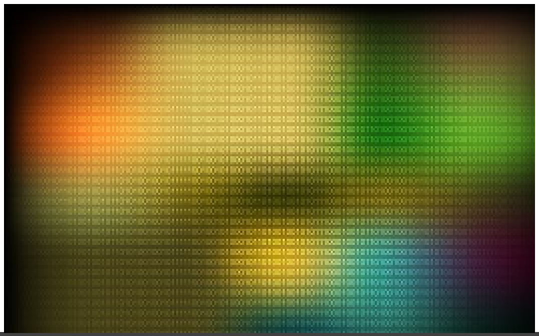

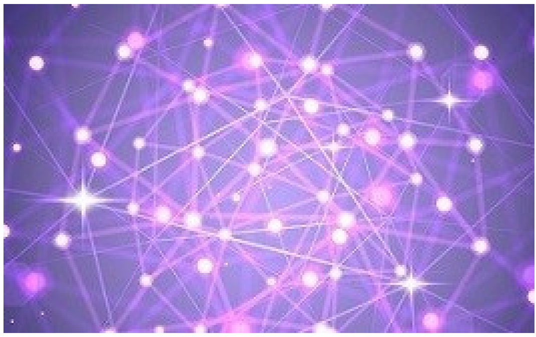

RESEARCH REPORT

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EXECUTIVE SUMMARY:
Virtual Reality for Consumer Markets
Head-Mounted Displays, Mobile Virtual Reality, Accessory Devices, and Virtual Reality Content: Global Market Analysis and Forecasts

Published 3Q 2015

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SECTION 1

EXECUTIVE SUMMARY

1.1 INTRODUCTION

Virtual reality (VR) is not a new technology and can trace its origins back to the 1950s and 1960s when leading universities conducted extensive experiments on human-computer interaction (HCI). Outside of niche commercial and industrial applications, however, consumers have been unwilling to embrace the technology. In the 1990s, the likes of Sega and Nintendo all released head-mounted displays (HMDs), thinking the time was right for mass market adoption and, ultimately, failed. While some believe that VR will never take off in consumer markets, fearing that fads requiring users to wear a cumbersome item will be unsuccessful, many others disagree. Compared to the closely-related augmented reality (AR) market, VR has seen a comparatively higher level of investment from some of the world's largest companies. Given that there are so few HMDs on the market right now, this is astounding; never before has a technology gotten so much attention before actually reaching consumers. It is estimated that around 75 venture capital (VC) firms have made an investment in VR companies, which is a number that will likely skyrocket.

One of the most notable companies involved in consumer VR is Oculus VR, which was acquired by Facebook for a staggering $2 billion in 2014. Oculus VR's founder, Palmer Luckey, is widely credited with giving the consumer VR space a kick start when he gathered $2.5 million for the first working prototype HMD that would go on to spawn the soon-to-be-released and much-hyped Oculus Rift. Microsoft's Xbox One controllers will be shipped with the product when it comes to market in 2016, around the same time Sony releases its PlayStation 4-based HMD, Project Morpheus. Google, meanwhile, has been increasing awareness of VR technology with its simple and affordable Google Cardboard devices, while Apple is rumored to be working on an HMD for a future iPhone release.

All of this points to a second coming for VR and industry participants are keen to ensure that products are fine-tuned prior to release in order to avoid a repeat of the 1990s bust, which set the industry back 10 to 15 years. Content is being slowly pushed out and we are seeing a number of games being developed especially for VR. Some publishers have embraced this new medium in its entirety; the United Kingdom's nDreams is one example. Short movies, television (TV) shows, and music videos are all being shot with 360 degree cameras, as are live events like sports and concerts. Facebook's involvement in the market indicates that social VR will be important and companies like Linden Lab, famous for the Second Life virtual world, along with Agora VR, AltspaceVR, and High Fidelity are all developing solutions to enable people to come together in VR for different purposes. Then, there are the virtual tourism, theme park, and sports and fitness apps that will be among the many apps invariably making their way to market.

1.2 KEY TRENDS

Making these VR experiences seem more real is the push to incorporate technologies that increase the user's sense of immersion and presence. Hand tracking is key, given that people instinctively reach out to touch something when wearing an HMD for the first time. The Leap Motion controller and other optical hand tracking solutions will be integrated into various headsets as standard at some point in the future because of this. Leap Motion aims to embed its technology into all HMDs and both Razer and Oculus have already integrated a modified version into their respective products by way of a special VR mount.

