

GLOBAL X

by Mirae Asset



Beyond Ordinary ETFs

December 2021

Content



Introduction to Global X ETFs

Thematic Investing

Including Thematic ETFs in Global Diversified Portfolios

Robotics & Artificial Intelligence

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About Us

Global X ETFs was founded in 2008. For more than a decade, our mission has been empowering investors with unexplored and intelligent solutions.

Our Team



A diverse collection of more than 80 financial professionals, representing more than five native languages and ten nationalities, bringing together over 200 years of industry experience

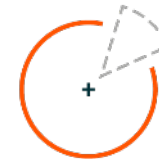
Our Business



Exchanged-Traded Funds (ETFs)



Research & Insights



ETF Model Portfolios

Our Partners



Global Perspective & Reach



World-renown Index Providers & Exchanges

Our Brand

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Global X Overview: ~\$43bn in AUM across 93 ETFs

AUM (US\$m) by Fund Family as of 8 November 2021



Source: Global X ETFs as of 8 November 2021

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Global X Thematic Growth ETF Suite in UCITS

Global X has two ETFs designed to target companies that may benefit from disruptive structural changes in technology and innovation and people and demographics¹

Disruptive Technology

- Video Games & Esports UCITS ETF (HERU)
- Cloud Computing UCITS ETF (CLO)
- Robotics & Artificial Intelligence UCITS ETF (BOTZ)
- Cybersecurity UCITS ETF (BUG)
- Autonomous & Electric Vehicles UCITS ETF (DRVE)
- FinTech UCITS ETF (FINX)
- Internet of Things UCITS ETF (SNSR)

Physical Environment

- U.S. Infrastructure Development UCITS ETF (PAVE)
- CleanTech UCITS ETF (CTEK)

People & Demographics

- Telemedicine & Digital Health UCITS ETF (EDOC)
- Genomics & Biotechnology UCITS ETF (GNOM)
- E-commerce UCITS ETF (EBIZ)

¹As of 21/11/2021

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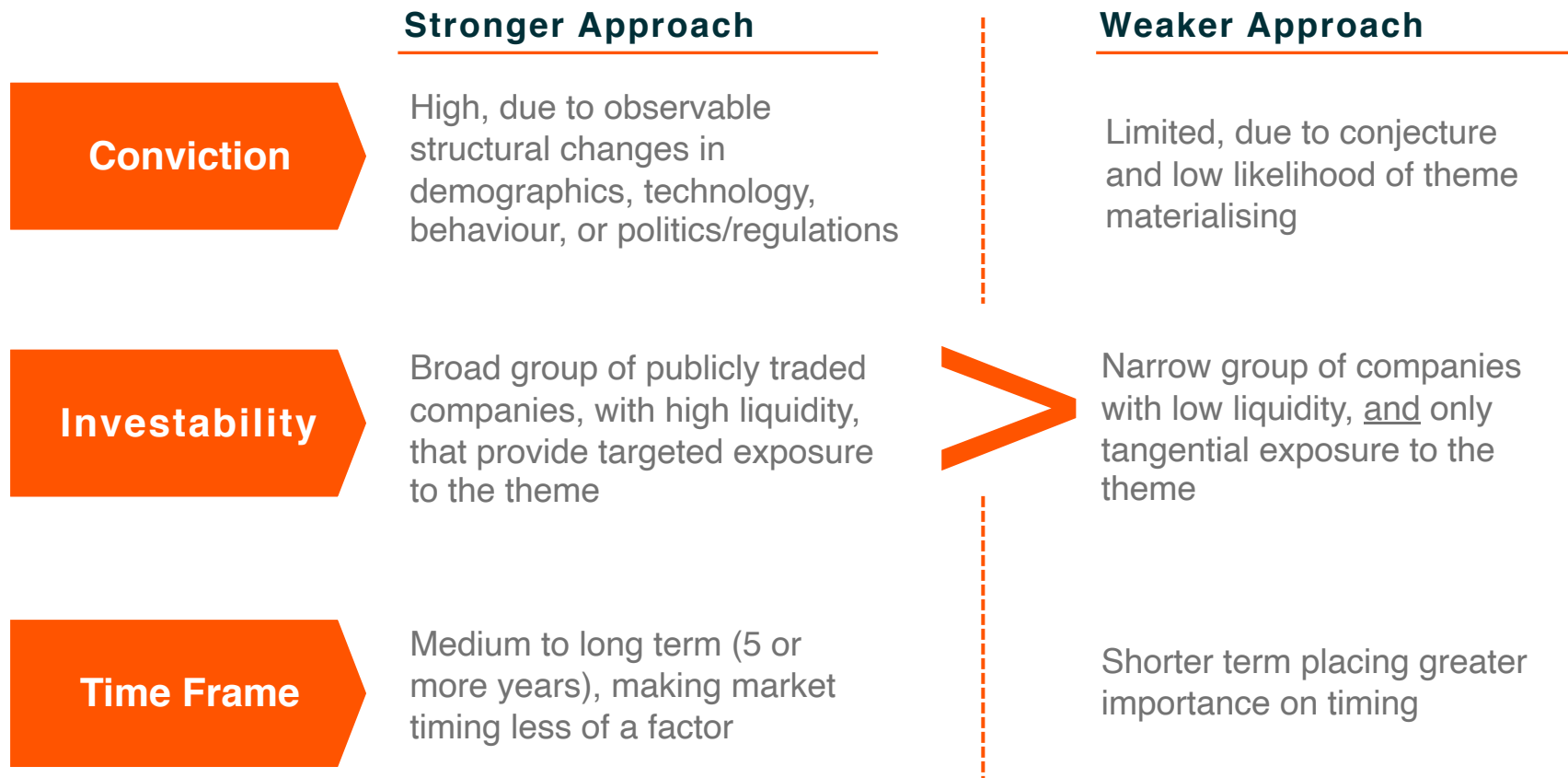
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Thematic Investing

