

Dell EMC Ready Solutions for AI

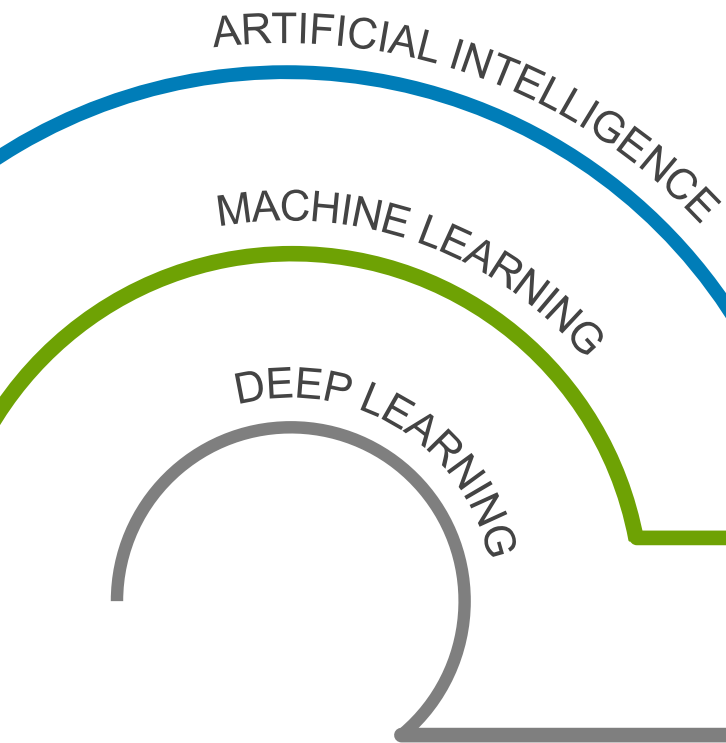


**CIO Council
Bucharest, March 26th, 2019**

**Horia Constantinescu
Datacenter Sales Executive**



What is AI, machine learning and deep learning?



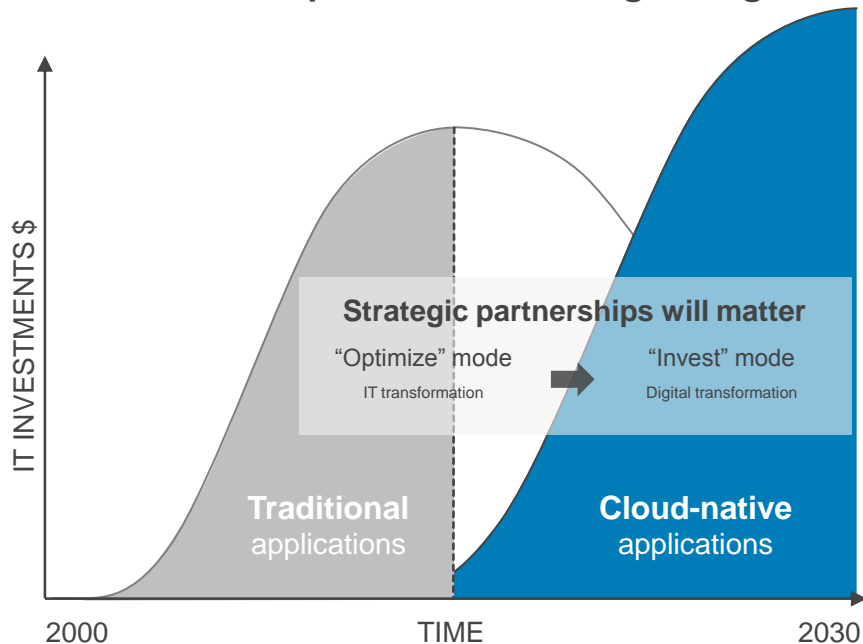
AI refers to machine intelligence, while machine learning and deep learning are the technologies that underpin AI and make it possible.

Machine learning refers to the process of “training” the machine, feeding large amounts of data into algorithms that give it the ability to learn how to perform a task.

