

Robotics Investment Trends

Cultivating A Sustainable Robotics Ecosystem

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Introduction to ABI Research

ABI Research's Client Solutions



MARKET OPPORTUNITY ASSESSMENTS

- New product viability
- Market sizing forecasts and trackers
- Technology assessments



COMPETITIVE INTELLIGENCE

- Market share
- Product review and comparison trackers



THOUGHT LEADERSHIP & DEMAND GENERATION

- Whitepapers and reports
- Webinars



SPEAKING ENGAGEMENTS

- Conference keynotes & panel sessions
- Customer events
- Sales kickoffs



ADVISORY

- Executive education
- Board meeting support
- Partnership evaluations
- Value and supply chain analysis

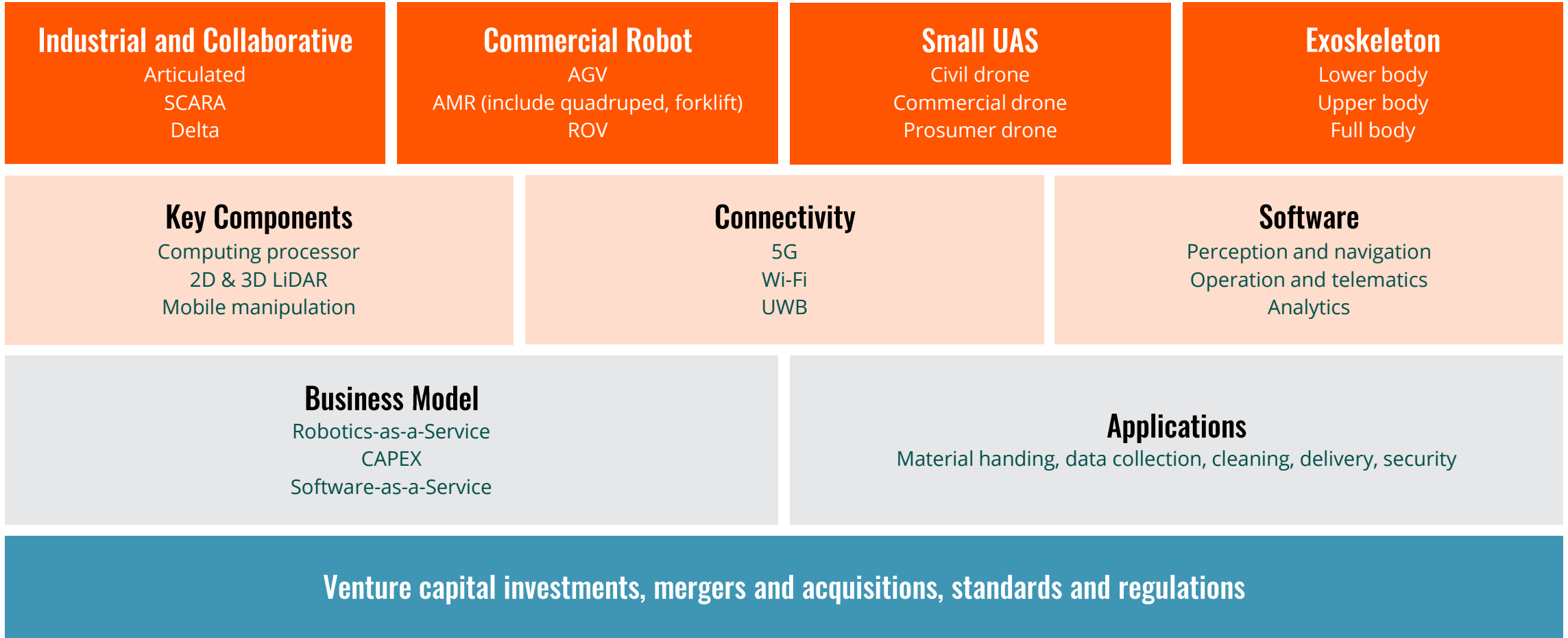


COMMERCIAL DUE DILIGENCE

- New venture due diligence
- M&A support
- Joint venture and ecosystem opportunity alignment

Introduction to the Robotics Service

What Does ABI Research Cover in Robotics



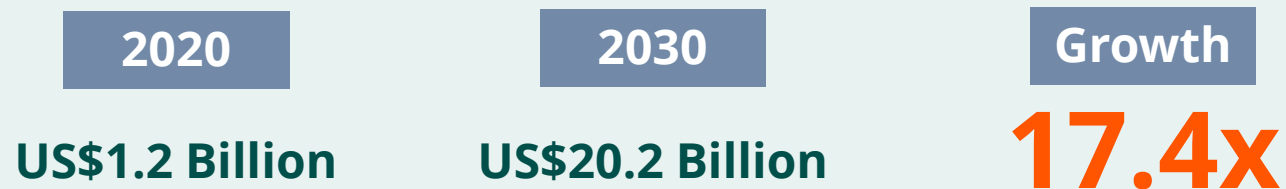
Rapid Adoption of Robots

The Need to Accelerate Deployment

- Total industrial and commercial robot installed base grows by more than six times the amount in the next 10 years.

