AR is really hot right now

Augmented Reality is the Future UI Paradigm

Internet of Things → **Big Data** → **Machine Learning & AI** → **Information, Intelligence & Instructions**
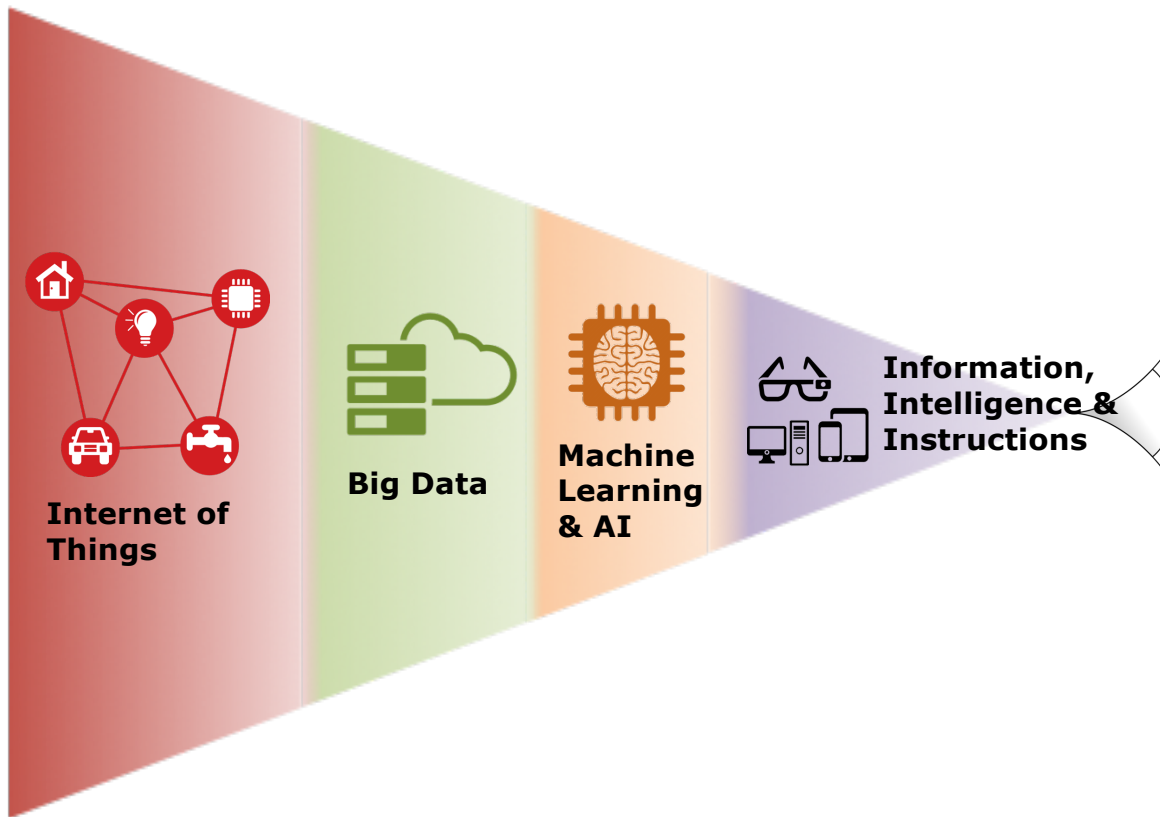
Augmented Reality

