



# Technology Brief...

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Research, Analysis, Strategy, Insight

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## Lockheed Martin Leverages Mixed Reality with Holograms

Recently, Microsoft featured a presentation by Lockheed Martin on how they are building spacecraft using mixed reality (MR), and more specifically, the Microsoft HoloLens 2 virtual reality headset along with Azure cloud services. As Lockheed Martin put it, “they moved from a rectangular screen to a transparent screen”, and got tremendous benefits. Lockheed cited the use of MR in the Orion deep space next generation spacecraft, as well as other projects in their aerospace division.

Analyzing their traditional operations, Lockheed found they spent more than 50% of their time in obtaining information and verifying information in one of their assembly processes, thus impacting actually working on assembling the system. By deploying an MR system, they were able to cut information overhead by 99%, and cut the overall assembly project time in half. In sharing several other examples, they indicated that they were able to reduce assembly labor by more than 90%, thereby saving both time to completion, as well as the ability to make their staff more productive. The process work required fewer specialized technician skills as the technicians were guided visually through each step of the process. And Lockheed indicated they were able to create the MR-based assembly aid applications using Azure Mixed Reality tools (Object Anchors, Spatial Anchors, Remote Rendering) in as little as 3 hours.

Saving time and money is certainly an important indicator of success, but just as important is improving quality and making it easier for employees to get work done. Lockheed indicated that to date no errors have occurred in their shop aid activities while using the MR system, that the shop aids are generally developed in less than 8 hours, and that the MR aids have resulted in greater than 85% labor savings.

Many organizations have hesitated to deploy MR systems due to the high start up cost (e.g., the HoloLens 2 headset costs \$3500) and development challenges (e.g., finding an MR development environment and building/hiring expertise to program it). Lockheed’s situation is somewhat unique in that the projects they are working on are valued into the many millions of dollars, enabling a fairly high threshold for tool development. Indeed, the ROI is so high that the cost of the devices, as a percentage of the total cost of enablement, is negligible. But we believe that there are many organizations that could benefit from MR even though they may not building extremely high value products.

MR can provide a major benefit in staffing. The ability to significantly reduce the necessary amount of and the time required to train workers means that new hires

can become productive much faster, and the normally steep learning curve is dramatically improved. Further, through the MR guided aids, workers are able to move to other jobs more readily without needing a high level of retraining. Finally, by using an MR aid system, nearly instantaneous updates are available for each process, enabling a much lower need for rework due to changes in design. These benefits can easily provide a positive ROI to MR deployments.

While the initial cost of MR systems can be high, the overall benefits can be significant, even in less dramatic instances than building spacecraft. Any complex operation can benefit by creating a visual aid to assist workers, resulting in improved quality, faster time of production, and enhanced ability to collaborate. Further, design and/or manufacturing process changes can be deployed almost instantaneously as all information presented is updated in the cloud servers where the MR headsets obtain their real-time information, as opposed to released on paper drawings. The savings in rework costs alone can often eclipse the initial cost of manufacturing and pay for the MR system. There is still a need to create and deploy MR software to the devices, but that is getting much easier through use of tools like Azure Mixed Reality (and other cloud players offer similar capabilities).

**Bottom Line:** We expect organizations with complex operations to increasingly adopt MR based solutions over the next 2-3 years, which will ultimately enable them to be more productive, lower overhead costs substantially, and make them more competitive in the marketplace. While an analysis of the cost of headsets, software development and deployment should be assessed by each organization's needs, it should be done as an exercise in overall cost of operations, rather than strictly as an IT costs issue. With all its benefits, companies should be creating an MR strategy now for deployment in the near term.

## Qualcomm Re-Visualizes AI

Visually processing information delivered by cameras and similar photo sensors is a growing market. Indeed, security, autonomous vehicles, healthcare, smart cities and many other fields are all exploring new ways of using visual processing. While there are many companies currently delivering such systems, the ability to create more intelligent AI based solutions that provide more complex processing solutions can lead to both more capable systems as well as delivering more cost effective and higher quality actionable intelligence. To that end, creating more effective AI computational devices is a necessity for advancing the field. Currently high power GPUs are most often used for visual AI processing. Reducing the complexity and cost of components means that many more devices can have built in AI capability

Qualcomm recently discussed an R&D project it has undertaken to reduce the amount of compute necessary to do visual AI, and thus create chips that are smaller, more cost effective and use less power. The techniques that it is implementing include creating methods to eliminate redundant information processing by only analyzing frame differences rather than analyzing each frame. In typical videos, each subsequent frame contains little information change from the previous one, so not having to process each frame individually with duplicated information is much more efficient. Further, Qualcomm is developing a skip function that also limits the number of frames to be analyzed by skipping frames that offer little or no change, eliminating the computational burden of processing them. This creates a process flow that understands the relationship between frames enabling the system to exit processing earlier when no additional information is needed, and potentially saving many frame processing cycles.

While not yet implemented in production components, these capabilities have an

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overall goal to reduce the complexity of the processor so that the amount of power used by the chip can be significantly reduced and the actual size of the chip created to be more compact. Both of these capabilities have the potential to reduce the cost of chips, as well as the needed power to run the chip and system it is implemented in. Smaller less power hungry chips produce less heat and also enable smaller finished devices with more limited power needs. That means being able to move the chip right into the camera or similar products without needing an external processing component as is common in current systems.