3 Steps for Choosing a Theme

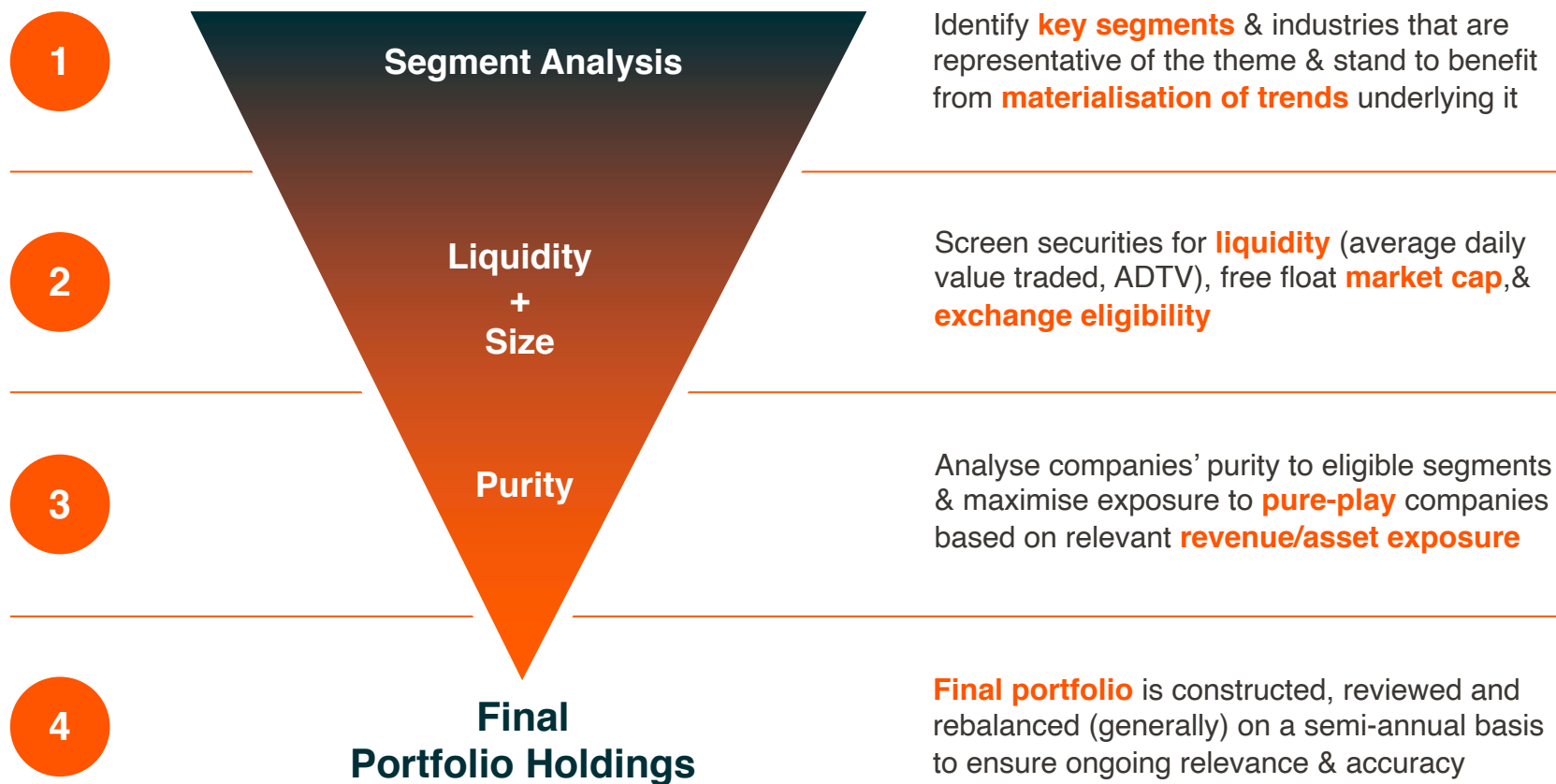
Keys to approaching thematic investing: Look for high conviction themes, investments with high exposure to those themes, and a multi-year time frame.



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Investability: Focusing in on Pure-Plays

Accurately identifying relevant market segments, industries, and individual companies that stand to benefit from the materialization of the theme is key to maximizing a theme's growth potential.

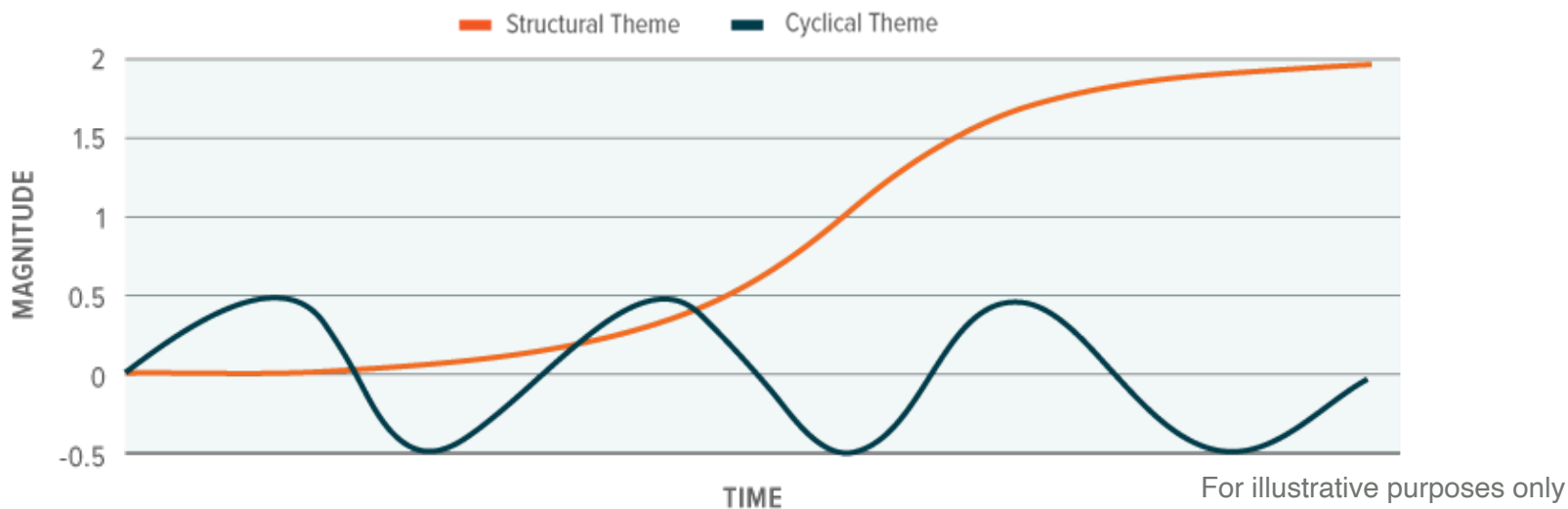


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Time Horizon: Differentiating Between Cyclical vs. Structural Themes

Thematic investing is often used to broadly describe a forward-looking investment approach, but we believe it's important to distinguish between two distinct types of themes: cyclical and structural.