AR is the new UI paradigm

- Improved Comprehension
- Knowledge Transmission
- On-Demand Knowledge
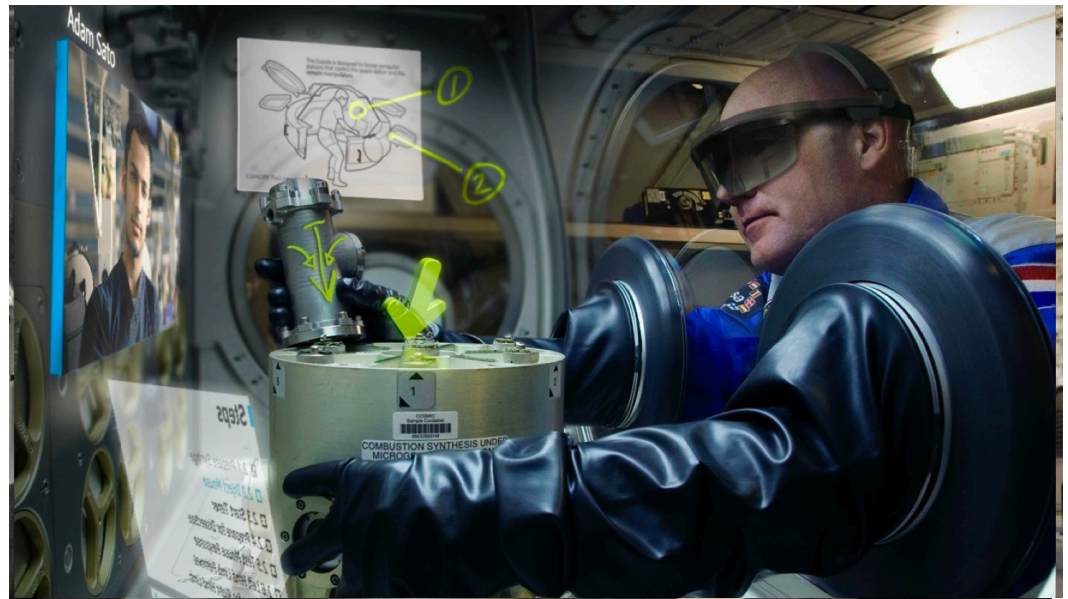
But the AR Market is Early


Gartner Hype Cycle for Emerging Technologies, 2017

Plateau will be reached in:
- ⬤ less than 2 years
- ⬤ 2 to 5 years
- ⬤ 5 to 10 years
- ▲ more than 10 years

Technologies (along curve):
- Connected Home
- Deep Learning
- Machine Learning
- Autonomous Vehicles
- Nanotube Electronics
- Virtual Assistants
- IoT Platform
- Smart Robots
- Edge Computing
- Cognitive Computing
- Blockchain
- Augmented Data Discovery
- Commercial UAVs (Drones)
- Smart Workspace
- Conversational User Interfaces
- Cognitive Expert Advisors
- Brain-Computer Interface
- Volumetric Displays
- Quantum Computing
- Digital Twin
- Serverless PaaS
- 5G
- Human Augmentation
- Enterprise Taxonomy and Ontology Management
- Virtual Reality
- Neuromorphic Hardware
- Deep Reinforcement Learning
- Software-Defined Security
- 4D Printing
- Artificial General Intelligence
- Augmented Reality
- Smart Dust

Expectations (y-axis) / Time (x-axis)

Phases:
- Innovation Trigger
- Peak of Inflated Expectations
- Trough of Disillusionment
- Slope of Enlightenment
- Plateau of Productivity

As of July 2017

gartner.com/SmarterWithGartner

Source: Gartner (July 2017)
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Gartner

Practical Applications?
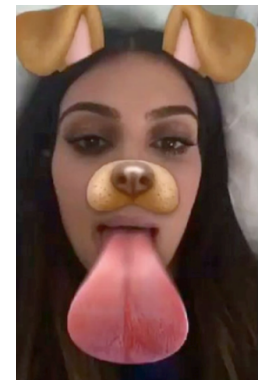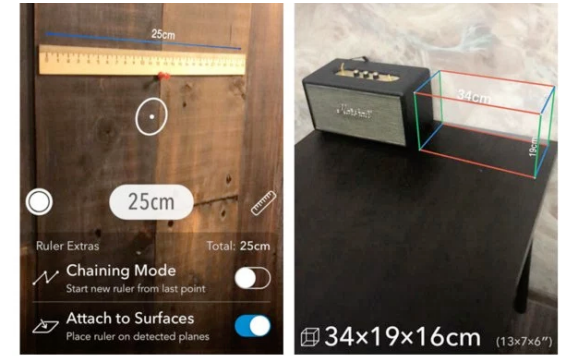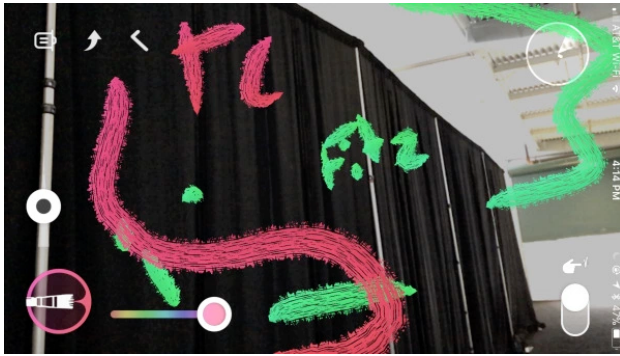
Practical Applications - Yes!

