Virtual Reality and Augmented Reality

VR Applications

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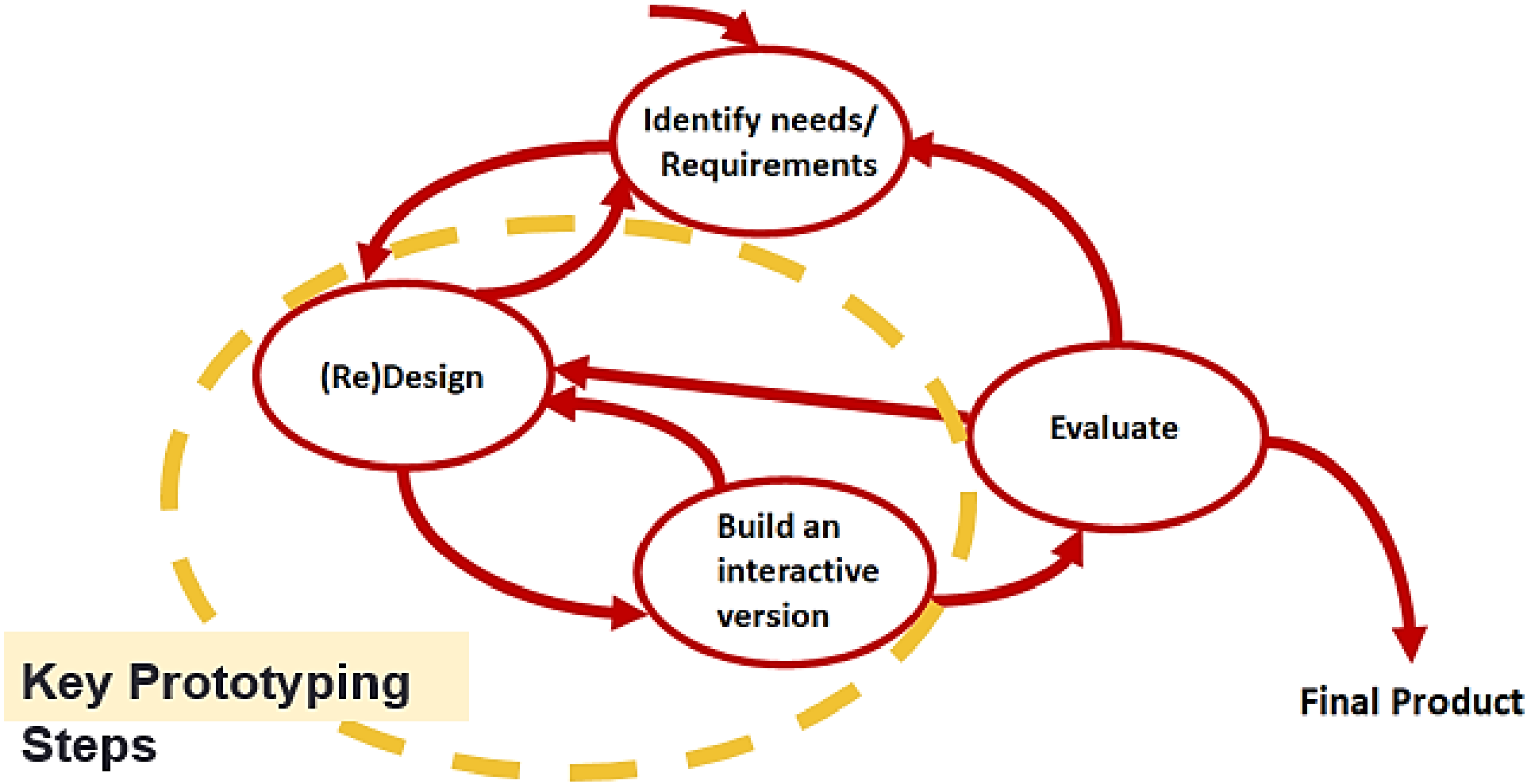
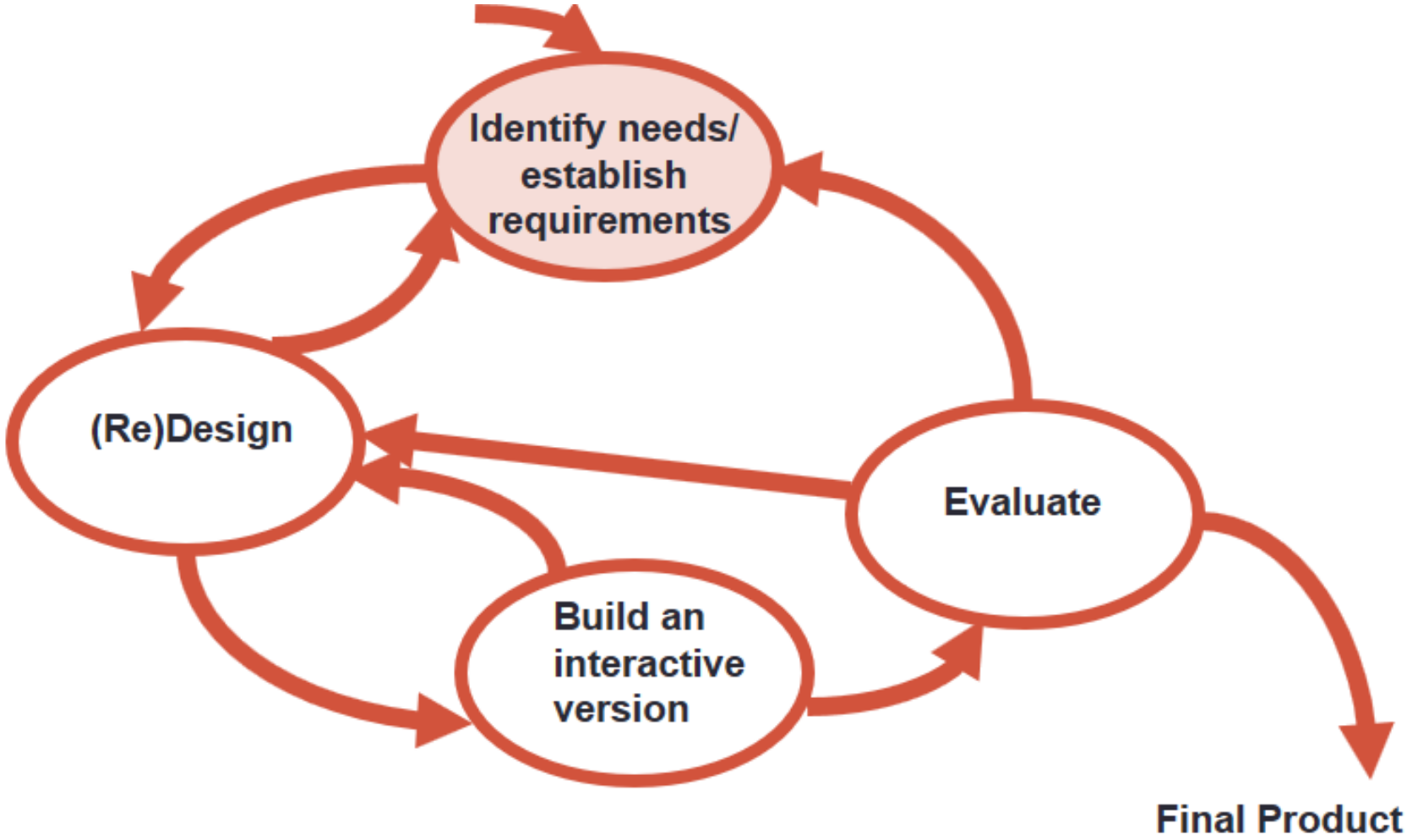
Interaction Design Process



