

THE FURTHER BACKWARD YOU LOOK,
THE FURTHER FORWARD YOU CAN SEE

- WINSTON CHURCHILL

EXPLORING THE POSSIBILITIES

History does not
matter because it
repeats. It matters
because it reveals
patterns too large
to see in one lifetime.



WHAT DEEPER
PATTERN DOES
HISTORY REVEAL?



DATA-DRIVEN FUTURE

SUSTAINABLE GROWTH
SMART INFRASTRUCTURE
AI-GUIDED SYSTEMS

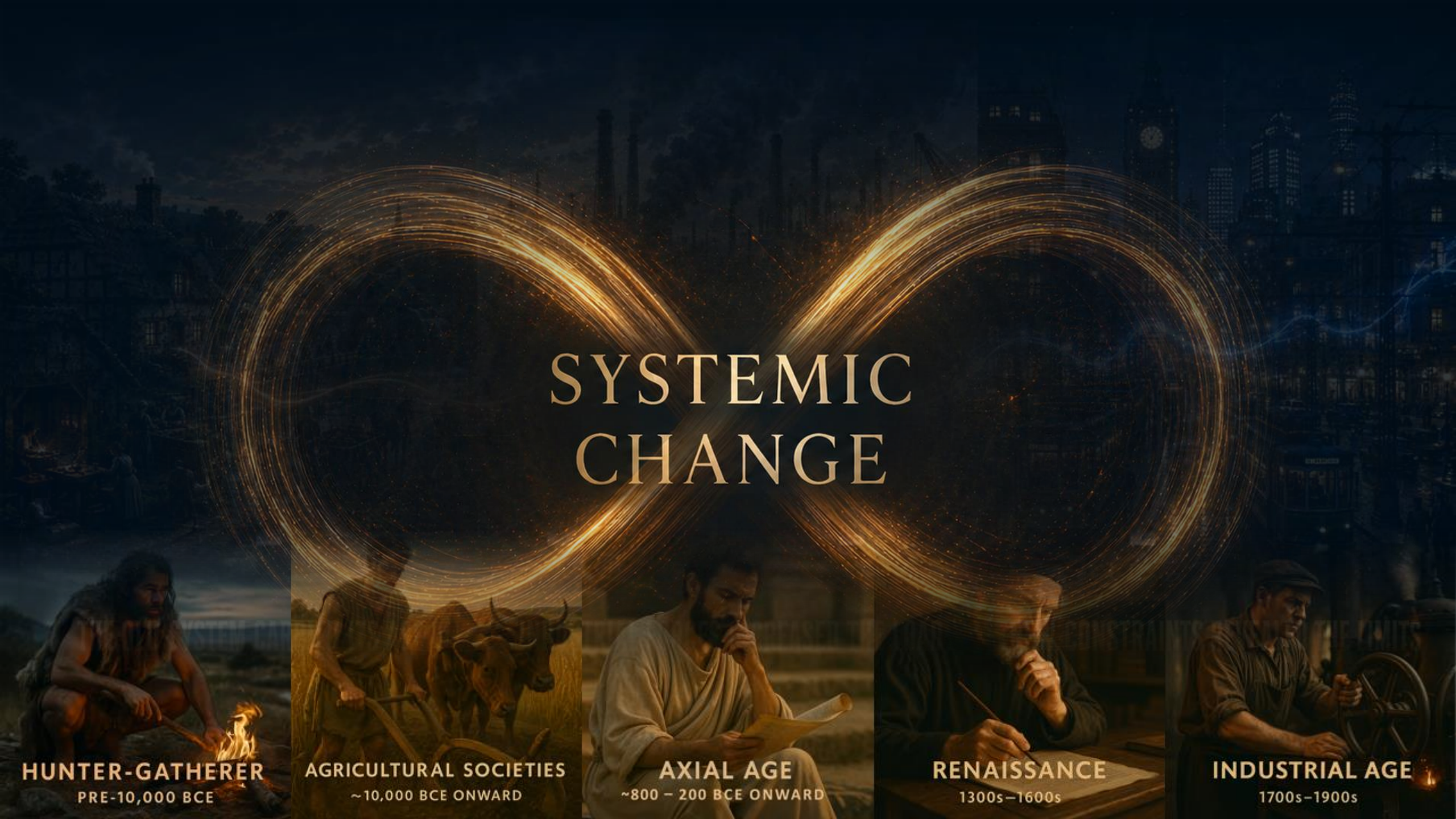




LIMITS

CONSTRAINTS

PRESSURE



SYSTEMIC CHANGE



HUNTER-GATHERER
PRE-10,000 BCE



AGRICULTURAL SOCIETIES
~10,000 BCE ONWARD



AXIAL AGE
~800 – 200 BCE ONWARD



RENAISSANCE
1300s–1600s



INDUSTRIAL AGE
1700s–1900s

HUMAN
CAPACITY

CONVERGENCE

GENERAL PURPOSE
TECHNOLOGY

THE GROWTH
OF
KNOWLEDGE

History reminds us that we are a stubborn species: one that is deeply resistant to making profound changes in our behavior and habits, even when it is clear that we need to do so.

