

## Market Share

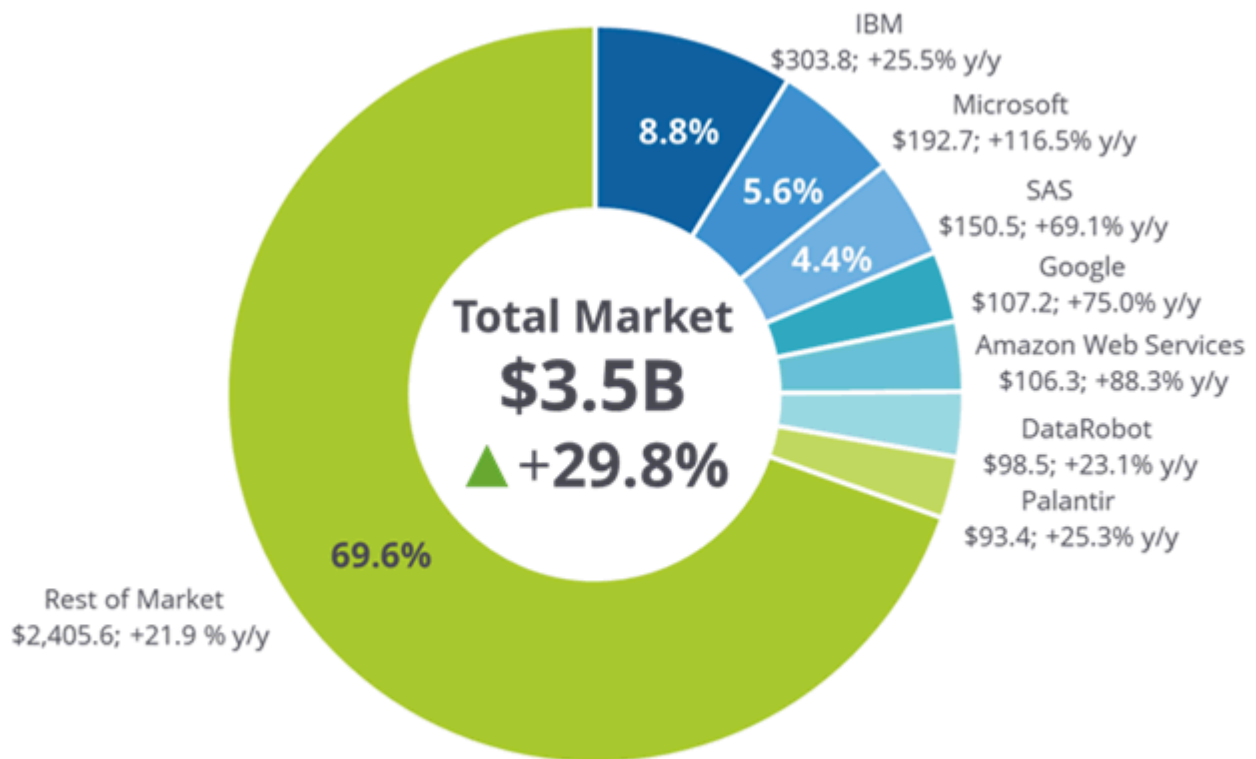
# Worldwide Artificial Intelligence Software Platforms Market Shares, 2019: The Battle Has Begun

David Schubmehl

### IDC MARKET SHARE FIGURE

FIGURE 1

### Worldwide Artificial Intelligence Software Platforms 2019 Share Snapshot



Note: 2019 Share (%), Revenue (\$M), and Growth (%)

Source: IDC, 2020

## EXECUTIVE SUMMARY

---

The artificial intelligence (AI) software platforms market achieved significant growth in 2019, growing 29.8% to \$3.5 billion. Growth in this market continues to be driven by increases in general-purpose AI software platforms, advanced machine learning (ML) platforms, and conversational AI software platforms used to develop models, algorithms, and solutions using techniques such as deep learning, natural language processing (NLP), speech recognition, computer vision, and other related technologies.

The top 5 vendors, IBM, Microsoft, SAS, Google, and Amazon Web Services (AWS), all saw impressive growth rates in 2019, ranging from 25.5% to 116.5%, based on the use of their tools to build conversational AI applications, advanced machine learning models, and other types of applications and solutions including natural language processing, computer vision, sentiment analysis, and speech recognition. In 2019, IDC also saw the introduction of tools and capabilities making it easier for AI software developers to identify and experiment with machine learning algorithms, extract and suggest features, perform experiments more easily, develop production-ready models, and deploy those models more easily into many form factors.