Needs Analysis

Interaction Design Process



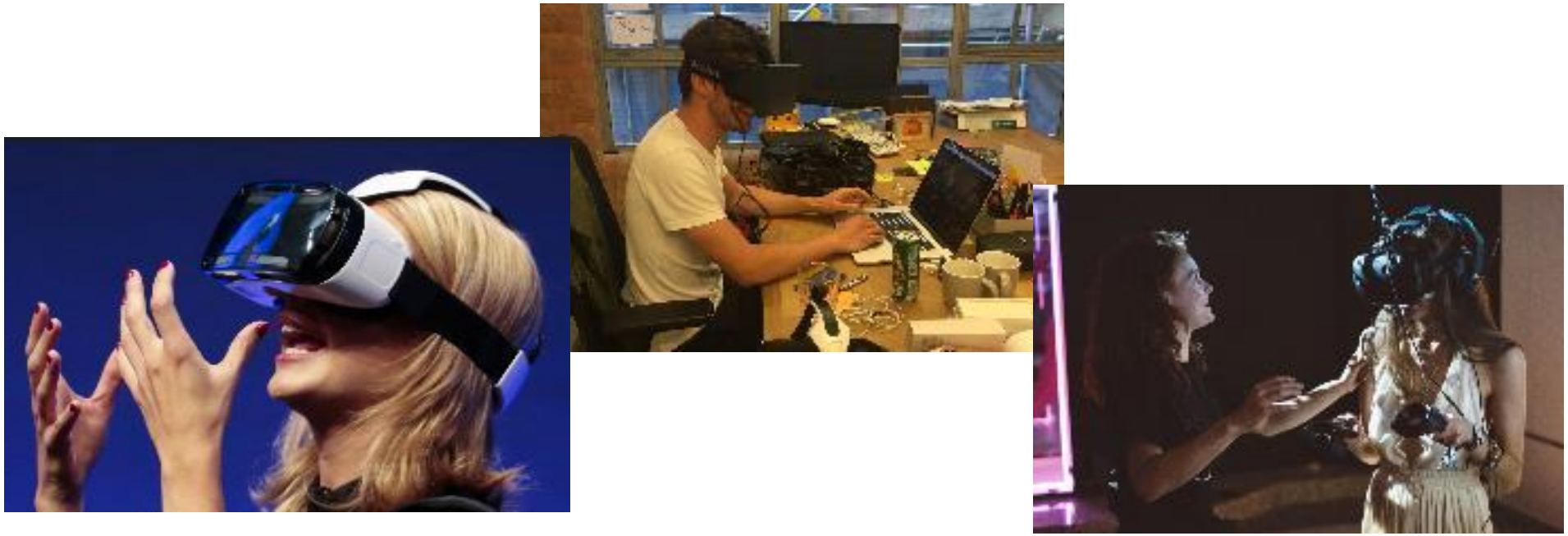
Needs Analysis Goals

- Create a *deep understanding* of the user and problem space
- Understand *how VR* can help address the user needs

Key Questions

- **Who is the user?**
  - Different types of users
- **What are the user needs?**
  - Understand the user, look for insights
- **Can VR address those needs?**
  - VR cannot solve all problems

Who are the Users?



Different types of users, must consider them all

- **Primary:** people regularly using the VR system
- **Secondary:** people providing tech support/developing system
- **Tertiary:** people providing funding/space for VR system

Who are the Users?

- **Primary:**
  - Are the end-users who interact directly and frequently with the VR system. *(**Examples:** Students using VR for education and training.)*
- **Secondary:**
  - Individuals don't use the VR system for its intended end-use, but they support or build it. *(**Examples**: Developers who design the VR software.)*
- **Tertiary:**
  - Are stakeholders who don't interact with the system directly but are impacted by its success or support it indirectly. *(**Examples**: Investors or organizations funding the VR project.)*

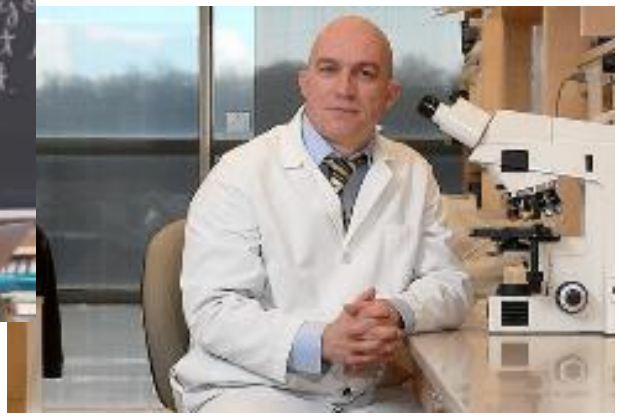
Methods for Identifying User Needs

1. Learn from people
2. Learn from Experts
3. Immersive yourself in context

1. Learn from People

- **Learn from target users by:**
  - Questionnaires and interviewing
  - Running focus groups
  - Observing people performing target tasks

