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Digital

Digital Reality changes everything

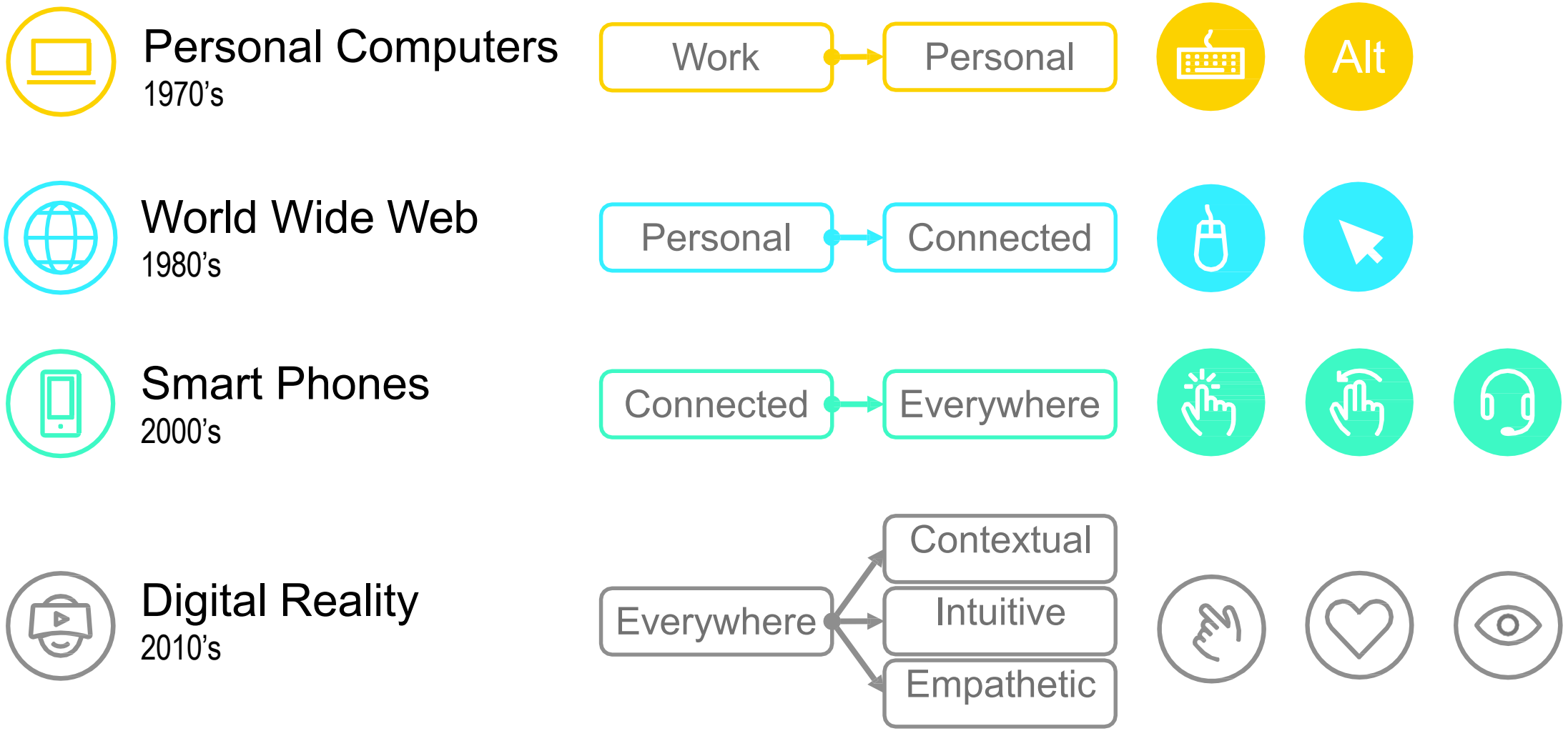
Step into the future

Henrik Ebbesen

Claus Machholdt

The potential of “Digital Reality” (VR/ AR/ MR) is to re-imagine reality and allow access to objects, places and people that are out of reach in the real world!

Where are we coming from?



Alter Your Reality

Virtual Reality

AN IMMERSIVE EXPERIENCE

"VR" creates a digital environment that replaces the user's real-world environment.

- Fully rendered, enclosed environment
- Body & motion tracking
- Consumer & enterprise ready

Augmented Reality

OVERLAYING THE REAL WORLD

"AR" overlays digitally-created content into the user's real-world environment.

- Transparent optics, viewable environment
- Aware of surroundings & self
- Primarily single display devices

Mixed Reality

PUTTING OBJECTS INTO THE REAL WORLD

"MR" is an experience that seamlessly blends the user's real-world environment and digitally-created content, where both environments can coexist and interact with each other

- Advanced sensors for spatial awareness and gesture recognition

Immersive Technologies

CHANGING REALITY

"Immersive Experience" is a deeply-engaging, multisensory, digital experience, which can be delivered using VR, AR, 360° video, MR and/or other technologies

360° Video

A NEW PERSPECTIVE

"360° Video" allows the user to look in every direction around him/her

- Shot with an omnidirectional camera or a collection of cameras
- User controls the view

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Digital Reality + Beyond the Glass

Augmented Reality

OVERLAYING THE REAL WORLD

Mixed Reality

PUTTING OBJECTS INTO THE REAL WORLD

Virtual Reality

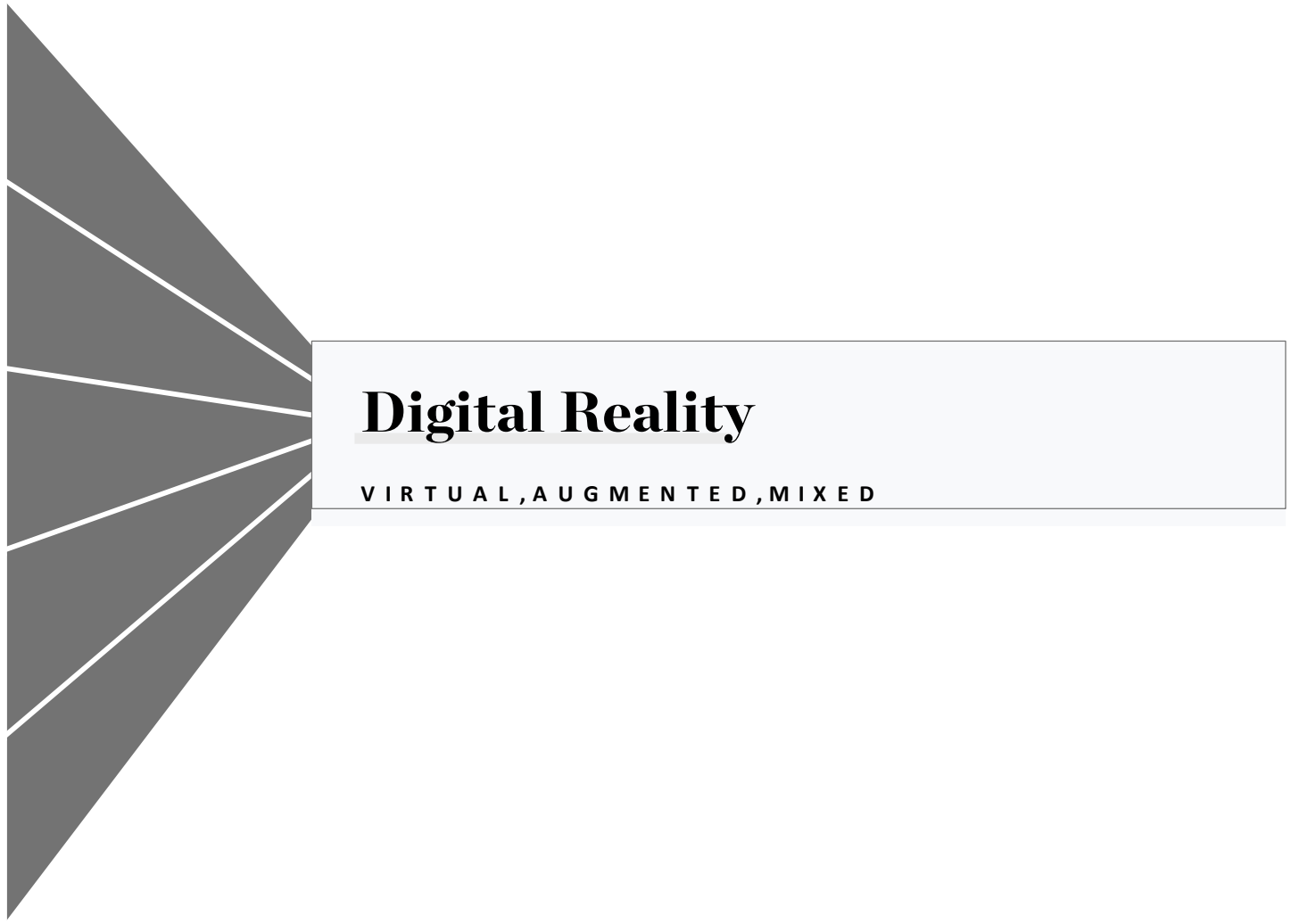
AN IMMERSIVE EXPERIENCE

360° Video

A NEW PERSPECTIVE

Immersive Technologies

DEEPLY ENGAGING MULTI-SENSORY REALITY



Digital Reality

VIRTUAL, AUGMENTED, MIXED

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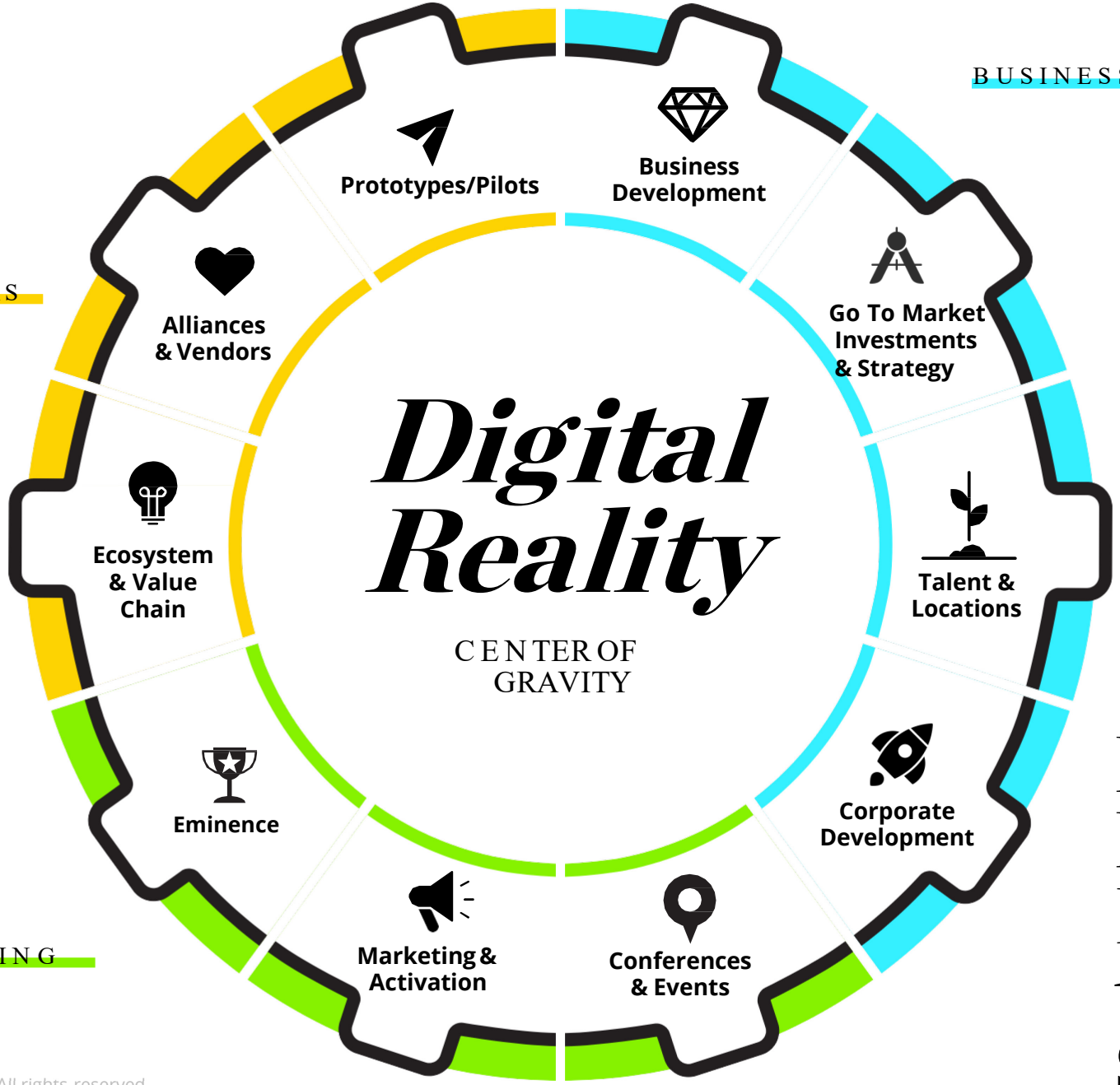
BUSINESS &OPERATIONS

TECHNOLOGY ENABLERS

BRANDANDMARKETING



Digital Reality Investments to Enable Success!