In addition to hand tracking, eye tracking is set to become more commonplace in consumer VR. Not only can this technology help to render scenes where the user is focused, thus reducing the requisite graphics processing unit (GPU) power, it also allows one avatar to react if another one looks it directly in the eye. Japanese company FOVE is looking to launch a headset with the same name that uses eye tracking as its primary user interface. Samsung has already invested in FOVE, which will also support Valve's SteamVR system and its room-scale tracking technology, Lighthouse. Eye tracking, hand tracking, and head tracking all help give a greater sense of being in the virtual environment and, from a social VR standpoint, help users understand if, for example, another user is paying attention to a presentation, nodding in agreement or shaking their head, or even just gesticulating in a certain way.

Additionally, 3D audio is seen as a must-have element in making people believe they are a part of the scene. As well as greatly enhancing gaming, this technology improves cinematic VR, just as Dolby Surround Sound changed the way we experience entertainment at home. When used in social VR, 3D audio makes it possible for one user to tell from which direction someone's voice is coming and even allows people to virtually whisper in other people's "ears." VisiSonics, a spin-out of the University of Maryland's Computer Science department, is a pioneer in this space, having created the RealSpace 3D audio software plugin. The firm is said to be in conversations with almost everyone in the VR market, having already licensed the technology to Oculus in October 2014.

Aside from optical hand tracking solutions, myriad firms are developing a wide range of accessory devices. Having no standardized input mechanism for VR in the way that the keyboard and mouse are standard PC input devices, companies are releasing peripherals that attach to all parts of the body. An interesting market segment is locomotion devices that would enable users to move around in virtual space just as they would in the real world. Cyberith and Virtuix are releasing omnidirectional treadmills, while companies like Ground Control and Stompz are hoping to be successful with smaller, less obtrusive foot controllers. This extends into the debate around whether the future of VR will continue to encompass seated experiences or if movement will become more commonplace. Clearly, not everyone will have the budget or the space for a "holodeck" in their home, but it stands to reason that there will be a market for solutions that enable locomotion, as standard VR is limited in terms of what can be done.

HTC's Vive headset is designed for moving around while wearing the device. Vive is paired with laser base stations that can track location in a room and the rough dimensions in it. Users of the Rift and Project Morpheus will also be able to stand up and walk around in a more limited fashion. However, all of these solutions are tethered to either a PC or a console. Unplugging VR headsets from their computing power is a problem that will need to be solved if moving around the room is to become the future of VR. Therefore, Tractica expects mobile VR to play an important role. A vast number of smartphone-based solutions already exist, ranging from the inexpensive Google Cardboard up to the higher-end Samsung Gear VR. Inevitably, smartphone screen technology and GPU chipsets will continue to improve and depth-sensing cameras will become ubiquitous, bringing positional tracking and hand tracking into the equation. Additionally, 5G connectivity is only 5 years away and could enable transmission speeds one terabit per second, which is enough to handle futuristic 8K HMDs with no compression.