In addition, the emergence of automated machine learning, or AutoML, capabilities by several AI software platform vendors, such as Google's Cloud AI AutoML, Amazon SageMaker Autopilot, and Microsoft Azure automated ML, has made it easier for data scientists and business users to create customized machine learning models easily and quickly. AutoML capabilities for computer vision, structured data challenges, language, and translation are currently available, and vendors are working on making AutoML easier to use and work with, helping democratize the development and deployment of AI/ML models.

This IDC study presents a view of worldwide artificial intelligence (AI) software platforms revenue broken down by vendor for the historical year 2019.

"The artificial intelligence software platforms market achieved significant growth in 2019, growing 29.8% to \$3.5 billion," says David Schubmehl, research director, Artificial Intelligence Software Platforms. "The AI software platforms market in 2019 saw accelerated growth providing the development and training tools that organizations are using to create deep learning models, predictive and prescriptive algorithms, and conversational AI solutions. The combination of new development tools, open source, and increased availability of automated options is helping organizations build AI/ML solutions."

## ADVICE FOR TECHNOLOGY SUPPLIERS

---

The market opportunity for AI software platform vendors continues to evolve at a very rapid pace. The emergence of tools, frameworks, and libraries that provide services for machine learning and deep learning is setting the stage for a low-cost enabler of machine learning-enabled applications to be built by developers today. AI software platforms such as Microsoft Azure Machine Learning, Amazon Machine Learning, SAS Viya, Google Cloud AI, and IBM Watson Studio, as well as numerous products such as DataRobot, Dataiku, and Mathworks, are being used for an ever-wider array of use cases, from image recognition and disease diagnosis to pricing optimization and product recommendations. Machine/deep learning is a key component of most AI applications and is also being added to many enterprise applications. Improvements in the variety, efficiency, and reliability of machine learning (including deep learning) will make these applications more usable and stable and help increase their popularity.

Vendors offering conversational AI platform resources include Google, Microsoft, IBM, Amazon Web Services, Nuance, and Verint, as well as a host of others such as Artificial Solutions, IPsoft, Uniphore, and Kasisto. These resources provide the capabilities to build very application and domain-specific conversational solutions that can respond to questions, perform actions, and provide information. Advances in natural language processing/understanding have enabled conversational AI technologies and widened their reach, leading to tools such as Siri, Alexa, and Google Home that are part of many consumers' everyday lives. The platforms offer capabilities to communicate with human beings, helping them execute tasks, answer questions, and find information more quickly and effectively. Traditionally, NLP/NLU has used ontologies and taxonomies with a lot of human linguistic assistance to process dialog and unstructured text properly. However, with the advent of deep learning algorithms and models such as BERT, IDC is seeing a resurgence of statistical NLP that can handle very specific language domains, such as banking, healthcare, manufacturing, sales, and retail customer service.

Another trend that IDC is observing is the creation of AutoML and other AI tools for jobs such as automatic translation, image recognition and classification, speech recognition, machine transcription, machine learning-based text analytics, and a host of other functions. These tools can be easily created and plugged into an application, providing the capabilities of an AI-enabled function without the need for extensive training or development. This trend is especially useful for organizations that have business analysts or traditional developers on staff but may not have many, if any, data scientists or machine learning software engineers trained in developing advanced neural network models. In some sense, this is democratization of AI, making it available for an ever-wider group of developers and business users.

Vendors are also continuing to include open source deep learning and machine learning tools, frameworks, and models into their offerings. Since many organizations are using these tools and languages such as TensorFlow 2, PyTorch, Jupyter Notebook, Kubeflow, and MLflow, as well as open source models such as Google's BERT, to develop their own deep learning/machine learning applications, vendors have found it attractive to offer these as components/options to their customers. However, these open source components often need additional capabilities and technologies that are not currently offered through open source means, and many commercial AI software platforms now provide capabilities for including these open source technologies as part of their development options. As IDC has noted previously, those vendors that can successfully mix and match open source with proprietary technologies and offer them at a reasonable cost will be the winners in this market in the long run.

