
HOW TO RUN AN INDUSTRIAL AUGMENTED REALITY PROJECT



UNLEASH THE POWER OF AUGMENTED REALITY



CONTENTS

04

EXECUTIVE SUMMARY

05

SELECTING A PILOT

06

HOW AR GLASSES WORK?

08

WHICH GLASSES

12

WHICH SOFTWARE?

11

TRAINING

18

USE CASES

21

OTHER ISSUES

23

ABOUT UTILITYAR

EXECUTIVE SUMMARY

AR glasses provide a superior form factor for service technicians, engineers and plant operators to

- Identify the correct asset that they should be working on
- Provide them with the information they need to work on it
- Guide them through the correct procedure to complete the task
- Validate that the work has been completed including step verification records
- Enable a trouble-shooting video call where a remote adviser can see exactly what the local resource is seeing real-time, and directly mark-up the local worker's vision to help communicate how to fix problems identified

Augmented Reality (AR) provides a unique opportunity for industry to reduce human error, streamline work procedures and increase workforce productivity. AR glasses use a forward-facing camera to recognise elements of their surroundings and can then project relevant information on the lens of the glass where it is visible to the wearer.

It is widely recognised as a nascent technology poised for growth and tech leaders such as Google, Microsoft, Apple and Epson have invested heavily in the space. The benefits that it can deliver in Industry and Utilities will be significant in relation to the costs of providing setup, integration and support of their increasingly sophisticated assets and systems.

This document aims to provide you with the information you need to complete a successful AR project. UtilityAR has worked with dozens of companies in this space and has seen the characteristics and key actions involved in having a successful AR project. In many cases your project may have some different characteristics however, so feel free to contact us at enquiries@utilityar.com for further information or with your comments on how to make this document more complete.



HOW AR GLASSES WORK?

Augmented Reality (AR) glasses are being produced by a growing number of hardware manufacturers. The glasses are internet connected computers which can be used to visualize the world in an augmented way. The three key features of these glasses are as follows:

Transparent Glass

Augmented Reality Glasses generally have clear transparent glass which means the wearer is predominantly seeing the real world and so remains aware of their surroundings. In addition the glasses will fail safe (allow the wearer to remain seeing the real world – not impair their vision) if there is any technical problem encountered. These is an important safety features use in the workplace.

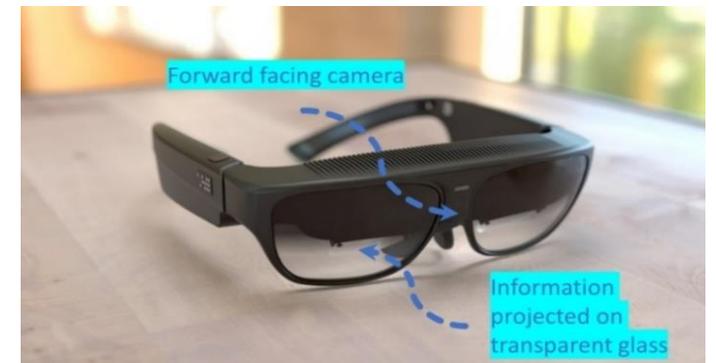
Forward Facing Camera

Forward facing cameras allow the glasses to understand their surroundings (using object, bar code or QR Code recognition). They also allow the glasses to take images or video and broadcast that media live to a remote location.

Visualisation of text/data/images/video in the vision of the wearer

AR glasses allow the wearer to see information/media projected on transparent glass or on a small screen in front of them, and so allow the wearer to see relevant information to help them get their job done. The information may be presented as “heads-up” information displayed directly in front of the wearer. Alternatively it may be “pinned” to a real-world object, such as a virtual name plate hanging over an object, or it may interact directly with real world object, such a virtual handle overlaid on a real-world handle (as in the image).

- Internet connected
- Transparent Glass – see the real world
- Forward Facing Camera
- Images/Data visible to the wearer



SELECTING A PILOT USE CASE

Identifying a suitable area in which to run a pilot is important in ultimately having a successful project. We have seen successful projects in Remote Assistance, Procedure Following and Training spaces, taking place in manufacturing, maintenance and field operations, so there is not one area that is the obvious best. Though important, along with the use case and the department to host the project, there are several other factors to be considered.