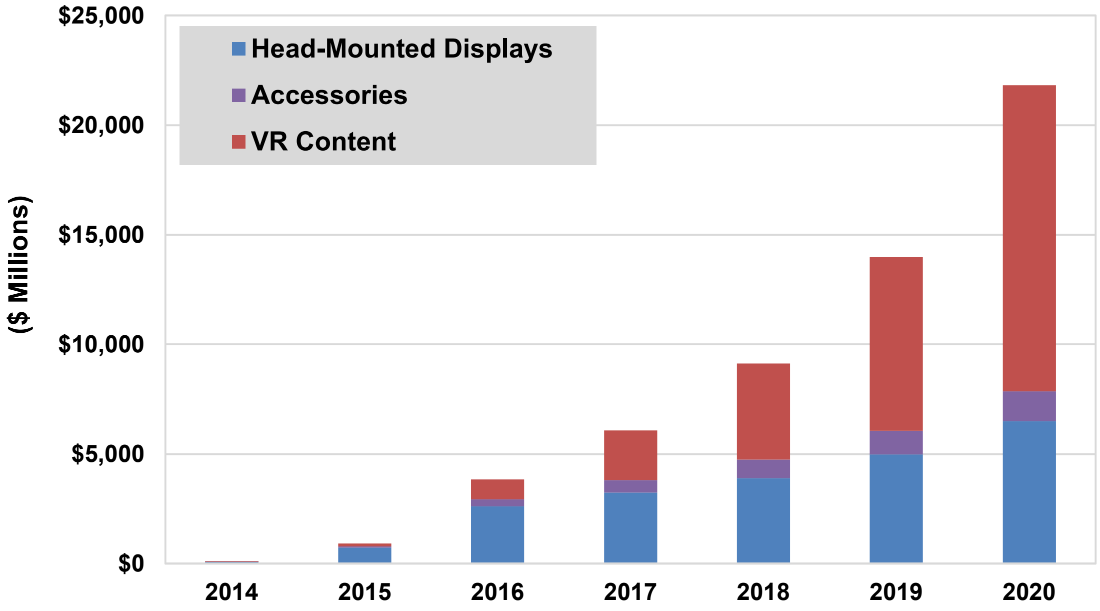
Mobile solutions are already helping to solve one of the main inhibitors of further adoption of VR, which is the difficulty in demonstrating its capabilities to potential users. Simply put, one must experience VR to appreciate it and getting the necessary equipment in the hands of people for them to get a taste of the technology is difficult. Google Cardboard and others are doing a good job of creating this first step, but some feel that, in order for VR to really take off, consumers need to experience truly immersive VR, or use high-end headsets more likely to induce the “wow factor.” The problem is that many of these solutions are not yet available and, even when they are, they will be prohibitively expensive when also taking into account the additional computing power needed for a good experience.

1.3 MARKET FORECAST HIGHLIGHTS

In 2014, total global revenue associated with HMDs, VR accessories, and VR content was estimated at just shy of $110 million. By 2020, Tractica expects this figure to increase to almost $22 billion at a 6-year compound annual growth rate (CAGR) of 142%. HMDs will account for the largest portion of total revenues until 2018 when a large enough base of headsets will have built up to support multiple content purchases year-on-year. By 2020, the global VR content market will be worth close to $14 billion, almost two-thirds of the entire market revenues. VR accessories that are not bundled in with the sale of the HMD at the time of purchase are expected to remain a niche market, accounting for just over $1.3 billion in 2020, or 6% of total global revenues.

The proliferation of smartphones means that mobile VR is set to become the biggest segment of the consumer HMD market. Tractica expects a global total of 96.4 million mobile VR devices to ship between 2014 and 2020. Project Morpheus will not be released until sometime in 2016 and Tractica expects some 1.7 million PlayStation 4 owners will purchase the device in its first year of sale. Factoring in a possible second console-based headset being released in 2017, Tractica believes the market for console-based VR could reach 13 million units by 2020. PC-based VR headsets will benefit from a huge installed base, and an ever-increasing number of computers with the requisite hardware to enable a high-quality VR experience. HTC’s Vive device will be released in 2015 and will likely account for the bulk of sales that year (total PC-based HMD sales are estimated at around 1 million units for 2015). Thereafter, the Oculus Rift will be the dominant PC-based device helping to propel total shipments of this device category to 29 million by 2020.

Chart 1.1 Annual VR Hardware and Content Revenue by Segment, World Markets: 2014-2020



(Source: Tractica)

SECTION 8

TABLE OF CONTENTS

SECTION 1 .... **1**
Executive Summary **1**
1.1 Introduction 1
1.2 Key Trends 1
1.3 Market Forecast Highlights 3
SECTION 2 .... **5**
Market Issues **5**
2.1 Introduction 5
2.2 Scope of Study 5
2.2.1 Product Type Definitions 5
2.2.2 Consumer VR Applications 6
2.2.2.1 Gaming 6
2.2.2.2 Television, Movies, and Music 6
2.2.2.2.1. Adult Entertainment and Dating 7
2.2.2.3 Social VR 8
2.2.2.4 Tourism 8
2.2.2.4.1. Theme Parks 9
2.2.2.5 Sports and Fitness 9
2.2.2.6 Others 10
2.2.3 Geographic Segmentation 10
2.3 Key Drivers of Growth 10
2.3.1 Huge Investment from Big Players 10
2.3.2 Mixed Reality 11
2.3.3 Mobile VR and Accessibility to VR 12
2.3.4 Gaming Market 13
2.3.5 Improved Processing Power 14
2.3.6 Image Resolution 14
2.3.7 Internet Connectivity 14
2.3.8 Drive for Greater Immersion and Sense of Presence 15
2.3.9 Development of VR App Marketplaces 16
2.4 Inhibitors of Market Growth 17
2.4.1 Difficulty in Demonstrating VR 17
2.4.2 Prohibitive Pricing and Minimum Hardware Requirements 17
2.4.3 A Lack of Content/Compelling Content 18
2.4.4 Retrofitting VR to Traditional Games 19
2.4.5 Potential Hardware Oversaturation 19
2.4.6 Ergonomics, Comfort, and Hygiene 20
2.4.7 A Matter of Timing 20
2.4.8 Safety Concerns 22
2.4.9 Natural User Input 22
2.4.10 Lack of Standards 22
SECTION 3 .... **24**
Technology Issues **24**
3.1 Introduction 24
3.2 Tracking 24
3.2.1 Outside-In versus Inside-Out 25
3.3 Hardware Components 25