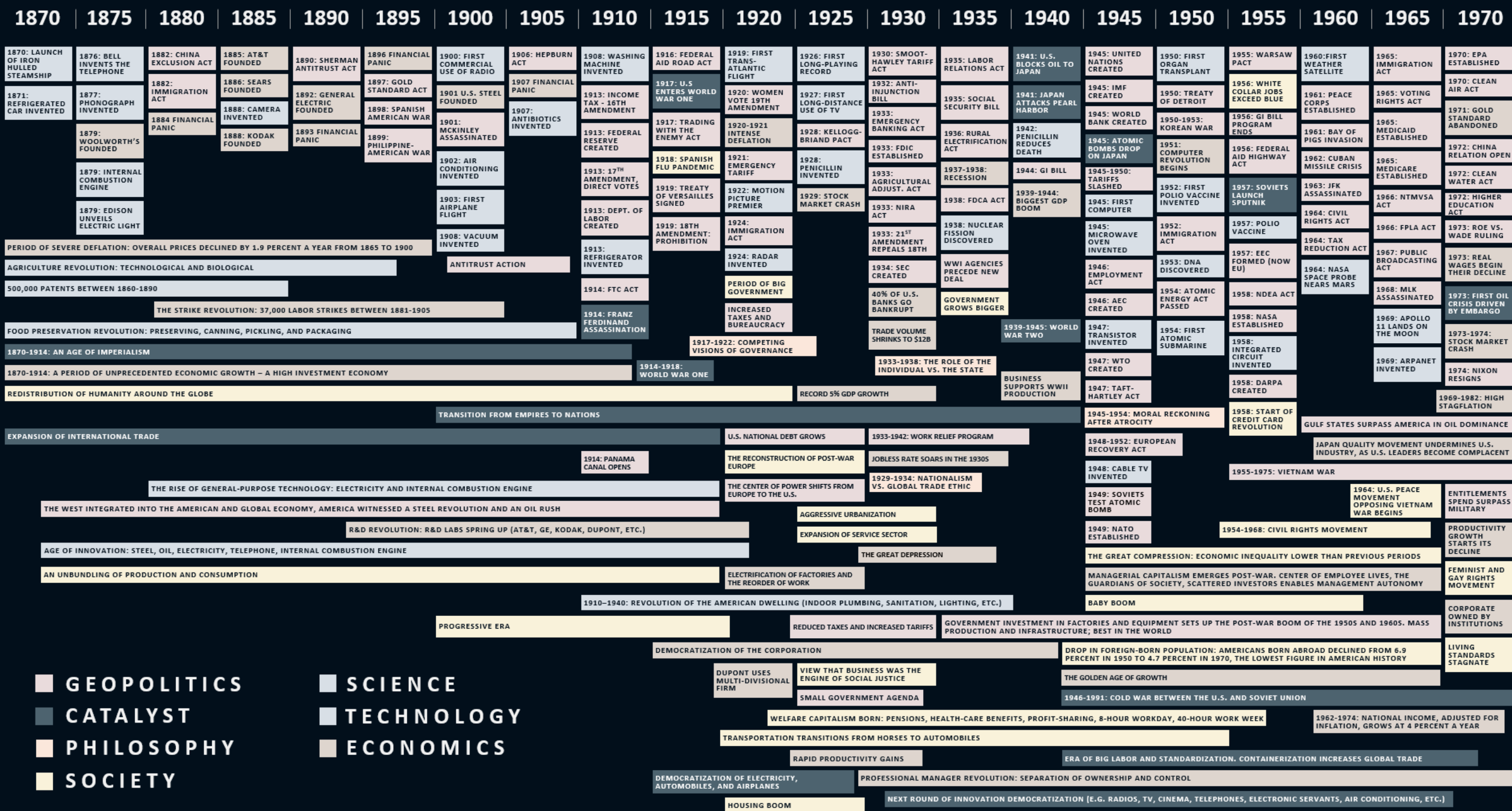
— James Suzman, *Work*



THE ILLITERATE OF THE 21ST
CENTURY WILL NOT BE THOSE
THAT CAN'T READ OR WRITE,
BUT THOSE WHO CANNOT
LEARN, UNLEARN, AND
RELEARN