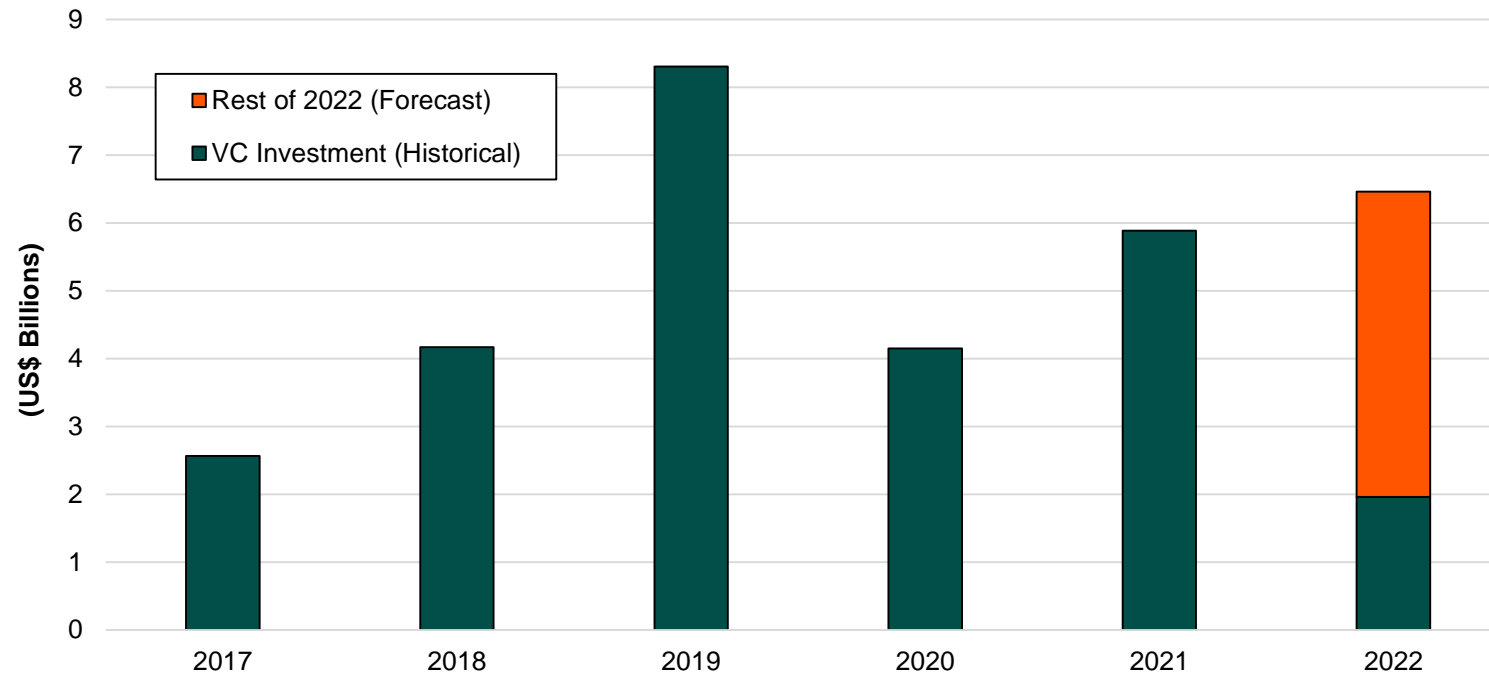


- This means many more Small and Medium Enterprises (SMEs) will become robot users, and they will have limited skillsets in robot deployment and maintenance; this is a big opportunity for pure-play software players.
- Turnkey software solutions are expected to stay, but large growth in Software-as-a-Service (SaaS) revenue in the next ten years is expected as platformization gains momentum.