Deep learning is a machine learning technique that uses neural networks as the underlying architecture for training models.

Digital transformation is a balancing act

From “status quo” to “embracing change”



Technology will move from the realm of IT to become inherent across the business

Last 15 years

Next 15 years

IT-centric

Business-centric

Systems of record

Systems of engagement
and insight

Traditional applications

Cloud-native apps

Transactional data
and reporting

Streams of data and
analytics

Internet

Internet of Everything

An opportunity to transform with machine learning

Machine learning has captured the CIO's imagination – largely because its potential to automate processes and improve decision-making could speed up difficult digital transformations

64% of CIOs investing in machine learning in the next 3 years

72%

Leading
digitization
efforts

53%

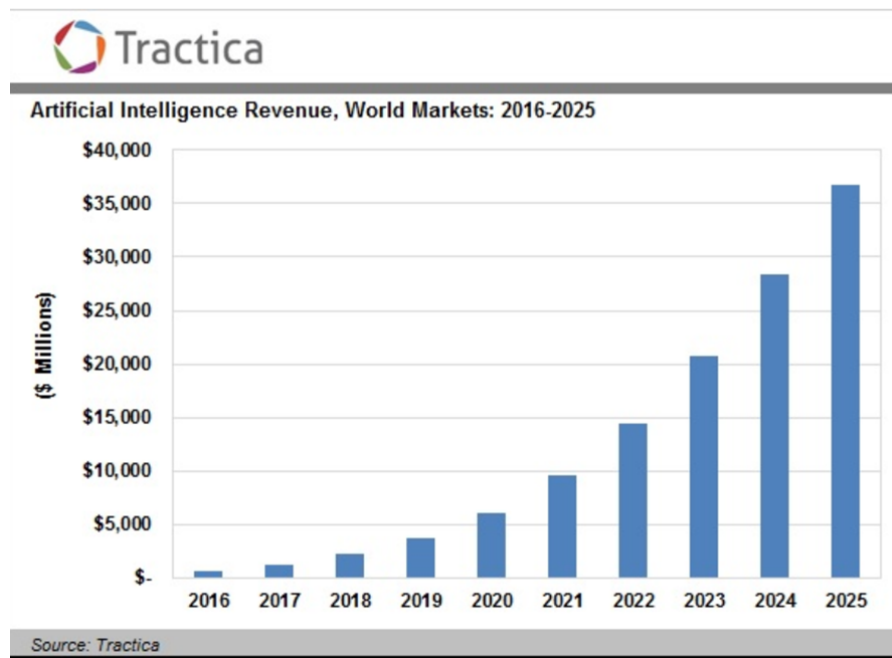
Machine learning
is a focus of those
efforts

90%

Automation will
increase the
accuracy and speed
of decisions

See the full study: [“The Global CIO Point of View.”](#)

Your competitors are taking the next step to get more insight out of their data









High Growth Markets

- Financial
- Life Sciences
- Government
- Security and Surveillance
- Media and Entertainment
- Research
- Retail
- Transportation
- Manufacturing

CAGR 45%

Machine learning and deep learning use cases

 Healthcare and life sciences	 Financial Services	 Government security	 Media and entertainment	 Energy	 Transportation
Drug interaction Cancer detection Chronic illness prediction Drug discovery Gene mutation Sanitation	Fraud prevention Risk management Investment predictions Customer service Digital assistants Network security	Facial recognition Video surveillance Cyber security Satellite imagery Event prediction Emergency Services	Video captioning Content-based search Real-time translation Language processing Content suggestions	Wind power generation Solar forecasts Oil production optimization Weather prediction Prediction of consumption demand	Autonomous vehicles Pedestrian and object detection Lane tracking and traffic patterns Preventative maintenance Risk assessment

Ready Solutions for AI



Machine learning with Hadoop

- With data in Hadoop, this is a **fast** way to take the next step from predictive analytics to prescriptive analytics
- Get **deeper insights** using Cloudera Data Science Workbench with the Dell EMC Data Science Engine
- Delivered with **proven Hadoop expertise** – workshops, consulting, deployment, proofs of concept, support and financing available