ALVIN TOFFLER, *Future Shock*





SYSTEMIC COMPRESSION

Science

Technology

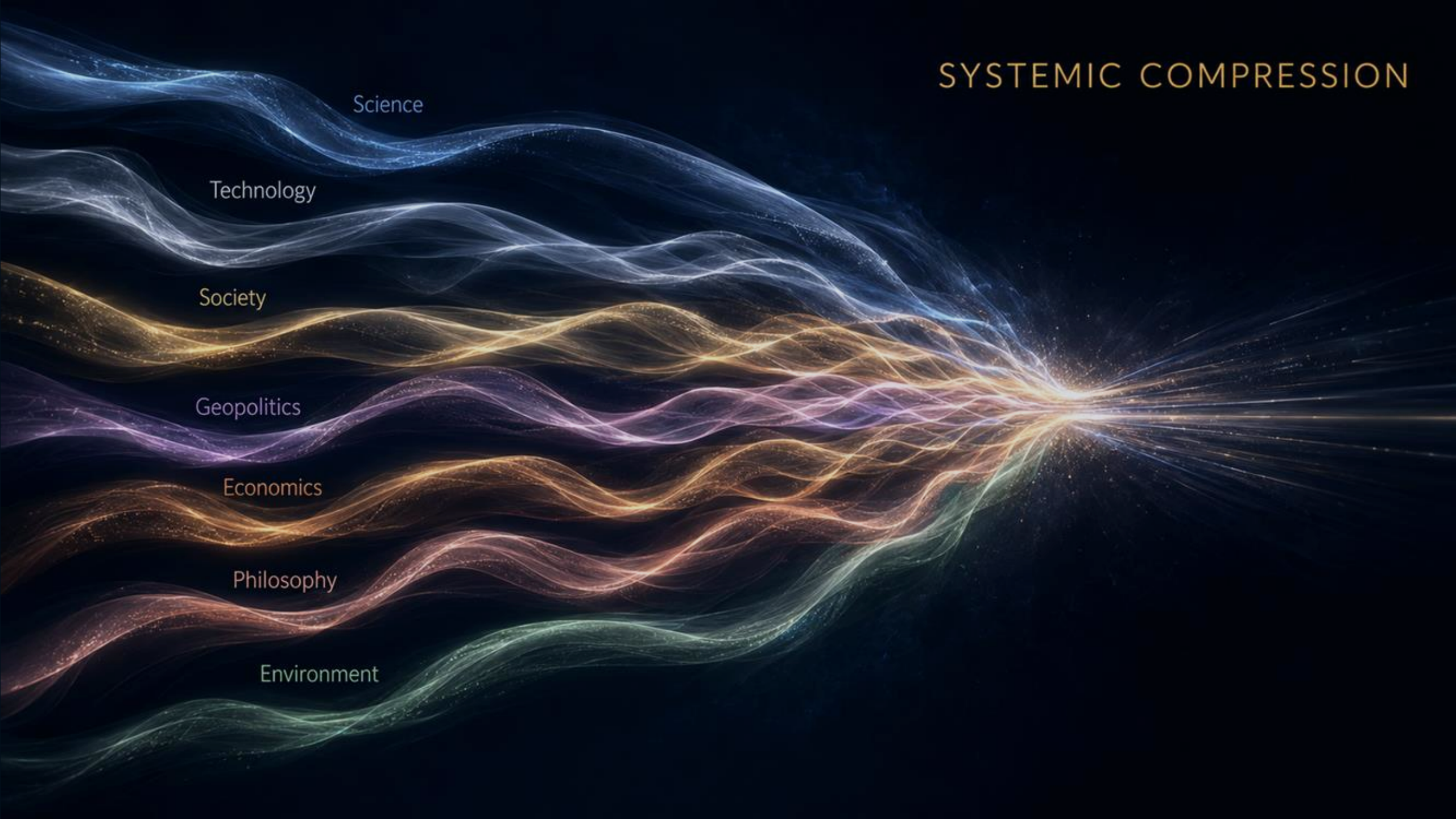
Society

Geopolitics

Economics

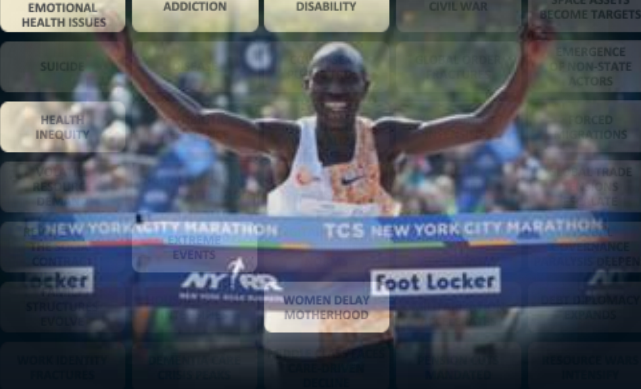
Philosophy

Environment



SCIENCE AND TECHNOLOGY							SOCIETY			GEOPOLITICS			ECONOMICS		ENVIRONMENT		PHILOSOPHY	
DIGITAL FOUNDATION	5G & 6G NETWORKS	INTERNET OF THINGS	ARTIFICIAL INTELLIGENCE	NATURAL LANGUAGE GENERATION	MACHINE READING COMPREHENSION	WIND ENERGY	SOCIETAL UNREST	FOOD & WATER INSECURITY	FOCUS ON PURPOSE	GLOBAL HEALTH	LACK OF CRISIS READINESS	LACK OF GLOBAL COOPERATION	DECLINING GLOBAL GROWTH	DEBT-FUELED GLOBAL GROWTH	REVIVAL OF TRADITIONAL ENV. PRACTICES	CLIMATE CHANGE	DIGITAL ETHICS	HUMAN-CENTRIC TECHNOLOGY DEVELOPMENT
WEB 3.0	COLLABORATIVE ROBOTS	GENERATIVE ALGORITHMS	DIGITAL TWINS	THORIUM-FUELED NUCLEAR REACTOR	GEO THERMAL ENERGY	HYDRO ENERGY	RIISING ENERGY DEMAND	DIVERSITY & INCLUSION	POVERTY	CLIMATE CHANGE DIPLOMACY	CLIMATE WEAPONIZATION	ANTI-GLOBALIZATION SENTIMENT	GOVERNMENT DEBT	GLOBAL TRADE	PLANETARY HEALTH	EXTREME ENVIRONMENTAL EVENTS	ETHICS OF EMERGING TECHNOLOGIES	ETHICAL USE OF AI & AUTOMATION
ROBOTICS	SOFT ROBOTICS	MOLECULAR ROBOTS	SYNTHETIC DATA SETS	PREDICTIVE MACHINE VISION	GENERATIVE ADVERSARIAL NETWORKS	BIOFUELS	DECLINING MIDDLE CLASS (WEST)	EMERGING MIDDLE CLASS (EAST)	DECLINE IN FERTILITY RATES	RELOCALIZATION	AGING INFRASTRUCTURE	EMERGING STRATEGIES FOR A NEW ERA	SHIFT FROM GLOBAL TO REGIONAL TRADE	ATROPHY OF GLOBAL ECONOMIC GOVERNANCE	POLLUTION	RESOURCE SCARCITY	POSTHUMANISM	PRIVACY & DATA ETHICS
PERSONAL ROBOTS & AI PARTNERS	SOCIAL ROBOTS	ROBOTIC SURGERY	CREATIVE AI	LARGE ACTION MODELS	ZERO CARBON NATURAL GAS	CARBON CAPTURE	INDIVIDUALISM	CORRUPTION	HUMAN MIGRATION	STRUCTURAL CHANGE FOR A DIFFERENT WORLD	SHIFTING INFLUENCE OF GLOBAL POWERS	SHIFT IN INFLUENCE FROM WEST-TO-EAST	MONEY & FISCAL POLICY	INEFFECTIVE ECONOMIC METRICS	RIISING SEA LEVELS	EXCEEDING PLANETARY BOUNDARIES	REASSESSMENT OF SOCIETAL VALUES	PHILOSOPHY OF AI
ROBOT AVATARS	VIR-CONTROLLED ROBOTS	ROBOT BEES	METaverse	EXTENDED REALITY	MIXED REALITY	MODERN GRID	CLASS WARS	CULTURE WARS	POPULATION GROWTH/ DECLINE	POSSIBLE CHINA-AMERICA DECOUPLING	MOVEMENT TOWARDS A NEW WORLD ORDER	SHIFTING GLOBAL ALLIANCES	DEMONETIZATION	MODERN MONEY THEORY	ZERO WASTE ADOPTION	DEFORESTATION	VALUES-DRIVEN LEADERSHIP	PHILOSOPHY OF VIRTUAL REALITY
SELF-ASSEMBLING ROBOTS	VIRTUAL REALITY	AUGMENTED & MIXED REALITY	CONTACTLESS INTERFACES	MICRO POWER PLANTS	SOLAR ENERGY	HYDROGEN FUEL	AGING POPULATION	URBANIZATION	CARING FOR THE ELDERLY	ANTIQUATED POLICIES EXPOSED	COLLAPSE OF POST-WORLD WAR II INSTITUTIONS	GLOBAL INSTITUTIONS STRAINED	RESERVE CURRENCY STATUS	CENTRAL BANK DIGITAL CURRENCY	NATURAL DISASTERS	CARBON-FREE TECHNIQUES & BIO-DEGRADABLES	PHILOSOPHY OF CLIMATE SCIENCE	THE DECLINE OF RELIGION
QUANTUM COMPUTING	DIGITAL AGENTS	U-PFI	SYNTHETIC MEDIA	VOICE CLONING	ELECTRIC HEAT PUMPS	ELECTRIC VEHICLES	INCREASED LIFESPANS	IMMIGRATION BACKLASH	MARRIED LATER	RIISING PRESSURE ON EU MODEL	CENTRALIZED VS. DECENTRALIZED GOVERNANCE	EMERGING MULTILATERAL INSTITUTIONS	DECENTRALIZED DIGITAL CURRENCIES	FINANCIAL CRASH	AGROECOCLOGY & PERMACULTURE	ATMOSPHERIC AEROSOL LOADING	BIAS AWARENESS & MITIGATION	CRITICAL THEORY & SOCIAL JUSTICE
PERSONAL DATA RECORD	DNA HARD DRIVES	HOLOGRAMS	FACE & VOICE PRINTS	RECOGNITION TECHNOLOGY	CONTAINED FARMING	VEHICLE-TO-GRID	RIISE IN THE DEPENDENCY RATIO	GENERATIONAL TURNS	BIODIVERSITY LOSS	POWER SHIFTS FROM NATIONS TO CITIES	SHIFT FROM MILITARY TO NON-MILITARY SPHERE	SHIFT FROM DEMOCRACY TO PLUTOCRACY	INFLATION	CASHLESS SOCIETY	BIO-MASS ENERGY SYSTEMS	BIOREGIONALISM	GLOBAL ETHICAL STANDARDS	EXISTENTIAL RISK & PHILOSOPHY
VISIBLE LIGHT COMMUNICATIONS	PHOTONICS	SPATIAL COMPUTING	CONNECTED CAR	AUTONOMOUS VEHICLES	DRONES	MICROGRIDS	FAKE NEWS	THE RISE OF ALTERNATIVE LIVING	FIVE GENERATIONS OF WORKERS	NATURAL RESOURCE DEPENDENCE	SHARING OF PRODUCTIVE RESOURCE	SHIFTING RESOURCE PARADIGM	DEPRESSION & RECESSION RISK	SLOWDOWN IN PRODUCTIVITY GROWTH	CLIMATE-RESILIENT ECOSYSTEM DESIGN	COMMUNITY-BASED ENVIRONMENTAL RESILIENCE	LONG TERM SOCIETAL IMPACT FOCUS	PHILOSOPHY OF EMOTIONS