Structural Themes	Cyclical Themes
<ul style="list-style-type: none"> • Occur as one-off shifts that change an existing paradigm • Tend to be longer-term in nature • Typically driven by powerful forces such as disruptive technologies, changing demographics and consumer behavior, or evolving physical environments 	<ul style="list-style-type: none"> • Occur at mostly regular short - or medium-term intervals, typically based on business cycle changes • Can be mean-reverting, so that over a long period of time they tend to regress to a normal level • Examples include asset valuations, volatility, interest rates, and currency values



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Portfolio Inclusion of Thematic ETFs

Thematic Investing: Harnessing Disruption in Portfolios

Thematic Investing brings a rigorous and research-driven approach to harnessing **structural changes** around the world. It seeks to identify powerful **macro-level trends** and the **companies that stand to benefit** from the materialisation of those trends.

General Process

Top Down

Identify disruptive macro-level trends and select related high-conviction themes



Bottom Up

Select investments highly exposed to those themes and related trends

Characteristics

- **Long-term, growth-focused** strategies
- **Unconstrained** by geographies & sectors
- **Concentrated**, often in tech & new consumer
- **Relatable** concepts that impact our daily lives

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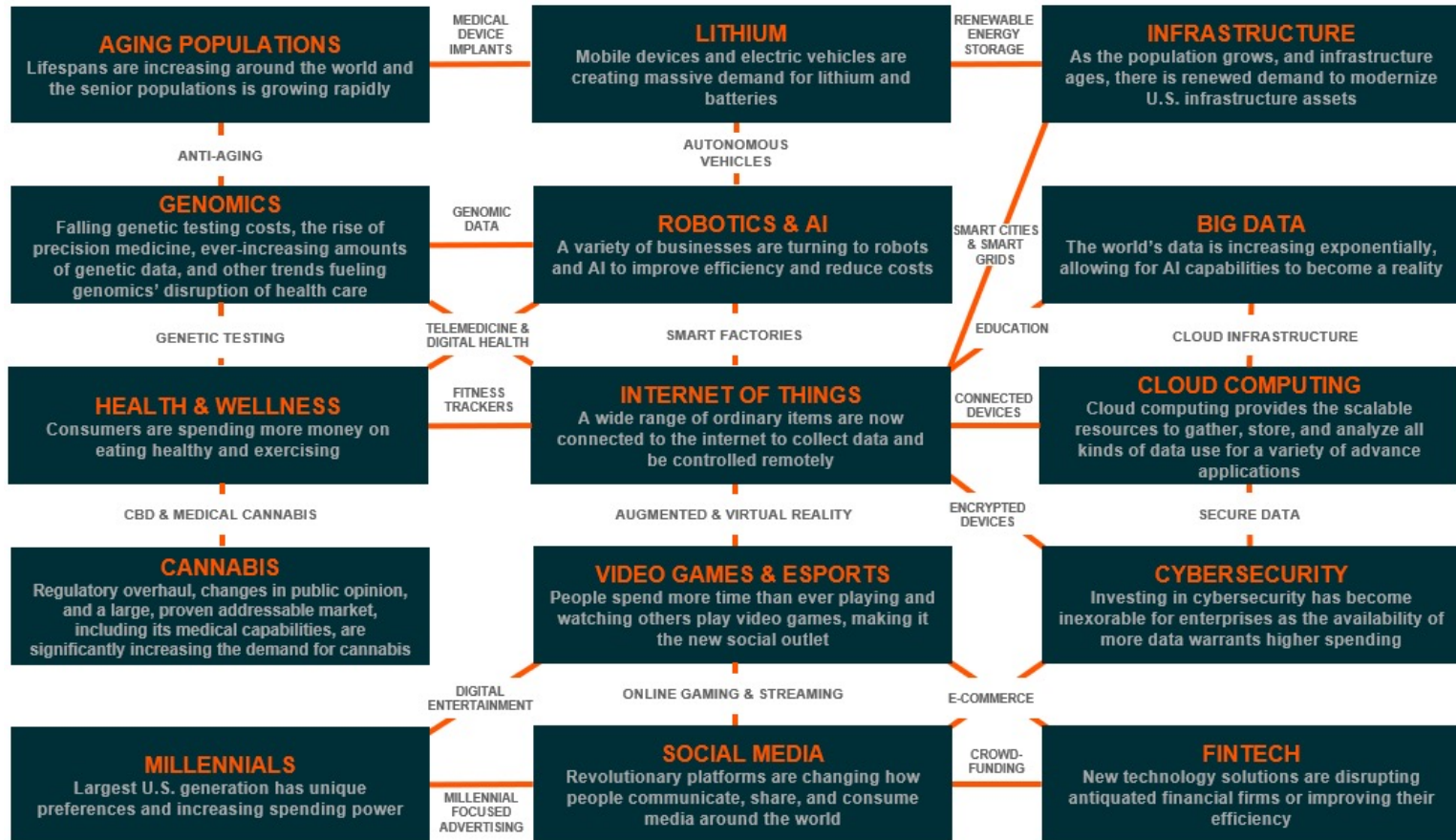
Potential Advantages of Thematic Investing

- 1 Embrace a Long-Term Mindset:** While markets are often more focused on short term earnings, guidance, and macro trends, patient investors can use their extended time horizons to their advantage by allocating to long term themes that may take years to fully play out.
- 2 Participate in Exponential Growth:** Due to their more short-term focus, markets often under-value or misprice protracted exponential growth opportunities, presenting opportunities for thematic investors.
- 3 Get Ahead of the Curve:** Leading companies in nascent themes often have small weightings in broad market or even sector indexes. By spotting themes early, investors can lock in exposure before mainstream index inclusion and ownership takes place.
- 4 Diversify Returns:** With concentrated baskets of securities and an unconstrained approach to sector and geographic exposures, thematic investing can offer returns with low correlations to other portfolio allocations.
- 5 Avoid Being the Disrupted:** Alternatively, not embracing a thematic approach may mean one's portfolio has too much exposure to industries and companies at high risk of being disrupted by changing paradigms.

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Diversifying Across Themes

Diversification in thematic investing involves an evaluation of potential holdings overlap, adjacency of themes, sector and geographic concentrations, key drivers, and other potential risks.



