Why Managed Service Models Are Critical to Training Autonomous Driving Systems

Manual data labeling is essential for autonomous driving (AD) applications. In the United States, the AD market is exploding, with CAGR (compound annual growth rate) projected at 53% through 2030.

Cameras, sensors, and other devices generate massive amounts of visual and other data that require manual analysis. A managed service model (MSM) delivers diverse, high-quality data sets vital to AD's AI algorithms. MSMs respond to rapid change in the industry by being agile, cost-effective, timely, and scalable.

Leading AD companies rely on an MSM to deliver expert, reliable data labeling that gets AD/ADAS applications to market faster.

A profound paradigm shift is underway in ground transportation. Both electric vehicles (EVs) and autonomous driving (AD) will revolutionize this transportation sector. The industry is at a major inflection point. For example, Research and Markets estimates that the US autonomous vehicle market will grow from $4 Billion in 2021 to $186.4 Billion by 2030. That's a compound annual growth rate (CAGR) of 53%!

Established automakers and dozens of startups now look beyond consumer applications to commercial ones. For example, autonomous trucking and robotaxis will redefine the transportation of products and people. There is already a complex global ecosystem of companies developing crucial AD tech. They include everything from OEMs to software developers to computer vision platform experts.

Inventors have contemplated the advantages of autonomous driving for a long time. According to The Atlantic, early attempts involved vehicles controlled remotely with the tap of a telegraph key. Of course, these early incarnations of the autonomous vehicle were still human-controlled. Today, AI, machine learning, and latent-free 5G make truly autonomous driving a reality.

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Machine Learning (ML) Algorithms in Self-Driving Cars

AD machine learning algorithms continuously interpret the surrounding environment. Crucially, they also predict potential changes by detecting, recognizing, and classifying objects. Then they localize objects and predict their movement.

However, deploying machine learning algorithms into autonomous driving is not automatic. **The process requires consistent, high-quality training data sets**. A strong data labeling team integrates its own data analysis with AI/ML applications.

A managed service model (MSM) for training autonomous driving data sets offers key advantages. MSMs tend to excel because they:

- Deliver quality through expert data labelers
- Are cost, time, and resource-efficient
- Come with a predictable pricing model
- Reduce headcount costs
- Are agile in response to rapid change
- Promote continuous improvement
- Are equipped to identify and handle edge cases

Deploying machine learning algorithms into autonomous driving is not automatic.

Artificial intelligence algorithms require a large amount of diverse data for training and testing to ensure their performance in actual applications.
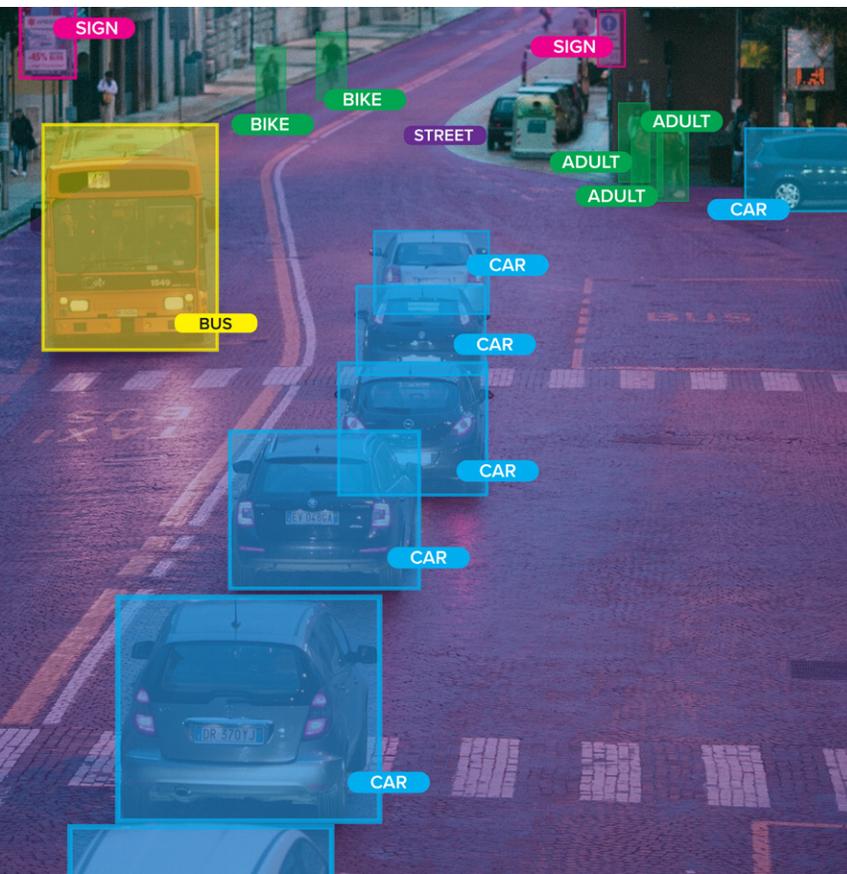
Challenges to AD Development

Cameras, sensors, and other devices generate a lot of information in autonomous vehicles. Data annotation identifies the area or object of interest in a video or image via bounding boxes. Video annotation and image annotation specify core attributes in their respective media. They help ML modes recognize objects detected by vehicle sensors.

In a world of self-driving trucks, cars, and robotaxis, it is vital to avoid collisions with obstacles. This is especially true in complex urban environments. **Safety is always paramount**. AD/ADAS failures garner the attention of the media, policymakers, and the general public. Such events undermine the acceptance of autonomous driving. They also impact the brands involved.