AFFECTIVE COMPUTING	EDGE COMPUTING	FLYING CARS & PASSENGER DRONES	HYPERPERSONAL & SOFTWARE RIGHTS	SATELLITE FLEETS	ENERGY STORAGE	NUCLEAR FUSION	SHIFTING VIEWS OF RETIREMENT	LONELINESS & ISOLATION	TECHNOLOGICAL UNEMPLOYMENT	SHIFTING ENERGY PARADIGM	SHIFT TO REGIONAL SUPPLY CHAINS	REDUCTION IN TRADE DRIVES GLOBAL CONFLICT	THE GREAT WEALTH TRANSFER	JOB LOSS	DEGROWTH & POSTGROWTH MODELS	EMBRACING INDIGENOUS KNOWLEDGE & PRACTICES	AESTHETIC ACTIVISM	COLLECTIVE INTELLIGENCE & EPISTEMOLOGY
BIOMETRY SENSORS	BEHAVIORAL BIOMETRICS	ADAPTIVE COMPUTING	AUTONOMOUS WEAPONS	DRONE-ENABLED INFRASTRUCTURE	SMART ROADS	SOLAR POWER SATELLITES	DIGITAL DIVIDE	TECHNOLOGY BIAS	POWER TO THE INDIVIDUAL	R&D-DRIVEN ADVANTAGE	POPULISM	BIOREGIONAL GOVERNANCE	OWNERSHIP TO ACCESS	MARKET ECONOMY	ENVIRONMENTAL POWER RATING & POLICY	GENE BANKING	EMBODIED COGNITION	ECOPOLITICAL ETHICS & STEWARDSHIP
FLOATING FARMS	FAKE LOOP	UNDERGROUND TRADING GRID	DEFENSIBLE ROBOTS	EMERGING NUCLEAR REACTOR	FLOATING NUCLEAR ENERGY PLANTS	WIRELESS POWER TRANSMISSION	RESPELLING SOCIETY	THE CHANGING NOTION OF WORK	GRID LIBERATION	TECHNO-NATIONALISM	NATION-LEST AGENDAS	GOVERNMENTS TURNING BACK	CONCENTRATION OF WEALTH	OFF-PLANET ECONOMY	LAND CONVERSION	MARINE BIODIVERSITY	ORGANIZATIONAL SOCIAL JUSTICE	EPISTEMOLOGY OF MISINFORMATION
PERSISTENT AUDIO SURVEILLANCE	REGENERATIVE MEDICINE	NERF	GENETIC RECOGNITION	GENE DOPING	SMART POWER GRIDS	WALKING-DRIVEN ENERGY	INDEPENDENT WORKERS	RIISE OF THE CROWD	VIOLENCE	PUBLIC EMPLOYMENT OPTION	GLOBALIZATION REVIVAL	COMPETING POLITICAL SYSTEMS	CONSUMER DEBT	SHARING ECONOMY	MONETIZING NATURE & SERVICES	ENVIRONMENTAL ACCOUNTING	PHILOSOPHY OF QUANTUM MECHANICS	MOMENTOUS SHIFT IN HUMAN CONSCIOUSNESS
PRECISION MEDICINE	PREDICTIVE MEDICINE	YOUTH VIRTUAL PROSTHETICS	GENETIC ENGINEERING	GENE THERAPY	GENETIC SCREENING	PRECISION AGRICULTURE	REVERSE BRAIN DRAIN	RACISM	FALL IN WORKING AGE POPULATION	AUTHORITARIAN CONTROL	DISTRIBUTED AUTHORITY	MASS-SCALE DISINFORMATION	INTANGIBLE ECONOMY	TOKEN ECONOMICS	NITROGEN & PHOSPHOROUS LOADS	ORGANIC POLLUTANTS	ETHICS OF COMPENSATION	PHILOSOPHY OF GLOBAL JUSTICE
AQUAPONICS	EXO-SKELETONS	GENOMICS	BIOTECHNOLOGY	PRECISION BIOLOGY	VERTICAL FARMING	MICROPLANTS	IDENTITY THEFT	OVERSATION TO PHYSICAL CONTACT	DEATHS OF DESPAIR	A POLARIZED SOCIETY	TRUST IN GOVERNMENT DROPS	WORLD WAR	VIRTUAL JOB	BIOECONOMICS	CLIMATE GEOTECHNOENGINEERING	EARTH SYSTEM GOVERNANCE	INCLUSIVE VALUE CREATION	TRANSPARENCY & ACCOUNTABILITY IN ACTIONS
BIOTECH	FULL-BRAIN SIMULATION	CLIMATE CHANGE POLICY	SYNTHETIC BIOLOGY	BIO-ROBOTICS	AGROBOTIC FARMING	HYDROPONICS	MENTAL & EMOTIONAL HEALTH ISSUES	ADDICTION	DISABILITY	CIVIL WAR	SPACE ASSETS BECOME TARGETS	TERRORISM	DIGITAL GUIDEDS	EMPOWERMENT ECONOMY	NATURE-BASED SOLUTIONS FOR CITIES	OZONE DEPLETION	PHILOSOPHY OF CARE & EMPATHY	PHILOSOPHY OF CONSCIOUSNESS
BRAIN-COMPUTE INTERFACES	BRAIN-TO-BRAIN COMMUNICATION	BIOMIMETIC INTELLIGENCE	PRINTED ORGANS	SYSTEM BIOLOGY	BIOELECTRONICS	AQUACULTURE	SUICIDES	DISEASE	COLLAPSE OF PUBLIC TRUST	GLOBAL ORDER FRACTURES	EMERGENCE OF NON-STATE ACTORS	DEVELOPING COUNTRY COLLAPSE	A NEW ZERO MARGINAL COST SOCIETY	ROBOT TAXES	ECOSYSTEM COLLAPSE	EARTH HEALTH MONITORING	PHILOSOPHY OF MIND IN NEUROSCIENCE	PHILOSOPHY OF DATA SCIENCE
CONNECTED CLOTHING	SMART GLASSES	3D BIO-PRINTING	STEM CELL THERAPY	IMMUNETIC SCREENING	AEROPONICS	CELLULAR AGRICULTURE	HEALTH INEQUALITY	ANTIBIOTIC RESISTANCE	ASSISTED REPRODUCTION NORMALIZED	CYBER CONFLICT INTENSIFIES	FORCED MIGRATIONS	GLOBAL INEQUALITY	UNIVERSAL BASIC INCOME	UNIVERSAL CAPITAL ENDOWMENT	REGENERATIVE AGRICULTURE	RESTORATION OF NATURAL ECOSYSTEMS	MORAL COURAGE & ADVOCACY	MACHINE CONSCIOUSNESS & NATURAL INTELLIGENCE
TERRAFORMING	ASTEROID MINING	CHEMICAL SYNTHESIS	METABOLIC ENGINEERING	CRYPOTICS	ARTIFICIAL PHOTOSYNTHESIS	SYNTHETIC FOOD	RELATIONS TO THE SOCIAL SCIENTISTS	HEALTH CARE ACCESS	DIGITAL CULTURE UNDERMINE TRADITIONAL NORMS	PROXY CONFLICTS SOVEREIGNTY	GLOBAL CONSPIRACY THEORIES	INSTITUTIONS BEING FORGOTTEN	DOUBTING ALL WISDOM	CLIMATE CRIPPLERS	OCEAN DEGRADATION	NATURAL CAPITAL ACCOUNTING	ENVIRONMENTAL JUSTICE	PHILOSOPHY OF ENVIRONMENTAL JUSTICE
FOOD SECURITY	SMART AGRICULTURE	3D FOOD PRINTING	INDUSTRIAL BIOTECHNOLOGY	SAFETY AND SECURITY	ARTIFICIAL PHOTOSYNTHESIS	SYNTHETIC FOOD	RELATIONS TO THE SOCIAL SCIENTISTS	HEALTH CARE ACCESS	DIGITAL CULTURE UNDERMINE TRADITIONAL NORMS	PROXY CONFLICTS SOVEREIGNTY	GLOBAL CONSPIRACY THEORIES	INSTITUTIONS BEING FORGOTTEN	DOUBTING ALL WISDOM	CLIMATE CRIPPLERS	OCEAN DEGRADATION	NATURAL CAPITAL ACCOUNTING	ENVIRONMENTAL JUSTICE	PHILOSOPHY OF ENVIRONMENTAL JUSTICE