Manufacturing

Construction

Maintenance

Quality Assurance

Training + Education

Construction + Manufacturing

- Common Attributes
  - Planning in 3D
    - BIM in construction (AEC)
    - CAD/PLM in manufacturing
  - Assembly Instructions
    - Blueprints in AEC
    - Diagrams / Text Instructions in Manufacturing
  - Compliance / Audit Trail
  - Verification / Inspection
  - Maintenance / Facilities Management
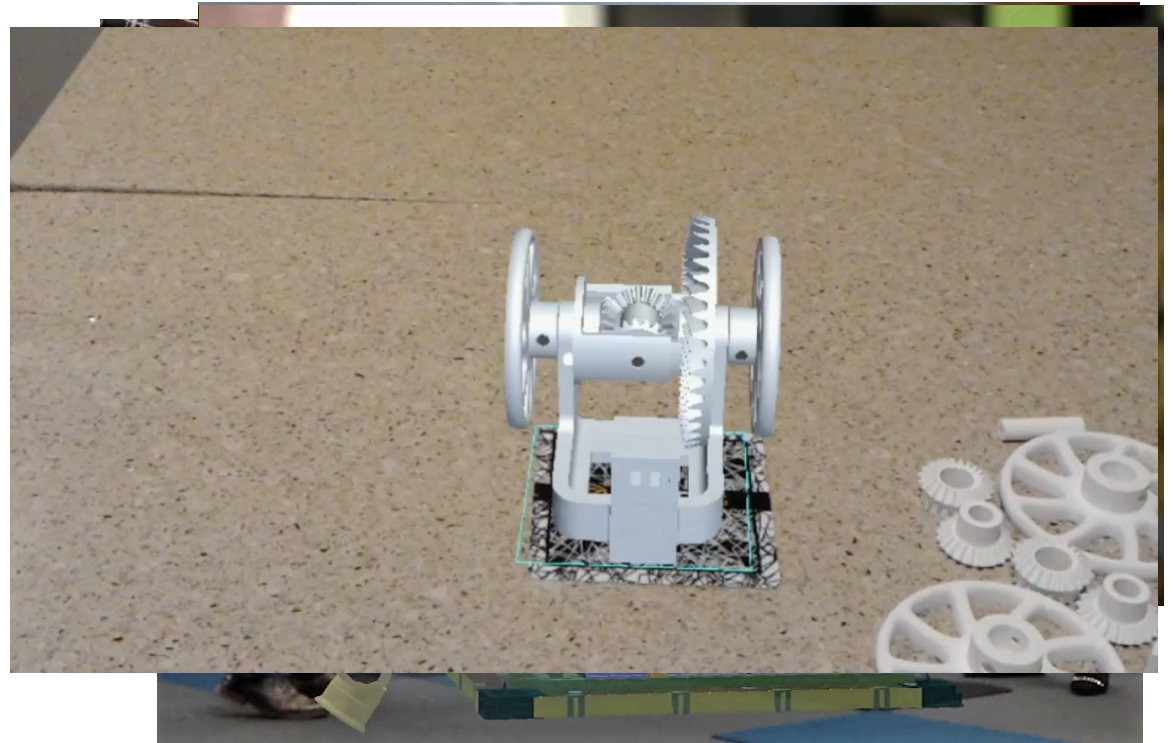 - Remote Collaboration

PHOTO: MARK ELIAS/BLOOMBERG VIA GETTY IMAGES

AR can help with all of these!

Common Attributes

- Planning in 3D
    - BIM in construction (AEC)
    - CAD/PLM in manufacturing
- Assembly Instructions
- Compliance / Audit Trail
- Verification / Inspection
- Maintenance / Facilities Management
- Remote Collaboration

Why do we even care?

- Manufacturing
  - 250% increase in productivity in the last 50 years
  - But still we need to make things faster and cheaper

762 **/ year**

Backlog: 6000

= 8 year wait

46 Year History

Backlog

Why do we even care?

