ELEVATE
Geoprofessional Value

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FALL CONFERENCE
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GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Currents and Characteristics of the Emerging Future

Kevin Benedict

Partner, Futurist

Tata Consultancy Services

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Building on belief

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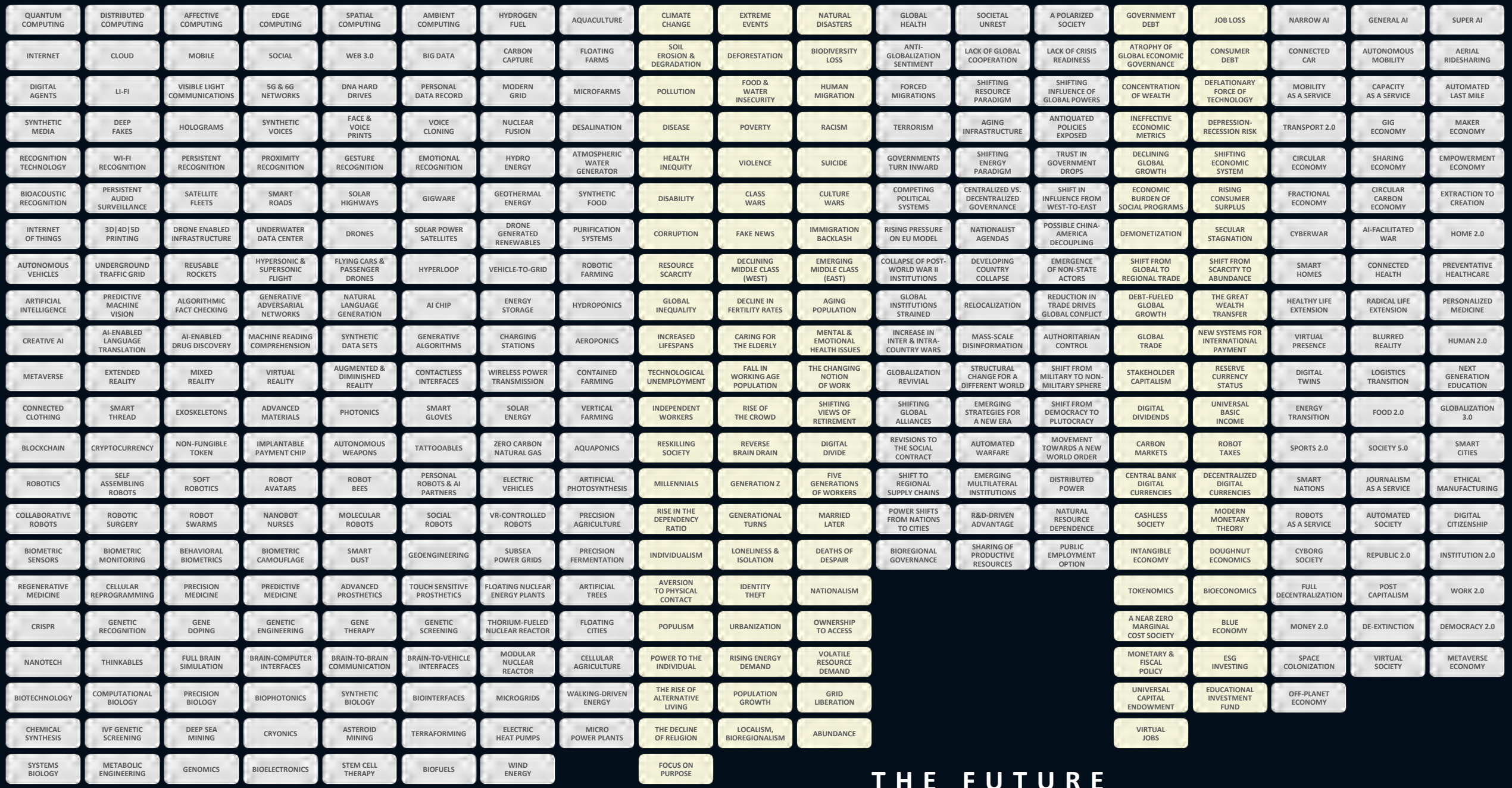
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	DISTRIBUTED COMPUTING		EDGE COMPUTING	SPATIAL COMPUTING				CLIMATE CHANGE	EXTREME EVENTS	NATURAL DISASTERS	GLOBAL HEALTH	SOCIETAL UNREST		GOVERNMENT DEBT	JOB LOSS	NARROW AI	GENERAL AI	SUPER AI
INTERNET	CLOUD	MOBILE	SOCIAL	WEB 3.0	BIG DATA								LACK OF CRISIS READINESS		CONSUMER DEBT		AUTONOMOUS MOBILITY	
DIGITAL AGENTS			5G & 6G NETWORKS			MODERN GRID		POLLUTION			FORCED MIGRATIONS	SHIFTING RESOURCE PARADIGM				MOBILITY AS A SERVICE	CAPACITY AS A SERVICE	
												AGING INFRASTRUCTURE			DEPRESSION-RECESSION RISK	TRANSPORT 2.0	GIG ECONOMY	MAKER ECONOMY
RECOGNITION TECHNOLOGY			PROXIMITY RECOGNITION	GESTURE RECOGNITION					VIOLENCE			SHIFTING ENERGY PARADIGM		DECLINING GLOBAL GROWTH		CIRCULAR ECONOMY	SHARING ECONOMY	
	PERSISTENT AUDIO SURVEILLANCE									CULTURE WARS				ECONOMIC BURDEN OF SOCIAL PROGRAMS		FRACTIONAL ECONOMY	CIRCULAR CARBON ECONOMY	EXTRACTION TO CREATION
INTERNET OF THINGS	3D|4D|5D PRINTING	DRONE ENABLED INFRASTRUCTURE		DRONES				CORRUPTION	FAKE NEWS	IMMIGRATION BACKLASH		POSSIBLE CHINA-AMERICA DECOUPLING						HOME 2.0
AUTONOMOUS VEHICLES	UNDERGROUND TRAFFIC GRID			FLYING CARS & PASSENGER DRONES	HYPERLOOP			RESOURCE SCARCITY				DEVELOPING COUNTRY COLLAPSE		SHIFT FROM GLOBAL TO REGIONAL TRADE	SHIFT FROM SCARCITY TO ABUNDANCE	SMART HOMES		