3.3.1 Cameras 25
3.3.2 Display Technology 26
3.3.3 Graphics Processing Units 26
3.3.3.1 Eye Tracking 27
3.3.4 Input Devices 28
3.3.4.1 Standard Gamepads and Other Game Controllers 28
3.3.4.2 Hand Tracking Solutions 29
3.3.4.3 Locomotion Devices 29
3.3.4.4 Vests and Suits 30
3.3.4.5 Haptics 31
3.4 New Gesture Controls 32
3.5 Seated versus Moving Experiences 32
3.5.1 Wireless Connectivity Technologies 32
3.5.2 Local Warping 33
3.5.3 Local Rendering 33
3.5.4 Sensor Accuracy 33
3.6 Field of View 34
3.7 Realistic Graphics 34
3.8 3D Audio 35
3.9 Other Senses 36
SECTION 4 37
Key Industry Players 37
4.1 Introduction 37
4.2 Selected Manufacturers of VR Input Devices 37
4.2.1 Immerz 37
4.2.2 Leap Motion 38
4.2.3 Reality Abstraction Industries 38
4.2.4 Virtuix 39
4.3 Selected Social VR Platforms 40
4.3.1 AltspaceVR 40
4.3.2 High Fidelity 41
4.3.3 Linden Lab 42
4.4 Selected Developers, Games Publishers, and Game Engines 43
4.4.1 Aesthetic Interactive 43
4.4.2 nDreams 44
4.4.3 Survios 45
4.4.4 Ubisoft Entertainment 46
4.4.5 Unity Technologies 46
4.5 Selected HMD Manufacturers 47
4.5.1 Avegant 47
4.5.2 HTC Corporation/Valve 48
4.5.3 Facebook (Oculus VR) 49
4.5.4 Razer 51
4.5.5 VRVana 51
4.5.6 Sony Computer Entertainment 52
4.6 Selected Other Industry Participants 53
SECTION 5 56
Market Forecasts 56
5.1 Introduction 56
5.2 Data Collection and Forecast Overview 56
5.3 Forecast Methodology 56
5.3.1 Top-Level HMD Shipments 57
5.3.2 Adoption of VR Accessories 57

5.3.3 VR Content Sales 58
5.3.4 Average Selling Prices and Revenues 58
5.4 Top-Level Annual Unit Shipments and Revenues 58
5.5 Consumer VR Market by Region 62
5.6 VR Content Revenues by Content Type 65
5.7 Conclusions and Recommendations 67
SECTION 6 68
Company Directory 68
SECTION 7 70
Acronym and Abbreviation List 70
SECTION 8 73
Table of Contents 73
SECTION 9 76
Table of Charts and Figures 76
SECTION 10 77
Scope of Study 77
Sources and Methodology 77
Notes 78

SECTION 9

TABLE OF CHARTS AND FIGURES

Chart 1.1 Annual VR Hardware and Content Revenue by Segment, World Markets: 2014-2020 4
Chart 5.1 Annual VR Hardware and Content Revenue by Segment, World Markets: 2014-2020 59
Chart 5.2 Annual VR Hardware Unit Shipments by Product Type, World Markets: 2014-2020 60
Chart 5.3 Annual VR Hardware Revenue by Product Type, World Markets: 2014-2020 60
Chart 5.4 Annual HMD Unit Shipments by Product Type, World Markets: 2014-2020 61
Chart 5.5 Annual HMD Revenue by Product Type, World Markets: 2014-2020.................................. 61
Chart 5.6 Annual HMD Unit Shipments by Region, World Markets: 2014-2020.................................. 62
Chart 5.7 Annual HMD Revenue by Region, World Markets: 2014-2020.. 63
Chart 5.8 Annual VR Accessory Unit Shipments by Region, World Markets: 2014-2020 63
Chart 5.9 Annual VR Accessory Revenue by Region, World Markets: 2014-2020 64
Chart 5.10 Annual VR Content Revenue by Region, World Markets: 2014-2020 64
Chart 5.11 Annual VR Content Revenue by Content Type, World Markets: 2014-2020 66
Chart 10.1 Tractica Research Methodology.. 78