RTS July 2018

If you're running Apache® Spark®, you can take advantage of the BigDL distributed deep learning library for Apache Spark, for a faster path to enabling machine learning and to making deep learning more accessible for non-expert big data users and data scientists

Take predictive analytics to the next level

With Dell EMC Ready Solutions for AI, Machine Learning with Hadoop

PRIMARY TARGET

Companies leveraging Hadoop

DIFFERENTIATION

Dell EMC Data Science Provisioning Engines +
Cloudera Data Science Workbench

- Web front-end makes it easy for data scientists, saving valuable time
- Containers for machine learning
- Language and framework agnostic
- Integrated security and governance, with all the features of Cloudera Enterprise

DELL EMC



cloudera



DELL EMC

Dell EMC Machine Learning with Hadoop include:

- Dell EMC PowerEdge R640 and R740xd servers
- Dell EMC Networking Z9100-ON, S3048-ON
- Cloudera Enterprise Data Hub
- Cloudera Data Science Workbench
- Spark with BigDL
- Dell EMC Data Science Provisioning Engine
- Consulting, deployment, support
- Financing

Caffe

BigDL



Please consult the Ready Solutions for AI Sales Guide for configuration options

Dell EMC Ready Solutions for Hadoop yield results

Ready Solutions for Hadoop

\$4.1M

of additional profit from new Hadoop-enabled business

2x

ROI

<6 months

payback

\$15M

of savings for data storage and offload

30%

Improvement in data science productivity

\$540k

savings in system administration efficiency per year

\$1.4M

in savings from reduced fraud

20%

reduction in fraud

Source: *The Total Economic Impact of the Dell EMC Ready Bundle for Cloudera Hadoop*, Forrester, May 2018

Protecting what's in your wallet



Business need

Turning 2.2B global cards
160M transactions/hour, 52B
transactions / year into
intelligence with 1.9M rules
applied to those transactions.

Solution

MasterCard worked with Dell and
Cloudera to build a secure, PCI-
certified Hadoop cluster

MasterCard's Enterprise Data Hub fully
conforms to the PCI-DSS V 2.0
security standards so it can host PCI
datasets and integrate with other
systems

Benefits

- Understand how, when and where customers buy leading to predictive analytics
- Increased security and fraud protection via analyzing customer purchasing patterns, affinities and rhythms using machine learning
- Expand business with anonymized data re: share of wallet compared to competition, average ticket and frequency to identify marketing opportunities and measure return on investment

“Data privacy and protection is a top priority for MasterCard. As we maximize the most advanced technologies from partners and vendors, they must meet the rigorous security standards we’ve set.”

Gary VonderHaar,
Chief Technology Officer, Architecture, MasterCard



Ready Solutions for AI



Deep learning with NVIDIA

- **AI simplified** with optimized hardware-software stack, validated solution
- **Faster, deeper insights** with leading PowerEdge servers, powerful NVIDIA GPUs and Isilon Scale-out NAS storage
- **Proven expertise** with workshops, consulting, deployment, proofs of concept, support and financing available

RTS July 2018

Built around NVIDIA® Tesla® V100 GPUs, the first to break 100 teraFLOPS

NVIDIA NVLink™ connects multiple V100 GPUs at up to 300 GB/s to deliver 30X higher inference performance

Deep Learning with NVIDIA

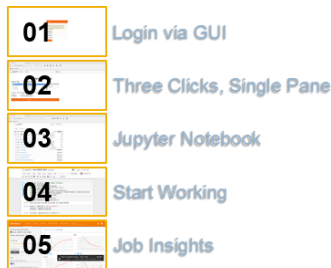
PRIMARY TARGET

Companies with applications written for parallel processing

DIFFERENTIATION

New Dell EMC IP: Data Science Provisioning Portal

- Radically simplifies cluster deployment with a point-and-click GUI
- Delivers ready-to-run environments in only 5 clicks
- Mitigates risk by highlighting human-error in cluster definition and deployment



Dell EMC Machine Learning with NVIDIA include:

- Dell EMC PowerEdge R740xd and C4140 servers
4x NVIDIA Tesla V100-SXM2 GPUs
- Dell EMC Networking S6036-ON, S3048-ON
Mellanox SB7800 InfiniBand
- Bright Cluster Manager for Data Science
Dell EMC Data Science Portal
- Dell EMC Isilon F800
- Education
Consulting, deployment, support
Financing



Please consult the Ready Solutions for AI Sales Guide for configuration options

Accelerating scientific research at Commonwealth Scientific and Industrial Research Organisation



Business need

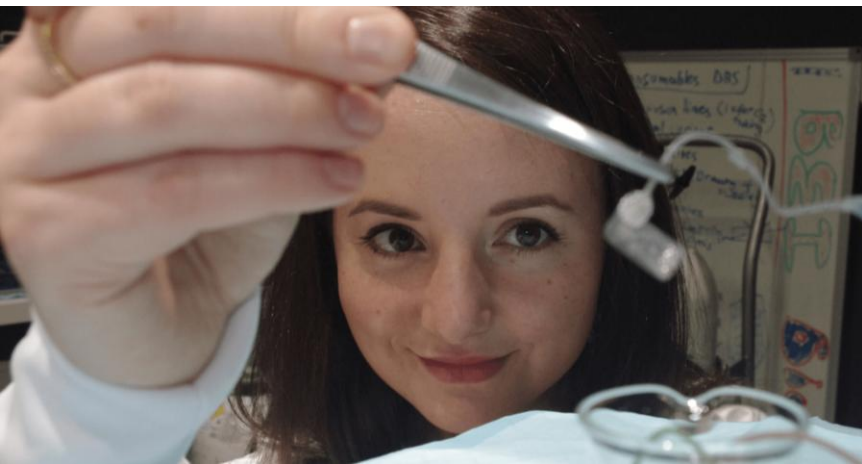
CSIRO needed a next-generation GPU-based supercomputer to meet the evolving needs of scientific research teams.

Bracewell Solution

- 114 Dell EMC™ PowerEdge™ C4130 servers with dual Intel® Xeon® CPUs, NVIDIA® P100 GPUs, NVLINK, and 100Gbps EDR InfiniBand
- 1,634,304 NVIDIA® CUDA® compute cores for GPU computing
- 3192 Intel® Xeon® compute cores
- 13 x 100Gbps 36p EDR InfiniBand switches
- Bright Cluster Manager Software 8.0

Benefits

- The peak performance of the system's GPUs alone total 2.4 petaflops, and the system as a whole has the ability to compress 126 million years' worth of calculations into a single second
- Bionic Vision advancements to help restore sight for people with profound vision loss
- Scientists can work through the possibilities and get to answers much more quickly



“With the new Dell EMC-based GPU machine, we’ve had very significant improvements in the time taken to run applications. Some applications that used to take five hours to run are now taking just two hours.”.