Historical Robotics Investment Values

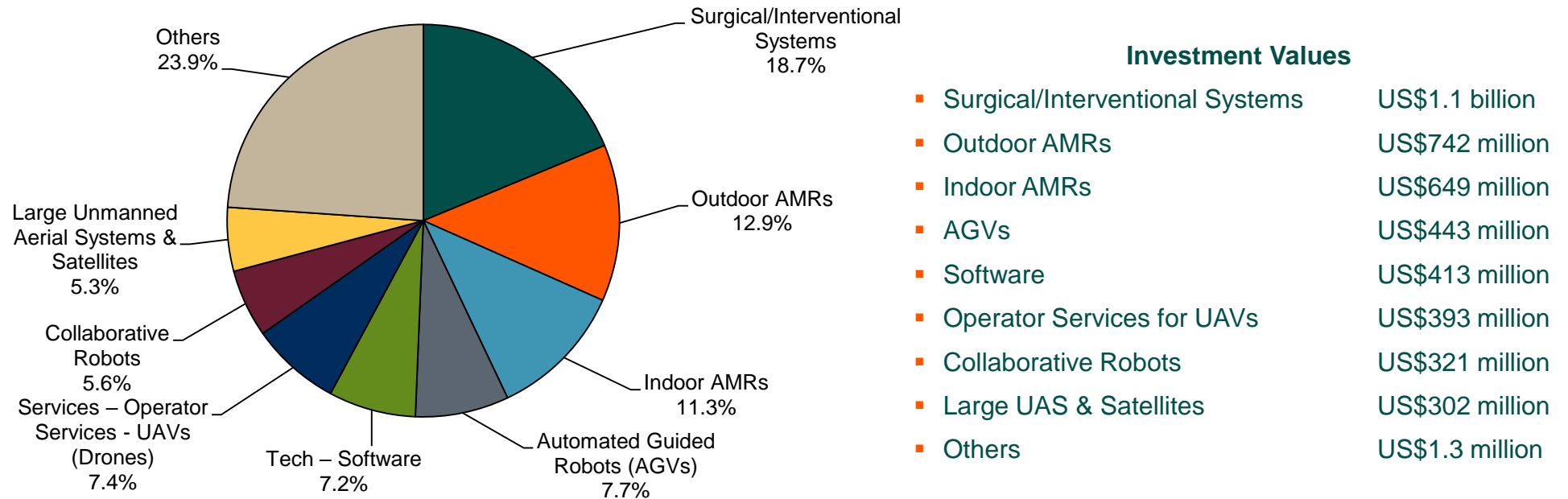
COVID-19 Highlighted the Need for Robotics Automation



- A total of US\$5.7 billion, with YoY growth of 38%.
- COVID-19 has further accelerated the need for automation. Social distancing and lockdown have caused manpower shortages, leading businesses to rely more on automation.
- Increasing market adoption of mobile robots and drones have led to rapid advancement of mobile robotics technologies and drone-related services.
- VC funding for robotics expected to continue its recovery in 2022.

2021 Robotics Investment Values by Technology

Collaborative Surgical Systems and Mobile Robotics Were the Key Themes



- Funding for surgical systems has continued its growth trend in recent years. Key players include CMR Surgical, Memic Innovative Surgery, Edge Medical Robotics, PROCEPT BioRobotics, and Changmugu Medical.
 - All of these startups are from different countries, signifying a common demand to automate surgical procedures.
- The demand for mobile robotics continues to grow across many verticals. Key players include Nuro in last-mile delivery, Automated Storage and Retrieval System (ASRS) startups Fabric and inVia Robotics in warehousing, Gaussian Robotics in cleaning, and Pudu and ForwardX Robotics in general-purpose AMRs.

Focus on Business Outcomes

Robotics Solutions Must Be Market Oriented

- The main challenge with creating a sustainable robotics ecosystem is the lack of revenues. Specifically the lack of scalable business applications that can generate steady income stream.
- Plenty of business opportunities, but most of them are highly fragmented and customized.
- As such, all robotics solutions must be market oriented.
 - **Highly focus on business outcomes and work backwards.**



Robotics vendors have been actively focusing on opportunities in port automation, semiconductor manufacturing, construction, and real estate, in line with the government's economic directions.

Key vendors: Lionsbot, SESTO, SPEEDCARGO



Food security is of paramount to Israel. Private sectors have been actively investing in agricultural automation.

Key vendors: Arugga, Bluewhite



Contrary to the macro trends, the frequent COVID-19 lockdown in China is leading to rapid growth of last-mile delivery robots.