A further benefit of this work will be reducing the need for complex processing in the cloud or at the edge. The less data sent to the cloud for processing, the less cost involved in transport, the faster analysis of the data is available, and the less load on centralized cloud processing is achieved. Its why so much effort is being made to move to distributed edge solutions.

Indeed, edge computing is becoming common place in distributed, often hybrid cloud-based environments. As the number of cameras and visual devices proliferate, the workloads placed on edge computing systems increases, making the deployment more complex and more expensive. Creating processing power running complex AI programs that can be embedded in the visual device enables large scale deployment of smart cameras for security, smart cities, autonomous vehicles, etc. while reducing system costs. Complexity and deployment cost are a prime inhibitor to greater use of such solutions in both public and private markets.

**Bottom line:** By creating a way to reduce the processing required to do visual AI computations and thereby reducing the power requirements, size and cost of AI chips, Qualcomm hopes to create mass market devices that can be deployed in lower cost and higher quantity devices, and without sacrificing AI quality. If it can accomplish this, the number of devices with self contained capability will skyrocket, relieving the strain on edge computing and allowing it to do more important processing functions. This is a win for Qualcomm, and potentially a win for all forms of new, visually “smart” products. While Qualcomm is not the only silicon vendor in this race, its R&D efforts put it ahead of many and it should benefit significantly from its leadership.

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## Cloudera Partners with IQVIA in Healthcare

Enterprises are increasingly being inundated with data. Many have moved to capture the massive amounts of internal and external data being generated, whether in a local data lake or in the cloud via various services. But capturing the data is the easy part. The bigger challenge is how to make best use of that data to gain insights needed to optimize the business. Enterprises must move beyond simply gathering their data and into an environment where that data can be maximized for value, just like any other valuable corporate asset.

Most organizations have done a poor job of gaining those valuable insights and getting maximum value for all their data. We estimate 75%-90% of organizational data is going unused – captured but then never analyzed. And the challenge is even greater as we move to a multi-cloud environment. The average enterprise may have dozens of independent data repositories, and they may even be compatible with each other. What’s needed is a full Enterprise Data Cloud that can manage the entire data lifecycle, from acquisition through meaningful insights. It’s a difficult task to manage data across multiple repositories and/or clouds, while also deploying the needed Machine Learning and AI techniques to secure, manage and aggregate the data for meaningful analysis. To that end, companies that need to focus on building

out a full data lifecycle strategy.

A great example of doing it well is what IQVIA is doing with their Human Data Science Cloud. It serves organizations that need a consolidated view of the data, with data from many unique sources that must maintain absolute privacy protection while also allowing ease of analysis for the multitude of problems that users want to analyze. IQVIA provides a single consolidated cloud enabled data service that includes data access management, privacy protection, AI/ML analysis tools, services/expertise and technology platform. Built on the Cloudera Data Platform (CDP) as an underlying foundation, it is able to support 190K sources of data, maintain 95B healthcare records, and enable data utilization to 4.9M researchers and 16M healthcare professionals, all from a multi-cloud environment. They provide more than 200 solutions for their customers' needs – with customized deployments both build by their own services arm as well as by their individual customers using IQVIA tools and templates.

IQVIA's platform provides out of the box capabilities for data warehousing, engineering, streaming, and machine learning, for on premises deployments or deployment in remote or hosted cloud instances, while using the same underlying management and security functions enabled in CDP. And its ability to enable customers to gain various insights by generating unique data queries makes it an invaluable tool in the industry. It's not just a data repository, but a complete data analysis source covering the many aspects of healthcare modeling, data analysis, drug trials, etc., and serving a vast array of constituents, including providers, insurers, regulators, consumers, physicians, life sciences and patients.

**Bottom Line:** Creating an Enterprise Data Cloud that enables organizations to maximize their valuable data assets must be a high priority. Those that don't do it well will risk becoming obsolete and/or at a competitive disadvantage. But this effort must be done in a method that provides not only data capture, but full data lifecycle management and analysis capability. Products like Cloudera CDP that power service providers like IQVIA, provide both a compelling solution to this dilemma, as well as an easy on-ramp for organizations to deploy a full data lifecycle management process, while still enabling the customized analysis required. Organizations must implement a data lifecycle management solution in the short term.



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## About J. Gold Associates, LLC.

*J. Gold Associates provides advisory services, syndicated research, strategic consulting and in-context analysis to help its clients make important technology choices and to enable improved product deployment decisions and go to market strategies. We work with our clients to produce successful new product strategies and deployments through workshops and reviews, business and strategic plan coaching and reviews, assistance in product selection and vendor evaluations, needs analysis, competitive analysis, and ongoing expertise transfer.*

*J. Gold Associates provides its clients with insightful, meaningful and actionable analysis of trends in the computer and technology industries. We have acquired a broad based knowledge of the technology landscape and business deployment requirements, and bring that expertise to bear in our work. We cover the needs of business users in enterprise and SMB markets, plus focus on emerging consumer technologies that will quickly be re-purposed to business use.*

*We can provide your company with a trusted and expert resource to maximize your investments and minimize your risk. Please contact us to see how we can help you.*