Figure 2.1 Sega VR HMD 21
Figure 3.1 HTC Vive Developer Edition.. 25
Figure 3.2 Sixense STEM System... 29
Figure 3.3 KOR-FX Gaming Vest 31
Figure 4.1 Ground Control Foot Pedals... 39
Figure 4.2 2D Representation of AltspaceVR’s Oculus Super Bowl Party.. 41
Figure 4.3 Hovercast VR Menu 44
Figure 4.4 Avegant Glyph... 48

Table 2.1 Well-Known Mobile VR Headsets 13
Table 4.1 Additional Industry Participants.. 53

SECTION 10

SCOPE OF STUDY

The year 2016 will be the make or break year for the second coming of consumer VR. Facebook and Sony are both set to release the much-anticipated Rift and Project Morpheus headsets, respectively, by which time HTC's Vive HMD will have been on the market for a while. Lessons have been learned since the 1990s when consumer VR last generated this much hype, with huge strides having been made on the comfort of HMDs, creating a convincing level of immersion, emergence of standards, and development of compelling content. Additionally, mobile VR is beginning the journey from inexpensive entry point in the form of Google Cardboard to something that could dominate the industry when technology improves.

The industry faces a challenge in enticing users to experience VR technology, but awareness is steadily growing. Some believe that any fad that would have someone wear a cumbersome device will ultimately fail. Given the huge amount of money invested in the industry by large companies like Facebook, Sony, HTC, Google, and, maybe in the future, Apple, the stakes are high. Development cycles have been long, as industry players seek to fine-tune their products so that a mid-quality system does not come along and muddy the water for all involved.

This Tractica report provides global market forecasts for annual unit shipments and associated revenues for VR hardware and content. HMDs are segmented into three product types: PC-based devices, console-based devices, and mobile VR headsets. VR accessories, such as gamepads and other VR-specific controllers, hand tracking devices, locomotion devices, and gaming vests and suits, are also quantitatively analyzed. Data is segmented by five major world regions (North America, Europe, Asia Pacific, Latin America, and the Middle East & Africa), while content is split into gaming; TV, movies, and music; social VR; tourism; and sports and fitness. All forecasts span the period from 2014 through 2020.

SOURCES AND METHODOLOGY

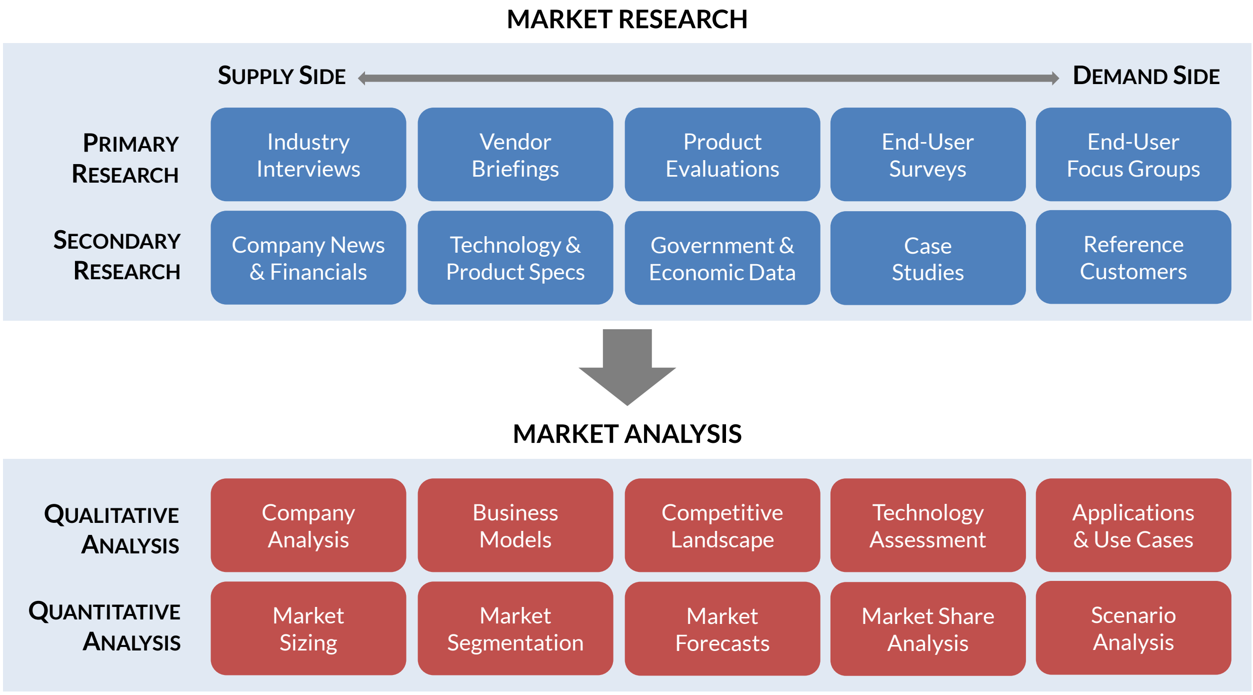
Tractica is an independent market research firm that provides industry participants and stakeholders with an objective, unbiased view of market dynamics and business opportunities within its coverage areas. The firm's industry analysts are dedicated to presenting clear and actionable analysis to support business planning initiatives and go-to-market strategies, utilizing rigorous market research methodologies and without regard for technology hype or special interests including Tractica's own client relationships. Within its market analysis, Tractica strives to offer conclusions and recommendations that reflect the most likely path of industry development, even when those views may be contrarian.