Key vendors: Neolix, Xingshen Technology, White Rhino



All robotics developments are commercially driven in the USA. Retail, manufacturing, and logistics remain the main drivers.

Key vendors: Brain Corp, Fetch, Seegrid, Vecna

Hardware and Software to Accelerate Adoption

Componentization of A Robot

Processing Chipset

- Optimized with AI compute to support robotics applications that require increasingly complex hardware, such as depth camera, 3D LiDAR, and ultra-wide band positioning system.
- Launch optimizing hardware for popular middleware platforms.
- Offer robotics-specific edge Artificial Intelligence (AI) hardware cameras and modules for perception, navigation, object detection, etc.



ROS-NVIDIA Jetson integration
Isaac Sim and Gazebo
interoperability



RB5 platform for 5G and AI in
mobile robotics and drones



Kria Robotics Stack (KRS) for
ROS 2 and Gazebo to develop
industrial robotics

Robotics Software

- Increasing focus on enabling software to facilitate robotics development.
- Offered as Software-as-a-Service (SaaS). Close partnership with major robotics vendors.



Machine vision for industrial and
collaborative robot



Open infrastructure for custom
visualization and management



Motion planning and digital twin
of robot



Production-grade ROS 2



Fleet management and
monitoring

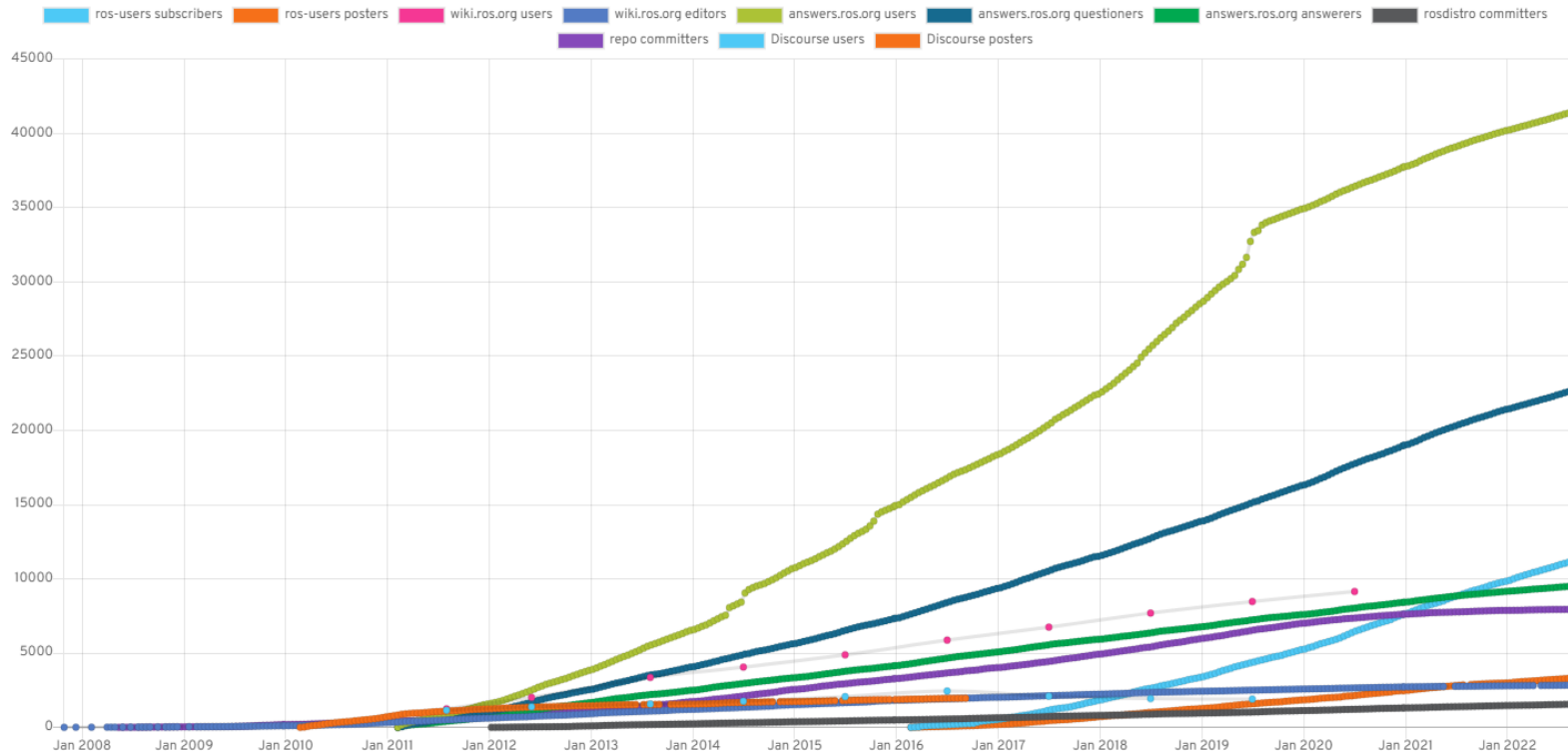


Common development platform

The Influence of Open Source and Open Standards

ROS Greatly Accelerates Robotics Solution Development

Number of ROS Users



A collection of different metrics for measuring the number of users in the ROS community.

Familiarity: Learning new tools and libraries is time consuming. Familiarity is necessary for sustaining a strong development community.

Scalability and Future Proofing: An SDK must also be able to match the pace of development in robotics. An SDK must also have the resources and foresight to include new architectures quickly and effectively.