Management Buy-in

The most important factor to the success of any project, but particularly an innovation project, is management buy-in. This means support from the highest level of an organisation, but it also means at the department/team management level. We suggest proceeding with a pilot project where the management are bought in at every level.

A further element of management buy-in is making it visible to all in the organisation that the technology has backing from the highest levels of the organisation. This clear signal of commitment will help encourage the staff to provide the time and resources required to make it a success.

Appetite of the Team

Similar to the management, the team needs to be open to the new technology. This means both open mindedness on their part, but also recognising a clear benefit which will be achieved by using the technology. Some organisations closely link a team's goals or bonus to quality or output level, while for others the benefits of the technology may be reduced stress or pressure.

Identifying the Benefits for the Team

The team needs to see the potential benefits of the project. This will help ensure team participation and ongoing acceptance of the technology. These benefits should be clear and everything should be done to ensure that they are achieved during the project.



SELECTING A PILOT USE CASE

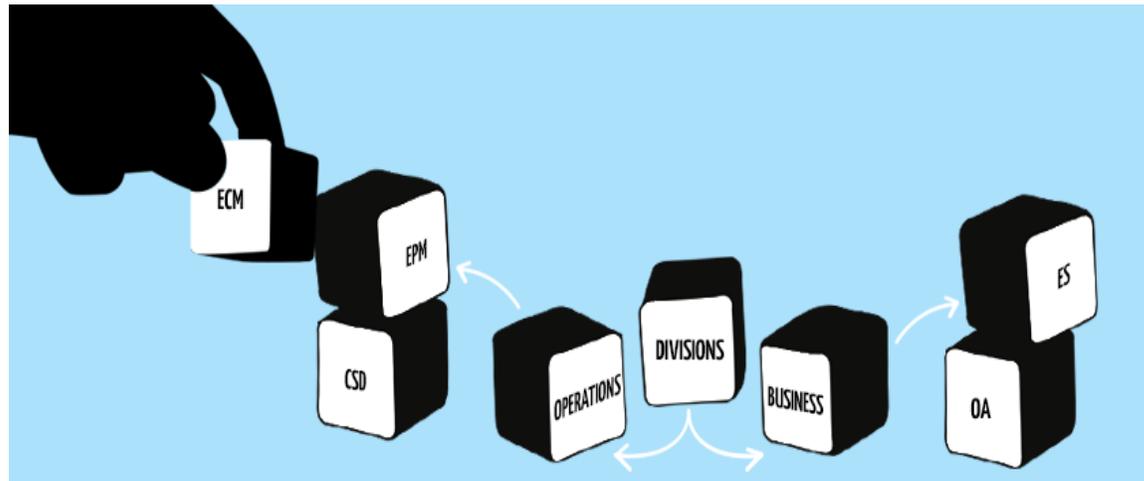
Area in the Business

AR glasses can be used in many different ways. For many business, which area of the business should progress an AR project first is unclear. The trade-off between available budget, short term need, long term potential and staff willingness can cause paralysis. It seems like an important decision, but in the end most areas of the business will use AR in future, so which one goes first is less critical. We suggest focusing on the people who will lead the project, rather than focusing too much on the relative merits of the different divisions of the business.

Use Case

Once a team in the organisation is chosen, the use case for the technology is often the next discussion. This may be Remote Assistance, Procedure Following, Surveying, Training or some bespoke need in the organisation.

We suggest considering more than one use case for a team. That will increase the importance of the project and so encourage more time to be devoted to it. Like any device, if out of sight, then the AR glasses will be out of mind for the times that they are needed. The goal is to make the glasses be the obvious solution when the need arises.



SELECTING A PILOT USE CASE

A Results-Focused Project Manager

A vital factor in the success of any project in a large company is the appointment of a results-focused Project Manager (PM). This person can drive the resolution of any issues which crop up such as IT connectivity, security documentation, Standard Operating Procedure approval, Health and Safety (H&S) or simply procurement management. We suggest appointing a PM who is “into this sort of thing” and so can help champion the technology within the organisation. If they do their job correctly, everyone should be eager to help them to be a success so that they will be next in line to benefit from it as it is spread across the organisation.