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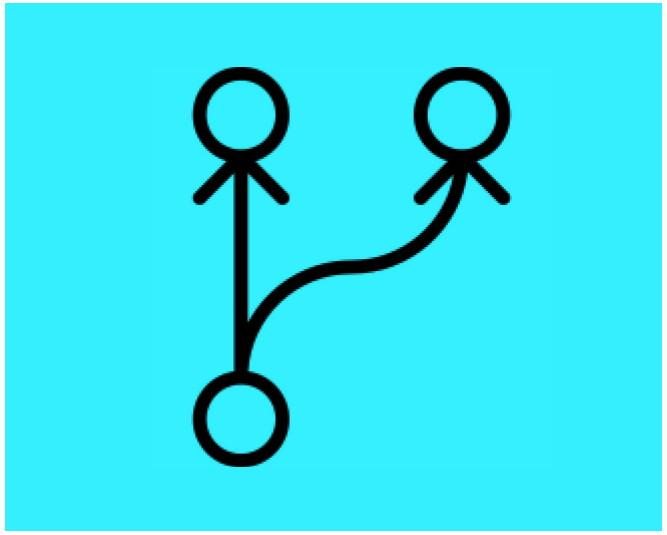
High level, Digital Reality will provide businesses new opportunities…

SAVE COSTS

IMPROVE PERFORMANCE



PROVIDE NEW VALUE

Digital Reality

Why now ?

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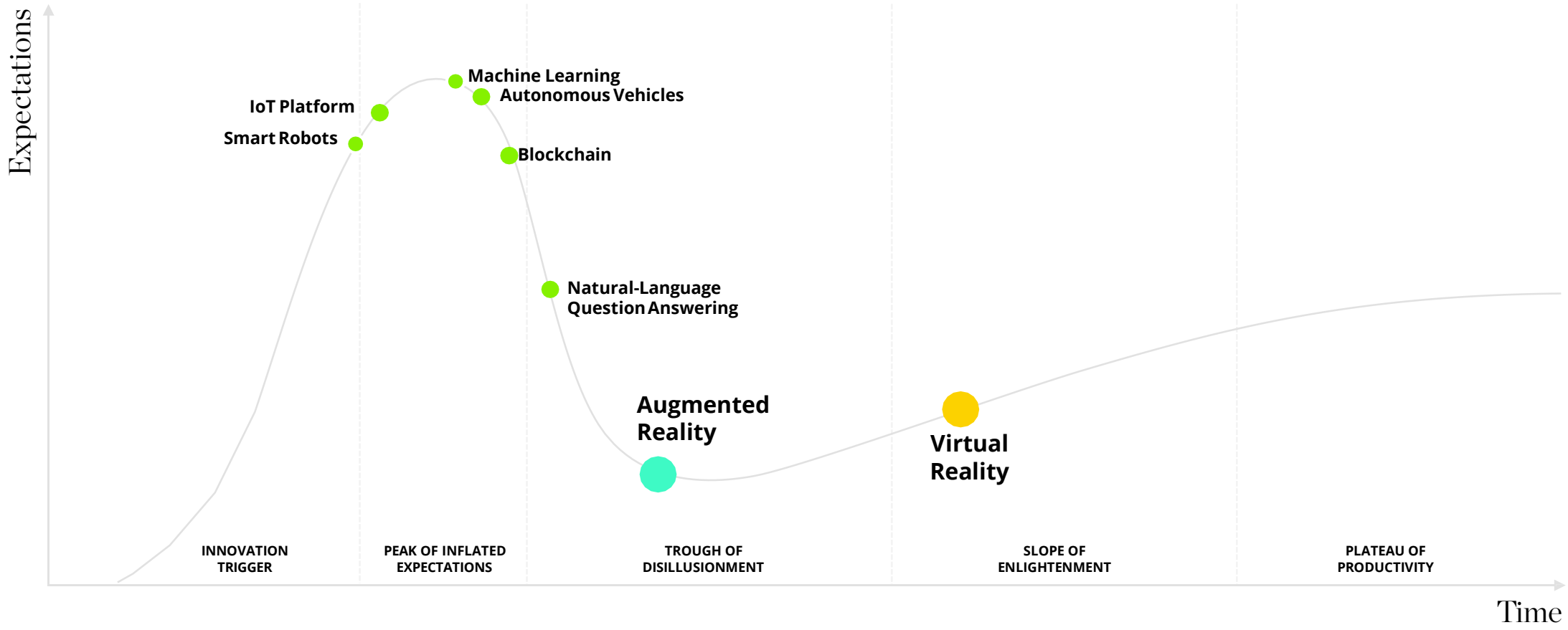
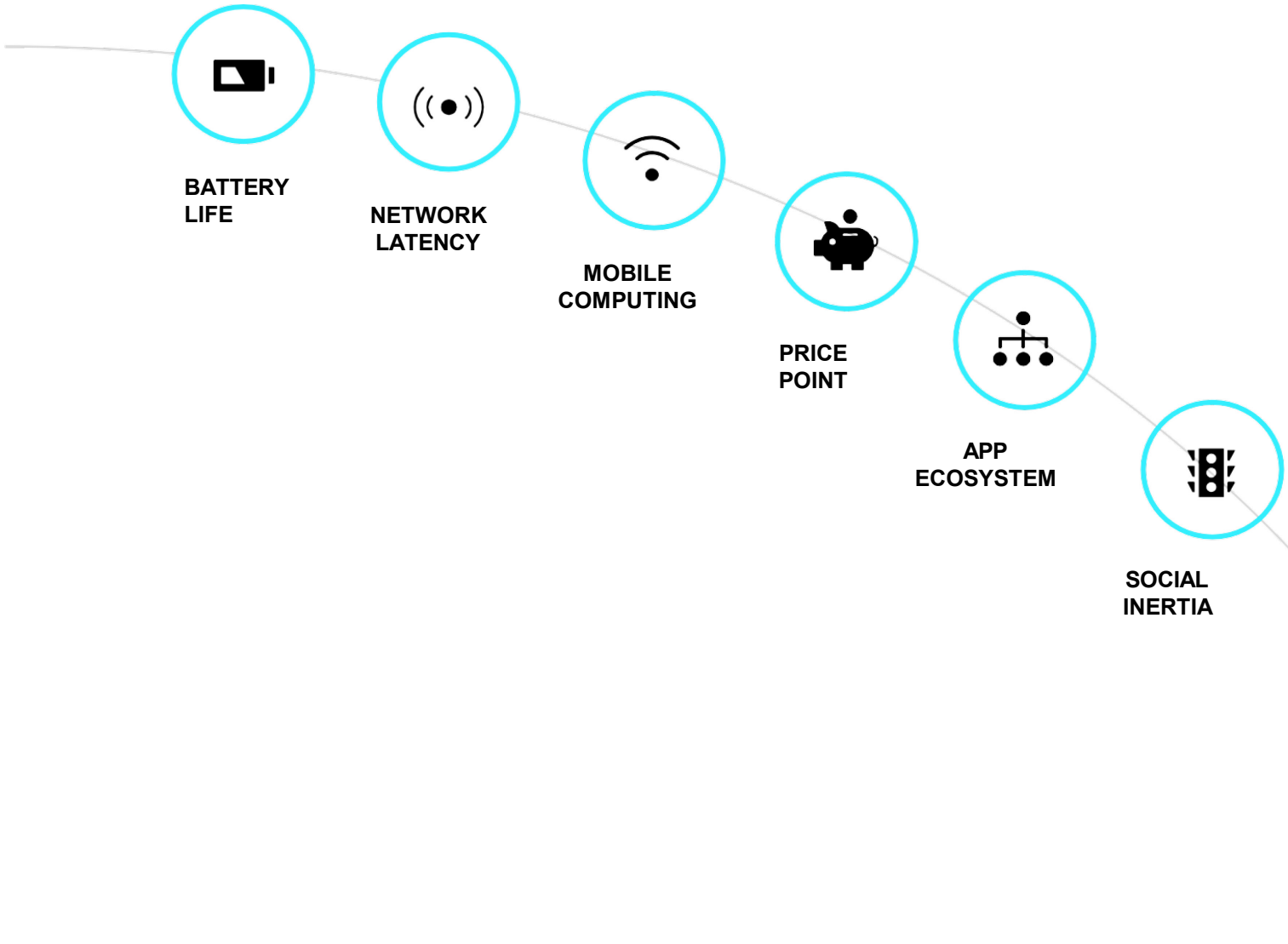
The hype may be waning, but real **opportunity is growing**



Gartner Hype Curve, 2017

The enterprise entry barriers are fading...



What are the opportunity areas?

Digital Reality opportunity areas

Connect

Collaborate without colocation – connect people remotely, communicate and enable individuals to view/interact with the same data/viewpoint

See-What-I-See

Holo-presence

Field Services

Repair & Diagnostics

Equipment Installation

Know

Augment data and resources to give professionals, engineers, and designers a new way to do their jobs

Architecture

Maintenance

Design

Medical

Analytics

Learn

Immerse in training, analytics, and research, lowering time, risk and cost required

Immersive Training

Safety & Compliance

Qualification

Gamification

Behavioral Analytics

Explore

Bring consumers on a journey of exploration across time and geography

Augmented Shopping

Travel & Hospitality

Events & Conferences

In-Store Experiences

Enhance physical products

Immersive Mobility

Augmented Catalogs

Play

Deliver Digital Reality experiences through content creation, enablement and consumption

Story Telling

Live Events

Location Based

Gaming

360

Think

Evaluate solutions, devise best practices, build business cases and determine a long term vision

Strategy & Vision

Vendor Assessment

Use Case Scoring

Business Case

Ecosystems

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These industries a currently leaders in enterprise adoption of Digital Reality

RETAIL

- Augmented Shopping
- Live Events
- Behavioral Analytics
- In-Store Experiences
- Augmented Catalogs
- Immersive Training
- **Enhance physical products**

CONSTRUCTION

- Architecture
- Location Based visualization
- 360 degree experiences

MANUFACTURING

- **Immersive Training**
- Enhance physical products
- Maintenance
- **See-What-I-See**
- Field Services
- Repair & Diagnostics
- Equipment Installation

EDUCATION

- Immersive Training
- Storytelling
- Gamification

HEALTHCARE

- Immersive Training
- Safety & Compliance
- **Treatment**

GOVERNMENT

- Immersive Training
- Maintenance
- See-What-I-See
- Field Services
- Repair & Diagnostics

PHARMA

- Immersive Training
- Safety & Compliance
- Maintenance
- Visualization

REAL ESTATE

- **Visualization**

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Connect & Know

Collaborating without co-location - connecting professionals remotely and augment data and resources to give professionals an improved way to do their jobs

CONNECT   **KNOW**

LEARN EXPLORE

Holo-Presence See-What-I-See Do-What-I-Do Remote Scribing Repair & Diagnostics Maintenance

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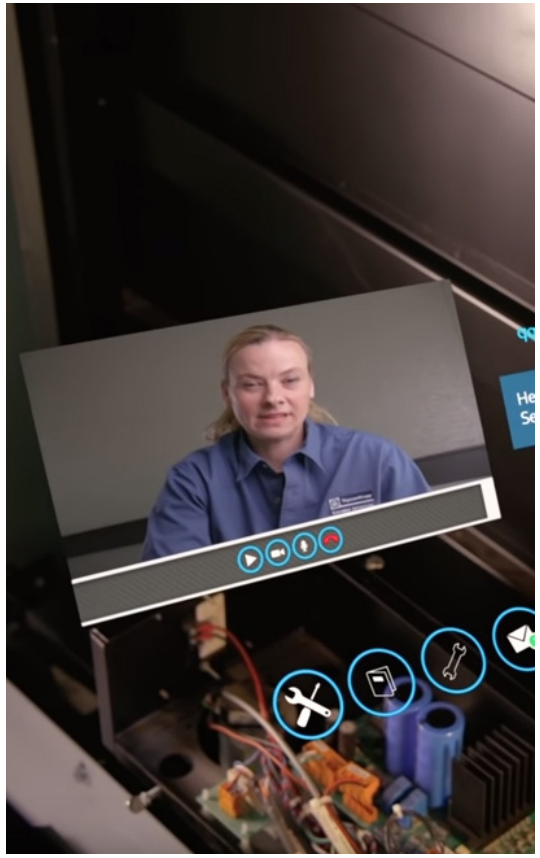
Connect+Know