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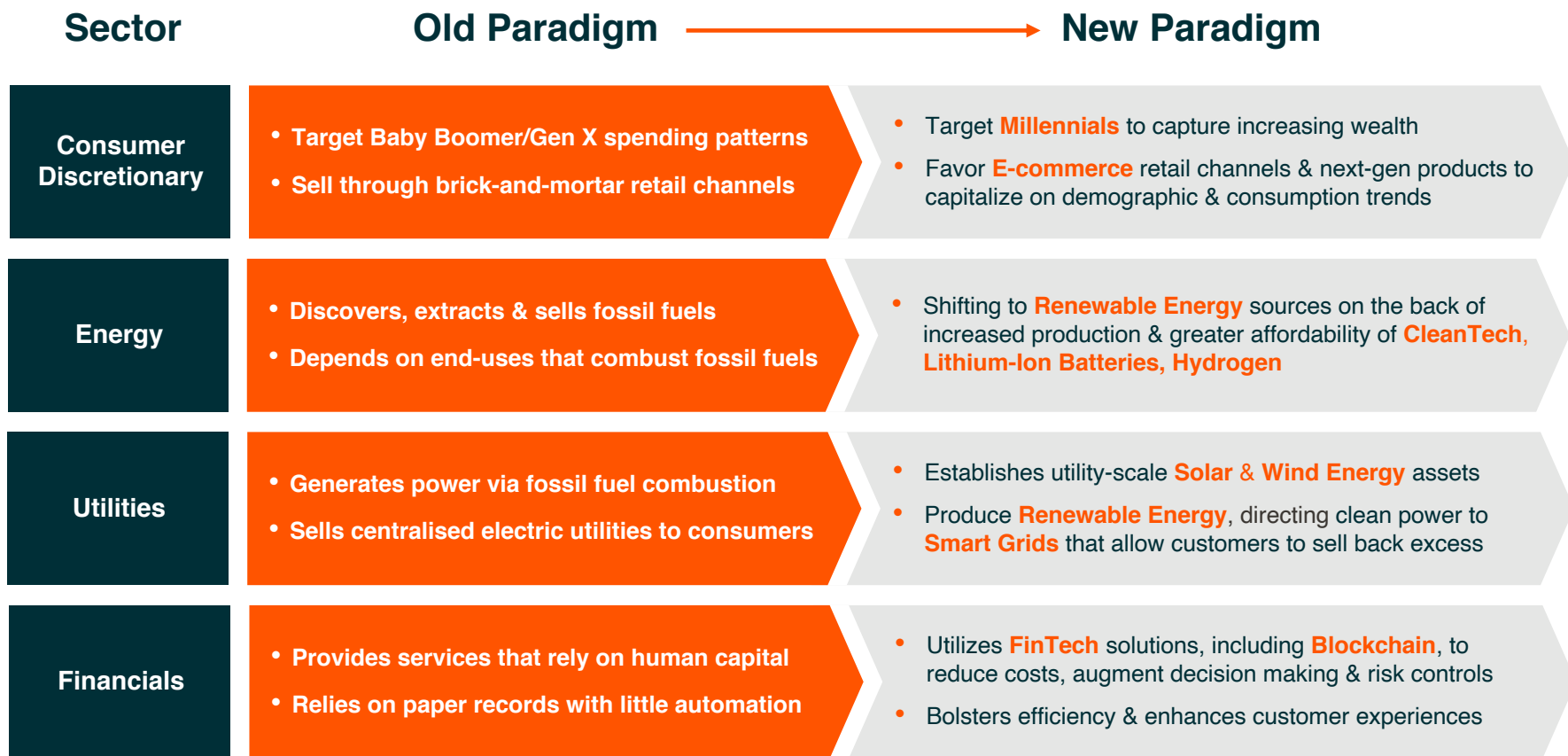
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Get to Know Global X ETFs

An Abundance of Change

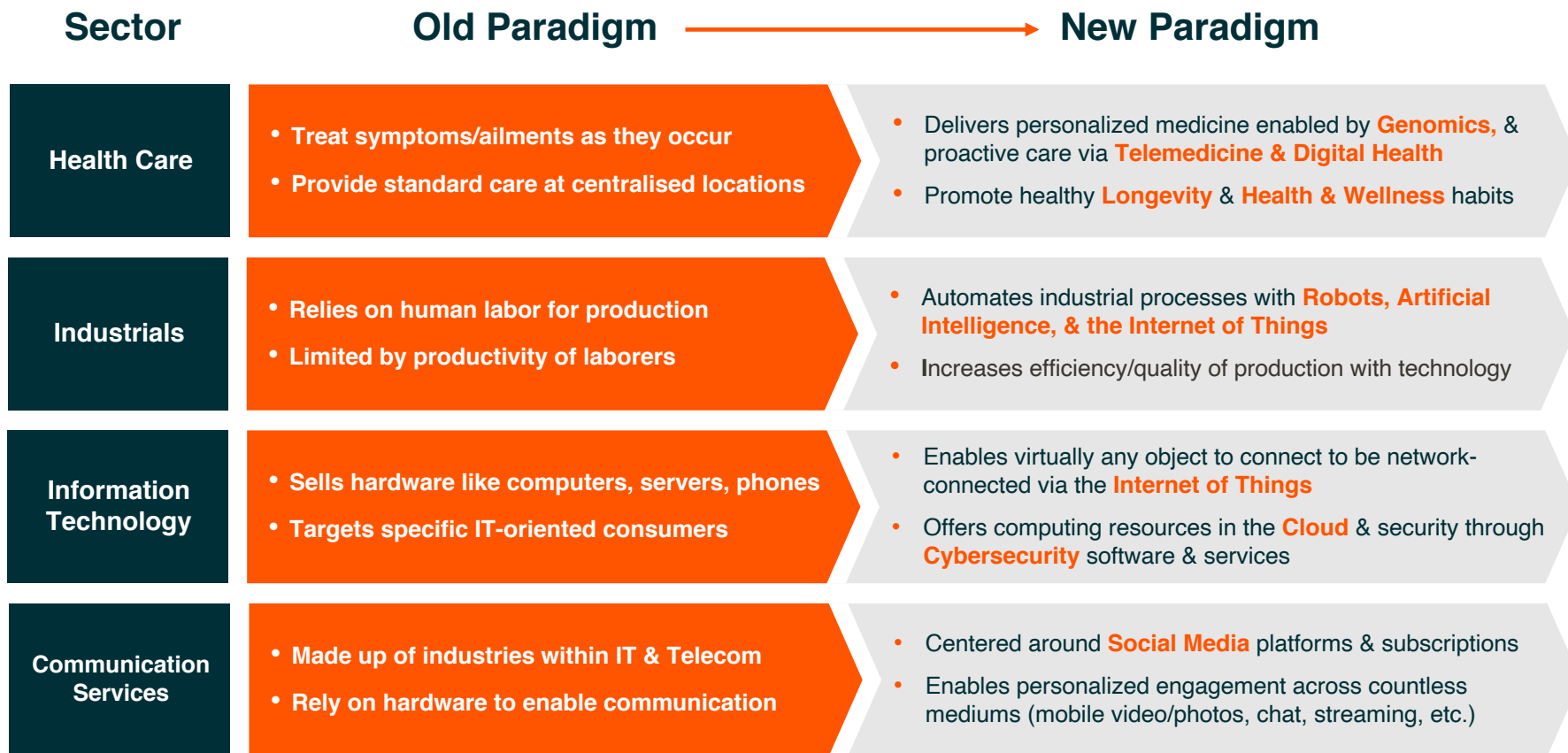
Rapid advancements in technology and changing consumer preferences are disrupting traditional paradigms in sectors, industries, and the economy at large.