DOMAINS
CONVERGE

SCIENCE AND TECHNOLOGY							SOCIETY			GEOPOLITICS			ECONOMICS		ENVIRONMENT		PHILOSOPHY				
DIGITAL FOUNDATION	5G & 6G NETWORKS	INTERNET OF THINGS	ARTIFICIAL INTELLIGENCE	NATURAL LANGUAGE GENERATION	MACHINE READING COMPREHENSION	WIND ENERGY	SOCIETAL UNREST	FOOD & WATER INSECURITY	FOCUS ON PURPOSE	GLOBAL HEALTH	LACK OF CRISIS READINESS	LACK OF GLOBAL COOPERATION	DECLINING GLOBAL GROWTH	DEBT-FUELED GLOBAL GROWTH	REVIVAL OF TRADITIONAL ENV. PRACTICES	CLIMATE CHANGE	DIGITAL ETHICS	HUMAN-CENTRIC TECHNOLOGY DEVELOPMENT			
WEB 3.0	COLLABORATIVE ROBOTS	GENERATIVE ALGORITHMS	DIGITAL TWINS	THORIUM-FUELED NUCLEAR REACTOR	GEOTHERMAL ENERGY	HYDRO ENERGY	RIISING ENERGY DEMAND	DIVERSITY & INCLUSION	POVERTY	CLIMATE CHANGE DIPLOMACY	CLIMATE WEAPONIZATION	ANTI-GLOBALIZATION SENTIMENT	GOVERNMENT DEBT	GLOBAL TRADE	PLANETARY HEALTH	EXTREME ENVIRONMENTAL EVENTS	ETHICS OF EMERGING TECHNOLOGIES	ETHICAL USE OF AI & AUTOMATION			
ROBOTICS	SOFT ROBOTS	MOLECULAR ROBOTS	SYNTHETIC DATA SETS	PREDICTIVE MACHINE VISION	GENERATIVE ADVERSARIAL NETWORKS	BIOFUELS	DECLINING MIDDLE CLASS (WEST)	EMERGING MIDDLE CLASS (EAST)	DECLINE IN FERTILITY RATES	RELOCALIZATION	AGING INFRASTRUCTURE	EMERGING STRATEGIES FOR A NEW ERA	SHIFT FROM GLOBAL TO REGIONAL TRADE	ATROPHY OF GLOBAL ECONOMIC GOVERNANCE	POLLUTION	RESOURCE SCARCITY	POSTHUMANISM	PRIVACY & DATA ETHICS			
PERSONAL ROBOTS & AI PARTNERS	SOCIAL ROBOTS	ROBOTIC SURGERY	CREATIVE AI	LARGE ACTION MODELS	ZERO CARBON NATURAL GAS	CARBON CAPTURE	INDIVIDUALISM	CORRUPTION	HUMAN MIGRATION	STRUCTURAL CHANGE FOR A DIFFERENT WORLD	SHIFTING INFLUENCE OF GLOBAL POWERS	SHIFT IN INFLUENCE FROM WEST-TO-EAST	MONETARY & FISCAL POLICY	INEFFECTIVE ECONOMIC METRICS	RIISING SEA LEVELS	EXCEEDING PLANETARY BOUNDARIES	REASSESSMENT OF SOCIETAL VALUES	PHILOSOPHY OF AI			
ROBOT AVATARS	VR-CONTROLLED ROBOTS	ROBOT BEES	METAVEVERSE	EXTENDED REALITY	MIXED REALITY	MODERN GRID	CLASS WARS	CULTURE WARS	POPULATION GROWTH/DECLINE	POSSIBLE CHINA-AMERICA DECOUPLING	MOVEMENT TOWARDS A NEW WORLD ORDER	SHIFTING GLOBAL ALLIANCES	DEMONETIZATION	MODERN MONETARY THEORY	ZERO-WASTE ADOPTION	DEFORESTATION	VALUES-DRIVEN LEADERSHIP	PHILOSOPHY OF VIRTUAL REALITY			
SELF ASSEMBLING ROBOTS	VIRTUAL REALITY	AUGMENTED & DIMINISHED REALITY	CONTACTLESS INTERFACES	MICRO POWER PLANTS	SOLAR ENERGY	HYDROGEN FUEL	AGING POPULATION	URBANIZATION	CARING FOR THE ELDERLY	ANTIQUATED POLICIES EXPOSED	COLLAPSE OF POST-WORLD WAR II INSTITUTIONS	GLOBAL INSTITUTIONS STRAINED	RESERVE CURRENCY STATUS	CENTRAL BANK DIGITAL CURRENCIES	NATURAL DISASTERS	CARBON-FREE PLASTICS & BIODEGRADABLES	PHILOSOPHY OF CLIMATE SCIENCE	THE DECLINE OF RELIGION			
QUANTUM COMPUTING	DIGITAL AGENTS	LI-FI	SYNTHETIC MEDIA	VOICE CLONING	ELECTRIC HEAT PUMPS	ELECTRIC VEHICLES	INCREASED LIFESPANS	IMMIGRATION BACKLASH	MARRIED LATER	RIISING PRESSURE ON EU MODEL	CENTRALIZED VS. DECENTRALIZED GOVERNANCE	EMERGING MULTILATERAL INSTITUTIONS	DECENTRALIZED DIGITAL CURRENCIES	FINANCIAL CRASH	AGROECOLOGY & PERMACULTURE	ATMOSPHERIC AEROSOL LOADING	BIAS AWARENESS & MITIGATION	CRITICAL THEORY & SOCIAL JUSTICE			
PERSONAL DATA RECORD	DNA HARD DRIVES	HOLOGRAMS	FACE & VOICE PRINTS	RECOGNITION TECHNOLOGY	CONTAINED FARMING	VEHICLE-TO-GRID	RIISE IN THE DEPENDENCY RATIO	GENERATIONAL TURNS	BIODIVERSITY LOSS	POWER SHIFTS FROM NATIONS TO CITIES	SHIFT FROM MILITARY TO NON-MILITARY SPHERE	SHIFT FROM DEMOCRACY TO PLUTOCRACY	INFLATION	CASHLESS SOCIETY	BIOMASS ENERGY SYSTEMS	BIOREGIONALISM	GLOBAL ETHICAL STANDARDS	EXISTENTIAL RISK & PHILOSOPHY			
VISIBLE LIGHT COMMUNICATIONS	PHOTONICS	SPATIAL COMPUTING	CONNECTED CAR	AUTONOMOUS VEHICLES	DRONES	MICROGRIDS	FAKE NEWS	THE RIISE OF ALTERNATIVE LIVING	FIVE GENERATIONS OF WORKERS	NATURAL RESOURCE DEPENDENCE	SHARING OF PRODUCTIVE RESOURCES	SHIFTING RESOURCE PARADIGM	DEPRESSION-RECESSION RISK	SLOWDOWN IN PRODUCTIVITY GROWTH	CLIMATE-RESILIENT ECOSYSTEM DESIGN	COMMUNITY-BASED ENVIRONMENTAL RESILIENCE	LONG TERM SOCIETAL IMPACT FOCUS	PHILOSOPHY OF EMOTIONS			
AFFECTIVE COMPUTING	EDGE COMPUTING	FLYING CARS & PASSENGER DRONES	HYPERSONIC & SUPERSONIC FLIGHT	SATELLITE FLEETS	ENERGY STORAGE	NUCLEAR FUSION	SHIFTING VIEWS OF RETIREMENT	LONELINESS & ISOLATION	TECHNOLOGICAL UNEMPLOYMENT	SHIFTING ENERGY PARADIGM	SHIFT TO REGIONAL SUPPLY CHAINS	REDUCTION IN TRADE DRIVES GLOBAL CONFLICT	THE GREAT WEALTH TRANSFER	JOB LOSS	DEGROWTH ECONOMIC MODELS	EMBRACING INDIGENOUS KNOWL. & PRACTICES	AESTHETIC ACTIVISM	COLLECTIVE INTELLIGENCE & EPISTEMOLOGY			