Governance: Strong governance of an open-source community is needed. This is critical in steering the development roadmap in a coherent direction and maintaining control over development guidelines.

Hardware Support: An SDK needs to run efficiently over existing process hardware but should also be able to support next-generation hardware technologies.

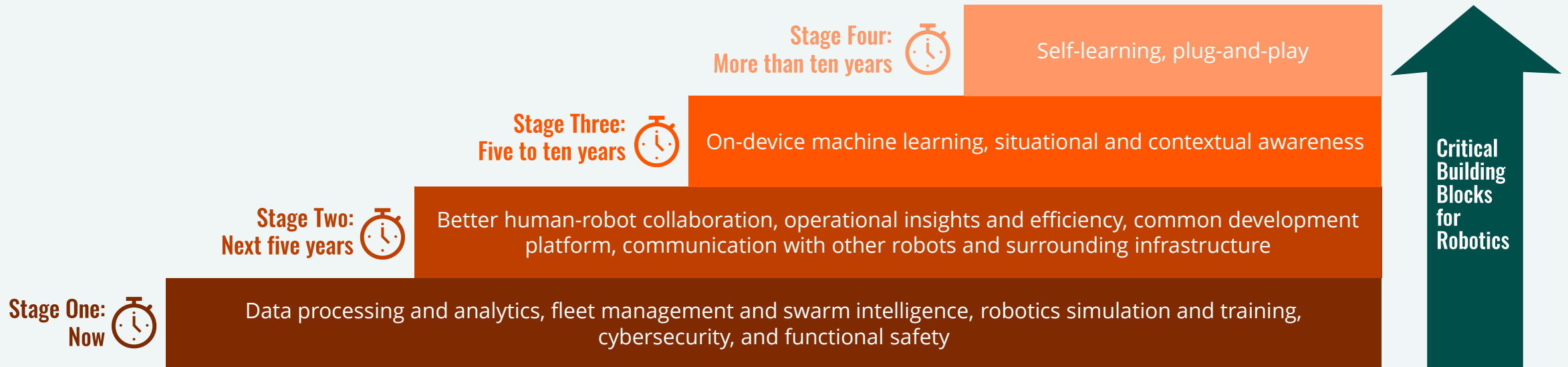
Commercial Support: Entities that can see the benefit of accelerating robotics development have been happy to subsidize an open-source community.

The Future of Robotics

Having A Clear Roadmap Helps with Ecosystem Building

- ABI Research envisions four-stage maturity roadmap for robotics maturity, involving key technologies such as 5G, distributed computing, smart sensors, computer vision, etc.
 - Cloud robotics will be linking robots and drones with scalable cloud-based computing and storage resources, empowering them to do more.
 - 5G provides ultra-low latency and ubiquitous outdoor coverage.
 - Software tools are essential. Simulation and digital twin are ideal for robotics design and development, while fleet management platform enables monitoring and maintenance of robots.
 - Integration of AI and robotics critical for quick onboarding and adjustment, making robotics ideal for collaboration.

Four Stages of Robotics



Key Takeaways

The era of componentization of robotics technology has arrived.

Always start with the business outcome.

Open source and open standard will continue to influence the future direction of robotics, given the right governance and future-proofing.

Developer support are not the only measurement for success. Ease of use and hardware enablement are equally important.

The future of robotics lies in software and RobOps solutions that enable collaboration, autonomy, and mobility.

THANK YOU

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