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COVID-19: A Case Study in Accelerated Disruption

The COVID-19 pandemic accelerated several disruptive long-term trends by fast-tracking digitalization, upending deeply engrained social norms and consumer habits, and unlocking new economic policies.

Theme

Pandemic-Induced Disruption & Accelerated Adoption

Genomics

- **Genomic Sequencing** becomes mainstream, identifying SARS-CoV-2, tracking transmission & mutations, and driving **mRNA vaccine development**
- Unprecedented sequencing/drug development offers **proof-of-concept & new uses**

Robotics & AI

- Global factory closures and supply chain disruptions forced manufacturers to seek business continuity solutions and rethink offshoring
- Manufacturers embrace **Robotics & Artificial Intelligence** to automate processes and to re-shore supply chain in a cost-effective manner

Cloud + Cybersecurity

- Office and school closures initiated an age of work-from-home and digital learning, creating new demand for **Cloud Computing & Digital Infrastructure**
- New reliance on technology increased cyber-risk and **Cybersecurity** spending in turn

Video Games

- Stay-at-home measures created new consumer habits within the **Digital Economy**
- **Video Games** saw massive adoption within this economy as consumers sought new mediums for recreation and socialisation

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Where Do Disruptive Themes Stand?

While each theme follows a unique adoption curve, the chart below estimates the phase of adoption for several themes we cover. Less developed themes plot further to the left on the adoption curve and have both higher risk and higher reward potential. More established themes plot further to the right on the adoption curve.



Adoption	Innovators	Early Adopters	Early Majority	Late Majority	Laggards
Growth	Slow	Medium	High	Medium	Slow

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Robotics & AI

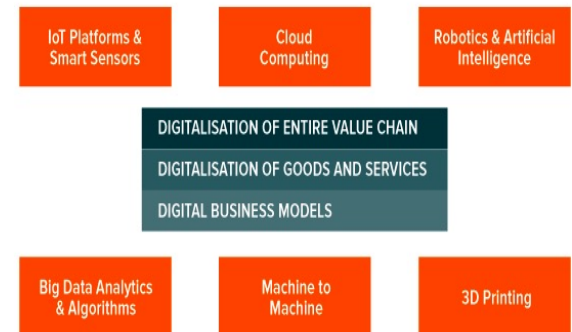
Disruptive Technology



- Connectivity (Internet of Things, IoT) drives the digitisation of the economy and enables new disruptive technologies that are profoundly changing the way we live and work.
- Following a sustainably-oriented theme means targeting innovative and disruptive industries that could lead to tangible improvements in certain environmental and/or social matters
- The Digital Economy generated almost half of value added and half of the new employment in G20 economies between 2006 and 2017*



Industry 4.0 Framework

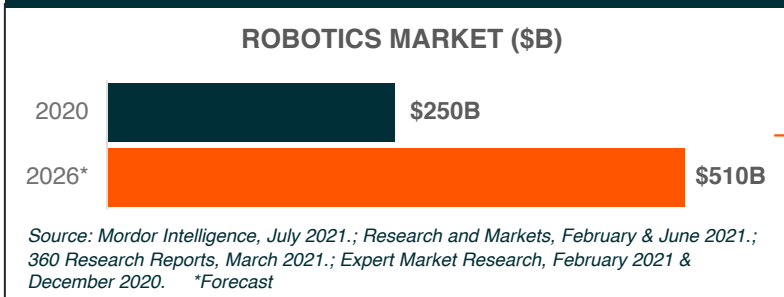


Source: Global X Research, Digital Economy concept adapted from Bukht and Heeks (2017), *OECD's estimates, Industry 4.0 framework adapted from Geissbauer et al. (2016)

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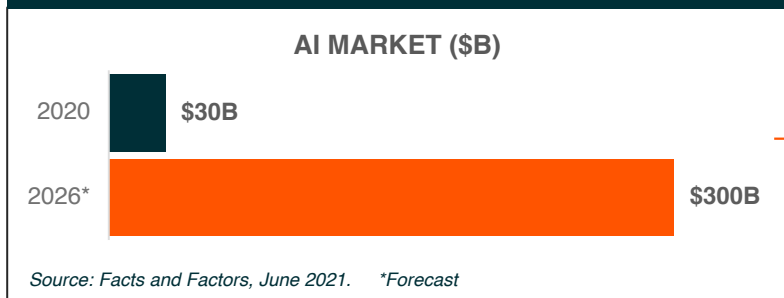
Robotics & AI: Growth Across Multiple Segments

Robotics encompasses the creation, design, and application of programmable machines that can perform tasks and interact with their environments without or alongside humans.



The global robotics market is expected to expand to about \$510B by 2026, a 12.4% CAGR.¹

Artificial intelligence (AI) refers to computer systems that can work, react, and learn like humans to autonomously perform tasks that involve decision making, visual perception, and speech recognition.