ARTIFICIAL INTELLIGENCE	PREDICTIVE MACHINE VISION	ALGORITHMIC FACT CHECKING		NATURAL LANGUAGE GENERATION	AI CHIP	ENERGY STORAGE			DECLINE IN FERTILITY RATES	AGING POPULATION		RELOCALIZATION	REDUCTION IN TRADE DRIVES GLOBAL CONFLICT	DEBT-FUELED GLOBAL GROWTH		HEALTHY LIFE EXTENSION	RADICAL LIFE EXTENSION	
CREATIVE AI	AI-ENABLED LANGUAGE TRANSLATION				GENERATIVE ALGORITHMS	CHARGING STATIONS		INCREASED LIFESPANS			INCREASE IN INTER & INTRA-COUNTRY WARS			GLOBAL TRADE			BLURRED REALITY	HUMAN 2.0
	EXTENDED REALITY	MIXED REALITY	VIRTUAL REALITY	AUGMENTED & DIMINISHED REALITY				TECHNOLOGICAL UNEMPLOYMENT	FALL IN WORKING AGE POPULATION	THE CHANGING NOTION OF WORK						DIGITAL TWINS	LOGISTICS TRANSITION	
CONNECTED CLOTHING		EXOSKELETONS	ADVANCED MATERIALS			SOLAR ENERGY	VERTICAL FARMING			SHIFTING VIEWS OF RETIREMENT					UNIVERSAL BASIC INCOME	ENERGY TRANSITION		
BLOCKCHAIN								RESKILLING SOCIETY		DIGITAL DIVIDE							SOCIETY 5.0	SMART CITIES
ROBOTICS					PERSONAL ROBOTS & AI PARTNERS	ELECTRIC VEHICLES		MILLENNIALS	GENERATION Z	FIVE GENERATIONS OF WORKERS	SHIFT TO REGIONAL SUPPLY CHAINS					SMART NATIONS		
										MARRIED LATER	POWER SHIFTS FROM NATIONS TO CITIES	R&D-DRIVEN ADVANTAGE	NATURAL RESOURCE DEPENDENCE				AUTOMATED SOCIETY	
					GEOENGINEERING													
								AVERSION TO PHYSICAL CONTACT						TOKENOMICS				WORK 2.0
							FLOATING CITIES		URBANIZATION	OWNERSHIP TO ACCESS								
			BRAIN-COMPUTER INTERFACES	BRAIN-TO-BRAIN COMMUNICATION	BRAIN-TO-VEHICLE INTERFACES				RISING ENERGY DEMAND						ESG INVESTING			
						MICROGRIDS		THE RISE OF ALTERNATIVE LIVING	POPULATION GROWTH	GRID LIBERATION								
							MICRO POWER PLANTS							VIRTUAL JOBS				
								FOCUS ON PURPOSE										