Brendan Dalton, chief information officer at CSIRO

Kerry hopes her model will help improve the resolution in bionic eyes



PowerEdge Server Reference Configurations

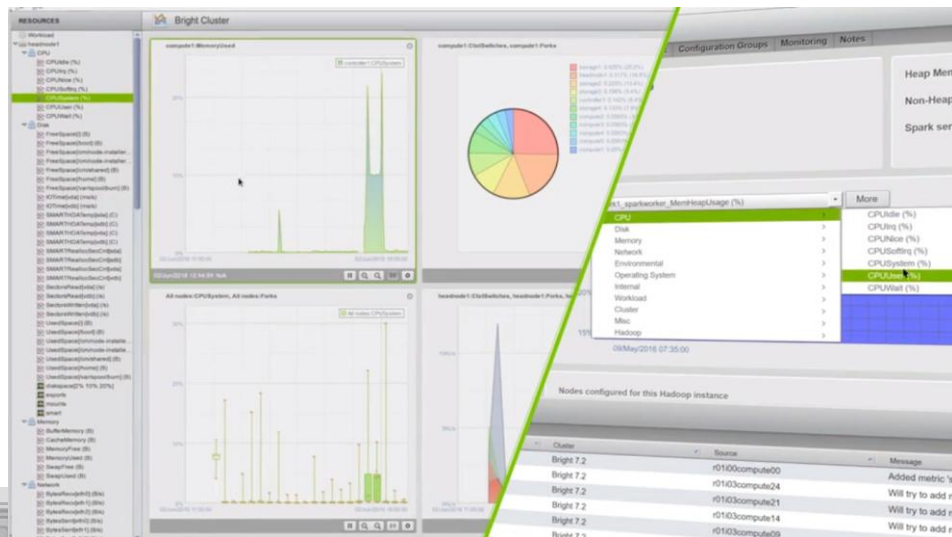
Configuration	Deep Learning Single node 'Training'	Deep Learning Single Node 'Training and Inferencing'	Deep Learning Medium 'K'
Compute	PowerEdge R740 Server Or PowerEdge T640 Server	PowerEdge R740 Server	PowerEdge C4140 Server
Processor	2x Intel Xeon Gold 6150	2x Intel Xeon Gold 6150	2x Intel Xeon Gold 6148
Memory	384GB DDR4 @2,667 MHz	384GB DDR4 @2,667 MHz	384GB DDR4 @ 2,667 MHz
Drives	PowerEdge R740: 1TB SSD PowerEdge T640: 400GB SSD	1TB SSD	2x SSDR, 120G, SATA, M.2, IN, BOSS
Accelerator	PowerEdge R740: 3x NVIDIA Tesla V100 PCIe PowerEdge T640: 4x NVIDIA Tesla V100 PCIe	3x NVIDIA Tesla P40 PCIe	4x NVIDIA Tesla P100 SXM2 Or 4x NVIDIA Tesla V100 SXM2
Software	Bright Cluster Manager for Data Science	Bright Cluster Manager for Data Science	Bright Cluster Manager for Data Science

Bright Cluster Management for Data Science

Everything you need to accelerate your data science projects

Administer data science clusters as a single entity, provisioning the hardware, operating system, big data and deep learning software from a single interface

Now with **unique integration** with PowerEdge servers easing management and configuration



Workstation configurations for training and inferencing

	Training			On-the-go
	Machine learning baseline	Moderate classical machine learning and deep learning	Performance classical machine learning, deep learning and inferencing	Portable classical machine learning, transfer learning, ideation and iteration
System	5820 Tower	7920 Tower	7920 Tower	7730 Mobile Workstation
CPU	Intel Xeon W-2145 8c	2x Intel Xeon Gold 6134 8c	2x Intel Xeon Gold 6136 12c	Intel Xeon E-2175M
GPU	NVIDIA Quadro GV100	2x NVIDIA Quadro GV100 + NVLink	3x NVIDIA Quadro GV100 + 2x NVLink	1 NVIDIA Quadro P5200
Storage	1x 1TB NVMe SSD – data 1x 1TB SSD – OS	2x 1TB NVMe SSD – data 1x 1TB SATA SSD - OS	4x 1TB NVMe SSD – data 1x 1TB SATA SSD - OS	4x 256G NVMe SSD – data/OS
Memory	64GB	192GB	384GB	32-64GB
Network	1 Gb integrated			

AI startup revs up its business



Business need

ZIFF Inc. needed a highly reliable, enterprise-class server to train algorithms for artificial intelligence

Solution

- Dell EMC PowerEdge C4140 servers
- NVIDIA Tesla V100 GPUs

Benefits

- Increased productivity with extremely reliable computing infrastructure
- Eliminated continual problems with server crashes
- Accelerated training models with tens of millions of images



“We obsess about images per second, performance and latency but also obsess about our cost so it has to back out for us on the cost per train and we couldn’t get that in the cloud.” – Ben Taylor, chief AI officer

“We struggled, like most startup companies. We built our own system based on gaming GPUs and a big gaming motherboard, and gaming this and gaming that. Frankly, it was pathetic. The thing would crash once a week, sometimes once a day. It just wasn’t going to work for us.” – Co-founder David Gonzalez

Index, auto-categorize, & curate photo, audio and video with ZIFF.ai

Dell EMC Services

Organizations of all sizes turn to Dell EMC and Dell EMC Partners to provide the services needed to succeed



Dell EMC **AI Consulting** accelerates your success with the Ready Solution for AI by pairing our teams to install, configure, test and tool the platform



Dell EMC **deployment experts** have a proven track record of success in thousands of engagements worldwide.