BIOMETRIC SENSORS	BEHAVIORAL BIOMETRICS	AMBIENT COMPUTING	AUTONOMOUS WEAPONS	DRONE ENABLED INFRASTRUCTURE	SMART ROADS	SOLAR POWER SATELLITES	DIGITAL DIVIDE	TECHNOLOGY BIAS	POWER TO THE INDIVIDUAL	R&D-DRIVEN ADVANTAGE	POPULISM	BIOREGIONAL GOVERNANCE	OWNERSHIP TO ACCESS	MAKER ECONOMY	ENVIRONMENTAL FOOTPRINTING IN POLICY	GENE BANKING	EMBODIED COGNITION	ENVIRONMENTAL ETHICS & STEWARDSHIP			
FLOATING FARMS	HYPERLOOP	UNDERGROUND TRAFFIC GRID	REUSABLE ROCKETS	MODULAR NUCLEAR REACTOR	FLOATING NUCLEAR ENERGY PLANTS	WIRELESS POWER TRANSMISSION	RESKILLING SOCIETY	THE CHANGING NOTION OF WORK	GRID LIBERATION	TECHNO-NATIONALISM	NATIONALIST AGENDAS	GOVERNMENTS TURN INWARD	CONCENTRATION OF WEALTH	OFF-PLANET ECONOMY	LAND CONVERSION	MARINE BIODIVERSITY	ORGANIZATIONAL SOCIAL JUSTICE	EPISTEMOLOGY OF MISINFORMATION			
PERSISTENT AUDIO SURVEILLANCE	REGENERATIVE MEDICINE	CRISPR	GENETIC RECOGNITION	GENE DOPING	SUBSEA POWER GRIDS	WALKING-DRIVEN ENERGY	INDEPENDENT WORKERS	RIISE OF THE CROWD	VIOLENCE	PUBLIC EMPLOYMENT OPTION	GLOBALIZATION REVIVAL	COMPETING POLITICAL SYSTEMS	CONSUMER DEBT	SHARING ECONOMY	MONETIZING NATURE'S SERVICES	ENVIRONMENTAL ACCOUNTING	PHILOSOPHY OF QUANTUM MECHANICS	MOMENTOUS SHIFT IN HUMAN CONSCIOUSNESS			
PRECISION MEDICINE	PREDICTIVE MEDICINE	TOUCH SENSITIVE PROSTHETICS	GENETIC ENGINEERING	GENE THERAPY	GENETIC SCREENING	PRECISION AGRICULTURE	REVERSE BRAIN DRAIN	RACISM	FALL IN WORKING AGE POPULATION	AUTHORITARIAN CONTROL	DISTRIBUTED AUTHORITY	MASS-SCALE DISINFORMATION	INTANGIBLE ECONOMY	TOKENOMICS	NITROGEN & PHOSPHOROUS LOADS	ORGANIC POLLUTANTS	ETHICS OF COMPENSATION	PHILOSOPHY OF GLOBAL JUSTICE			
AQUAPONICS	EXOSKELETONS	GENOMICS	BIOTECHNOLOGY	PRECISION BIOLOGY	VERTICAL FARMING	MICROFARMS	IDENTITY THEFT	AVERSION TO PHYSICAL CONTACT	DEATHS OF DESPAIR	A POLARIZED SOCIETY	TRUST IN GOVERNMENT DROPS	WORLD WAR	VIRTUAL JOBS	BIOECONOMICS	CLIMATE GEOENGINEERING	EARTH SYSTEM GOVERNANCE	INCLUSIVE VALUE CREATION	TRANSPARENCY & ACCOUNTABILITY IN ACTIONS			
NANOTECH	FULL BRAIN SIMULATION	COMPUTATIONAL BIOLOGY	SYNTHETIC BIOLOGY	BIOPHOTONICS	ROBOTIC FARMING	HYDROPONICS	MENTAL & EMOTIONAL HEALTH ISSUES	ADDICTION	DISABILITY	CIVIL WAR	SPACE ASSETS BECOME TARGETS	TERRORISM	DIGITAL DIVIDENDS	EMPOWERMENT ECONOMY	NATURE-BASED SOLUTIONS FOR CITIES	OZONE DEPLETION	PHILOSOPHY OF CARE & EMPATHY	PHILOSOPHY OF CONSCIOUSNESS			
BRAIN-COMPUTER INTERFACES	BRAIN-TO-BRAIN COMMUNICATION	BRAIN-TO-VEHICLE INTERFACES	BIOINTERFACES	SYSTEMS BIOLOGY	BIOELECTRONICS	AQUACULTURE	SUICIDE		EMERGENCE OF NON-STATE ACTORS	DEVELOPING COUNTRY COLLAPSE	A NEAR ZERO MARGINAL COST SOCIETY	ROBOT TAXES	ECOSYSTEM COLLAPSE	EARTH HEALTH MONITORING	PHILOSOPHY OF MIND IN NEUROSCIENCE	PHILOSOPHY OF DATA SCIENCE					
CONNECTED CLOTHING	SMART GLOVES	3D BIOPRINTING	STEM CELL THERAPY	IVF GENETIC SCREENING	AEROPONICS	CELLULAR AGRICULTURE	HEALTH INEQUITY		UNFUNDED PENSIONS	GLOBAL INEQUALITY	UNIVERSAL BASIC INCOME	UNIVERSAL CAPITAL ENDOWMENT	REGENERATIVE AGRICULTURE	RESTORATION OF NATURAL ECOSYSTEMS	MORAL COURAGE & ADVOCACY	MACHINE CONSCIOUSNESS DEBATES INTENSIFY					
TERRAFORMING	ASTEROID MINING	CHEMICAL SYNTHESIS	METABOLIC ENGINEERING	CRYONICS	ARTIFICIAL PHOTOSYNTHESIS	SYNTHETIC FOOD	TRADE WARS		NATIONALISM	GIG ECONOMY	STAKEHOLDER CAPITALISM	SOIL EROSION & DEGRADATION	FRESHWATER SCARCITY	ENGINEERED CONSUMPTION ETHICS DEBATED	TIME WEALTH GAINS CULTURAL VALUE						
BLOCKCHAIN	DIGITAL CURRENCIES	GENENGINEERING	3D/4D/5D PRINTING	SELF-HEALING MATERIALS	DESALINATION	PURIFICATION SYSTEMS	STRATEGIC POLICY		NEW INSTITUTIONS BEGIN TO RIISE	DOUGHNUT ECONOMICS	ECONOMIC BURDEN OF SOCIAL PROGRAMS	OCEAN ACIDIFICATION	NATURAL CAPITAL ACCOUNTING	AI CHALLENGES HUMAN CONTROL	MORAL WORLDS DRIFT APART						
NON-FUNGIBLE TOKENS	INSTANTANEOUS PAYMENT CORP	DEEP SEA MINING	ADVANCED PROSTHETICS	MOLECULAR MANUFACTURING	ATMOSPHERIC WATER GENERATION	CHARGING STATIONS	UNEMPLOYMENT RIISING		LINE BETWEEN PEACE AND CONFLICT BLUR	FOOD INVESTING	CARBON MARKETS	EXTREME WEATHER BECOMES ROUTINE	INSURANCE MODELS COLLAPSE IN HIGH-RISK ZONES	STORY BECOMES STRATEGIC INFRASTRUCTURE	DATA OWNERSHIP BECOMES PROPERTY						
SOLAR HIGHWAYS	ARTIFICIAL PHOTOSYNTHESIS			ARTIFICIAL TREES	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	CIRCULAR ECONOMY	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS	ARTIFICIAL PHOTOSYNTHESIS			
ROBOT SWARMS		MYCO-ARCHITECTURE			DRONE GENERATED RENEWABLES	DISTRIBUTED COMPUTING		RUNNING											CITIES RETROFIT FOR COGNITIVE SAFETY		