The global AI market is expected to expand to nearly \$300B by 2026, a 35.6% CAGR.²

Key Segments

INDUSTRIAL ROBOTS & AUTOMATION

Companies that provide robots and robotic automation products and services with a focus on industrial applications

UNMANNED VEHICLES & DRONES

Companies involved in development and production of unmanned vehicles, including related hardware and software; drones and robots for military and consumer markets

NON-INDUSTRIAL ROBOTICS

Companies involved in developing robots and AI used for non-industrial applications, including agriculture, healthcare, consumer applications and entertainment

ARTIFICIAL INTELLIGENCE

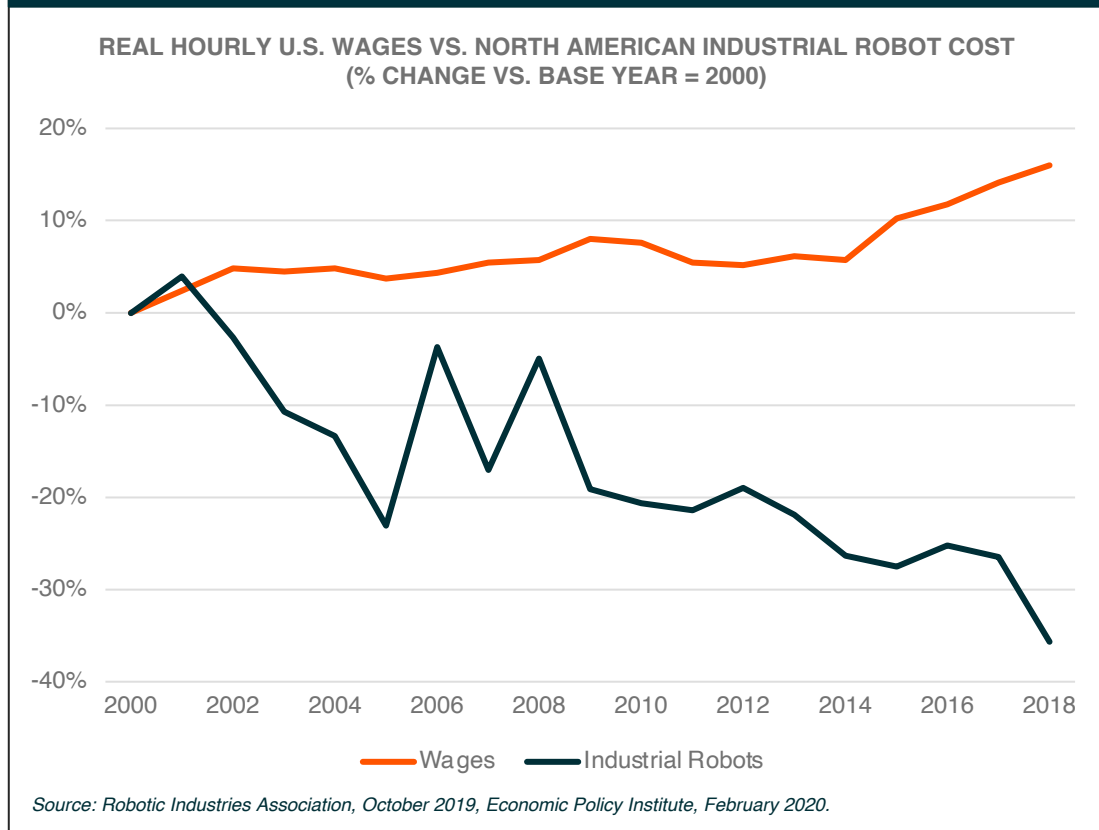
Companies that develop or directly deliver AI in form of products, software, or systems, only including those that sell AI beyond using to enhance products

Sources: 1. Global X calculation based on Mordor Intelligence, Research and Markets, 360 Research Reports, & Expert Market Research 2021 reports.; 2. Facts and Factors, "Artificial Intelligence Market By Component," June 2021.

Robotics & AI: The Trends Driving Adoption

Recent disruptive macro-events like trade conflicts and global health emergencies challenge globalization & offshoring manufacturing. Many firms could turn to robotics and automation to reshore their supply chains.

COST OF ROBOTICS DECREASES AS LABOR COSTS RISE



Sources: 1: The Guardian; 2-3: Boston Consulting Group

What's Driving Robotics/AI?

Aging Populations

- Increased lifespan & decreased birth rates requires robotic labor to maintain output
- **EX:** Japan's labor force will be at half of peak level by 2060¹

Labor Costs

- Robots have become cheap as labor costs increased (see chart)
- **EX:** By 2025, robotics driven labor-cost-savings could reach 22% in the U.S.²

Performance Enhancements

- Robots can be more precise, AI optimizes production for maximum output
- **EX:** By 2025, robotics could increase productivity by 30% in some countries³

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Robotics & AI: Potential Disruption Areas

Robotics and AI disrupt a broad range of verticals, including manufacturing, military and defense, medicine, transportation, and agriculture.

Manufacturing

Around 10% of manufacturing was automated in 2015; this could increase to 25% by 2025.¹

Military & Defense

U.S. Army expects robot-use to reduce Brigade Combat Team size by 1,000 soldiers by 2030.²

Medicine

IBM Watson diagnoses lung cancer with 90% accuracy, superior to human doctors' 50% rate.³

Transportation

Autonomous vehicles could account for up to 15% of global passenger vehicles sales by 2030.⁴

Agriculture

The global market for agriculture robots could reach \$21.1 billion by 2026, growing at a 25.5% CAGR.⁵

AI and task automation could add \$15.7T to the global economy in 2030⁶

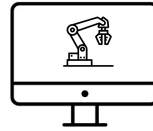
Sources: 1. CBS News, 2. Wellpoint, 3. McKinsey & Company, 4. Global Industry Analysts, Inc., 5. Research and Markets, 6. PwC

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Robotics & AI: What's Next?