The basis of Tractica's analysis is primary research collected from a variety of sources including industry interviews, vendor briefings, product demonstrations, and quantitative and qualitative market research focused on consumer and business end-users. Industry analysts conduct interviews with representative groups of executives, technology practitioners, sales and marketing professionals, industry association personnel, government representatives, investors, consultants, and other industry stakeholders. Analysts are diligent in pursuing interviews with representatives from every part of the value chain in an effort to gain a comprehensive view of current market activity and future plans. Within the firm's surveys and focus groups, respondent samples are carefully selected to ensure that they provide the most accurate possible view of demand dynamics within consumer and business markets, utilizing balanced and representative samples where appropriate and careful screening and qualification criteria in cases where the research topic requires a more targeted group of respondents.

Tractica's primary research is supplemented by the review and analysis of all secondary information available on the topic being studied, including company news and financial information, technology specifications, product attributes, government and economic data, industry reports and databases from third-party sources, case studies, and reference customers. As applicable, all secondary research sources are appropriately cited within the firm's publications.

All of Tractica's research reports and other publications are carefully reviewed and scrutinized by the firm's senior management team in an effort to ensure that research methodology is sound, all information provided is accurate, analyst assumptions are carefully documented, and conclusions are well-supported by facts. Tractica is highly responsive to feedback from industry participants and, in the event errors in the firm's research are identified and verified, such errors are corrected promptly.

Chart 10.1 Tractica Research Methodology


MARKET RESEARCH
SUPPLY SIDE
DEMAND SIDE
PRIMARY RESEARCH
Industry Interviews
Vendor Briefings
Product Evaluations
End-User Surveys
End-User Focus Groups
SECONDARY RESEARCH
Company News & Financials
Technology & Product Specs
Government & Economic Data
Case Studies
Reference Customers
MARKET ANALYSIS
QUALITATIVE ANALYSIS
Company Analysis
Business Models
Competitive Landscape
Technology Assessment
Applications & Use Cases
QUANTITATIVE ANALYSIS
Market Sizing
Market Segmentation
Market Forecasts
Market Share Analysis
Scenario Analysis

(Source: Tractica)

NOTES

CAGR refers to compound annual growth rate, using the formula:

CAGR = $(\text{End Year Value} \div \text{Start Year Value})^{(1/\text{steps})} - 1$.

CAGRs presented in the tables are for the entire timeframe in the title. Where data for fewer years are given, the CAGR is for the range presented. Where relevant, CAGRs for shorter timeframes may be given as well.

Figures are based on the best estimates available at the time of calculation. Annual revenues, shipments, and sales are based on end-of-year figures unless otherwise noted. All values are expressed in year 2015 U.S. dollars unless otherwise noted. Percentages may not add up to 100 due to rounding.

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