SCIENCE AND TECHNOLOGY

SOCIETY

GEOPOLITICS

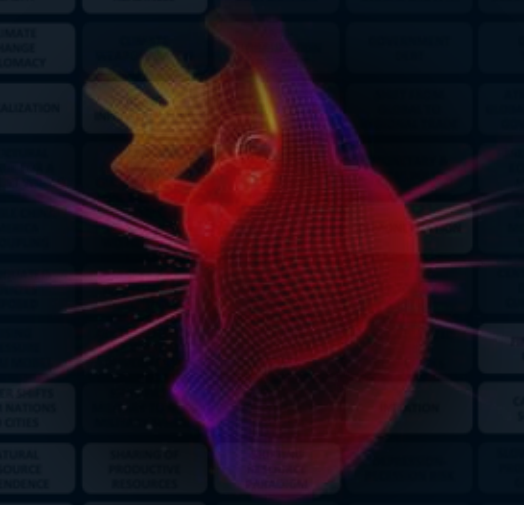
ECONOMICS

ENVIRONMENT

PHILOSOPHY



ADVANCED
PROSTHETICS



DIGITAL
TWINS



R U N N I N G

Running to the Future

Can a personal digital twin help an average runner complete his first marathon?

Training Plan Development

Generative AI creates an optimal training plan based on inputs including age, fitness level, running experience and available training time.



Strain and Recovery

Data from a smart band monitors physical exertion, stress, heart rate variability, respiratory rate, sleep quality and recovery. AI enabled virtual coach provides feedback to optimize recovery.



Real-time Training Data

Smart watch provides key training data including distance, pace, time, heart rate, heart rate zone and more to track and optimize training runs and supplemental activities like strength training.



Training Plan Tracking

Training app collects data from wearable devices to track training over time, helping to identify weekly miles run, performance improvements, performance vs. peers, etc.



Diet and Nutrition

Glucose monitor tracks diet, nutrition and the effects on blood sugar levels from food, activity, stress and sleep, which can impact running performance.



Improved Health Data

Nanobots delivered throughout the body will provide a larger scope and depth of health data than wearables can, improving the accuracy of the digital twin.



Optimized Biological Actions

Based on health markers, the digital twin could instruct a nanobot to release additional oxygen into the lungs when needed.



Proactive Pain Management

If the digital twin simulation shows that a specific part of the course is harder on the knees, it could instruct nanobots to release pain medication at the appropriate time during a real race.



Shoe Fit

In-store 3D scanners measure and analyze multiple dimensions of an individual's foot. AI enabled software uses these measurements to recommend a shoe that will provide an optimal fit.



TODAY

TOMORROW

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FUTURE ATHLETE



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.