Take a test drive in the **Customer Solution Centers**



Dell EMC **ProSupport** offers a single point of accountability, premium hardware and software support available 24x7 and next-business-day on-site service.

NEW Deep Learning Institute

Learn how to build Artificial Intelligence (AI) and accelerated computing applications with hands-on training

- Fundamentals
- Industry/domain-specific courses
- Workshops and labs
- Industry collaborations
- Videos and podcasts

[Now from Dell EMC](#)



Access the world-class HPC and AI Innovation Lab

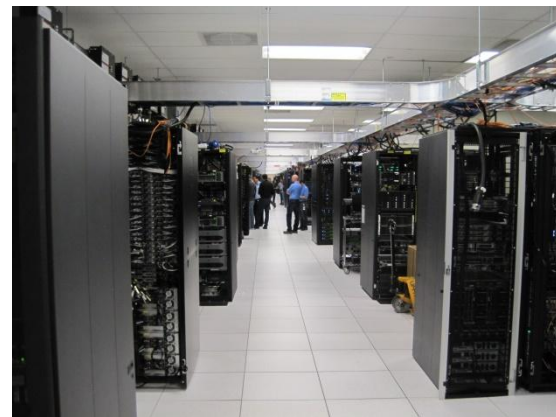
Dedicated to research and development of HPC solutions so you can make discoveries faster



Leverage HPC
engineering expertise



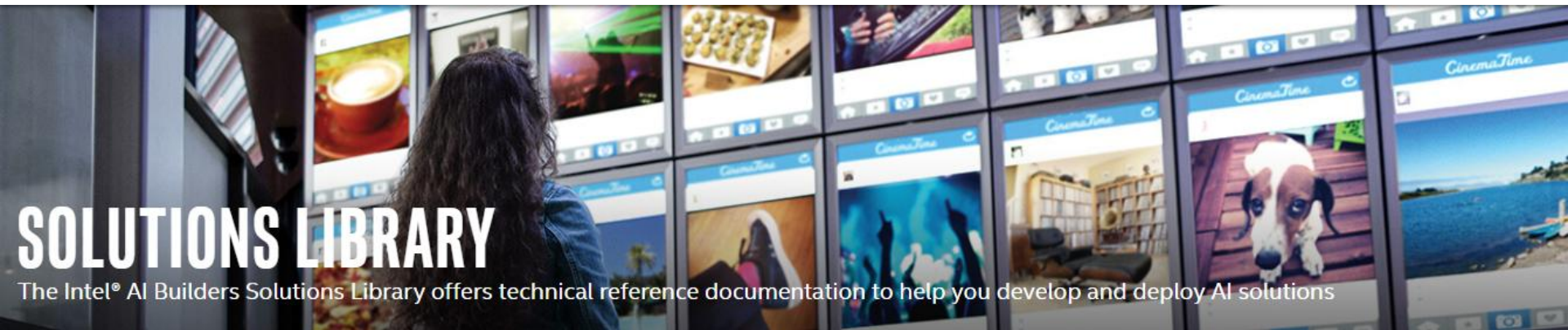
Test new technologies



Tune your applications
for performance
and efficiency

Fostering the next generation of AI

Accelerating AI **ecosystem** innovation with Intel AI Builders



Participating in an ecosystem of ISVs, system integrators, OEMs, cloud service providers and enterprise end users who have a shared mission to accelerate adoption of AI

Why Dell EMC?



Dell EMC is the ONLY tier1 with a portfolio from workstations to optimized solutions to supercomputers, with worldwide education, services, support, financing and community to support customers as their data and their businesses grow.