Vendors should be considering a mix of open source technologies together with their own IP to develop best-of-breed platforms that can help developers create AI/ML solutions as easily and quickly as possible. To that extent, visual development environments, low-code/no-code options, AutoML capabilities, and ML-guided or assisted tools to speed development and deployment are what customers will be expecting to see over the next 12 to 24 months.

## MARKET SHARE

---

Table 1 displays 2017-2019 worldwide revenue and 2019 growth and market share for the AI software platforms market.

**TABLE 1****Worldwide Artificial Intelligence Software Platforms Revenue by Vendor,  
2017-2019 (\$M)**

	2017	2018	2019	2019 Share (%)	2018–2019 Growth (%)
IBM	191.2	242.0	303.8	8.8	25.5
Microsoft	37.6	89.0	192.7	5.6	116.5
SAS	43.5	89.0	150.5	4.4	69.1
Google	34.2	61.2	107.2	3.1	75.0
Amazon Web Services	27.4	56.4	106.3	3.1	88.3
DataRobot	58.4	80.0	98.5	2.8	23.1
Palantir	71.2	74.5	93.4	2.7	25.3
Cloudera	32.9	45.9	77.4	2.2	68.6
Digital Reasoning	38.1	49.8	59.2	1.7	18.9
MathWorks	42.2	46.9	57.2	1.7	22.0
IPsoft	26.8	41.1	53.6	1.6	30.7
C3.ai	18.9	27.8	42.8	1.2	54.0
iFLYTEK	13.0	26.1	37.8	1.1	45.1
Banjo	23.6	28.9	33.9	1.0	17.2
CognitiveScale	17.0	24.5	32.0	0.9	30.6
Veritone	9.1	15.7	31.8	0.9	102.4
Nuance Communications	13.2	13.5	27.7	0.8	104.7
Tencent	2.2	6.6	27.0	0.8	308.1
Ayasdi	14.5	20.2	27.0	0.8	33.6
SenseTime	4.4	9.2	25.8	0.7	180.9
Baidu	0.4	3.7	25.8	0.7	589.1
AppZen	15.7	19.3	25.8	0.7	33.8

**TABLE 1****Worldwide Artificial Intelligence Software Platforms Revenue by Vendor, 2017-2019 (\$M)**

	2017	2018	2019	2019 Share (%)	2018–2019 Growth (%)
Amdocs	8.8	20.0	25.6	0.7	28.0
SAP	4.1	14.8	23.9	0.7	61.3
Verint Systems	16.5	19.3	21.4	0.6	10.9
Megvii	5.9	12.8	21.2	0.6	64.8
Xiaoi	1.6	3.2	18.8	0.5	482.8
YITU	0.8	1.7	15.1	0.4	765.6
Aspen Technology	10.6	12.6	14.2	0.4	13.2
Alibaba Group	1.7	5.0	13.5	0.4	171.0
CloudWalk	0.7	1.7	12.9	0.4	637.0
Clarifai	8.2	10.6	12.7	0.4	20.2
Other	1,332.9	1,491.5	1,641.2	47.5	10.0
<b>Total</b>	<b>2,127.2</b>	<b>2,664.8</b>	<b>3,457.9</b>	<b>100.0</b>	<b>29.8</b>

Source: IDC's Worldwide Semiannual Software Tracker, April 2020

**WHO SHAPED THE YEAR**

In 2019, the number of vendors in the AI software platforms market increased significantly and the revenue for the top vendors also increased significantly over 2018. Specifically, public cloud vendors that offered AI software platform products grew strongly and debuted many innovations in 2019, setting the stage for the battle to come in 2020 and beyond. At the same time, emerging vendors also increased their share of the AI software platforms market, fueled by strong customer adoption, and in the case of some, acquisitions helped extend and strengthen their overall offerings. 2019 also saw the entrance of many Chinese AI software platform vendors. Total AI software platforms revenue from these vendors approached \$250 million in 2019 with year-over-year growth rates in 2019, ranging from 45% to over 700%. There is a very health ecosystem for AI software platforms in China, and IDC expects to see similar growth patterns in 2020 and beyond.