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.

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.

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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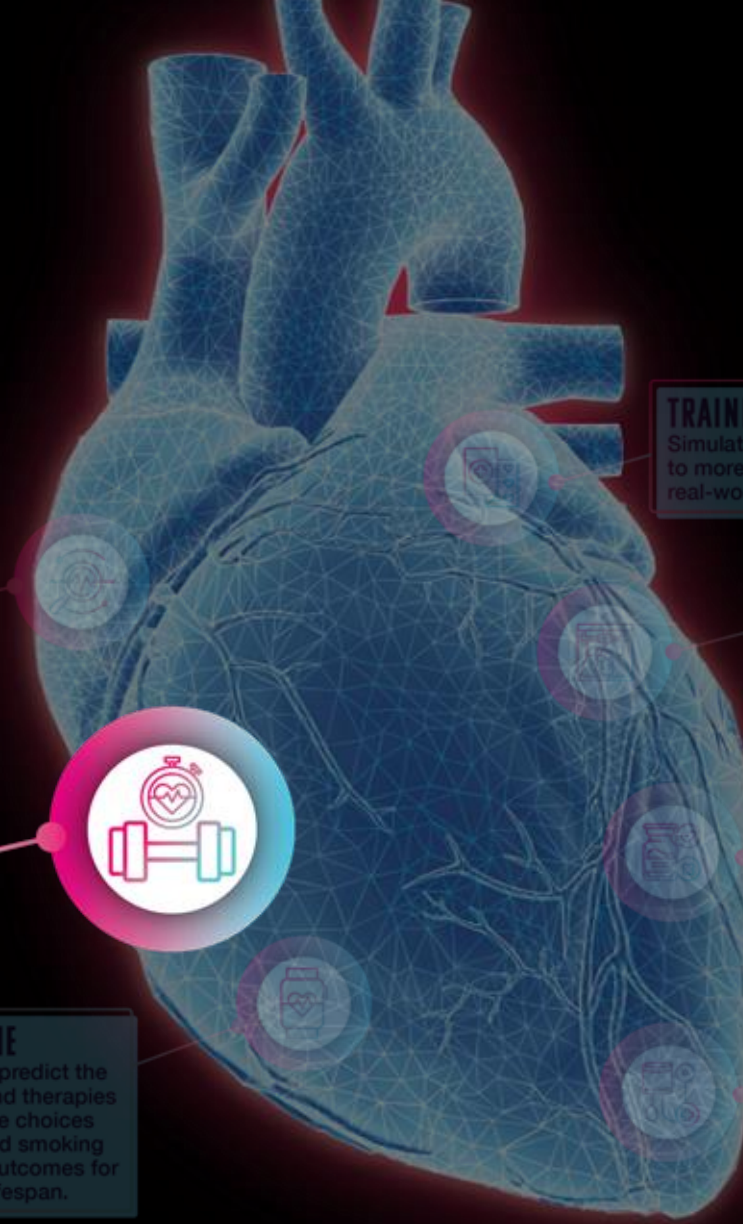
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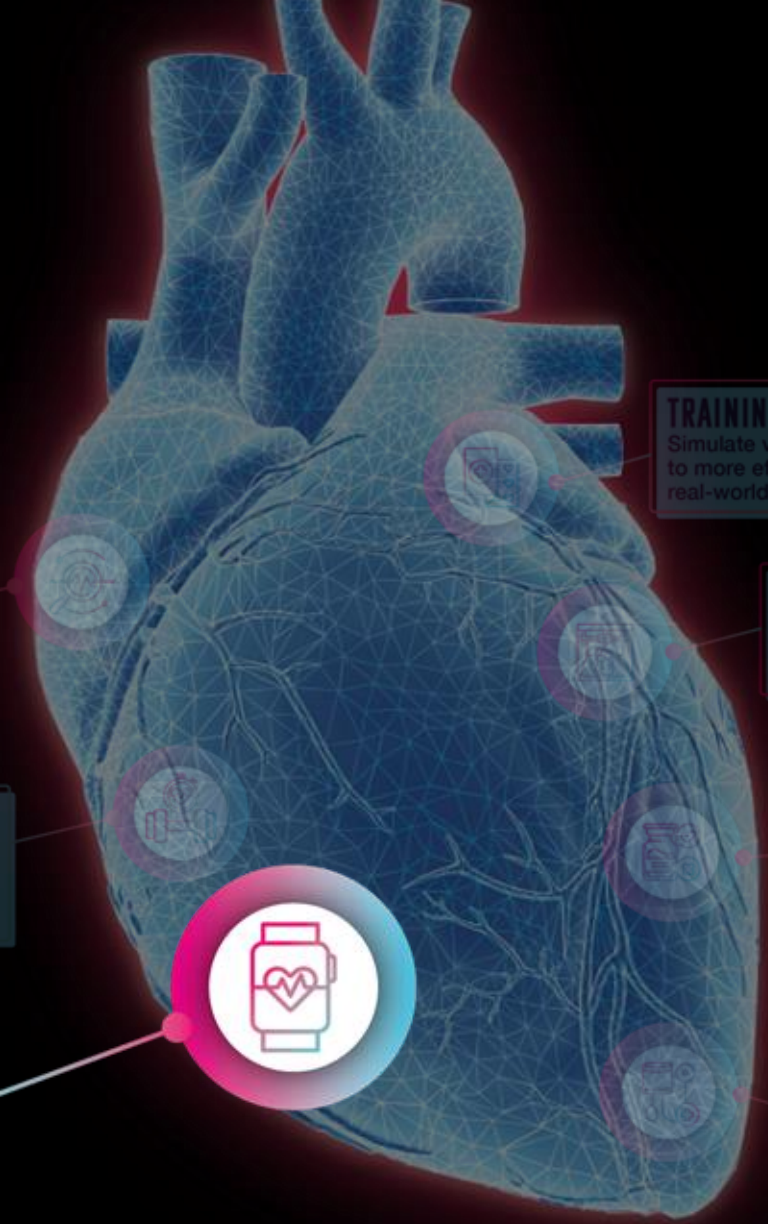
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A large, blue, wireframe heart is the central focus of the image. It is surrounded by several circular icons, each containing a different medical or technological symbol. Lines connect these icons to callout boxes that describe various applications of digital heart technology. The background is dark, making the blue heart and white text stand out.

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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.



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

Platforms such as the TCS Digital Platform for NextGen Agriculture help farmers monitor and optimize crop growth by modeling weather, soil quality, fertilizers, and seed variants - reducing waste, increasing yields, and improving crop quality.



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.

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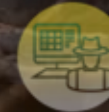
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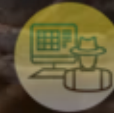
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ALVIN TOFFLER, *Future Shock*



THINKING DIFFERENTLY.

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Bill Quinn

[linkedin.com/in/billdquinn](https://www.linkedin.com/in/billdquinn)

Thank you.