Augmented Reality enhanced workforce

Augmenting data and resources to give professionals, engineers, and designers a new way to do their jobs more effectively

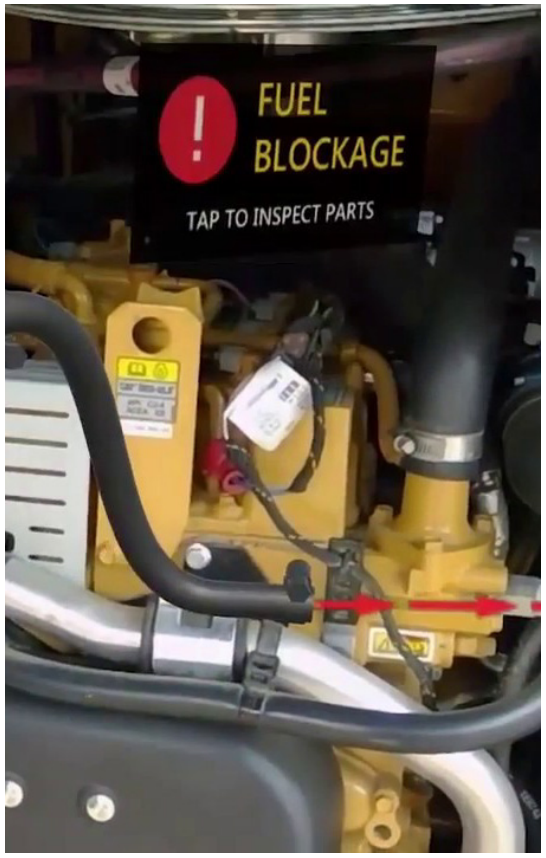
Industry Examples

Remote assist



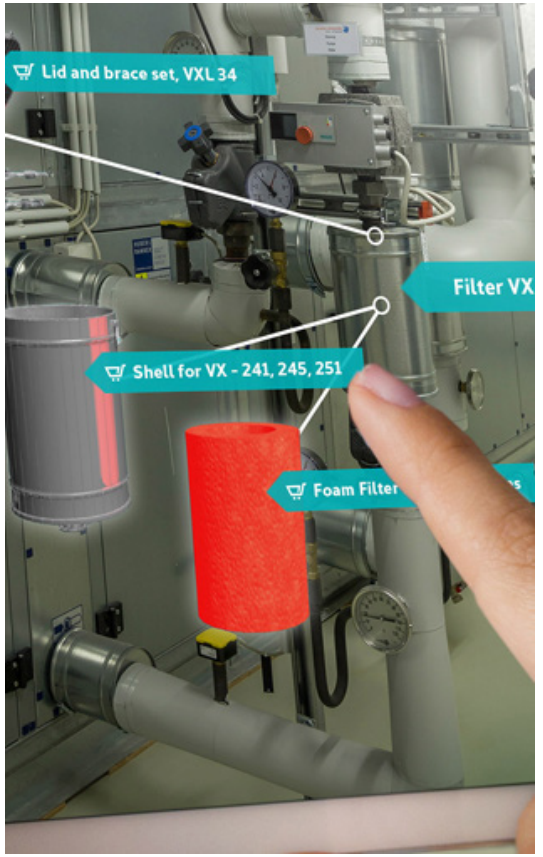
thyssenkrupp

Machine Maintenance tasks



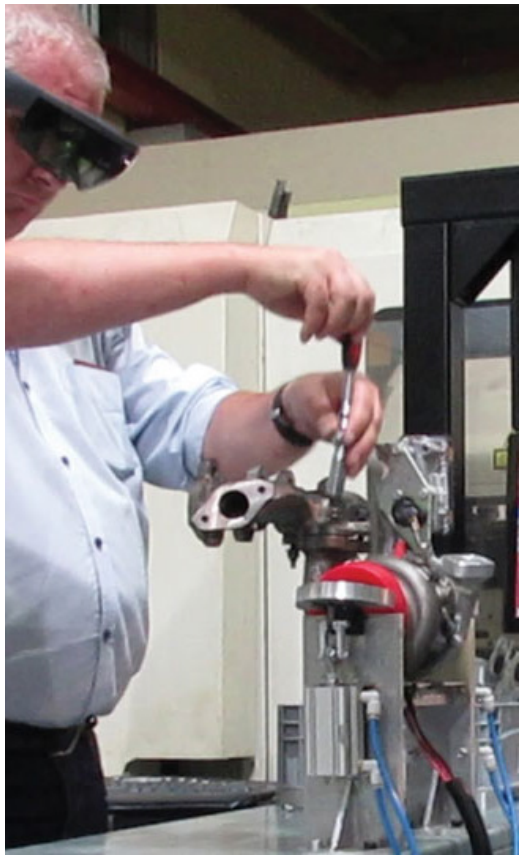
CAT

IOT - Digital twin



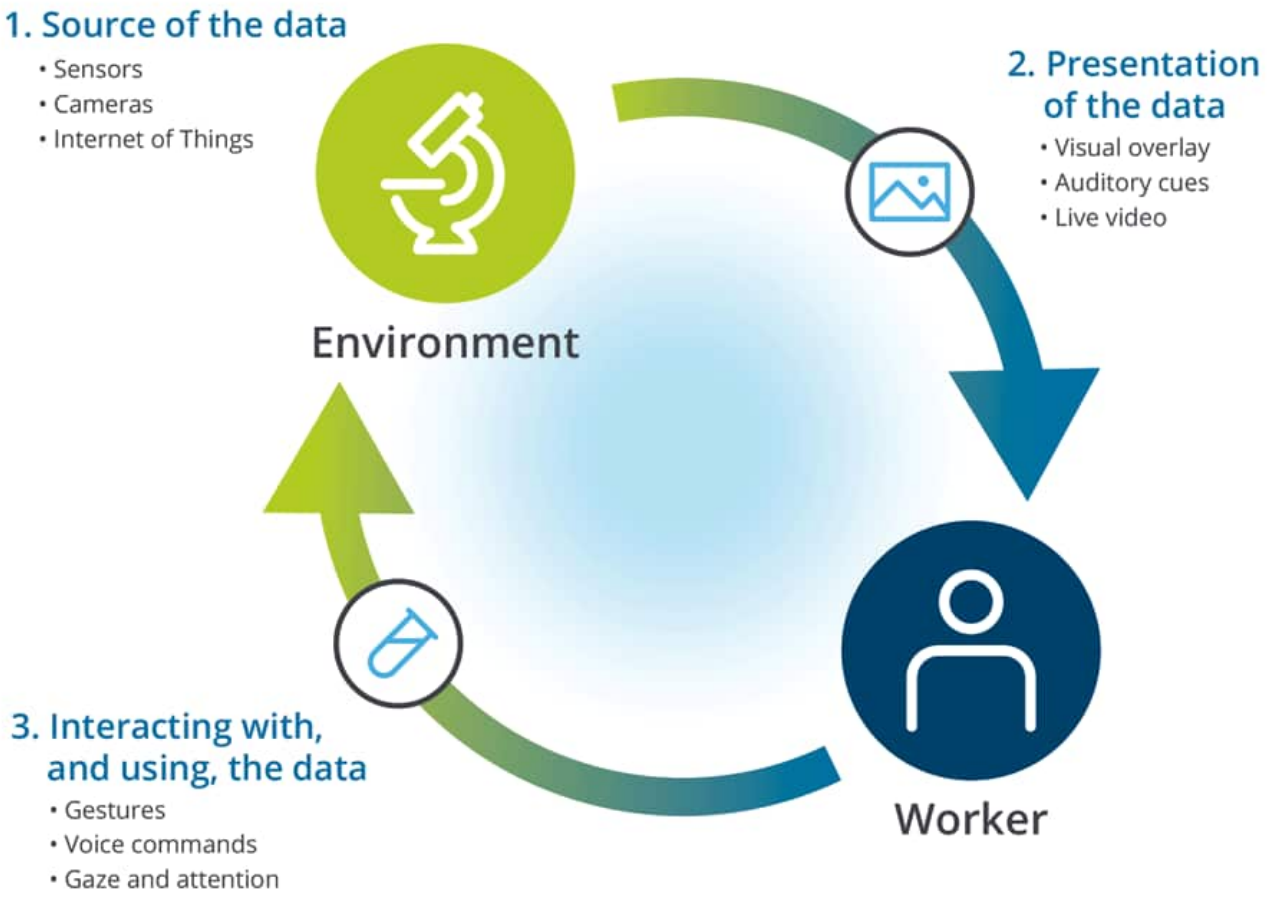
IBM

Collaboration with robotic arm



OPEL

The core elements of Augmented Reality



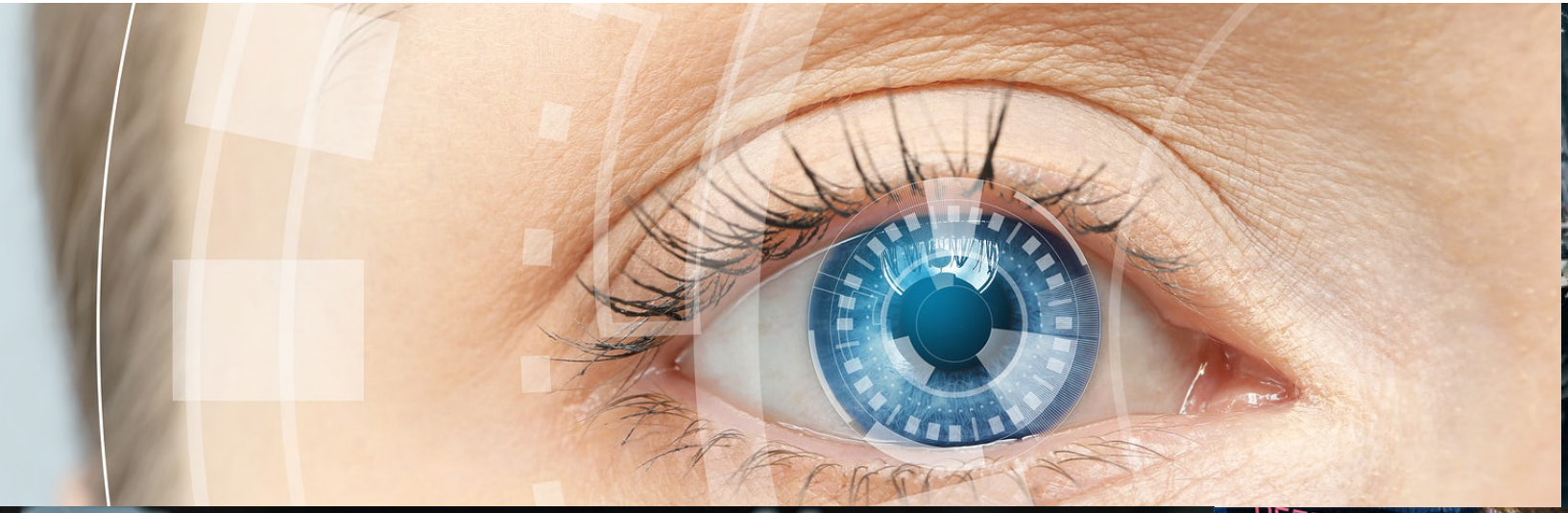
Typical Devices for Augmented Reality

Hololens 2

- Integrated with Azure
- Contextual understanding
- Retina scan identifications
- Hand-tracking: two-handed fully articulated model, direct manipulation

Build for and sold only to enterprise customers

Next gen Augmented Reality



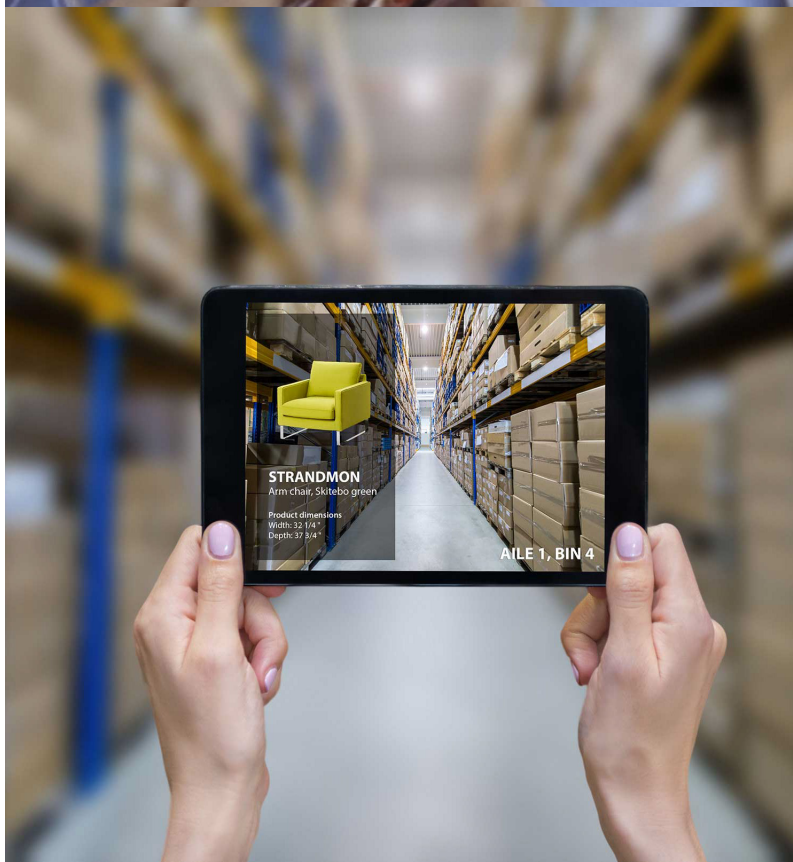
The industry says it works

Study conducted by Boeing showed that AR improved productivity in wiring harness assembly by **25%.**

And at GE Healthcare a warehouse worker receiving a new picklist order through AR completed the task **46% faster** than when using the standard process, which relies on a paper list and item searches on a work station.