CONSTRUCTION

SCIENCE AND TECHNOLOGY | SOCIETAL | GEOPOLITICAL | ECONOMIC | SCENARIOS

DRONES

DIGITAL TWINS

BIG DATA

INTERNET OF THINGS

MIXED REALITY

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NEXT GENERATION EDUCATION

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AUTOMATED SOCIETY

CLIMATE CHANGE

AUTONOMOUS MOBILITY

CIRCULAR ECONOMY

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DRONES | DIGITAL TWINS

BIG DATA

INTERNET OF THINGS | MIXED REALITY

PERSONAL ROBOTS & AI PARTNERS | DIGITAL AGENTS

ARTIFICIAL INTELLIGENCE

CREATIVE AI | PREDICITVE MACHINE VISION

NEXT GENERATION EDUCATION | RADICAL LIFE EXTENSION

RESKILLING SOCIETY

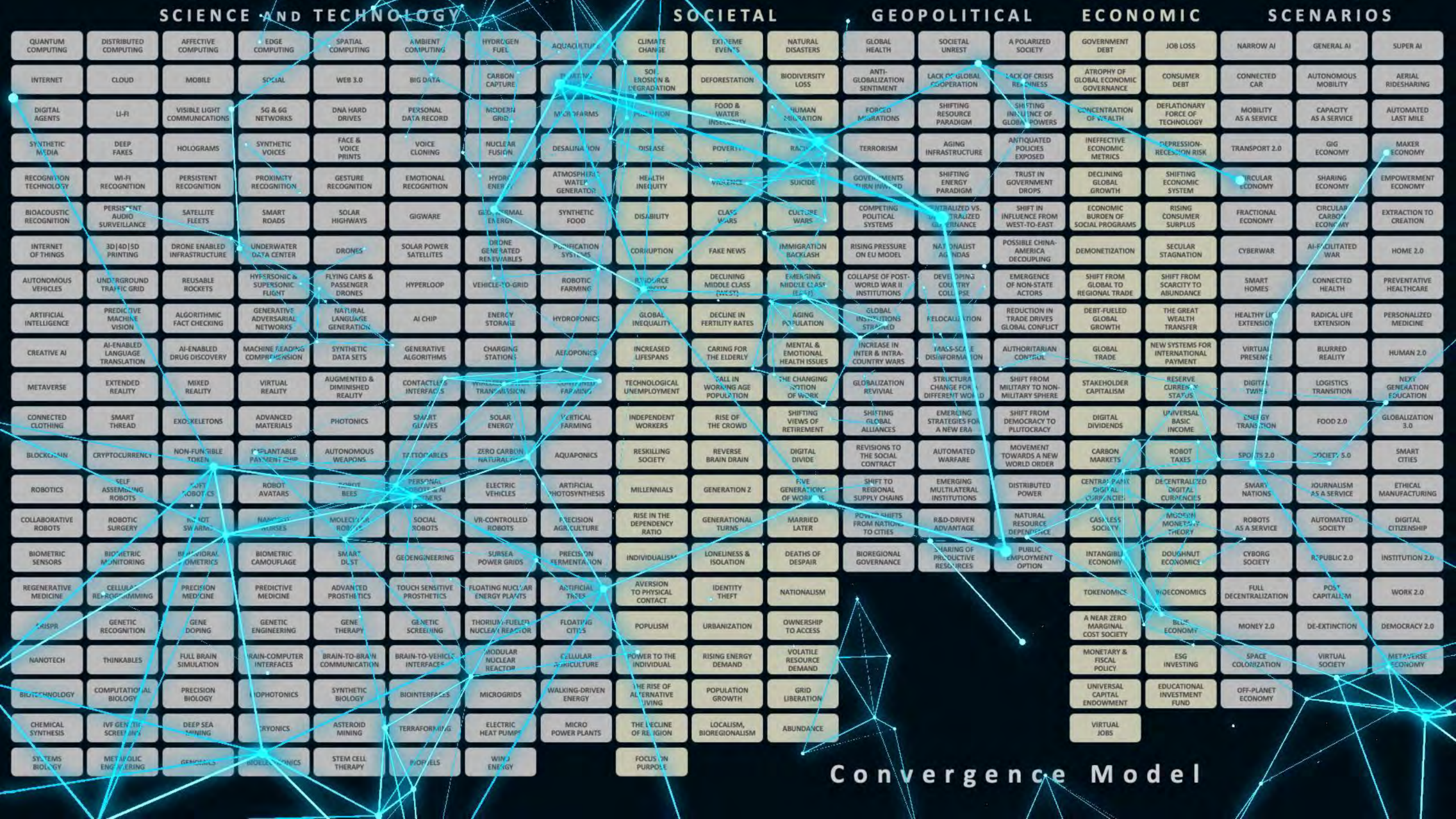
WORK 2.0 | TECHNOLOGICAL UNEMPLOYMENT

AUTOMATED SOCIETY | CLIMATE CHANGE

SMART CITIES

AUTONOMOUS SOCIETY | CIRCULAR ECONOMY

CONSTRUCTION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FLOATING NUCLEAR ENERGY PLANTS
ARTIFICIAL TREES
AVERSION TO PHYSICAL CONTACT
IDENTITY THEFT
NATIONALISM
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DEMOCRACY 2.0
NANOTECH
THINKABLES
FULL BRAIN SIMULATION
BRAIN-COMPUTER INTERFACES
BRAIN-TO-BRAIN COMMUNICATION
BRAIN-TO-VEHICLE INTERFACES
MODULAR NUCLEAR REACTOR
CELLULAR AGRICULTURE
POWER TO THE INDIVIDUAL
RISING ENERGY DEMAND
VOLATILE RESOURCE DEMAND
MONETARY & FISCAL POLICY
ESG INVESTING
SPACE COLONIZATION
VIRTUAL SOCIETY
METAVERSE ECONOMY
BIOTECHNOLOGY
COMPUTATIONAL BIOLOGY
PRECISION BIOLOGY
BIOPHOTONICS
SYNTHETIC BIOLOGY
BIOINTERFACES
MICROGRIDS
WALKING-DRIVEN ENERGY
THE RISE OF ALTERNATIVE LIVING
POPULATION GROWTH
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UNIVERSAL CAPITAL ENDOWMENT
EDUCATIONAL INVESTMENT FUND
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CHEMICAL SYNTHESIS
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CRYONICS
ASTEROID MINING
TERRAFORMING
ELECTRIC HEAT PUMPS
MICRO POWER PLANTS
THE DECLINE OF RELIGION
LOCALISM, BIOREGIONALISM
ABUNDANCE
VIRTUAL JOBS
SYSTEMS BIOLOGY
METABOLIC ENGINEERING
GENOMICS
BIOELECTRONICS
STEM CELL THERAPY
BIOFUELS
WIND ENERGY
FOCUSED PURPOSE
Convergence Model

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CURRENTS & CHARACTERISTICS OF THE EMERGING FUTURE

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DISCLAIMER

INVENTING GUARANTEES

UNINTENDED CONSEQUENCES

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SENSING & CAPTURING EVERYTHING

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THE WORLD AS DATA

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ANALYZING EVERYTHING

Author: Kevin Benedict

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NETWORKING & AGGREGATING GLOBAL KNOWLEDGE

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EMERGING DIGITAL

PLATFORMS

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CAPTURING REALITY

DIGITAL TWINS

THE FUTURE OF HEART HEALTH

Technological advancement on hearts means more lives, human and animal, will be saved in the future.

New innovations such as Digital Twins and 3D-printed organs will allow doctors, researchers, and surgeons to predict health outcomes and test new therapies digitally instead of exploratory surgery or animal testing.

FAST FACTS

- Heart disease is the leading cause of death in the United States.
- Cardiovascular diseases takes an estimated 17.9 million lives globally each year.
- More than 580 million people have undiagnosed hypertension.
- Clinical trials for new heart drug therapies can cost in excess of $150M.
- Proper training on new techniques and technologies remains the biggest challenge to medical innovation.
- Currently, animals are required for the majority of heart valve replacement testing.

CARDIAC ANALYSIS
Run millions of simulations on a digital twin heart to analyze performance in different conditions, such as exercising or under stress.

ATHLETIC PERFORMANCE
Simulate the effects of different activities and training programs to identify those that create optimal heart health, avoid injuries and optimize recovery time.

PREDICTIVE MEDICINE
Custom treatment plans predict the effectiveness of drugs and therapies and the impact of lifestyle choices such as diet, exercise and smoking are modeled to predict outcomes for an individual over their lifespan.

TRAINING AND EDUCATION
Simulate various heart conditions digitally to more effectively prepare students for real-world situations.

SURGICAL PREPARATION AND TESTING
Digital twin and 3D-printed hearts allow surgical experimentation and testing of new products and techniques.

DRUG DEVELOPMENT AND TESTING
Measure the effectiveness and safety of new drug therapies and doses on digital hearts, helping researchers develop safer and more effective treatments, reducing the need for animal testing and human trials.