#1

- Converged and hyper-converged infrastructure
- Servers
- Traditional and all-flash storage
- Traditional and all-flash storage
- Cloud IT infrastructure
- Data protection
- Software-defined storage

1 IDC WW Quarterly Converged Systems Tracker, Q4 2017, April 2018, Vendor Revenue. 2 IDC, "[Worldwide Server Market Revenue Grew 38.6% in the First Quarter of 2018, According to IDC](#)," May 2018. 3 IDC WW Quarterly Enterprise Storage Systems Tracker, September 2017, Vendor Revenue — EMC Q2 2017. 4 IDC WW Quarterly Cloud IT Infrastructure Tracker, April 2017, Vendor Revenue — EMC Q4 2016. 5 Dell EMC Pulse, "[Gartner Recognizes EMC as a Leader in the 2016 Data Center Backup and Recovery Software Magic Quadrant](#)," June 2016. 6 IDC WW Semiannual Software Tracker, 2H2016, April 2017.

Immersive Learning



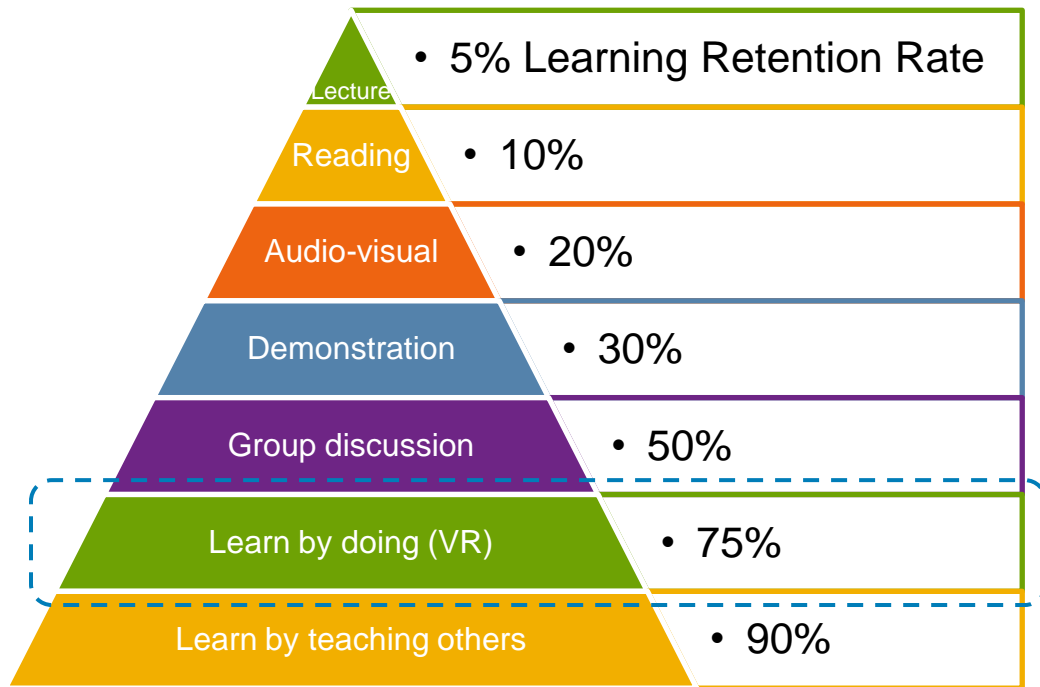
Deeper look at VR Training

Learning by doing at 75% retention has one of the highest effectiveness ratings

Greater value/return of VR training

- Limited or expensive resources
- High-risk situations
- Cost effective (e.g., limit travel)
- Detailed analytics

Learning is not just for new or acquired employees. There is also **application for customers, external partners and their clients**



Source: National Training Laboratories

Reimagining Medical Training with Enduvo

- Allows everyone to design, create and deliver their own 3D content
- Uses one-on-one, immersive experiences to better prepare learners
- Delivers more effective 3D-courseware and improved outcomes
- Requires no coding, VR-expertise, or big production budgets
- Increases efficiency and scalability through an asynchronous learning platform