Additional cases several other firms show an average productivity improvement of approximate **30%.**

Source: National Training Laboratories, USA



And academic research is backing it up

In 2018 an extensive field study was performed to find out which technology was more effective at giving remote support: AR-enabled remote guidance solution, or a standard video call.

Over 200 people participated.
None were experts, yet the increases in speed and accuracy they achieved using AR remote guidance was major. How much would one of your own more experienced field technician boost their performance using the same tool?

Four key findings

#1

84% prefer remote guidance to a standard video call.

Positive features highlighted by test subjects: "intuitive", "gives direct visual feedback", "more possibilities for the expert to guide you", "pedagogical", "easy to adjust", "good when there is a language barrier".

#2

Problem solving is 32 % faster with remote guidance than a standard video call.

How much could 32 % faster problem resolution save you? A recent report found that 82 % of the global industrial companies surveyed had experienced unplanned downtime in the past three years.

#3

50 % fewer errors occured when using remote guidance compared to a standard video call.

Yes. You read that right. Video calls involved far more trial and error when solving the test problem. With remote guidance, test subjects saw the expert's hands showing them exactly how to place the right parts, in the right place, in real time. No complex verbal instructions needed.

#4

Users perceived remote guid- ance as more efficient than a standard video call.

Perception is everything. When users *feel* they can solve things more efficiently —they do. Net perceived efficiency, measured as a net promoting score (NPS), was far higher for remote guidance than a standard video call
Users *felt* it was helping them more efficiently. And so it became: speed and accuracy were measurably improved.

Typical Connect+Know use cases in an enterprise setting

DRIVERS	BENEFITS	IMPACT
Labor Productivity	• Transform how workforce captures, reports and shares information • Collaborate to take action near real time, supported by data	• *10-20% gains in productivity* • *25% decrease in warehouse picking time (DHL)* • *30% decrease in assembly time (Boeing)* • *30-50% increase in material handling transaction speed*
Resource & Asset Efficiency	• Decrease in training / ramp-up time for resources • Reducing downtime of machinery • Decreased time to market for new equipment	• *10-15% increase in utilization of scarce resources* • *5-10% decrease in labor unit rate*
Quality	• Reduction in repair time and expenses • Deliver task-specific and context-specific information in the field to ensure conformance to critical processes	• *6% to 10% reduction in error rates (Boeing)* • *10-20% decrease in rework costs*
Safety & Risk Management	• Tracking of users and equipment minimizes accidents	• *Assessment of impact in progress*

Learn

Immerse in training, analytics, and research, lowering time, risk and cost required

Immersive Training Safety Compliance Certification Gamification

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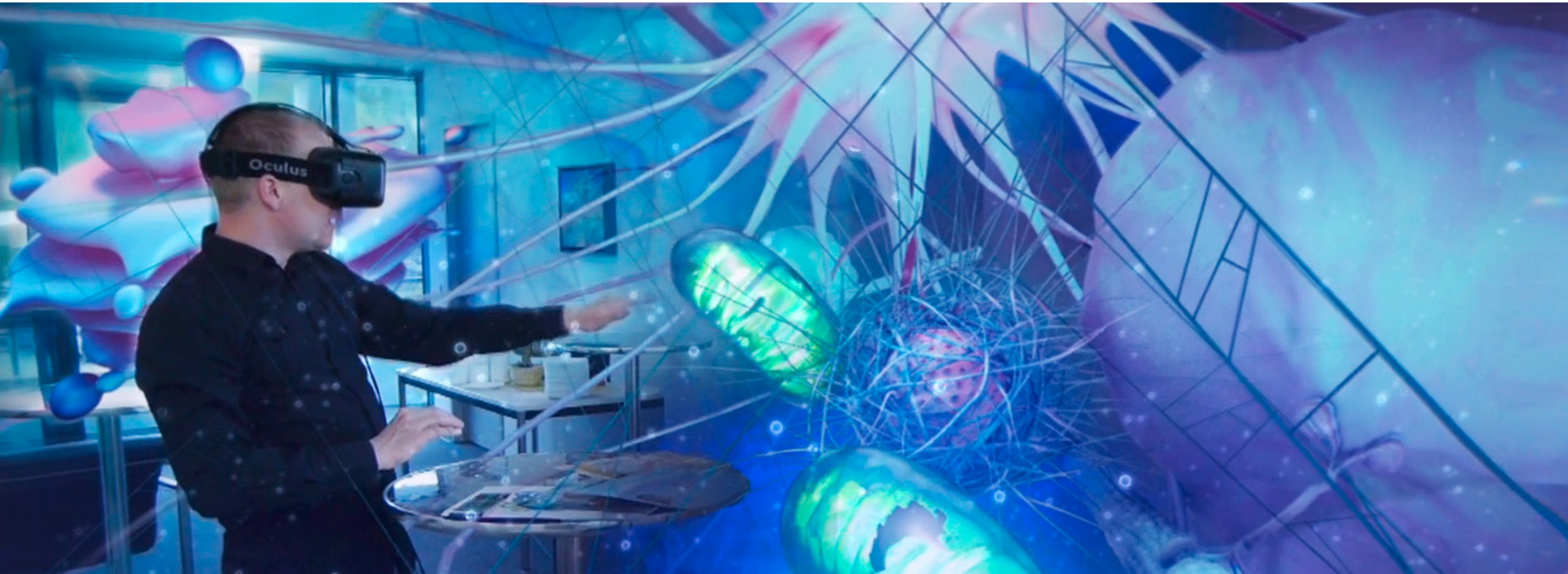
Learn

Virtual Reality based training

Leverage digital reality technologies to support training, research and exploration, effectively lowering the time, risk & cost traditionally required