Digital Twins

AI simulators train robots by emulating the real world, reducing the time, capital, and expertise required in the past



Digital Twin

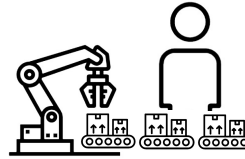


Physical Asset

- Iterating 1000s of processes per second
- Enabled by vast data volumes & improved emulation quality

Collaborative Robots (Cobots)

Modern sensor-equipped robots with increased dexterity & situational awareness can work alongside humans

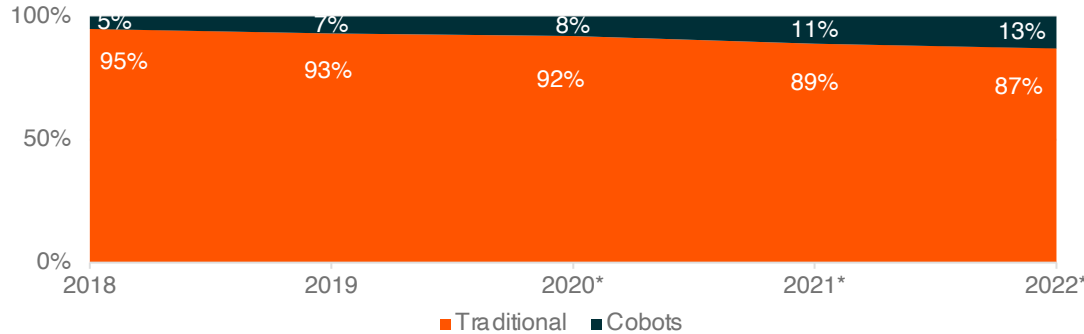


Human + Robot

- End-of-arm-tooling (aka effectors) & soft grippers enable handling of delicate items
- Cobots represented 4.8%+ of installed industrial robots in 2019 (+26.3%, YoY)¹

COBOT SALES CONTINUE TO RISE AS TECH IMPROVES VIABILITY

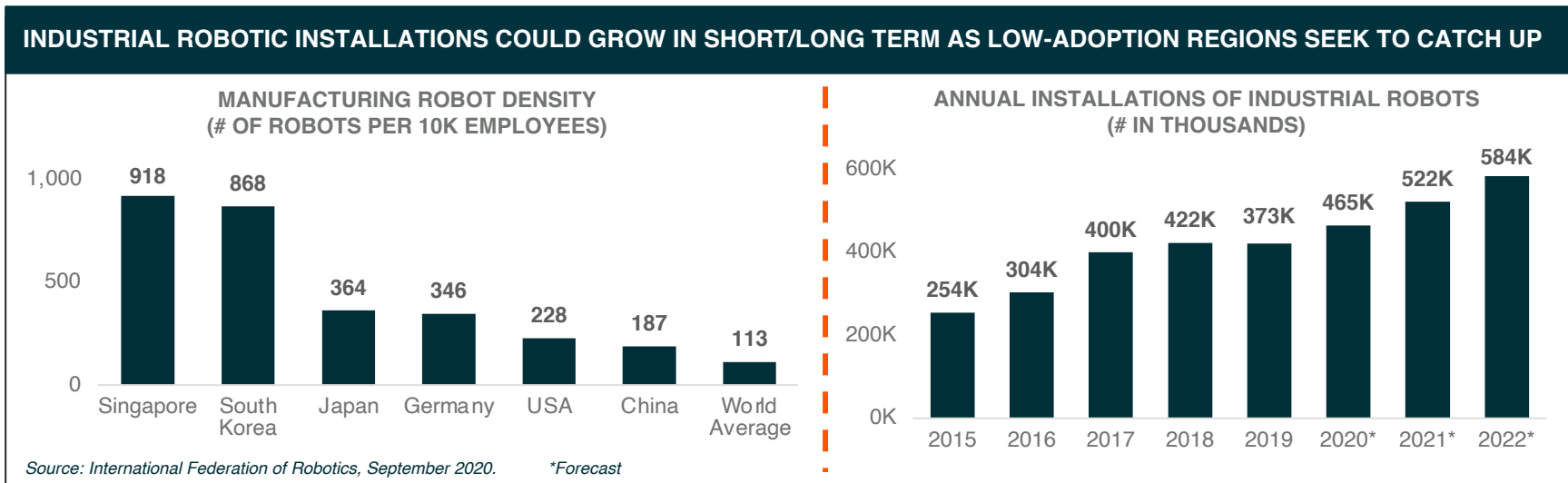
TRADITIONAL ROBOTS VS. COLLABORATIVE ROBOTS SHARE OF NEW ROBOT UNIT SALES (%)



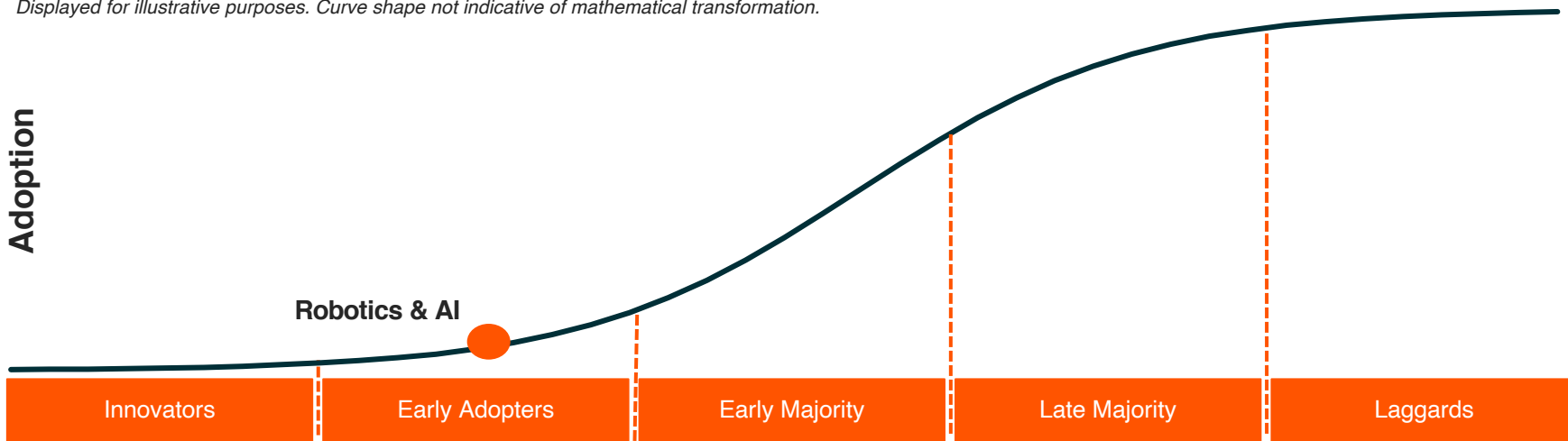
By 2026, the global cobot market could reach an estimated \$1.5B, growing at a 19.8% CAGR²

Source: 1. International Federation of Robotics; 2. Statista, June 2021. Note: CAGR = compound annual growth rate

Robotics & AI: Penetration Levels Remain Low



Displayed for illustrative purposes. Curve shape not indicative of mathematical transformation.