2. Learn from Experts



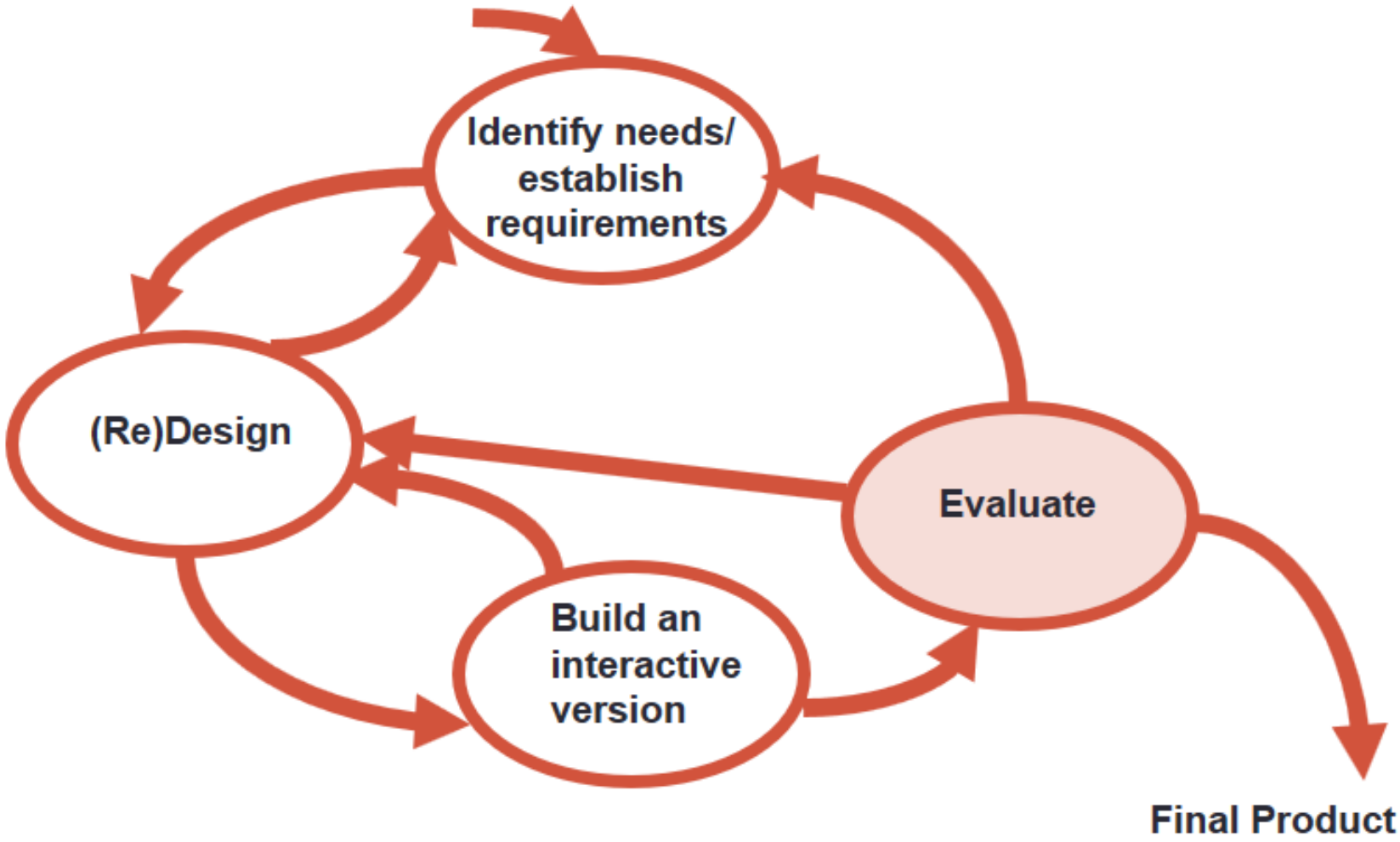
- **Experts have in-depth knowledge about topic**
  - Can give large amount of information in short time
- **Choose participants with domain expertise**
  - Look for existing process/problem documentation

3. Immersive yourself in Context

A day in the Life of.. **Cultural Probes..** **Role Playing..**

- **Put yourself in the position of the user**
  - Role playing, a day in the life of a user, cultural probes
  - Observing the problem space around you – how do you feel?
- **Take notes and capture your observations**

Interaction Design Process



Evaluation

What is Evaluation?