Industry Examples

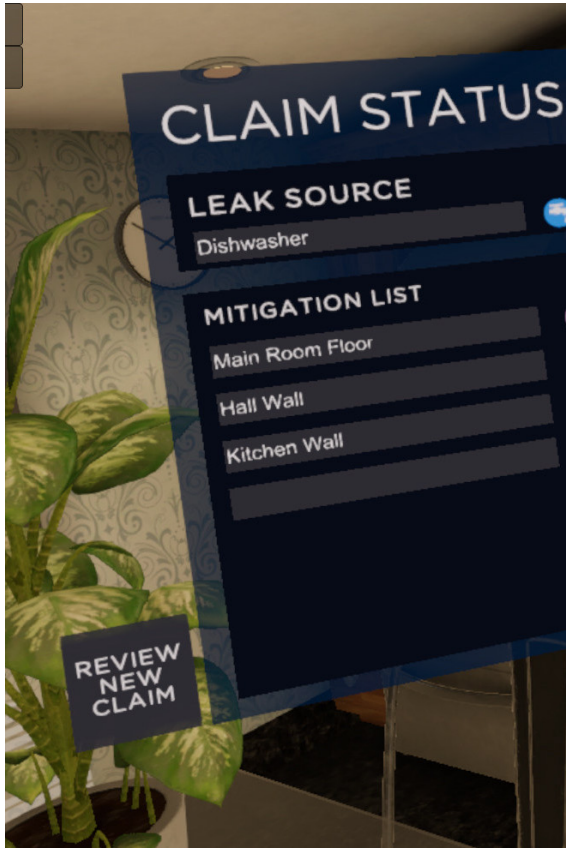
Employee Training in VR

Walmart

Training employees without travel

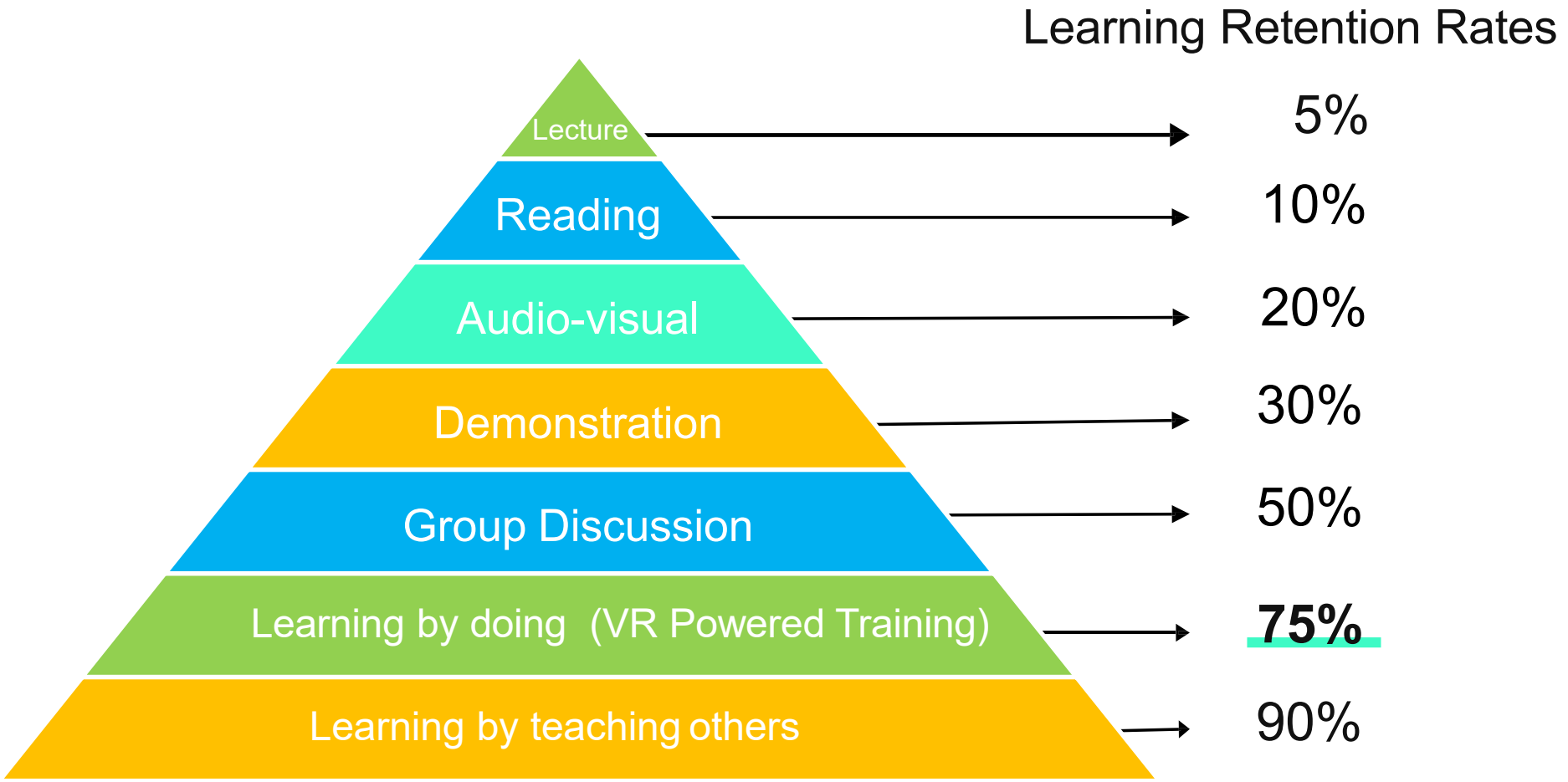
Volkswagen

Employee Training in VR



Insurance

Why VR powered training is impactful

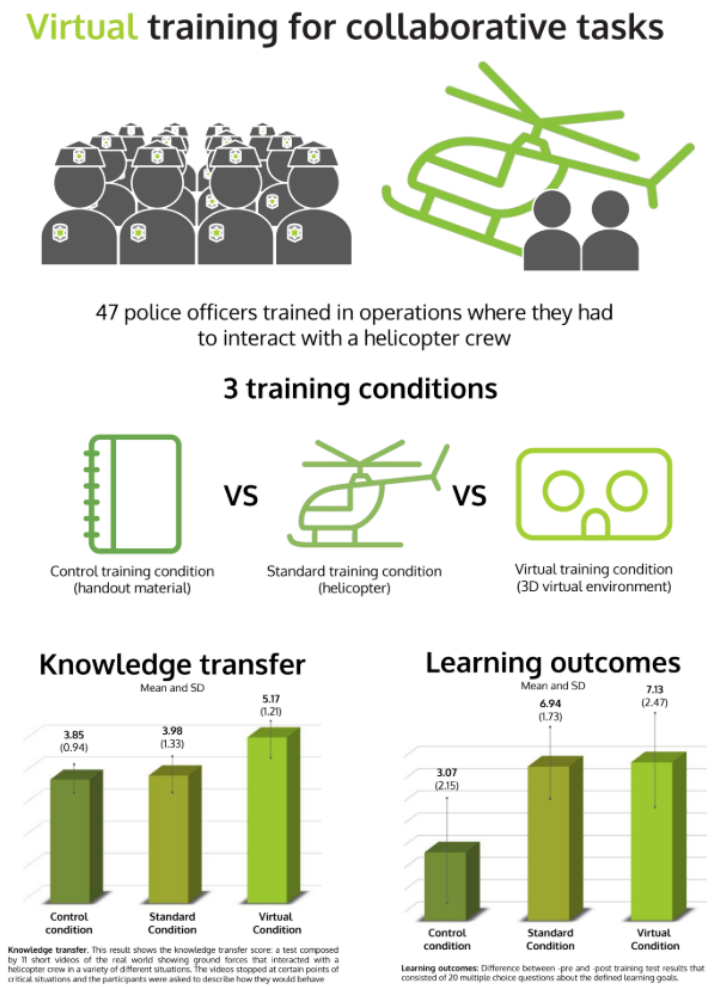


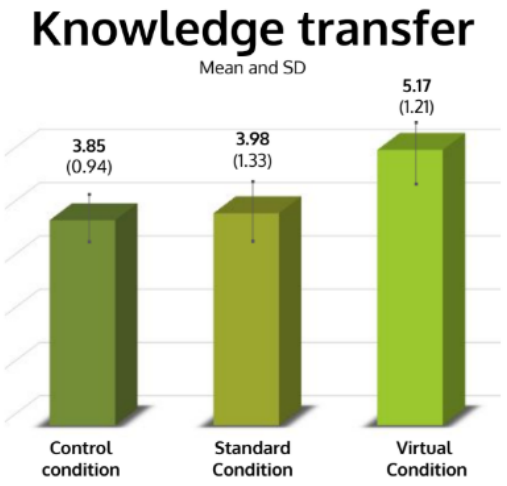
Source: National Training Laboratories, USA

“I hear and I forget.
I see and I remember.
I do and I understand.”

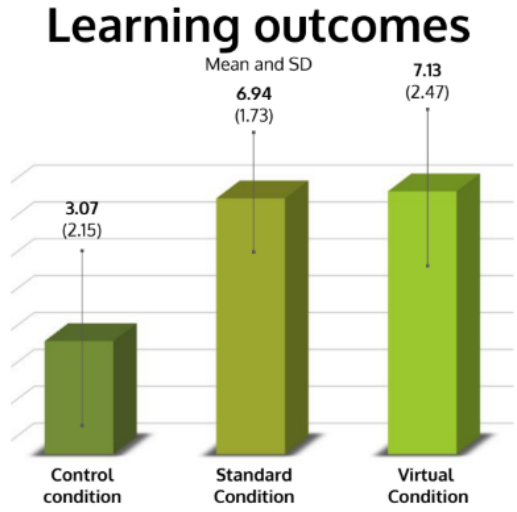
Does it really work ?

Virtual Reality applied to corporate training and VR training applied to various disciplines has proven to be highly effective, as well as time and cost saving





Knowledge transfer. This result shows the knowledge transfer score: a test composed by 11 short videos of the real world showing ground forces that interacted with a helicopter crew in a variety of different situations. The videos stopped at certain points of critical situations and the participants were asked to describe how they would behave

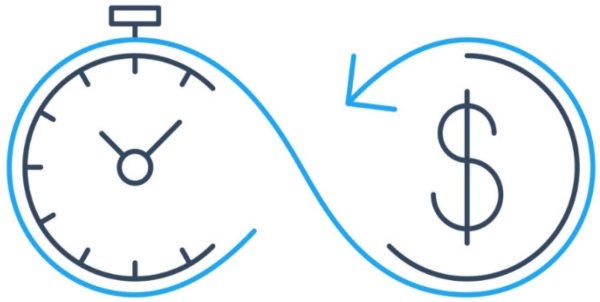


Learning outcomes: Difference between -pre and -post training test results that consisted of 20 multiple choice questions about the defined learning goals.

Other Benefits

1. Appealing to a Variety of Learning Styles
Classic teaching and training methods convey content to students according to the instructor's preferred style of learning. VR experiences access all the senses, a variety of preferences can be satisfied and delighted. It offers the ability to simultaneously reach students across at least three of the four classical learning styles.

2. Offering Experiences That Promote Repetition and Retention
New skills require practice. But what if the skill is heart surgery? And what if you need to be able to strategize a response to an enemy ambush on the fly?. VR training options offer controlled, easily generated environments that allow for the repetition and variation



3. Eliminating Risk and Safety Concerns
Firefighters and military personnel need to learn how to respond in dangerous situations without risking their lives.VR experiences can build extreme environments and situations, allowing users to test and learn without severe consequences.

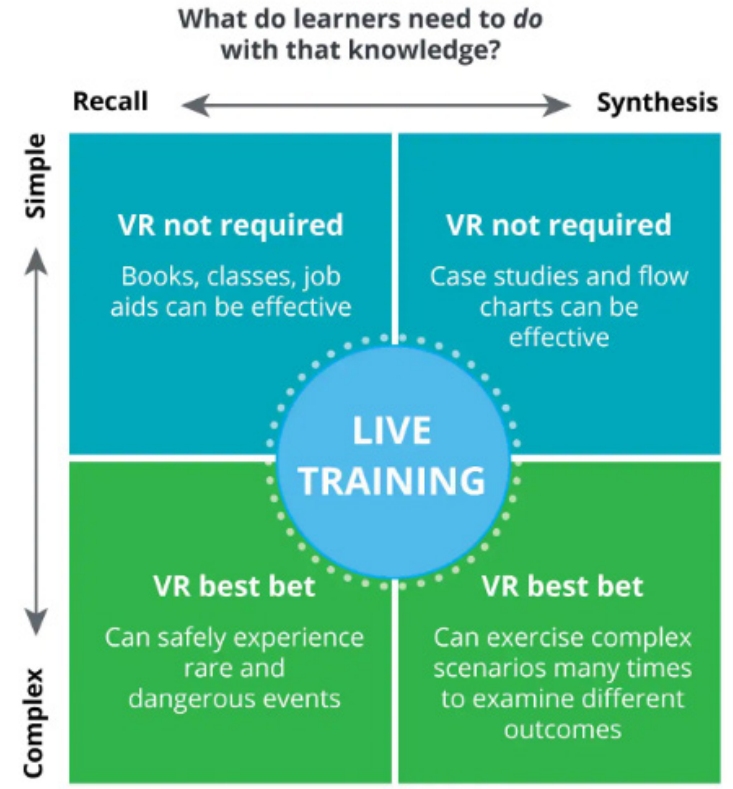
4. Reducing Training Budget and Providing Scalability

Equipment longevity. Heavy equipment doesn't have to be brought to a special training location, or suffer wear and tear as numerous trainees learn how to operate it.

Logistics reduction. Firefighters don't have to set buildings on fire to do the repetitious part of training. Instead, after virtual training, they can save the test fire environment for a "final exam" type of situation.

Time savings. In the corporate world at lot of time and money is spend on traveling to be trained

Where does VR typically make sense in learning?



Source: Deloitte analysis.

EXPLORE.

Bring consumers on a journey of exploration across time and geography

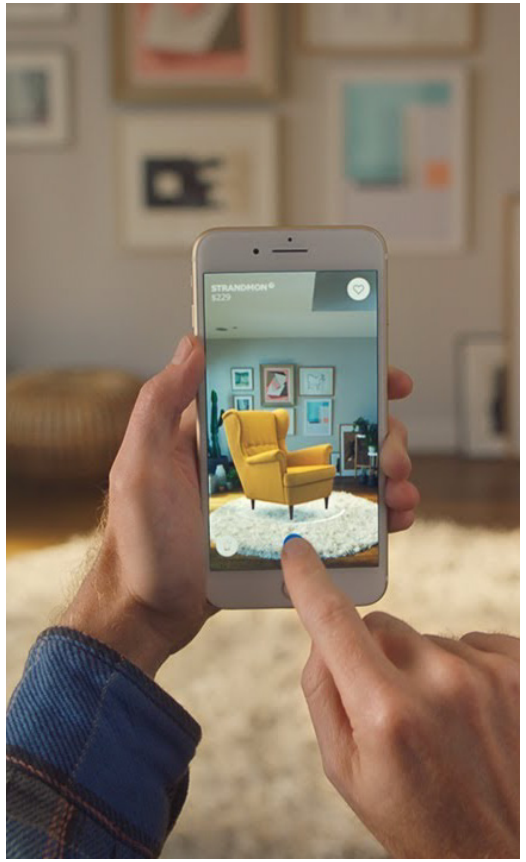
Explore

Augmented Reality can enhanced Products and Services

Enhancing your physical product or service with new functionalities and value propositions that increases the perceived and/or monetary value of your product or service.