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Thank you.

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Appendix

Defining & Categorising Themes: Global X’s Classification System

Category	Mega-Theme	Theme	Sub-Theme
Disruptive Technology	Big Data	Machine/Deep Learning	
		Cybersecurity	
		Quantum Computing	
	Mobility	Cloud/Edge Computing	Remote Work, MarTech
		Autonomous Vehicles	
	Digital Content	Electric Vehicles	Lithium/Batteries
		AR/VR	
		Video Games	E-sports
		Social Media	
	FinTech	Streaming	
		Mobile Payments	
		Peer-to-Peer Lending	
		Crowdfunding	
		Blockchain	
	Connectivity	Digital Infrastructure	
		5G/Next Gen Networking	
		Emerging Markets Internet	
		Internet of Things	Smart Devices, Smart Cities, IIoT
Space/Satellite Communications			
Robotics	AI/Automation		
	3D Printing		
	Drones		
People & Demographics	New Consumer	Millennials & Gen Z	
		Emerging Market Consumers	
		Urbanization	
		E-commerce	
		Education	
		Sharing/Gig Economy	
		Safety and Security	
		Cannabis	
		Sports Betting	
		Professional Sports	
	Health	Healthcare Innovation	Telemedicine & Digital Health, Genomics, Immunotherapy, Public Health
		Aging Population	Senior Care, Senior Economy
		Health & Wellness	Obesity, Organics
		Emerging Markets Healthcare	
Physical Environment	Climate Change	Alternative Medicine	
		CleanTech	
		Clean & Renewable Energy	Solar, Wind, Hydrogen
	Infrastructure Development	Resource Scarcity	Water, Waste/Recycling, Rare Earths, Sustainable Food

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Global X Thematic Growth ETF Suite in the US

Global X has 33 ETFs designed to target companies that may benefit from disruptive structural changes in technology and innovation, people and demographics, and the availability of resources, as well as 2 multi-theme, single-ticker ETF¹

Disruptive Technology

- Social Media ETF (SOCL)
- Lithium & Battery Tech ETF (LIT)
- FinTech ETF (FINX)
- Internet of Things ETF (SNSR)
- Robotics & Artificial Intelligence ETF (BOTZ)
- Autonomous & Electric Vehicles ETF (DRIV)
- Artificial Intelligence & Technology ETF (AIQ)
- Cloud Computing ETF (CLOU)
- Video Games & Esports ETF (HERO)
- Cybersecurity ETF (BUG)
- Data Center REITs & Digital Infrastructure (VPN)
- Blockchain ETF (BKCH)
- Blockchain & Bitcoin Strategy ETF (BITS)

Multi-Theme

- Global X Thematic Growth ETF (GXTG)
- China Innovation ETF (KEJI)

Physical Environment

- U.S. Infrastructure Development ETF (PAVE)
- CleanTech ETF (CTEC)
- Renewable Energy Producers ETF (RNRG)
- Clean Water (AQWA)
- AgTech & Food Innovation ETF (KROP)
- Hydrogen (HYDR)
- Wind (WINDY)
- Solar (RAYS)

People & Demographics

- Millennials Thematic ETF (MILN)
- Longevity Thematic ETF (LNGR)
- Health & Wellness Thematic ETF (BFIT)
- E-commerce ETF (EBIZ)
- Cannabis ETF (POTX)
- Education ETF (EDUT)
- Telemedicine & Digital Health (EDOC)
- Genomics & Biotechnology ETF (GNOM)
- China Biotech Innovation ETF (CHB)
- Emerging Markets Internet & E-commerce (EWEB)

¹As of 21/11/2021

Disclosures

The Global X Thematic Classification System is based on the expertise, views, and opinions of the Global X Thematic Classification Committee and are subject to change. Global X defines thematic investing as the process of identifying powerful disruptive macro-level trends and the underlying investments that stand to benefit from the materialisation of those trends. By nature, thematic investing is a long term, growth-oriented strategy, that is typically unconstrained geographically or by traditional sector/industry classifications, has low correlation to other growth strategies, and invests in relatable concepts.

The process of identifying themes consists of three inexorable principles:

- 1) There must be high conviction that the theme will materialise and have a meaningful impact on segments of the economy or markets. Often this is due to observable structural changes in technology, demographics, consumer behavior, or the physical environment, but can also be influenced by other factors.
- 2) A theme must be investable, meaning there are publicly traded companies that provide exposure to the concept. Ideally, the group of companies is broad, have high liquidity, and attribute a substantial portion of their business operations (revenues, assets, research & development) to the theme.
- 3) A theme must be expected to express itself over a medium to long-term time horizon, generally considered to be five years or longer. A longer-term time horizon makes market timing less of a factor in the success of identifying a theme.

Notably, and taking into consideration the principles above, Global X's thematic investing does not consist of ESG, values-based, or policy-driven strategies, unless they otherwise represent a disruptive structural trend (e.g. climate change). Further, funds that adhere to traditional sector or industry classifications, or that are used primarily to gain exposure to cyclical trends (e.g. currencies, valuations, inflation) are not considered thematic. Finally, alternative asset classes, such as listed infrastructure, MLPs, and ubiquitous commodities are not considered thematic. We recognise that these exclusions may differ from other third-party definitions of thematic investing, but it is consistent with, and core to, Global X's thematic classification system and process.

Based on the definition and principles of thematic investing above, Global X has established a thematic classification system that seeks to identify powerful themes and organise them by common traits and drivers. The system consists of four layers of classifications: 1) Categories; 2) Mega-Themes; 3) Themes; and 4) Sub-Themes, with each layer becoming sequentially narrower in its focus.

'Categories' is the broadest layer and represents three fundamental drivers of disruption: exponential advancements in technology (Disruptive Technology), changing consumer habits and demographics (People & Demographics), and the evolving physical landscape (Physical Environment). One layer down are 'Mega-Themes,' which serve as a foundation to multiple transformative forces that are causing substantial changes in a common area. Conceptually, Mega-Themes are a collection of more narrowly targeted Themes. For example, Big Data is a Mega-Theme that consists of Machine/Deep Learning, Cybersecurity, Quantum Computing, and Cloud/Edge Computing. Further down, we identify 'Themes' as the specific areas of transformational disruption that are driving technology forward, changing consumer demands, or impacting the environment. 'Sub-Themes' are more niche areas, such as specific applications of themes or upstream forces that are driving themes forward.

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