Training AD algorithms is a demanding process. As a 2021 Survey on Autonomous Driving Datasets notes, "these artificial intelligence algorithms require a large amount of diverse data for training and testing to ensure their performance in actual applications."

It's challenging to train AD/ADAS systems to cope with the implausible. Ironically, training autonomous vehicles occurs primarily through manually generated data. Fortunately, it is possible to cope with out-of-the-norm situations through a capable analysis of relevant data sets.

What is a Managed Service Model (MSM)?

In times of rapid growth, the ability to scale operations is essential. Fortunately, scalability is a significant strength of the Managed Service Model.

Gartner discusses managed service providers (MSPs) in general. MSPs deliver services via ongoing support and active administration. Services may relate to network, application, infrastructure, and/or security. This may occur:

- On customers' premises
- In an MSP's data center
- In a third-party data center

An MSP specializing in a specific industry is often a superior alternative to generalized outsourced IT. The Managed Service Model exhibits key attributes. MSMs typically focus on core client needs.

Companies often choose MSM to address an urgent need for expertise. This is particularly true in rapidly changing fields. By their very nature, MSMs are nimble enough to respond to rapid change. Machine learning self-driving cars are a case in point. To compete, companies must act with precision and without delay.

Look for a successfully managed service team to:

- Sit down with the client to define the specifications
- Review metrics with the client
- Review examples with the client
- Use its autonomy to quickly integrate client feedback
- Provide proper training to the labeling workforce

To optimize value, managed service teams rely on continuous innovation. When it comes to price, MSPs often outperform those using other approaches like full-time-equivalent (FTE) pricing.

> *The goal is to get your autonomous driving application to market faster and safer, and the Managed Service Model delivers in that regard.*

MSM's Value in AD Development

What are MSM best practices when handling the data demands of autonomous driving systems? AD enterprises need expert data labeling and data analysis, and dedicated data labeling teams respond.

Reliable data outcomes

MSM is also well-positioned to deliver reliable data results for an array of AD-related needs, including:

- Ground truth operations
- On-road deployment
- Model validation, including localization
- Critical Events
- Multi-sensor linking

While labeling is tedious and time-consuming, it is also vital. One serious error out of 10,000 delivered labels undermines the trustworthiness of the entire process. The goal is to get your autonomous driving application to market faster and safer, and the Managed Service Model delivers in that regard. It presents the test data necessary to evaluate perception algorithms, for example. Robotaxi data labeling is one example.

Ground truth labeling checks the accuracy of perception machine learning in the real world. Algorithms integrate ground truth information from multiple sensors to improve AD/ADAS. It is imperative to optimize data gleaned from diverse sensors like radar, LiDAR, sonar, cameras, thermal, and infrared imaging.

Model Comparison Chart

	Service Type	Internal Team	Standard Outsourcing	Crowdsourcing	Managed Service
Strategic Partnership	Core Business Model	—	✓	—	✓
	Dedicated Success Manager	—	✓	✓	✓
	Continuous Improvement	—	—	✗	✓
	New Process Development	✓	—	—	✓
	Consistent Workforce	✓	—	✗	✓
	24/7 coverage and responsiveness	—	✗	—	✓
Solutions Experts	Process Optimization Specialists	—	✗	—	✓
	Cross-industry Experience	✗	✓	✓	✓
	Multiple Use Case Experience	—	✓	✓	✓
	Scale quickly and efficiently	—	✗	✗	✓
Domain Expertise	SME Access	✓	✗	—	✓
	Additional Quality Management	—	✗	—	✓
	Identify and solve edge cases	—	✗	✗	✓
Technology	Tool Improvement Feedback	—	—	—	✓
	Flexible tool integrations	✗	—	✗	✓
Pricing	Load-Based Pricing	✗	✓	—	✓

The Managed Service Model offers distinct advantages to enterprises competing in the AD/ADAS space.

MSM Compared to Alternatives

The Managed Service Model offers distinct advantages to enterprises competing in the AD/ADAS space. For example, MSM is often better for use cases when compared to:

- Workforce-as-a-service options
- Crowdsourced models
- Business process outsourcing (BPO)

These competing approaches have their shortcomings. For example, turnover is a common issue with crowdsourcing. Disadvantages of BPOs include loss of control, communication challenges, and hidden costs. Ultimately, the selection of a lesser model may lead to higher costs, missed deadlines, and other problematic outcomes.

As the autonomous driving revolution proceeds, **companies must demonstrate a capacity to quickly scale operations**. They must swiftly build out their data labeling/collection silos to address burgeoning demand. In this dynamic environment, MSM is often a better fit than competing business models.

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About Digital Divide Data (DDD)

Digital Divide Data (DDD) delivers ML data solutions and content services to Fortune 500 companies and the world's leading academic institutions. DDD is unique in its ability to deliver end-to-end data creation, curation, labeling and annotation services, regardless of scale, with a guaranteed level of quality. Founded in 2001, Digital Divide Data is a New York-based non-profit with the vision of using technology and digital skills to bridge the gap between economically and socially marginalized populations and employment opportunities that lead to a sustainable and viable future.

DDD's managed service model (MSM) provides detailed and customized services to those wanting to scale AD operations. DDD adds value by providing services that are at once strategic, reliable, consistent, and flexible.

Learn more at **www.digitaldividedata.com**.

DDD Changing How the World Works.

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