Measurable Results

A good pilot project is one with a defined end point and measurable results. In this case the end point does not mean stopping using the technology, rather the point at which we can measure whether it has been a success or not. The metrics for each business are different and needs to be thought through locally. We have seen projects where one Remote Assistance session in a month can be considered a very good result, while others where daily use of the technology is what is expected. It largely depends on the relative value of the intervention of the technology as well as the growth curve of usage in an organisation. The important thing is to identify the metrics on which it should be measured and making sure that it is possible to record them effectively.



Reduction in technical service costs in the region of 50%
Improved uptime and service offering valued at millions

WHICH GLASSES?

Selecting the most appropriate glasses

As with any other application, different use cases and circumstances mean that there is not one technical solution which is always the best option. AR glasses come at different price points, capabilities, weights, sizes and form-factors. Choosing the most appropriate pair for your use case is important in ensuring a successful project. Below sets out a number of the factors which are likely to be important in helping you make a choice

Heads-up display or fixed to a point in space or other object

A very exciting capability in AR relates to fixing virtual graphics to a point in space or to another object. This could mean that a label sits above a real-world object (such as a person's or an asset's name sitting above them in space), a 3D graphic is overlaid on a real world object (such as a virtual part overlaid on a real machine to help visualise a potential modification) or a virtual graphic that interacts with a real-world object (such as a virtual arrow that directs a worker which way to turn a handle). This feature is enabled if the glasses can recognise the real world items around them and then remember where they are relative to the wearer, so when the virtual object stays in position when the wearer moves their head.

These are all very exciting capabilities, and should be applied when appropriate. On the other hand, simple heads up display of information is simpler, less immersive, and can be preferable for some applications. Where an application is based on the idea of providing heads up display of information to an operator, the application is simple and relatively inexpensive to produce as well as the content being easy to create. The hardware is also cheaper and lighter.



WHICH GLASSES?

ATEX, Safety Glass and Other Industrial Requirements

Some workplaces require ATEX (Atmosphere Explosive) rated or safety glasses for H&S reasons. As you would expect, this reduces the number of options available, though it can be done. It is also often the case that the value that is created by using the technology in ATEX rated areas is often much higher.

Comfort Requirements and Suitability for the Wearer - Weight

Comfort is an important decision factor when choosing a headset or glasses. In the event that the wearer will be using it for a long period of time, comfort is important. In addition, battery life is important when the device will be in use for an extended period of time, though in many cases a larger battery and comfort for long-term wear do not work well together.

Battery Life

Battery life in AR headsets/glasses varies significantly depending on the level of technical sophistication of the headset, battery size and usage type. Similar to a phone, our experience is that the actual usage time of the device is low relative to the amount of time the wearer has it on standby.

Monocular Vs Binocular

Monocular devices such as Realwear, Google Glass or Vuzix M400 are good for presenting heads up information to the wearer through a single screen in front of one eye. These devices can be less intrusive and also have the benefit of generally working well with the wearers regular glasses, allowing for the device to be shared between more than one user.

Binocular devices facilitate more sophisticated graphics being presented to both eyes. They are also more intuitive to use as most of us are used to seeing through both eyes.



WHICH GLASSES?

Need for and Convenience of Special Lenses

Some glasses allow the focus of the image to be adjusted, and so reduce or remove the need for specialist lenses. Others allow special prescription lenses to be purchased which fit within the device. Finally some devices are designed to facilitate use of a wearers regular glasses.

Field of View

Much ink has been devoted to the “Field of View” (FOV) or the size of the area in which the device can provide augmented vision to the wearer. This is important particularly in the event that the application the wearer is interested in includes moving virtual items (say a flying object in a game) or they wish to link a piece of information to a specific real world item or point in space. In the event that the application only requires information to be projected heads up for the wearer, there is little need to worry about the FOV. Also, when first using a headset the FOV issue seems important, but once a wearer has adjusted to the new normal, it ceases to be an issue.

Cost

Headset costs vary depending on the model and the number of headsets being purchased. The lowest cost headset we have worked on is €1,000 and meets the requirements of most applications. At the other end of the spectrum some devices cost closer to €6,000 or so.