HEART CONDITION MONITORING
Continually monitor heart rate, condition and efficiency, in real-time, to quickly identify issues or abnormalities.

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RUNNING TO THE FUTURE

EMERGING DIGITAL TWIN TECHNOLOGY WILL MAKE 2-HOUR MARATHONS COMMONPLACE

NOW

IN 2030

WEARABLES
Monitors real-time data on running performance, heart rate, O2 levels, and beyond

CLOTHING
Materials wick away moisture to help regulate temperature

SHOES
Customized orthotics improve shoe fit and correct for abnormalities in stride to prevent injury

DIGITAL BRAIN
Simulates mental states to identify the conditions that help a marathoner avoid the pain cave and enter the flow state to achieve peak performance

DIGITAL SKIN
Simulates sweat evaporation and water retention in different race environments to achieve optimal hydration

DIGITAL TRAINING
AI "coaches" test mileage training scenarios in the metaverse to identify an individual's ideal program

DIGITAL NOSE
Measures ideal air intake through nasal passages

DIGITAL HEART
Runs millions of stress tests to find out how long an athlete can operate at peak performance without injury

ANALYTICS
Nanobots monitor health conditions at the molecular level

WEARABLES
Glasses/contacts provide heads-up display of key metrics, telling runners when to increase or decrease their pace based on real-time data

3D PRINTED MEALS
Provide the precise mix of nutrients, at the molecular level, based on real time data from health monitors

CLOTHING
Advanced materials dynamically morph based on body temperature and changing weather conditions

SHOES
3D printed based on the exact specifications of an individual's foot to establish an optimal running stride and prevent injury

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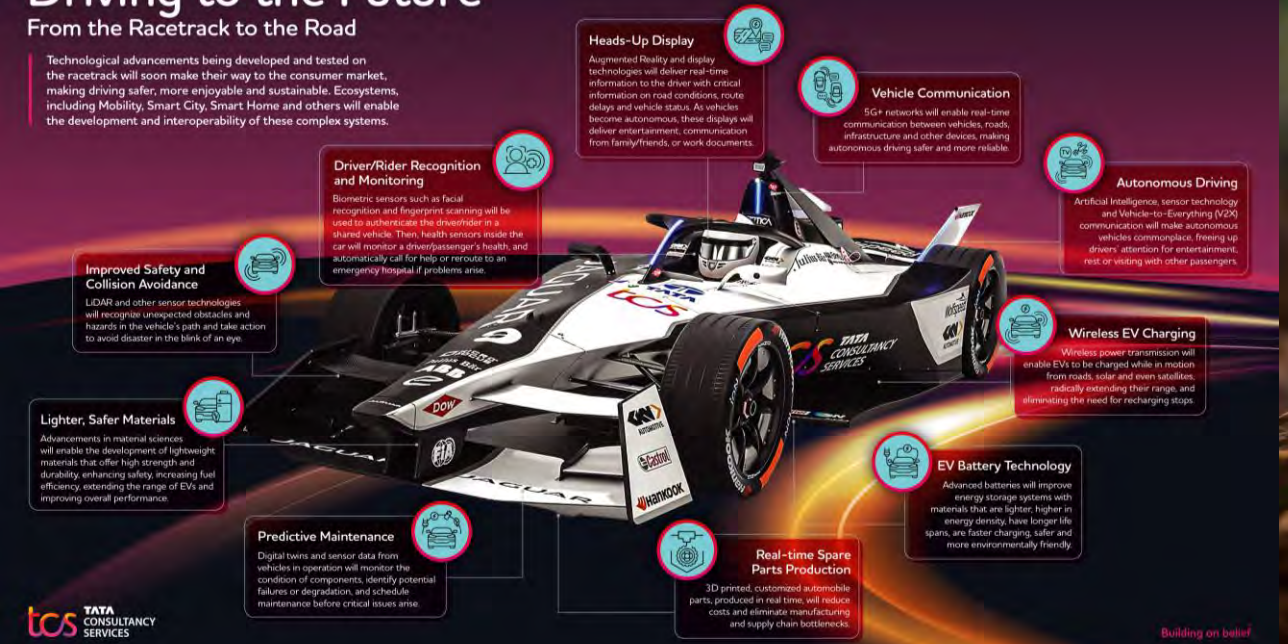
Driving to the Future

From the Racetrack to the Road

Technological advancements being developed and tested on the racetrack will soon make their way to the consumer market, making driving safer, more enjoyable and sustainable. Ecosystems, including Mobility, Smart City, Smart Home and others will enable the development and interoperability of these complex systems.



Heads-Up Display
Augmented Reality and display technologies will deliver real-time information to the driver with critical information on road conditions, route delays and vehicle status. As vehicles become autonomous, these displays will deliver entertainment, communication from family/friends, or work documents.

Vehicle Communication
5G+ networks will enable real-time communication between vehicles, roads, infrastructure and other devices, making autonomous driving safer and more reliable.

Driver/Rider Recognition and Monitoring
Biometric sensors such as facial recognition and fingerprint scanning will be used to authenticate the driver/rider in a shared vehicle. Then, health sensors inside the car will monitor a driver/passenger's health, and automatically call for help or reroute to an emergency hospital if problems arise.

Autonomous Driving
Artificial Intelligence, sensor technology and Vehicle-to-Everything (V2X) communication will make autonomous vehicles commonplace, freeing up drivers' attention for entertainment, rest or visiting with other passengers.

Improved Safety and Collision Avoidance
LiDAR and other sensor technologies will recognize unexpected obstacles and hazards in the vehicle's path and take action to avoid disaster in the blink of an eye.

Wireless EV Charging
Wireless power transmission will enable EVs to be charged while in motion from roads, solar and even satellites, radically extending their range, and eliminating the need for recharging stops.

Lighter, Safer Materials
Advancements in material sciences will enable the development of lightweight materials that offer high strength and durability, enhancing safety, increasing fuel efficiency, extending the range of EVs and improving overall performance.