Specifically, IDC noted the following:

- Over the last year, Amazon Web Services has continued to expand its AI software platform offering. At its 2019 re: Invent, AWS introduced a wide range of new tools and services including Amazon SageMaker Studio, a complete IDE for machine learning development. Among the many additions, AWS introduced Amazon SageMaker Autopilot to automatically build, train, and tune models with full visibility and control.
- Tencent, a Chinese AI software platform vendor, saw its revenue increase from \$6.6 million in 2018 to \$27 million in 2019, a year-over-year increase of over 300%. Its Ti Matrix platform is an AI software development and delivery platform that combines algorithm experimentation, model development, and integration into an AI application. Tencent is indicative of several Chinese AI software platform vendors that are now moving onto the world stage.
- Google continued its advancement in its AI/ML software platforms business. At Google I/O in 2019, Google released a mobile machine learning toolkit for Firebase, its development framework for mobile applications. It comes with a set of prebuilt APIs and ML models that lets the developer design and use custom-built models using TensorFlow Lite. The models can run in the cloud or on device, at the developer's choosing. In addition, Google has placed into open source a new set of TensorFlow tools for addressing bias and explainability in machine learning models called TCAV (testing with concept activation vectors). Finally, Google continued to make improvements to both its document AI offering and its contact center offerings in 2019.
- Microsoft continued its pace of announcements and developments in the AI/ML space as well. At Microsoft Build 2020, Microsoft announced a new responsible ML innovation in Azure Machine Learning that helps customers understand, protect, and control their data and models. It also announced Bot service enhancements to make developers more productive. Microsoft announced Azure Cognitive Services features that enhance AI functionality, deployment, and language capabilities in apps. Finally, Microsoft launched Project Bonsai, its new machine teaching service for building autonomous systems for public preview. Bonsai was acquired by Microsoft in 2018.
- In 2019, IBM introduced several advances to its IBM Watson Platform. With Watson Anywhere, IBM made Watson portable across any cloud and empowered businesses to deploy AI wherever their data resides. The company also added several new key features to the IBM Watson Assistant conversational AI product that allows users to deploy, train, and continuously improve their virtual assistants quickly on the cloud of their choice. IBM also announced AutoAI, a new set of capabilities for Watson Studio designed to automate many of the often complicated and laborious tasks associated with designing, optimizing, and governing AI in the enterprise.

## MARKET CONTEXT

---

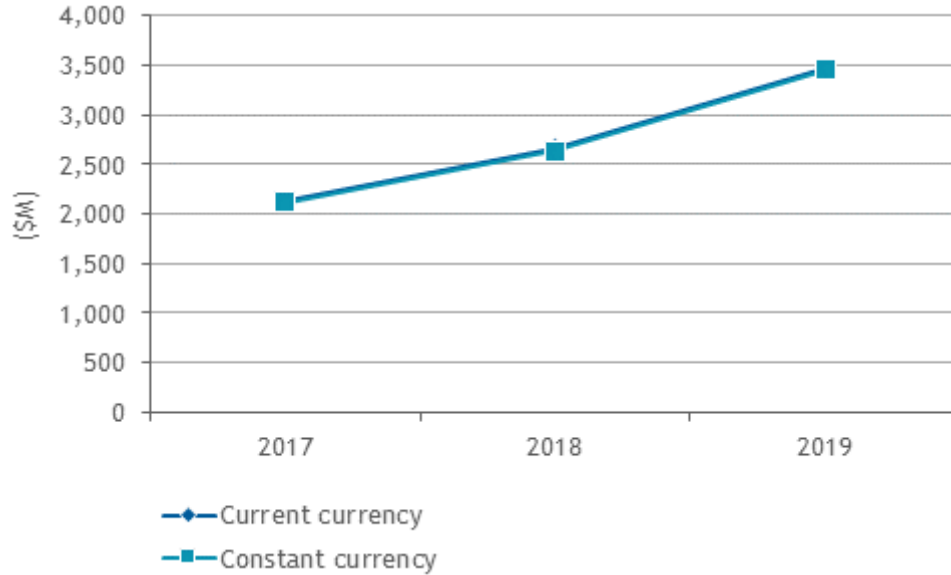
IDC is seeing several factors driving the growth of revenue in the AI software platforms market. These include:

- Enterprises and governments around the world have shifted to a major strategic focus on "digital transformation" in recent years, which has helped drive a great focus on the adoption and implementation of new technologies and related services. This is especially true now during the pandemic. Organizations are being forced to innovate using AI and ML technologies and platforms to create new digital environments and applications in weeks and months, not years. This is a significant driver for the adoption and use of AI software platforms.
- Open source AI software languages and toolsets such as TensorFlow 2, PyTorch, R, Jupyter Notebook, and Kubeflow will continue to be broadly adopted. IDC expects that open source components will continue to represent the core of many AI-enabled applications. In turn, IDC believes that open source options will continue to push down prices of AI software platforms and tools. This trend is also likely to accelerate transition from on premises to differentiated cloud solutions that compete on added value above the functionality of core components.
- The COVID-19 pandemic has severely disrupted our baseline forecast assumptions for economic growth. We now assume major declines in GDP during the first half of the year, with the worst impact likely to be recorded in 2Q20, which is the projected time frame for double-digit declines in real GDP. A down economy affects business and consumer confidence, the availability of credit and private investment, and internal funding. A global recession could cause businesses to delay AI/ML projects.
- IDC does not believe that the lack of experienced talent will be a detriment to AI software platforms growth. Prior to the COVID-19 pandemic, according to the November 2019 release of IDC's Worldwide Technology Employment Impact Guide, IDC's estimate for AI-related jobs (data engineer, data scientist, and machine learning engineer/developer) in 2020 is 947,000, up 13.3% from 2019. Based on early indicators from the first quarter, IDC expects to see the potential for a variety of changes in job growth during the first half of 2020. While the outlook for the second half of the year and beyond remains uncertain, IDC sees two additional possible scenarios for AI job growth for the full year. We believe that a pessimistic scenario would see a lower estimate of 927,000, which is based on a reduced growth rate of 11%, and a more optimistic scenario sees a larger estimate of 969,000, with a higher growth rate of 16%. Additional resources will drive additional revenue for the AI software platform vendors.

IDC includes constant currency measures in our Market Share documents to provide an indication of overall market developments excluding the effects of fluctuating exchange rates. The valuation of the U.S. dollar was stable in 2017 and 2018 compared with most other currencies. In 2019, the U.S. dollar strengthened in value (see Figures 2 and 3).

**FIGURE 2**

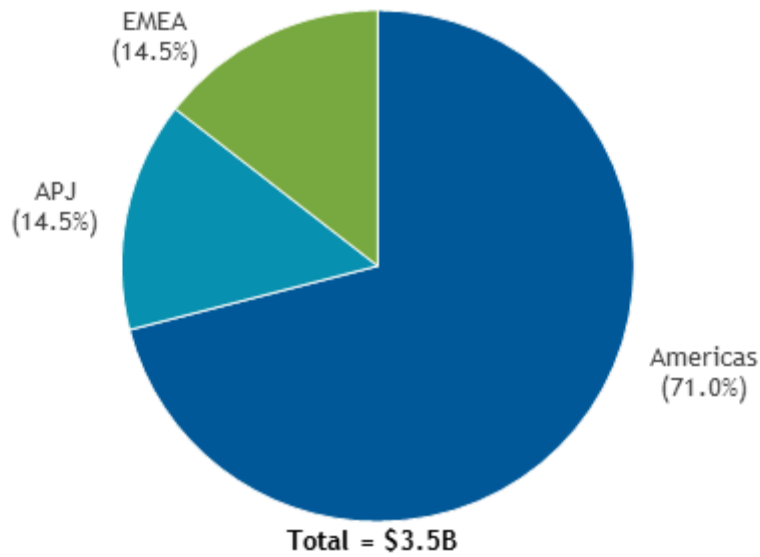
**Worldwide Artificial Intelligence Software Platforms Revenue in Current and Constant Currency, 2017-2019**



