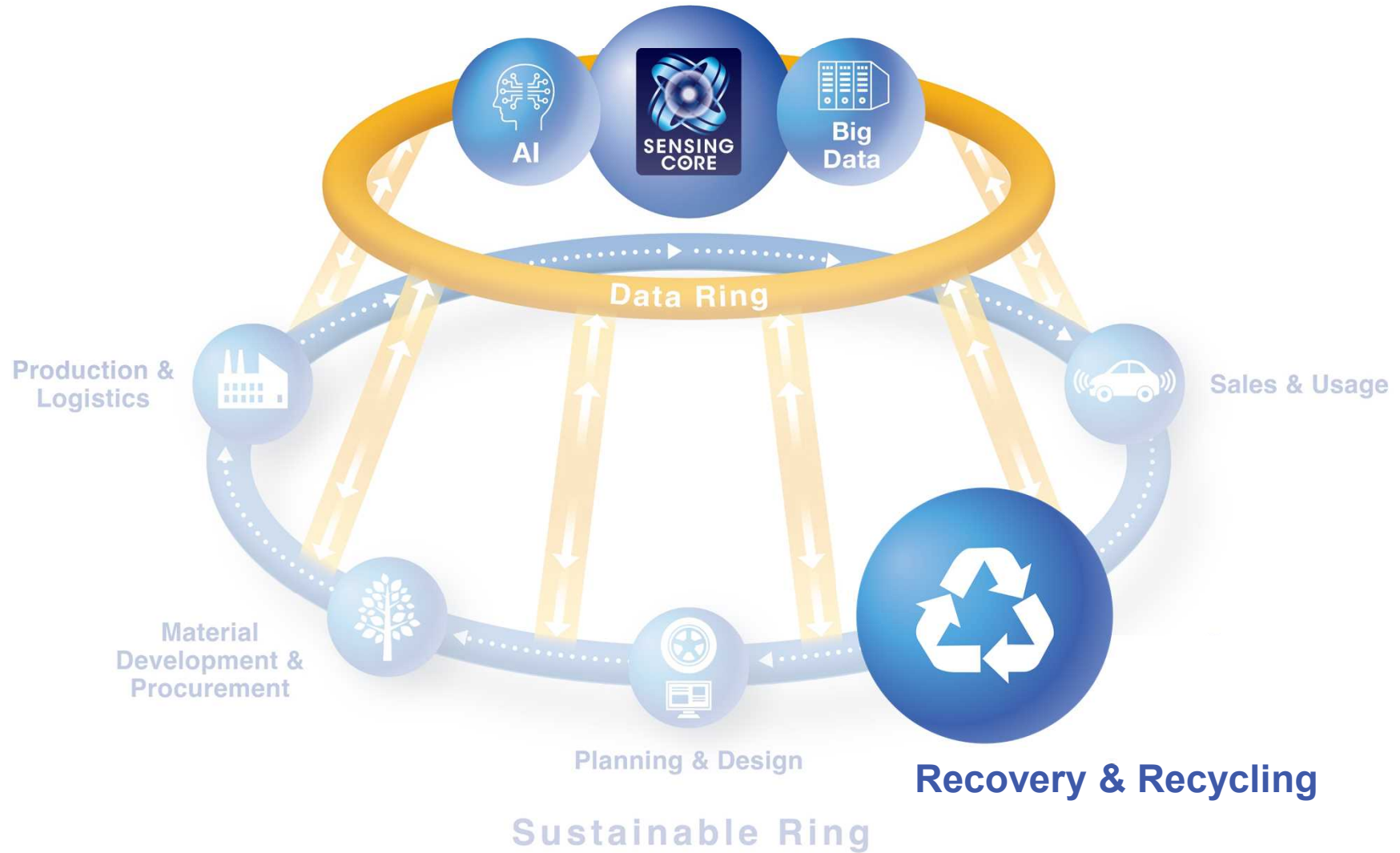
Tire Sensing to **Supplement or Replace** Hardware-Based Vehicle Onboard Sensors

Tire Sensing for **Improved Drive Torque Control with 4WD Vehicles**

Real-Time Understanding of Tire Conditions for Improved **Total Fleet Management**

We hope to see vehicles equipped with the first five SENSING CORE Functions on the roads of Japan, China, Europe and/or North America by the year 2030.