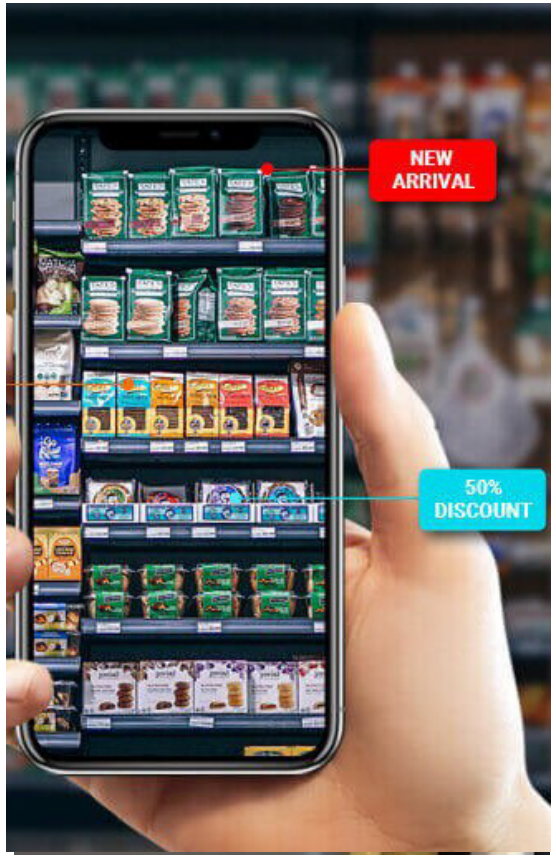
Industry Examples

See furniture in your own home



Car owner AR assistant

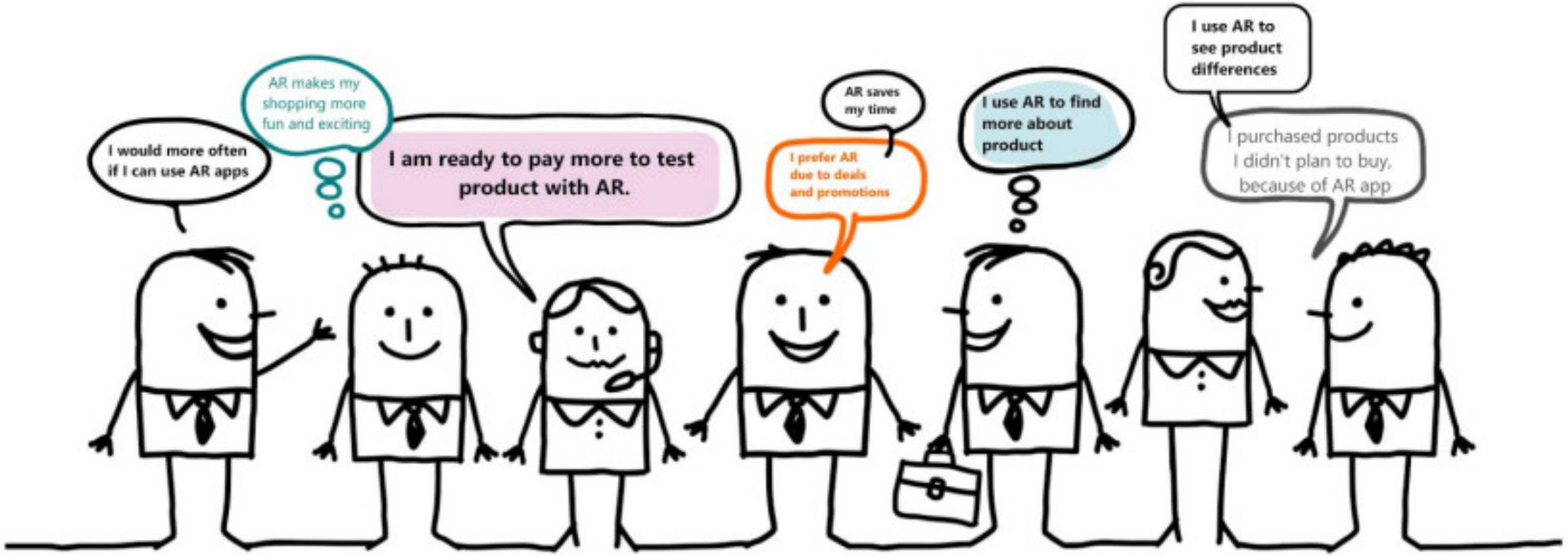
AR Shopping guide



Experience real estate

What are the consumers saying?

34% of customers use AR while shopping



What are the consumers saying?

34% of customers already use some form of AR while shopping. And 47% of them use it both in a store and online shopping

71% of shoppers consider that they would shop more often if they used AR apps.

45% said it saves their time

61% said they preferably choose stores with AR over those without it.

40% of shoppers consider that they are ready to pay more for a product if they were allowed to test it through AR.

55% admitted AR makes shopping more fun and exciting.

How to apply Digital Reality succesfully to your business ?


Getting it right.
Our approach helps you apply Digital Reality technology in a way that helps people do their jobs easier – and leads to business results.

It’s not about the technology.

THIS IS THE
FUTURE OF

your business.

We bring a distinct focus on the opportunities that will result in the biggest impact and ROI in the context of your industry, developing meaningful solutions that people want to adopt, architecting scalable and flexible technology, and working with your organization to develop the right change management approach for your people, so they can adopt a whole new way of working for the future.

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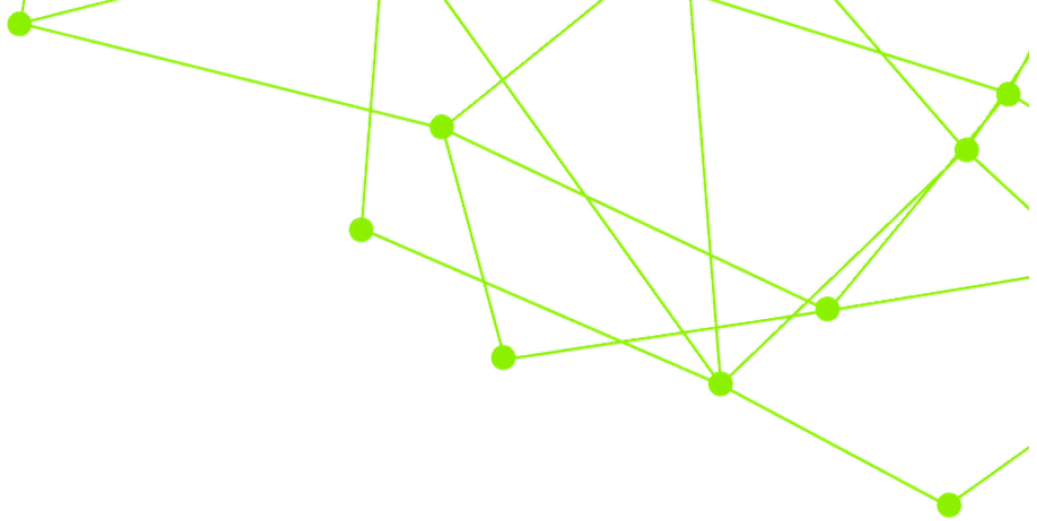
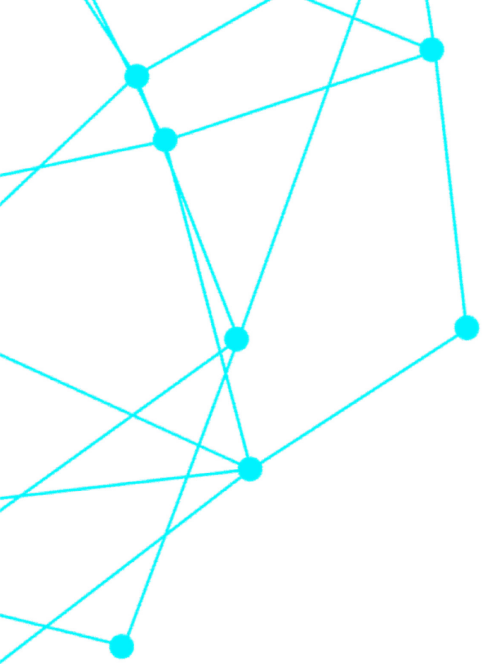


MAKE IT Impactful.

This is about business outcomes. **Bottom-line**. ROI. We're not here to help you build shiny objects—we want to help you use new technology to solve problems in ways you never imagined were possible.

Building your organization's competitive advantage for the future is our North Star. Because of this, we're able to balance the unknowns of emerging technology with outcome-focused initiatives that help you learn in th short term and can give you the leg up in creating advantages well into the future.



MAKE IT Engaging.

Technology for technology's sake isn't helpful to anyone. It has to seamlessly fit into the way we, as **humans**, work in order to achieve better outcomes.

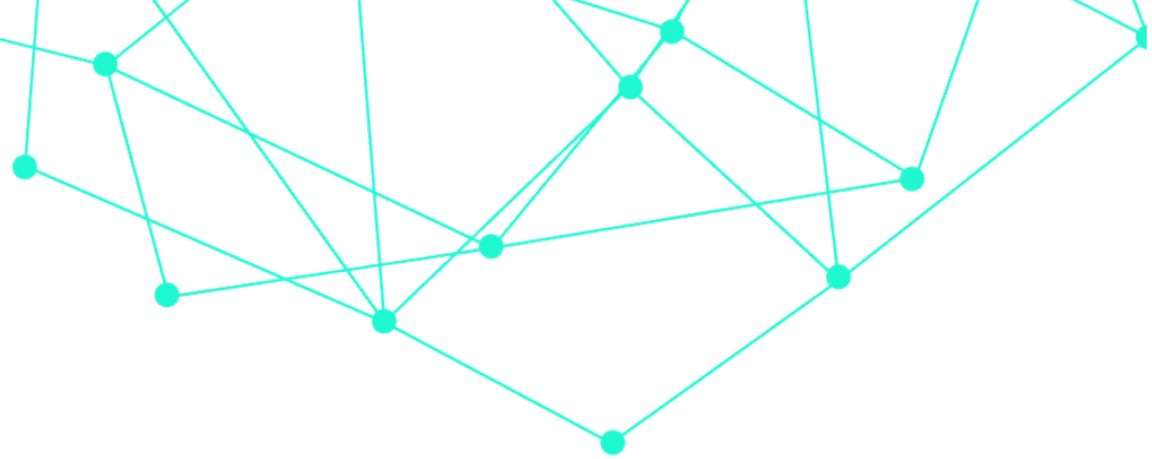
Grounded in iterative design processes that help define the problem, observe opportunities, and rapidly test and refine, we are able to help you deliver augmented and virtual reality solutions that fit your organization's needs – making things simpler, more intuitive, and more efficient.

M AKE I T

Flexible & Scalable.

Awell-designed solution is built to evolve with technologydevelopments.

From the way we design front end experiences, integrate systems, design infrastructures, secure solutions, and transform your customer base and workforce, our strategic and agile approach to technology helps ensure that the solutions you design for today will continue to provide value well into the future.



MAKE IT WORK

For you.

Augmented and virtual reality is going to have far-reaching effects on the workplace in the years to come, which will require **new ways of working** and thinking about how to get a job done.

That's why change management for your workplace and workforce training is woven into our Digital Reality offering—it's not just an add-on. We help you prepare, train, and adopt new ways of thinking and doing business to make sure your solutions create the impact you're looking for.

solve **real world problems**

with new technology, ecosystems of choice, designed for humans—all the elements to achieve your ambitions for the future.

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Digital Reality

extends deeper and beyond
Creating digital experiences

Digital Strategy
Systems Integration
Content Management Systems
Workforce Transformation & Training
Business Model Transformation
Infrastructure & Connectivity
Operate – Managed Services
Advertising & Marketing
V-commerce & V-tail
Personalization
Cloud Services
Analytics
M&A

CONNECTIVITY

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Develop an organization wide shared vision and strategy

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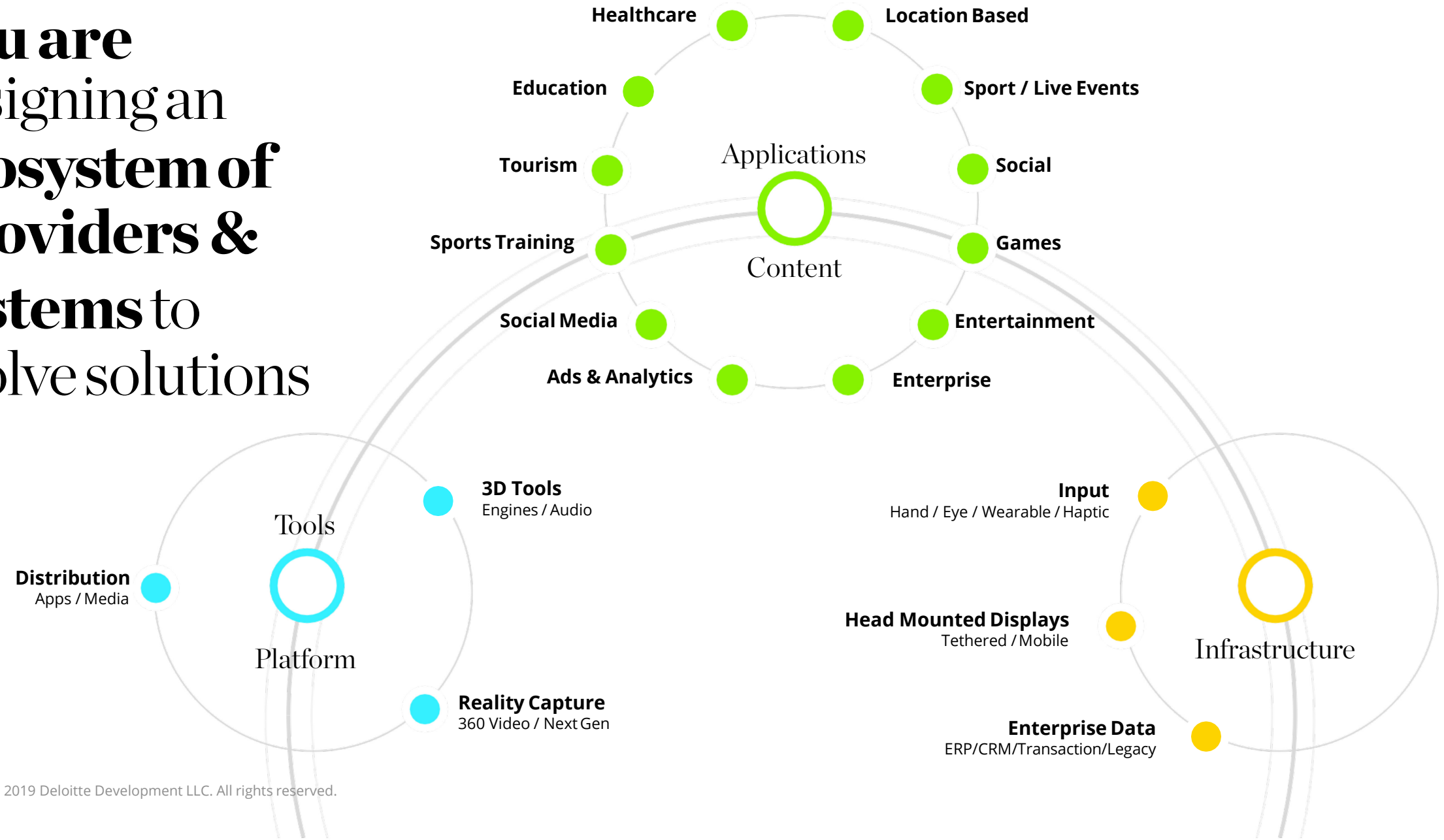
You are designing an **ecosystem of Providers & systems** to evolve solutions



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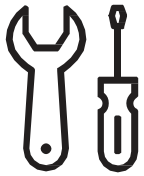
To be truly successful with Digital Reality projects companies need to think end-to-end.