- ## Construction
  - Construction productivity decreased 20% in the past 40 years
  - 65-75% of any building cost is labor, building materials and overhead
  - For every building you build in the future, it will cost more than it will today

Overview of productivity improvement over time

Productivity (value added per worker), real, $ 2005

Manufacturing
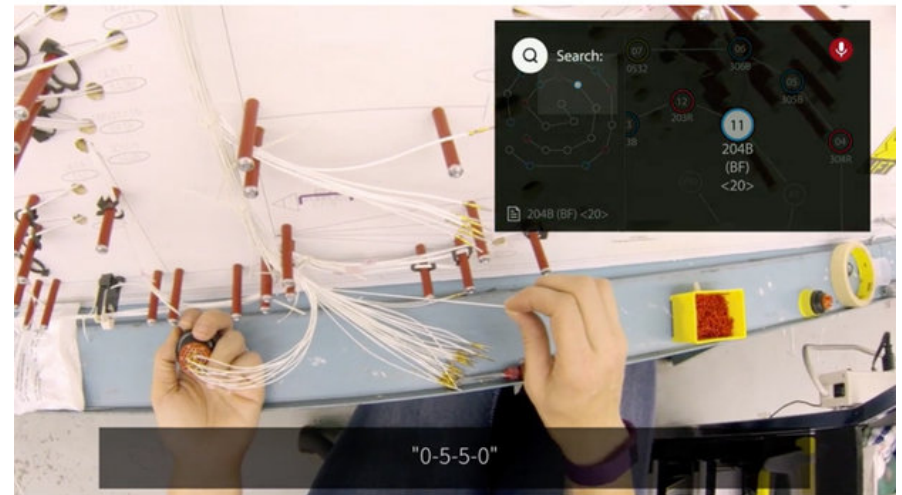Construction

$ thousand per worker

1.7x
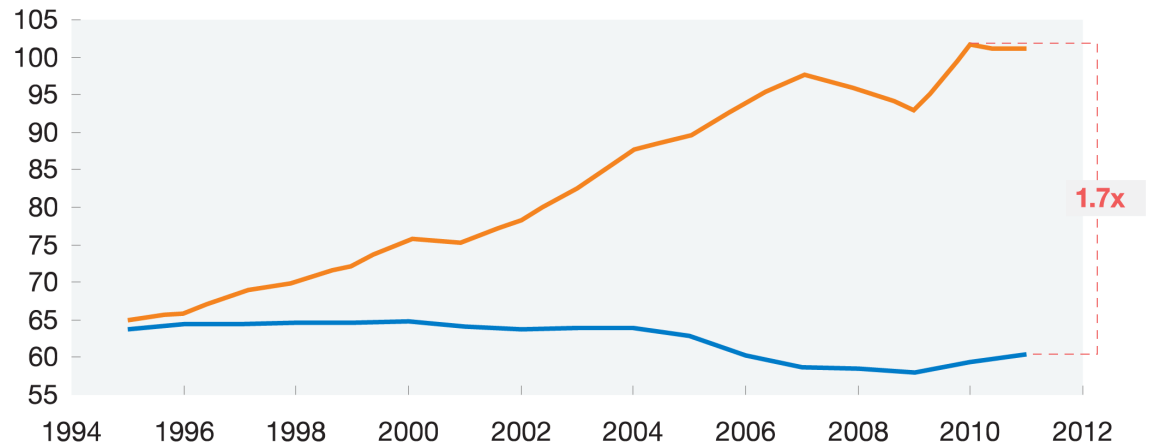
Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

McKinsey&Company

Success Stories

Boeing with Upskill's Skylight platform cut production time substantially and lowered error rates to nearly zero

Success Stories

Success Stories

- Caterpillar branded an AR Remote Assistance tool

- Helps technicians and experts communicate more effectively

CAT® LIVESHARE

This is just the beginning…

- Hololens makes a lot of these initial use cases possible
- Almost every industrial customer wants head worn displays.
- For many of these use cases, robust tracking is essential

What about ARKit / ARCore?

- Apple and Google's investment in the space means AR is accessible to everyone
- Applications previously limited to Hololens are now potentially viable on phones and tablets to a wider audience
- Good first step

What about the future?

- Better head worn form factors
  - Limitations
    - Battery life
    - Field of view
    - Comfort
    - UX – how to control and interact with AR?
- Better Tracking Tools
  - Object Recognition (AI?)

- Content Tools
  - Authoring Platforms
  - Content Management Platforms
  - 3D Data Tools – Decimation
- Collaboration Tools

Thank You!

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