9. Process (Recovery & Recycling)



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Data Ring

- SENSING CORE
 - Tire Pressure Monitoring System (TPMS)
 - Radio Frequency ID Tags (RFID)
- ⇒ Understanding the Usage Status of Tires & Managing Material Information



TPMS
(Tire Pressure Monitoring System)



RFID
(Radio Frequency ID)



Sustainable Ring

- Recovering Quality Base Tires for Retreading
⇒ Reusing Same Base Tires Multiple Times
- Promoting Recovery of End-of-Life Tires
⇒ Recycling for Use as Sustainable Materials



ELT
(End-of-Life Tires)



Recycled
Carbon Black



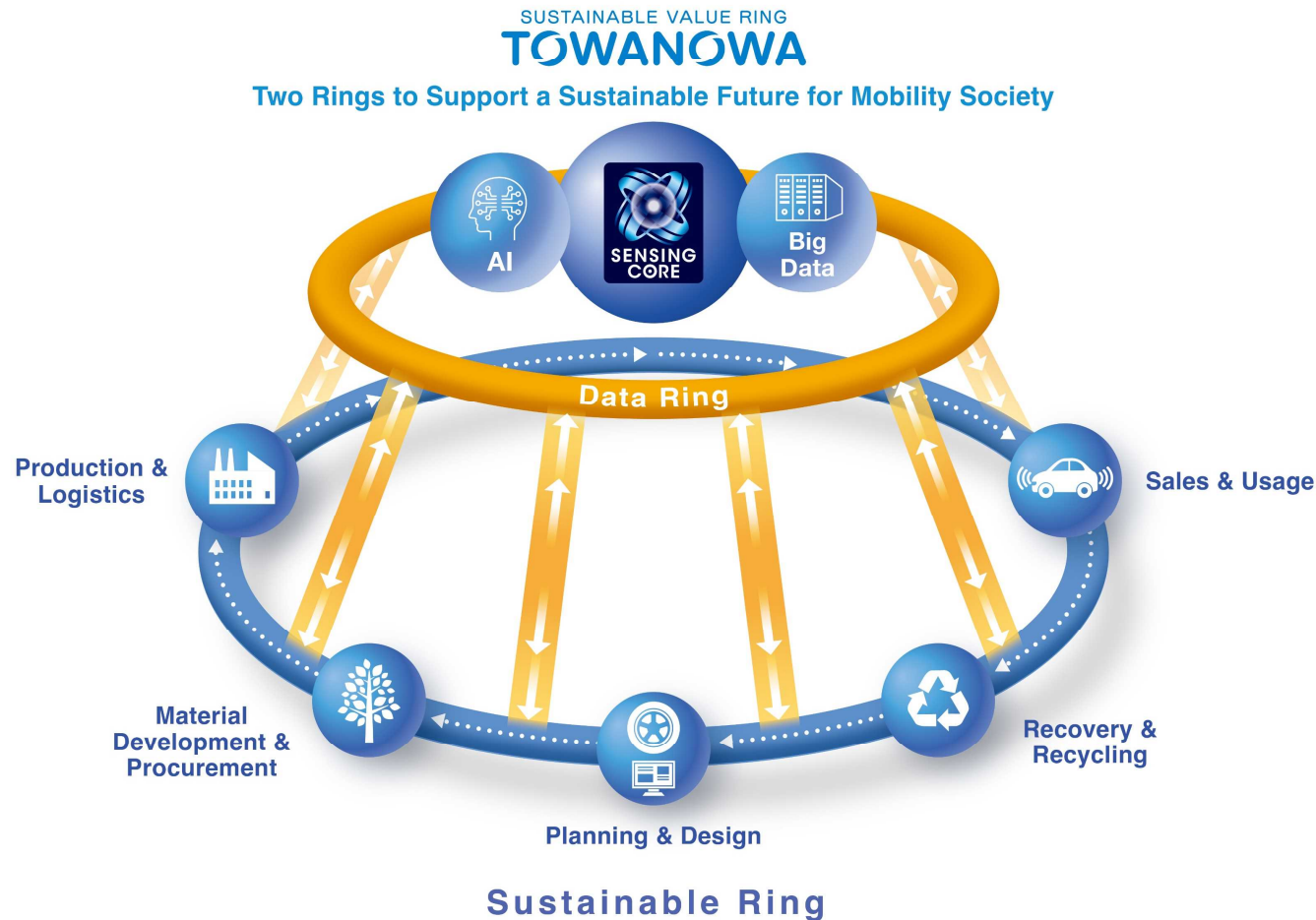
Recycled Oil

Value Provided

- ✓ Retreading Light Truck Tires
 - Contributing to Last One Mile
 - Resource Conservation & Cost Reduction
- ✓ Putting ELT (End-of-Life Tires) to Use
 - Usage as Recycled Tire Materials
 - Step Toward Realizing Circular Economy