EV Battery Technology
Advanced batteries will improve energy storage systems with materials that are lighter, higher in energy density, have longer life spans, are faster charging, safer and more environmentally friendly.

Predictive Maintenance
Digital twins and sensor data from vehicles in operation will monitor the condition of components, identify potential failures or degradation, and schedule maintenance before critical issues arise.

Real-time Spare Parts Production
3D printed, customized automobile parts, produced in real time, will reduce costs and eliminate manufacturing and supply chain bottlenecks.

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FROM FARM TO FORK

DIGITAL TWINS, SYNTHETIC BIOLOGY AND THE FUTURE OF FOOD

Global population growth, climate change and geopolitical instability are putting an ever-increasing strain on the world's food production. New innovations in Digital Twins and Synthetic Biology are helping researchers, growers, food producers and retailers bring fresher and more nutritious foods to consumers around the world while easing the strain on our environment.

Precision Fermentation
Produce foods and ingredients that are more sustainable, nutritious, and flavorful than traditional production methods including alternative protein sources, vitamin supplements and fortified foods by using microorganisms to create foods and ingredients through fermentation.

CRISPR
This powerful gene-editing technology can be used to edit the DNA of plants and animals to create or enhance desirable traits such as disease resistance and drought tolerance, and increased yield.

Food Security
Model the impact of different factors on food production, such as climate change, water scarcity, pests and diseases, and develop alternative growing practices, fertilizers and pesticides to adapt to changing conditions.

Vertical Farming
Precisely model, test and control every aspect of the growing process including light, nutrients, water, humidity and air purity to optimize food quality and yield in a vertical farming environment.

Education and Training
Create immersive training experiences for food industry professionals, farmers and prosumers, allowing them to learn new production practices and test new products to meet changing consumer demand and preferences.

Food Waste Reduction
Digital twins, such as the TCS Digital Banana, can model and monitor foods from the field to the consumer's home to track freshness, allowing producers to continually optimize production, reduce over production, and improve supply chain logistics.

Food Transparency
Improve the transparency of food with real-time information on the origins, production and distribution of food products throughout the supply chain, allowing consumers to make more informed choices about the food they purchase and consume.

Food Safety
Simulate the behavior of food products under different conditions such as temperature, humidity, light and packaging to identify potential risks and prevent contamination or spoilage.

Demand Management
Predict demand for food products, allowing producers and retailers to shift supply in real-time to better match supply with demand, reducing unsold food that goes to waste.

Precision Agriculture
Help farmers optimize crop growth by modeling the impact of environmental factors such as weather, soil quality, fertilizers and seed variants on plant growth to reduce waste, increase yields and improve the quality of crops.

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Author: Kevin Benedict

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ORGANIZING KNOWLEDGE VIA GENERATIVE AI

Author: Kevin Benedict

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REVIEW:

1. Sensing and Capturing
2. Breaking the World into Data
3. Analyzing IT
4. Networked Global Knowledge
5. Emerging Digital Platforms
6. Capturing Reality with Digital Twins
7. Organizing & Communicating Knowledge

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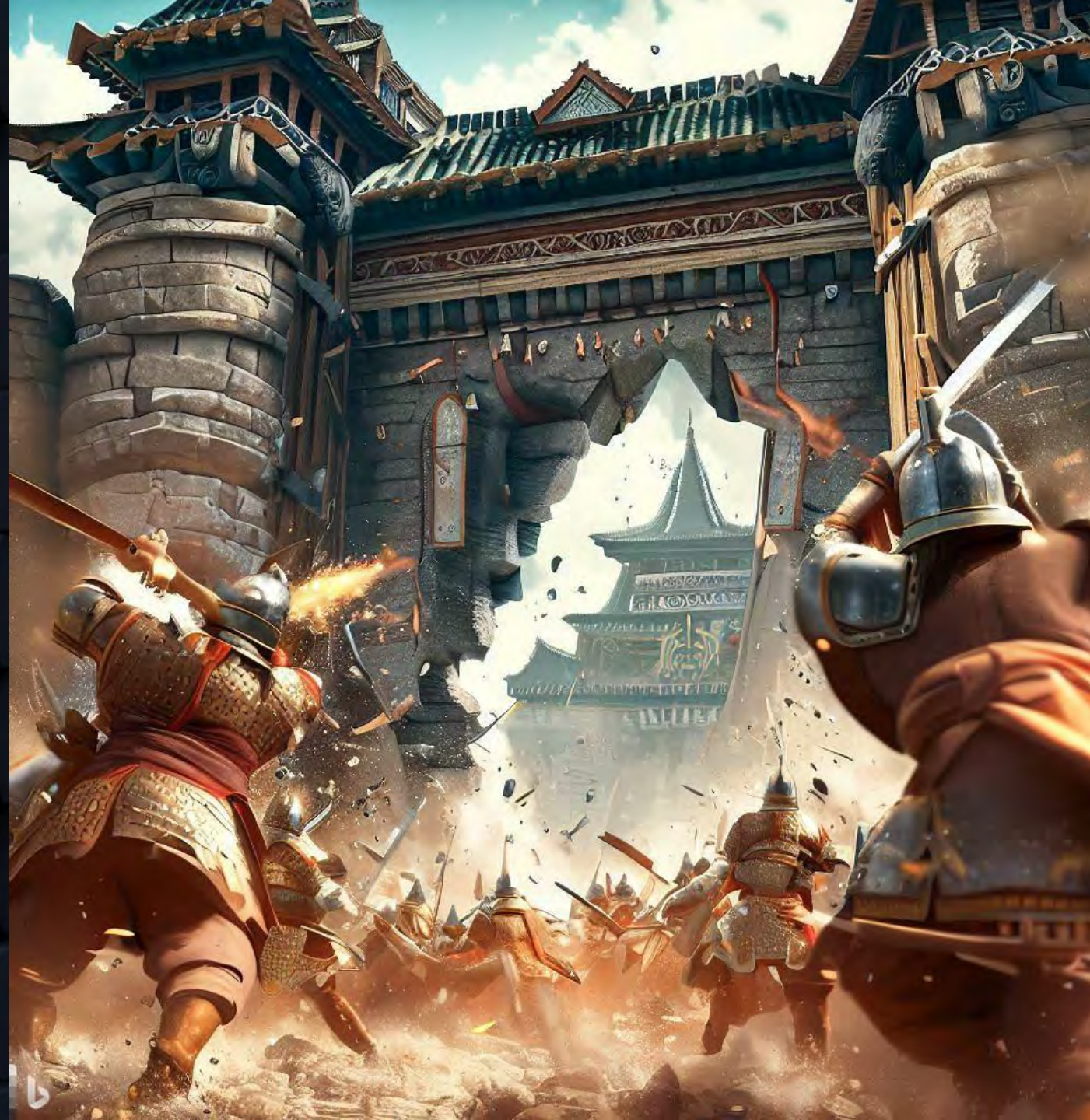
CONQUERING IGNORANCE