Source: IDC's Worldwide Semiannual Software Tracker, April 2020

**FIGURE 3**

**Worldwide Artificial Intelligence Software Platforms Revenue Share by Region, 2019**



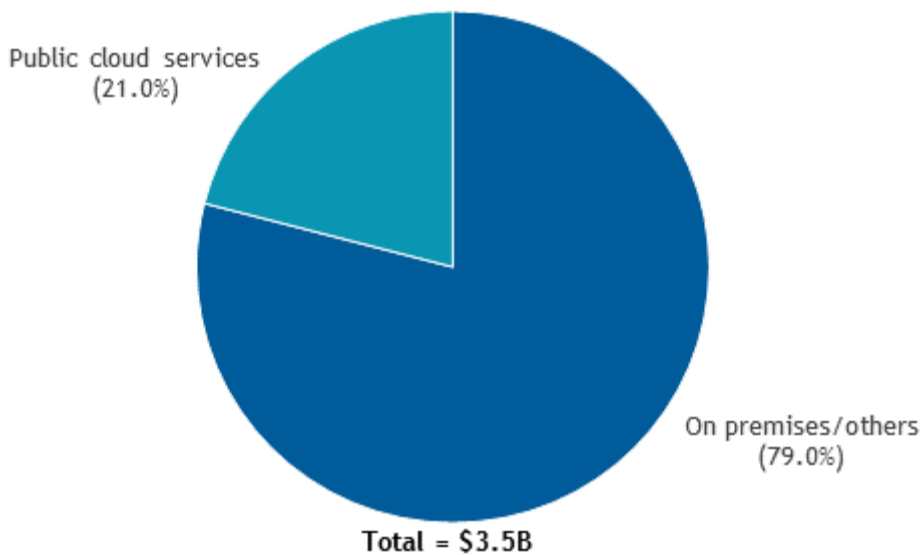
Source: IDC's Worldwide Semiannual Software Tracker, April 2020



IDC is seeing significant growth in public cloud deployment for AI software platforms revenue and expects that the ratio of public cloud revenue will exceed that of on-premises/other deployment by the end of 2023 (see Figure 4).

## FIGURE 4

### Worldwide Artificial Intelligence Software Platforms Revenue Share by Deployment Type, 2019



Source: IDC's Worldwide Semiannual Software Tracker, April 2020

## Significant Market Developments

Over the past year, several trends have begun to exert pressures and changes on the market for AI software platforms. These overall trends include the following:

- **The emergence of advanced machine learning platforms:** Over the past 12 months, IDC has noted that most of the hyperscale cloud vendor have created sets of tools that IDC has dubbed advanced machine learning platforms. IDC has defined advanced machine learning platforms as toolsets that provide a range of methods and facilities providing capabilities for data collection, data integration, feature exploration, identification and selection, algorithm selection, model building and experimentation, and finally model deployment. These toolsets operate primarily on structured and semi-structured data to create advanced machine learning models that are used for various jobs including classification, optimization, and prediction. Some of these platforms offer visual development environments, connections to logs and notebooks, and guided recommendations to assist in the creation and production of models.
- **The continued expansion of conversational interfaces and digital assistance and automation:** The market for intelligent conversational assistance is continuing to grow rapidly, fueled by the use and acceptance of consumer tools such as Google Assistant, Apple Siri, Microsoft Cortana, and Amazon Alexa as well embedded digital assistants such as Salesforce's Einstein

and Adobe Sensei. Some of these platforms offer capabilities for connecting to existing IT services for automation purposes or providing the actual automation capabilities themselves.

- **Lack of data and the emergence of simulation/synthetic data:** One of the largest challenges that face builders of machine learning and deep learning models is where to get enough quantities of good, unbiased, and high-quality data to train their models. This is a major problem for many medium-sized and small businesses that do not have the types and amounts of first-party data needed to create a really accurate model. To create many types of deep learning models, thousands and possibly millions of data points are needed for a neural network to show the right level of accuracy. Much research and development is going into building simulated or synthetic data that can be used in place of real data. For example, NVIDIA provides an environment for autonomous vehicle companies to safely drive billions of qualified miles in virtual reality with its NVIDIA DRIVE Constellation AV simulator. Similarly, Microsoft offers its Machine Teaching capabilities to teach robotic devices how and where to move. AWS RoboMaker provides a similar capability. New approaches like reinforcement learning require less data than traditional deep learning models. This trend will accelerate over the next three to four years as more organizations develop and deploy custom models.

## METHODOLOGY

---

The IDC software market sizing and forecasts are presented in terms of commercial software revenue. IDC uses the term *commercial software* to distinguish commercially available software from custom software. Commercial software is programs or codesets of any type commercially available through sale, lease, rental, or as a service. Commercial software revenue typically includes fees for initial and continued right-to-use commercial software licenses. These fees may include, as part of the license contract, access to product support and/or other services that are inseparable from the right-to-use license fee structure, or this support may be priced separately. Upgrades may be included in the continuing right of use or may be priced separately. These are counted by IDC as commercial software revenue.