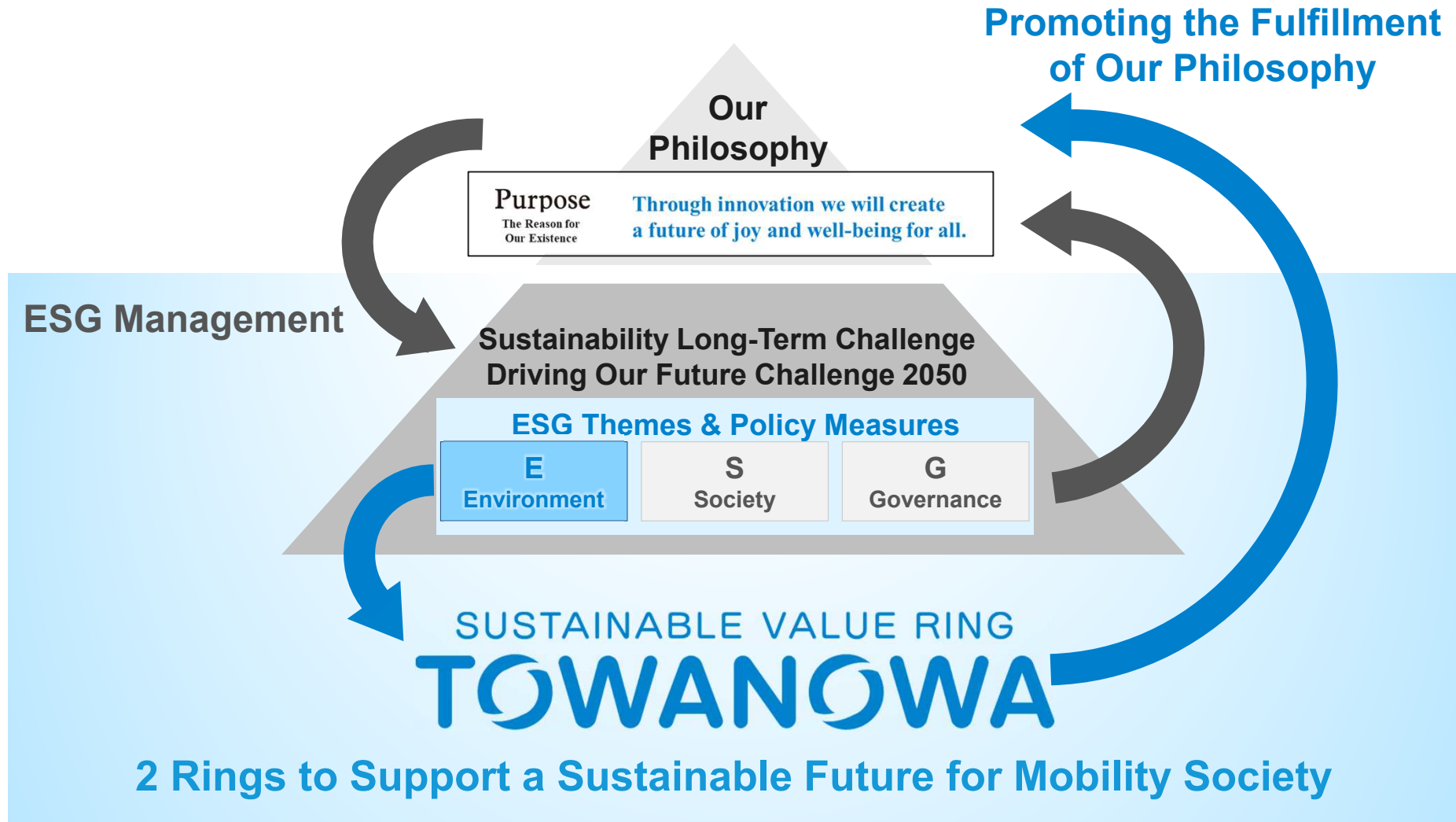


10. TOWANOWA Overview



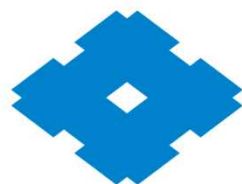
With TOWANOWA, we aim to create a Circular Economy for the future so that we may continually provide our customers with value through our tires.

11. Role of TOWANOWA



We will promote the fulfillment of Our Philosophy by putting TOWANOWA into practice as the E (Environment) in our ESG.

Rubber and Beyond, Driving Our Future



SUMITOMO
RUBBER INDUSTRIES