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EDITING & CREATING

BIOLOGICAL SYSTEMS

Author: Kevin Benedict

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COMPETITIVE DECISION MAKING

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SPEED

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INTELLIGENCE EVERYWHERE

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AUTOMATED EVERYTHING

Author: Kevin Benedict

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AUTONOMOUS OPERATIONS

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THE NEW FRONTIER
COMPLEXITY

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STRATEGY

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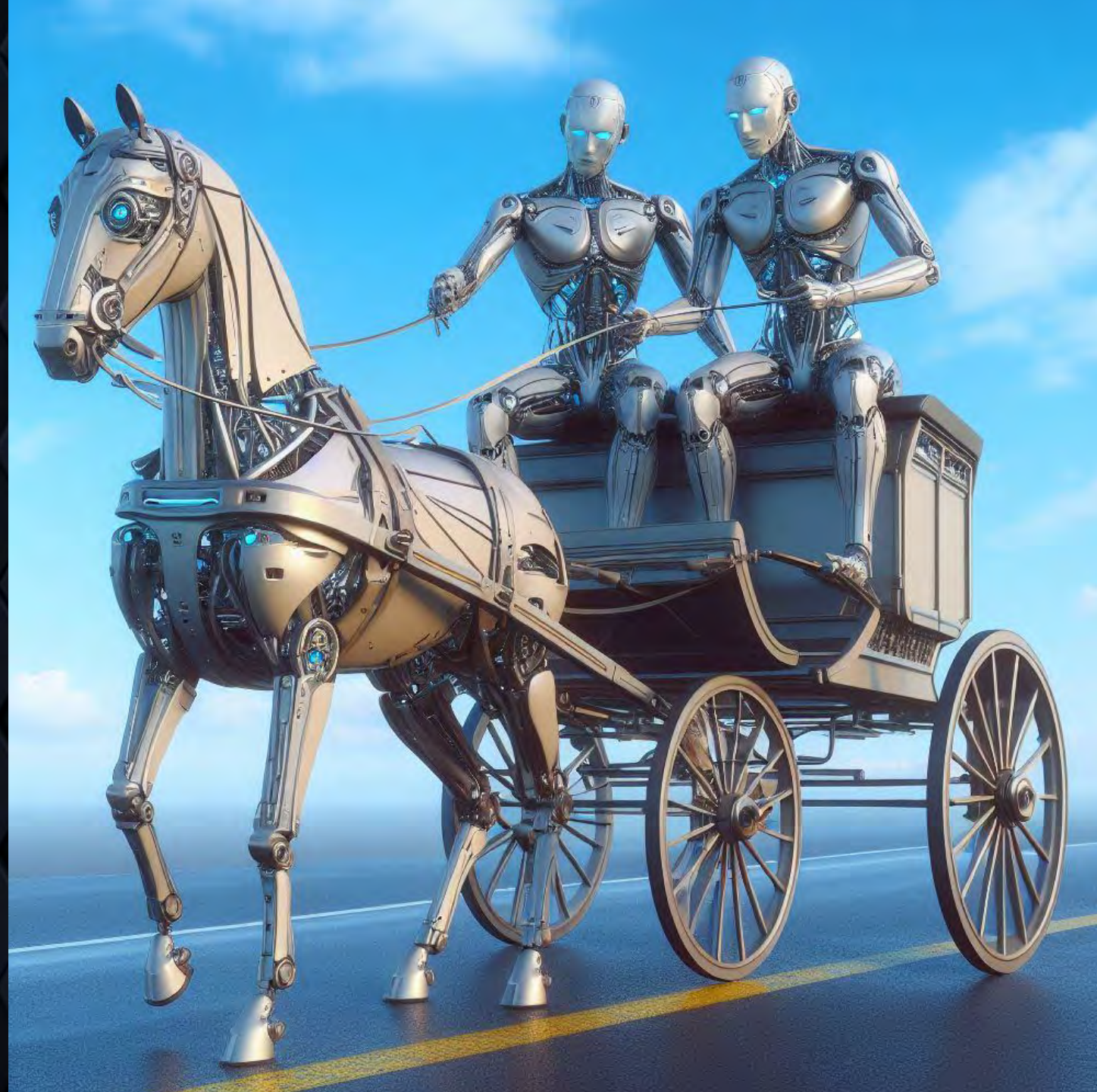
NEW TECHNOLOGIES

WITHOUT NEW STRATEGIES IS WASTED.