Evaluation: is the process of **gathering data** about the **usability** of a **design** or **product** by a specified group of users for a particular activity within a specified environment or work context

When to Evaluate?

Once the product has been [illegible]

pros: rapid develop[illegible]mall evalu[illegible]on cost

cons: fixing proble[illegible] is har[illegible]

During design and development

pros: find and rectify problems early

cons: higher evaluation cost, longer development

Four Evaluation Paradigms

1. Quick and dirty
2. Usability testing *(laboratory-based studies)*
3. Field studies
4. Predictive evaluation

1. Quick and Dirty

Quick & dirty evaluation:

- You show users a sketch, prototype, or mockup.
- Informal feedback from users to confirm that their ideas are in-line with users' needs and are liked.
- Quick & dirty evaluations are done any time.
- Focuses on fast input to the design process rather than carefully documented findings.

2. Usability Testing

- Recording typical users' performance on typical tasks in controlled settings.
- As the users perform tasks they are watched & recorded on video & their inputs are logged.
- User data is used to calculate performance times, errors & help determine system usability
- User satisfaction questionnaires & interviews are used to elicit users' opinions.

Laboratory-based studies

Controlled, instrumented environment

3. Field/Ethnographic Studies

- Field studies are done in natural settings
- The aim is to understand what users do naturally and how technology impacts them.
- In product design field studies can be used to:
  - Identify opportunities for new technology
  - Decide how to introduce new technology
  - Evaluate technology in use.
  - Determine design requirements

4. Predictive Evaluation

- Experts apply their knowledge of typical users, often guided by heuristics, to predict usability problems.
- Can involve theoretically based models.
- A key feature of predictive evaluation is that users need not be present
- Relatively quick and inexpensive

VR Applications

Many Possible Types of VR Applications

Healthcare
Surgeons operate in VR to practice difficult procedures ahead of time

Entertainment
Fully immersive cinematic experiences (Virtual stadiums, Concerts, Theatre)

Manufacturing
VR Headsets used to experience, build and inspect prototyping designs

Education
Virtual classes to observe historic, natural and architectural sites to drive deeper subject engagement

Charity
Charities are allowing people to experience first hand hardships such as war, poverty and natural disaster for a deeper impact

Sporting
Coaches using player point of view simulations to train teams, devise plays and re-visit past games

Military
Virtual combat simulations are used to train soldiers before they are deployed in real life

Travel
Travel agencies let customers experience destinations in VR before they book, from views such as helicopter or submarine

Education: Google Expeditions

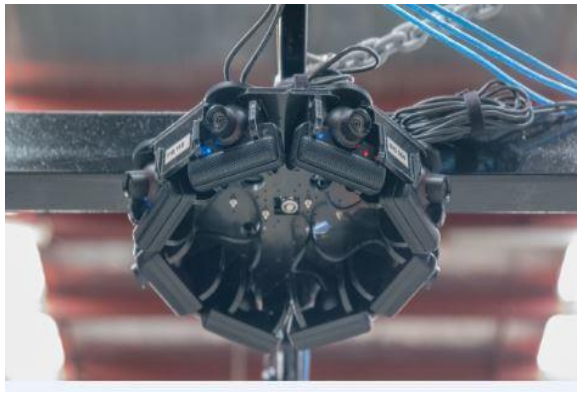
- **Goal:** Provide low cost educational VR experience
  - Based on Google Cardboard VR platform
- **Different roles:**
  - **Guide**: person leading an expedition on a tablet
  - **Explorer**: person following an expedition on a phone.
- **Usage**
  - Used by millions of students
  - Over 1000 educational experiences developed

Entertainment: Large Scale VR Gaming

- **Wide Area Tracking**
  - Computer vision, lights/reflective balls
    - > 120 cameras for 300 m^2 space
- **Backpack VR system**
  - Haptic feedback, wireless HMD
- **Real Props**
  - Tracked objects, walls

Examples

- The Void - https://www.thevoid.com/
- Zero Latency - https://zerolatencyvr.com/



Tracking cameras

Backpack system

THANK YOU