Commercial software revenue excludes service revenue derived from training, consulting, and systems integration that is separate (or unbundled) from the right-to-use license but does include the implicit value of software included in a service that offers software functionality by a different pricing scheme. It is the total commercial software revenue that is further allocated to markets, geographic areas, and sometimes operating environments. For further details, see *IDC's Worldwide Software Taxonomy, 2020* (IDC #US45718419, January 2020).

Bottom-up/company-level data collection for calendar year 2019 began in January 2020 with in-depth vendor surveys and analysis to develop detailed 2019 company models by market, geographic region and, in some cases, operating environment.

The data presented in this document is IDC estimates only.

*Note: All numbers in this document may not be exact due to rounding.*

## MARKET DEFINITION

---

### Artificial Intelligence Software Platforms

AI software platforms facilitate the development of artificial intelligence models and applications, including intelligent assistants that may mimic human cognitive abilities. They typically include APIs and microservices for the various functionalities that developers can include in their AI applications. In addition, the AI software platforms also include advanced machine learning development and operations tools, including pretrained artificial intelligence models that help developers and business users to experiment, automate machine learning, and build and deploy artificial intelligence models into production. They could provide functionality to apply a broad range of supervised, unsupervised, reinforcement, and transfer learning methods. The technology components of AI software platforms include machine learning, deep learning, natural language processing, text analytics, rich media analytics, tagging, searching, categorization, clustering, hypothesis generation, question answering, visualization, filtering, alerting, and navigation. When these individual components are sold standalone, they are accounted for in the content, search, advanced, and predictive analytics functional markets.

The AI software platforms market is made up of three types of platforms: general-purpose AI software platforms, conversational AI software platforms, and advanced machine learning platforms. General-purpose AI software platforms are used to develop applications often including video, image, audio, and text as some of the data components. Conversational AI platforms are primarily used to build applications that involve interactive communications with human beings, whether that be by voice, text, or other means. Advanced machine learning platforms provide a range of ML methods primarily on structured and semi structured data to create predictive and prescriptive applications. These platform types often overlap, and vendors may offer two or more sets of capabilities in a single platform.

General-purpose and conversational AI platforms also typically include knowledge representation tools that provide for knowledge curation and continuous automatic learning based on tracking past experiences. Typically, knowledge representation leans heavily on the output of natural language processing and text analytics to create a representation of a knowledge base that can be used to answer questions, do automated reasoning, or connect various sets of information through relationships. These knowledge representation tools provide information that can be used in conversational interfaces and other applications to store, represent, and access information and knowledge.

## RELATED RESEARCH

---

- *Worldwide Artificial Intelligence Software Platforms Forecast, 2020-2024* (IDC #US45724520, June 2020)
- *IDC's Forecast Scenario Assumptions for the ICT Markets, April 2020* (IDC #US46208220, April 2020)
- *IDC's Worldwide Software Taxonomy, 2020* (IDC #US45718419, January 2020)
- *IDC FutureScape: Worldwide Artificial Intelligence 2020 Predictions* (IDC #US45576319, October 2019)
- *Market Analysis Perspective: Worldwide AI Software Platforms, 2019* (IDC #US45487219, September 2019)

- *Worldwide Artificial Intelligence Software Platforms Market Shares, 2018: Steady Growth – Moving Toward Production* (IDC #US45262419, June 2019)
- *Artificial Intelligence Global Adoption Trends and Strategies* (IDC #US45120919, June 2019)
- *IDC's Worldwide Artificial Intelligence Taxonomy, 2019* (IDC #US45013419, April 2019)

## About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

## Global Headquarters

5 Speen Street  
Framingham, MA 01701  
USA  
508.872.8200  
Twitter: @IDC  
idc-community.com  
www.idc.com

---

### Copyright Notice

This IDC research document was published as part of an IDC continuous intelligence service, providing written research, analyst interactions, telebriefings, and conferences. Visit [www.idc.com](http://www.idc.com) to learn more about IDC subscription and consulting services. To view a list of IDC offices worldwide, visit [www.idc.com/offices](http://www.idc.com/offices). Please contact the IDC Hotline at 800.343.4952, ext. 7988 (or +1.508.988.7988) or [sales@idc.com](mailto:sales@idc.com) for information on applying the price of this document toward the purchase of an IDC service or for information on additional copies or web rights.

Copyright 2020 IDC. Reproduction is forbidden unless authorized. All rights reserved.