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REMOVE CONJECTURE & BLINDSPOTS

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OILS

- OPTIMIZED
- INFORMATION
- LOGISTICS
- SYSTEMS

Author: Kevin Benedict

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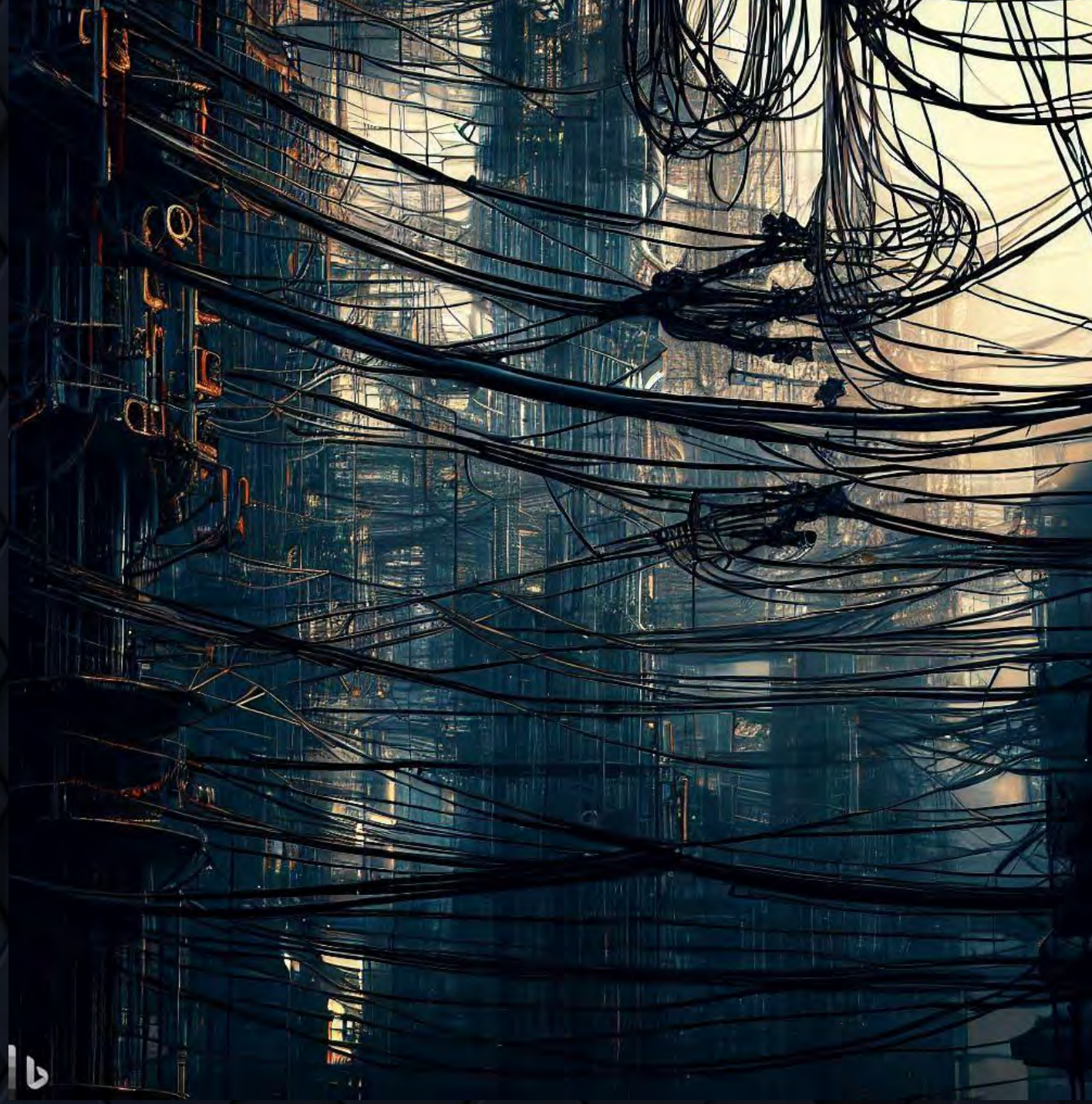
NETWORK INNOVATIONS

Networks move the world



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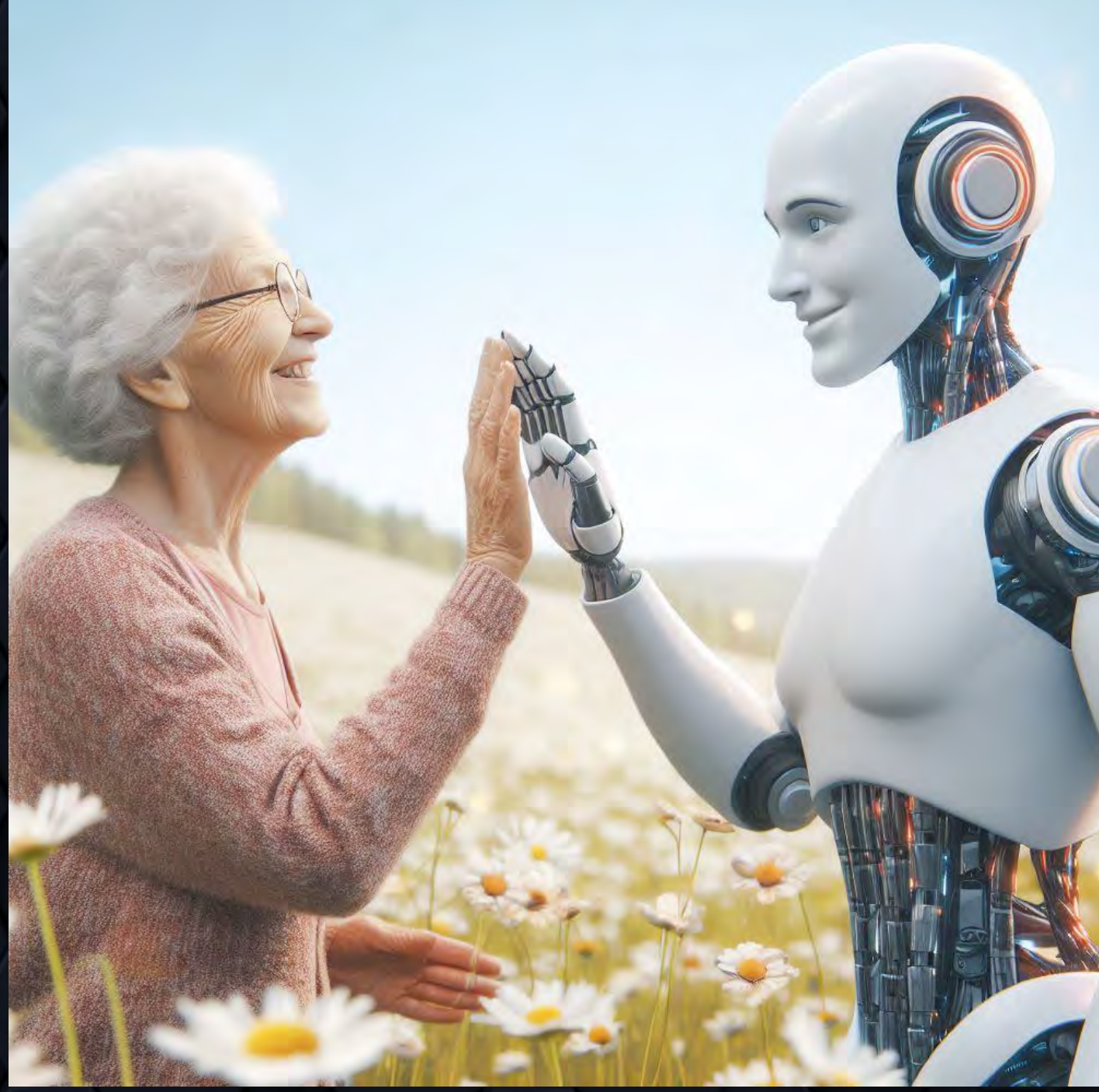
CUSTOMER EXPERIENCES