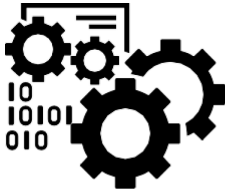
Strategy
Operations
Where to Play & How to Win

- Determine where AR/VR provides a **significant value lever** in operations
- Assess **technology maturity and gaps**
- Conduct **financial impact planning** and develop **technology roadmap**



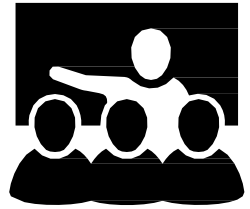
Design
Develop
Quickly Learn & Build

- Employ design thinking strategies to move from **use case to user journey**
- Employ agile methodology to **test and iterate** in low-risk cycles
- Rely on **user-centric design to identify requirements** that enable success



Implement
Integrate
Embed Solution For Use

- Analyse existing **IT architecture, software, and data flows**
- Integrate the solution into **existing Product Development infrastructure**
- Implement agile NPI processes enabled by **digital and core execution capabilities**



Manage
Roll Out
Handle the Change

- Manage the **change in design process** and workflows
- Address hyper care and **issue resolution**
- Assess agile culture maturity, **embed desired behaviours** and redesign of organisational structures to support strategic goals

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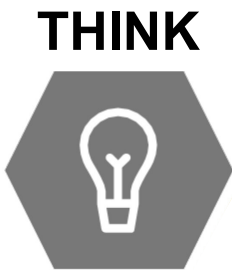
Think

Strategy & Vision. ROI / Business Case, Use Cases & Scoring , Ecosystem & Vendors, Data Security, Infrastrucure



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Think

- Strategy & Vision
- ROI / Business Case
- Use Cases & Scoring
- Ecosystem & Vendors
- Technology Stack
- Data Security
- Infrastrucure

Evaluate solutions, Devise best practices, Build business cases & determine a long term vision

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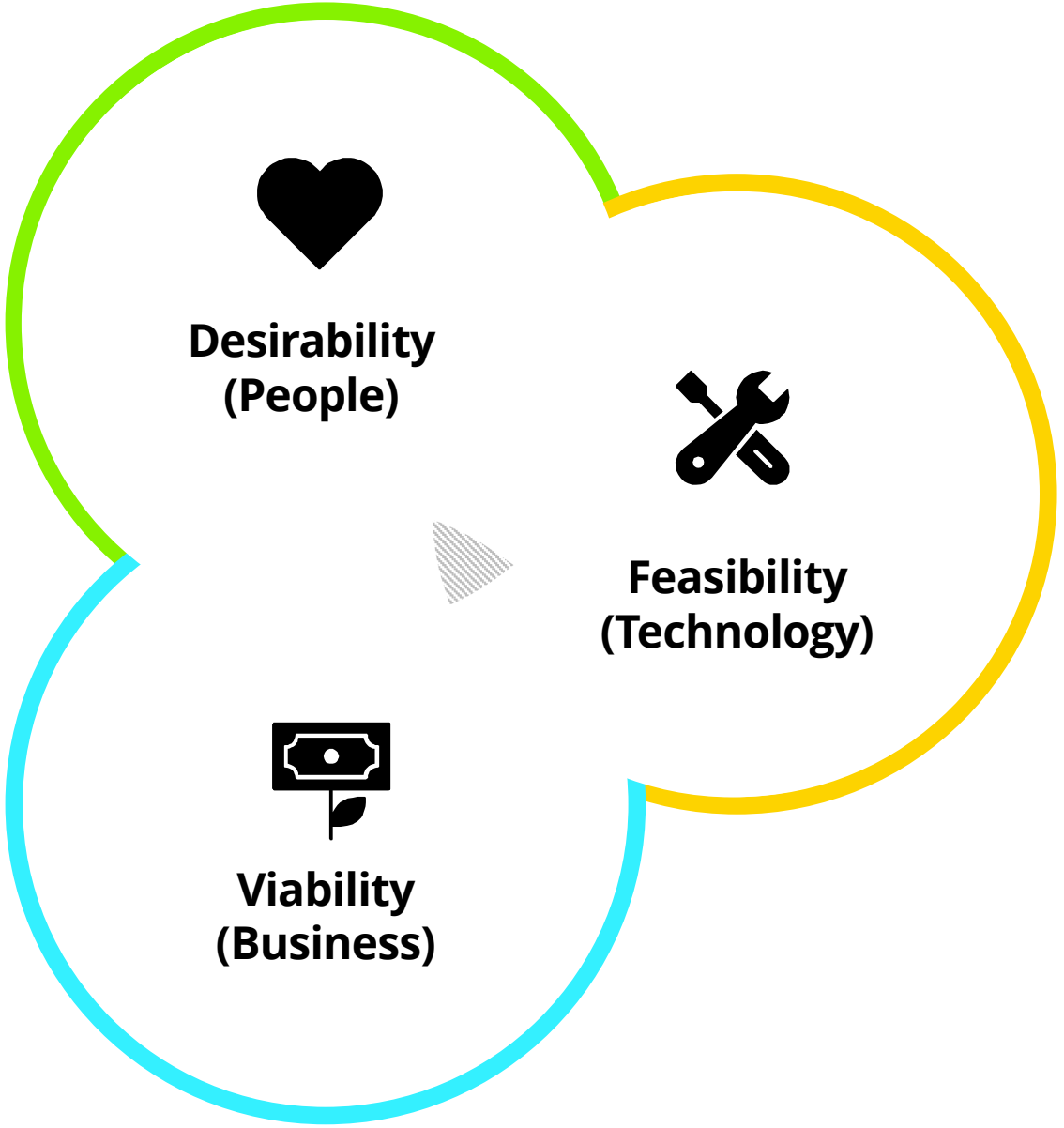
Identify Digital Reality Use- & business cases that has real value

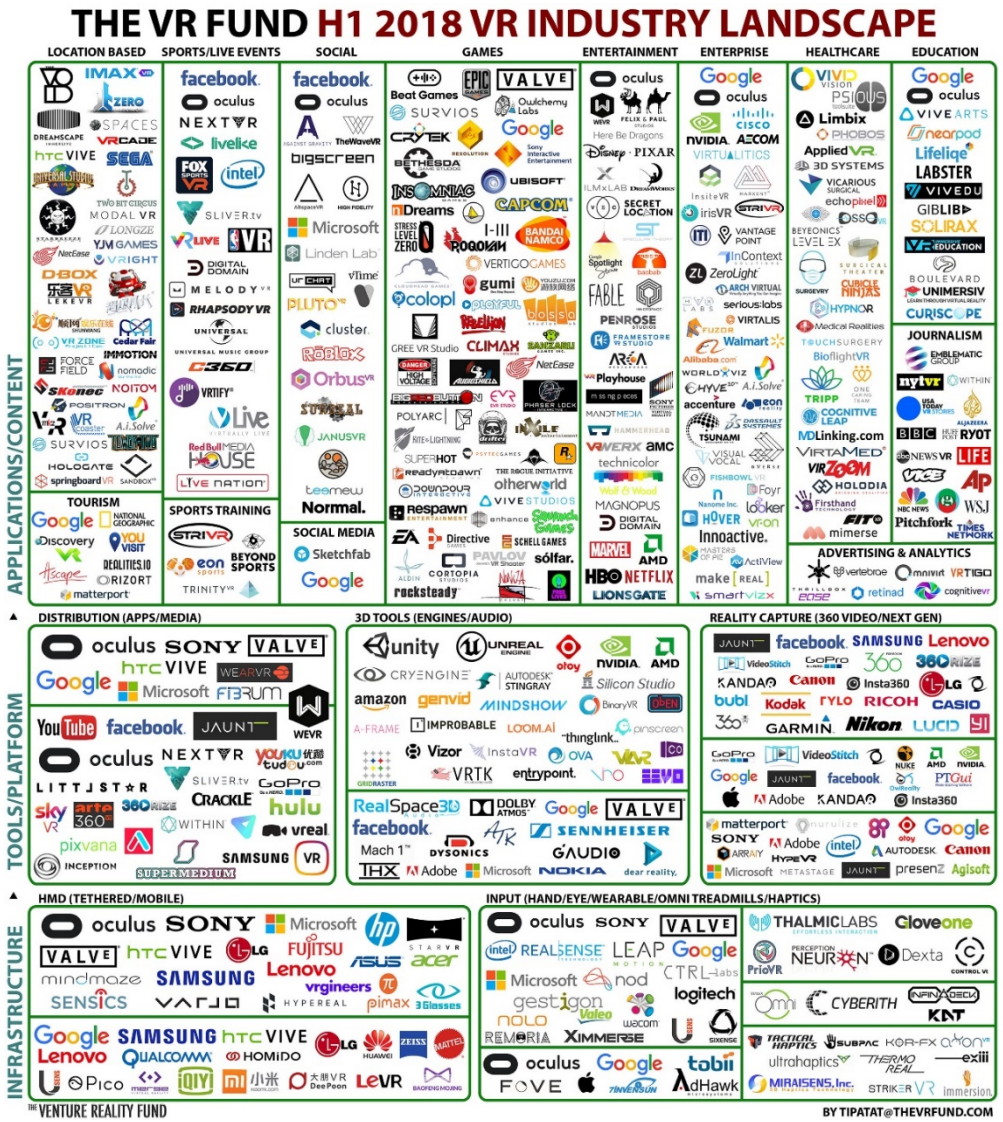
Digital Reality Use Cases

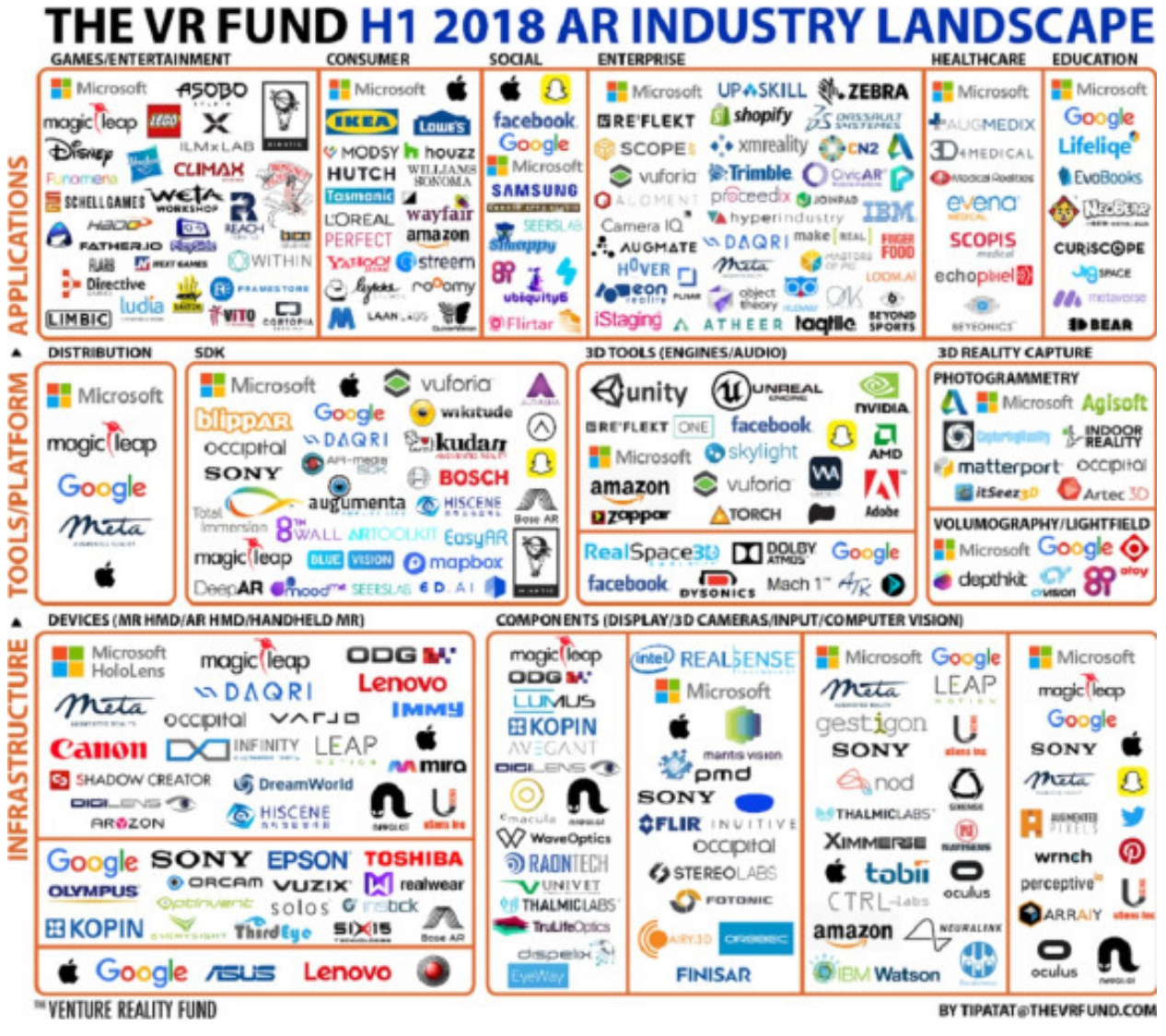
Ensure that new digital products and services live in the sweet spot where we know the answers to the following questions:

- Do users want this? *Desirability*
- Should we do this? *Viability*
- Can we do this? *Feasibility*



Assessing & selecting the right technologies & platform(s)





Data Security & Infrastructure

Data Protection Risks

Risk that compromises the Confidentiality, Integrity or Availability of data due to theft, loss, neglect or poor information security practices

- Recording/Theft of user behavior and personal data
- Interjection of data into AR/VR to entice users
- Unreliable content uploaded to AR/VR device and application

AR/VR Ecosystem & Application Risks

Risks that result in negatively impacting infrastructure, systems, data or business operations due to undetected flaws (faulty piece of code) that creates security loopholes

- Use of fake or mal-coded AR/VR applications
- Sabotage availability of VR/AR applications and ecosystem
- Unencrypted communication channel within AR/VR system
- Malicious content taking over AR/VR devices resulting in ransomware

Privacy Risks

Risks that result in loss of personal information (Name, DoB, SSN details, address) stored in devices/applications resulting in identity fraud/impersonation

- Non-compliance to state/country privacy laws & legislation
- Theft of user's personal data stored in AR/VR devices/application resulting in identity fraud
- Geo-locations data privacy risks in case of a breach or theft of user's personal data

Our Approach

VISION

First, **define the vision, ambition, and success metrics** for an digital reality project. Develop art-of-the-possible goals and an **initial case for change** for transforming digital processes.

ANALYSIS

Next, **assess the pain points and value provided by overcoming these challenges**. Analyze current process flow and operations to identify opportunities for growth. Identify value drivers to form the foundation of the future state recommendations and building that follows.

BUSINESS JUSTIFICATION

Leverage capability analysis, identified opportunities, and an understanding of the platform to **create use cases that support the highest value opportunities**. Prioritize use cases that meet business needs and bring the most ROI. **Project the incremental business benefits based on success measures.**

ROADMAP

Create a **roadmap** that can be used to deliver the future state Digital Reality design capabilities. Outline the **framework used for vendor selection and solution selection**.

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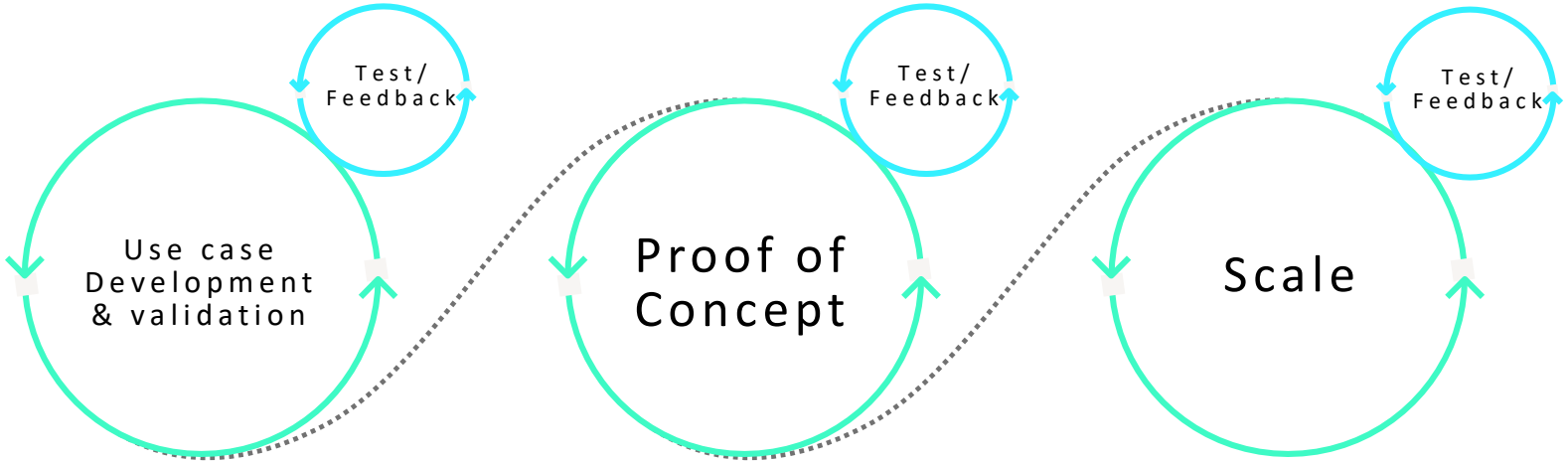
Now we have a vison, a strategy and a roadmap....but still no solution .

What now ?

Sprint based approach

We use this methodology as it saves time and costs, and also results in better products that are tailored to the requirements. Since not all the requirements are collected in the beginning, continuous client involvement is necessary. We work on the product incrementally, in multiple iterations. During each iteration, we engage in planning, analysis, coding, and testing.



1-week framework

Example Use case Design Workshop

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
	Map Map out the problem and pick an important place to focus	**Sketch** Sketch competing solutions on paper	**Decide** Decide on best direction and create a testable hypothesis.	**Pretotype** Build a realistic prototype	**Test** Test with target users
START 10:00 AM	• Introductions & Overview • Long-term Goals & Risks • Mapping the Journey	• Demos / Talks / Videos (Inspiration) • Decide approach (Divide or Swarm)	• Sketch Review & Presentations • Sketch Voting	• Assign Roles (Maker, Writer, Asset Collector, Interviewer…) • Pretotype	• Ethnographic Observations • Usability Interviews
1:00 PM			LUNCH		
	• SM & DM Interviews • 'How Might We' - Exercise • Identify a Target	• 4-Step Sketch • Gather info • Doodle rough solutions • Rapid Variations • Flush out the details	• Make a Storyboard • Plan the Pretotype	• Pretotype • Stitch it together • Trial Run • Usability Interview Prep	• Usability Interviews • Review Observations • Debrief
END 5:00 PM					

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The journey ahead

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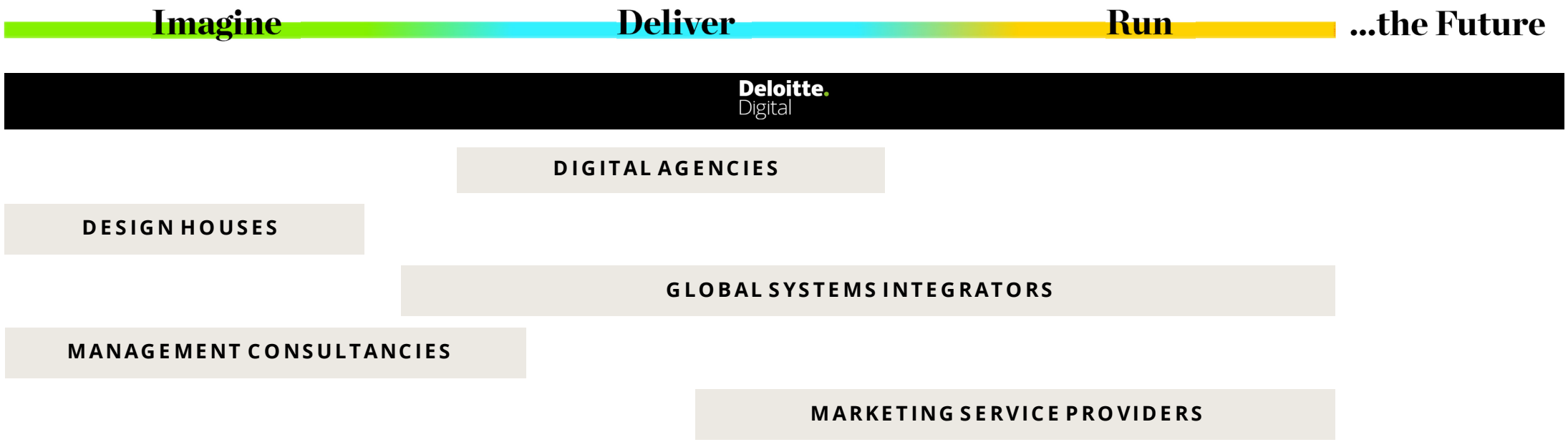
Deloitte Digital

Other companies may take a siloed or technology-first approach, which can lead to confusion and disconnected initiatives that wont capture digital's full potential. Unlike them, we assist our clients in developing **sustainable processes that will help them respond, compete, and win in the future**. Deloitte Digital provides the interdisciplinary experience needed to help clients develop a winning strategy, and **our demonstrated ability to execute allows us to deliver on their most transformative ambitions** – helping to set them up to succeed no matter what the future holds.



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Ambition delivered for our clients

Home Goods Retailer

Project:
AR Catalog

Using AR, smartphone users able to use their phone to scan the catalog and open additional information about the product & view 3D objects

Explore

Federal Logistics & Delivery

Projects:
Immersive Training
Consumer Future Visualize

Created a VR proof of concept for immersive learning for the maintenance & repair of the postal sorting machines

Learn
Explore

Athletics Clothing Retailer

Projects:
Architectural Visualization
Immersive Training

Visualization & agreement for store look & feel prior to building
Training of staff prior to store being opened or ready for occupancy

Know
Learn

High Tech Manufacturer

Project:
See-What-I-See

Globally enabled high quality off-shore manufacturing with real-time distributed expertise spread over 3 continents in a matter of seconds

Connect
Know

Consumer Electronics Manufacturer

Projects:
Market Sizing
Ecosystem Searching

Global market sizing for VR headsets in the absence of existing products or market Ecosystem searching for VR 3D computer graphics (CG) & compression technologies

Think

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Ambition delivered for our clients

Video Games

Project:
360

360 video and storytelling associated with upcoming game release

Play

Government Department

Projects:
Exponential Market Analysis

Market Analysis, Technology Scouting, Horizon Scanning project across a broad range of technology developments including the VR & AR marketplace

Think

Shopping Mall

Projects:
Architectural Visualization

3-year engagement with a major city mall to bring to life refreshed designs from multiple interior design & architecture firms, to create a cohesive vision for the shopping center

Know

Automotive Manufacturer

Projects:
AR Vehicle Specs
AR Engine Status

Detailed vehicle specifications overlaid on an app as vehicle scanned in the showroom
Check engine status as an overlay on an app as you scan the hood of the vehicle

Explore

Government Agency

Project:
Immersive Analytics

Simulate social networks, supply networks, telecom infrastructure, power grids, etc., & the ways they interact to answer high-impact, high-value what-if questions

Know

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Finally

- Don’t boil the ocean. Start small and move rapidly to prove the technology fit and business impact..
- Remember organizational barriers stops the project, not technological
- Get executive interest – innovation goes top down
- Start and fail, get use cases mature by execution until you capture value, not by selection process
- Select use cases with a strong business case which solves real user needs
- Bring clarity around your technology stack. Picking the right one can be proves hard. Ask a set of clear questions around five areas – applications, data management, infrastructure needs, security and edge process/control – to select the right platform.

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Digital

Thank You...

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