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GENERATIVE AI

Voice Synthesis

short cut spectrum – 00:40

ENGLISH

HINDI

SPANISH

How often do you use Generative AI?

- **Daily - 35%**
- **Weekly - 30%**
- **Monthly - 07%**
- **Not Using - 28%**

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LIFELONG LEARNING

Author: Kevin Benedict

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NEW WORLD

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HUMAN-ROBOT PAIRING

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DEEP-KNOWING

AI SYSTEMS THAT UNDERSTAND:

- PSYCHOGRAPHIC PROFILES
- PERSONALITIES
- PREFERENCES
- ETHNICITIES
- LANGUAGES
- CULTURES
- TRAITS
- HABITS
- VALUES
- DNA
- ETC.

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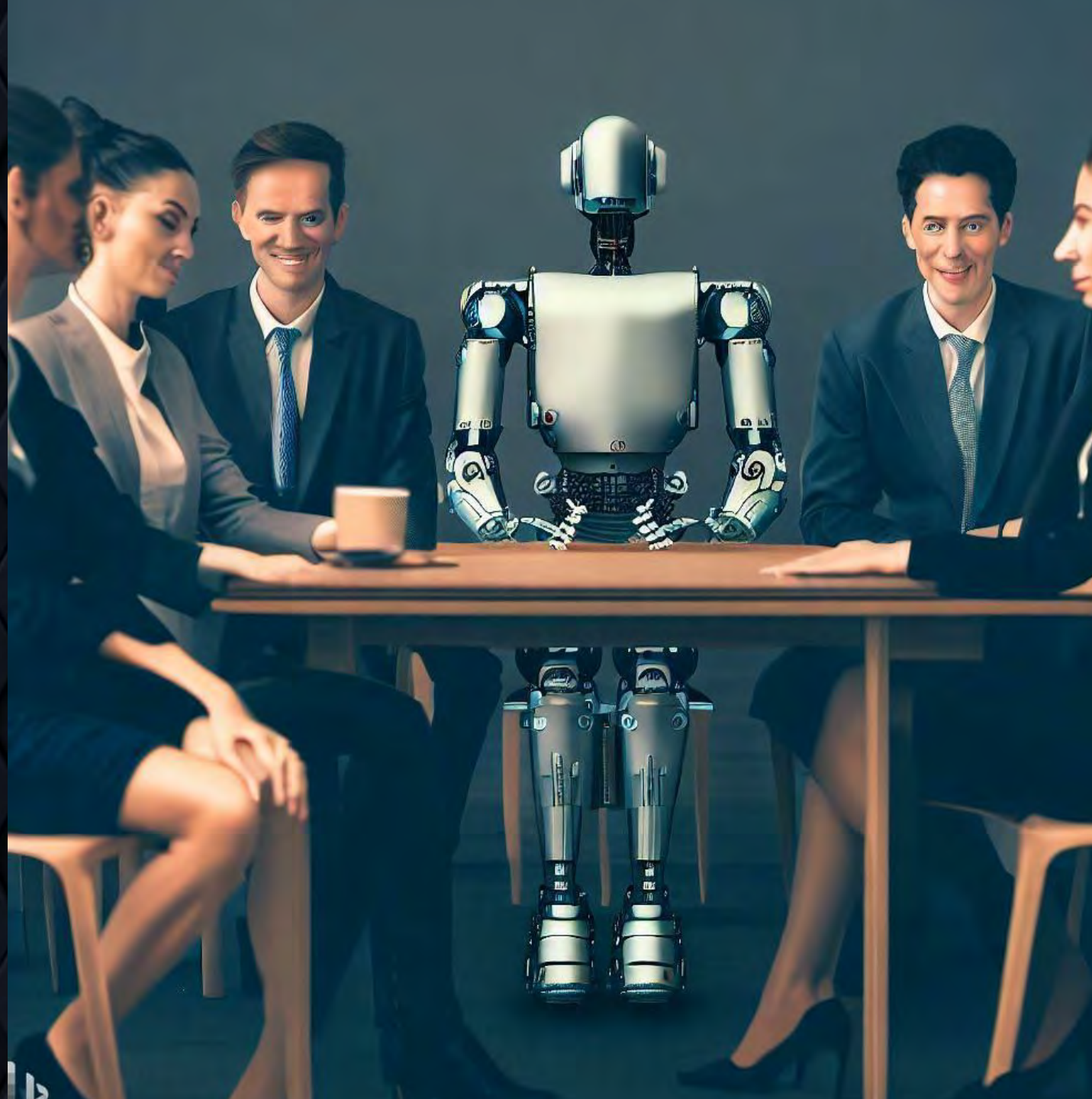
ROBOT BOARD MEMBERS

ROBOT EXECUTIVES

ROBOT MANAGERS

ROBOT WORKERS



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WHY DID THE CLOCK REPAIRMAN CLIMB A LADDER?

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