Flexibility to Change Device in Future

We believe that the costs and technologies set out above will change significantly over the coming years. We therefore discourage organisations doing anything which ties them into one headset or platform. Flexibility to change solution will be extremely important in future as things develop.

WHICH SOFTWARE?

Selecting the Software

After choosing the appropriate glasses for your pilot project, next you need to identify the appropriate software solution. There are a growing number of software providers in this space, some with off the shelf solutions, while others build bespoke solutions for particular needs. UtilityAR offers both, with off the shelf solutions for many application, while also developing and adapting solutions for some customers. Where other software providers are more suitable for your needs, we or other consultants can advice you on the best option in that space. Some things to consider are:

Off the Shelf vs Bespoke Solutions

Off the shelf solutions offer a cost effective and proven solution which is readily available and comes with a host of documentation and experience. In many cases the developers continue to develop upgrades and bug fixes which can be added to your system if required. That said, it may not be tailored specifically to your needs and involve “hacking” solutions together to make everything work as you wish.

Bespoke solutions mean that you can develop the exact solution that meets your requirements, tailored to include all your companies detailed needs. The reality is however that this comes at significant cost. The time required to complete the development is significant and it is likely that new requirements will continue to present themselves as you go, meaning that the project can go on for some time. Any upgrades or bug fixes will also come at significant cost.

Connect to your existing database

Generally speaking AR software can be linked to an existing SAP, IBM Maximo, Service Now, QEMS, or other ERP asset and maintenance management system. Alternatively, a simple database on the software providers own servers can facilitate a Proof of Concept project. AR projects are regularly sited as a important reason for investment in database management projects.

WHICH SOFTWARE?

Ease of Use

Having been involved in dozens of projects of this type, our observation is that this is the single most important feature of any software system chosen. As we are asking workers to use a completely different technology to anything that they have experienced before, providing them with an easy to use software is the most important thing in encouraging the to use it.

Hardware Agnostic

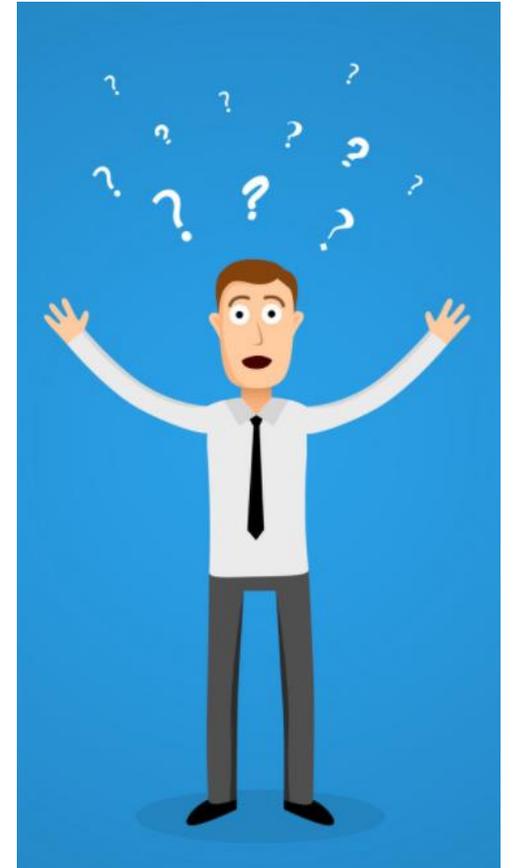
As mentioned above, we expect to see significant developments in the hardware space over the coming years. It is important therefore to choose software solutions that can be adapted to provide a similar feel to your staff in a range of different headsets, many of which have not yet been developed. A commitment from the software developer to do this is critical.

Open API to Interface with Other Systems

Many AR applications are powered by other database and management tools that your organisation already has in place. This might be asset, quality or scheduling management systems or other design and development tools. It is important that the solution you choose can be integrated with those other tools and so allow you to share data without creating information silos in your organisation.

Features

Possibly the last important thing to consider in choosing software is to compare the features available in comparable software solutions. While there may be some critical features which are important to your business, often non-essential features create clutter which only serve to reduce the ease of use discussed above.

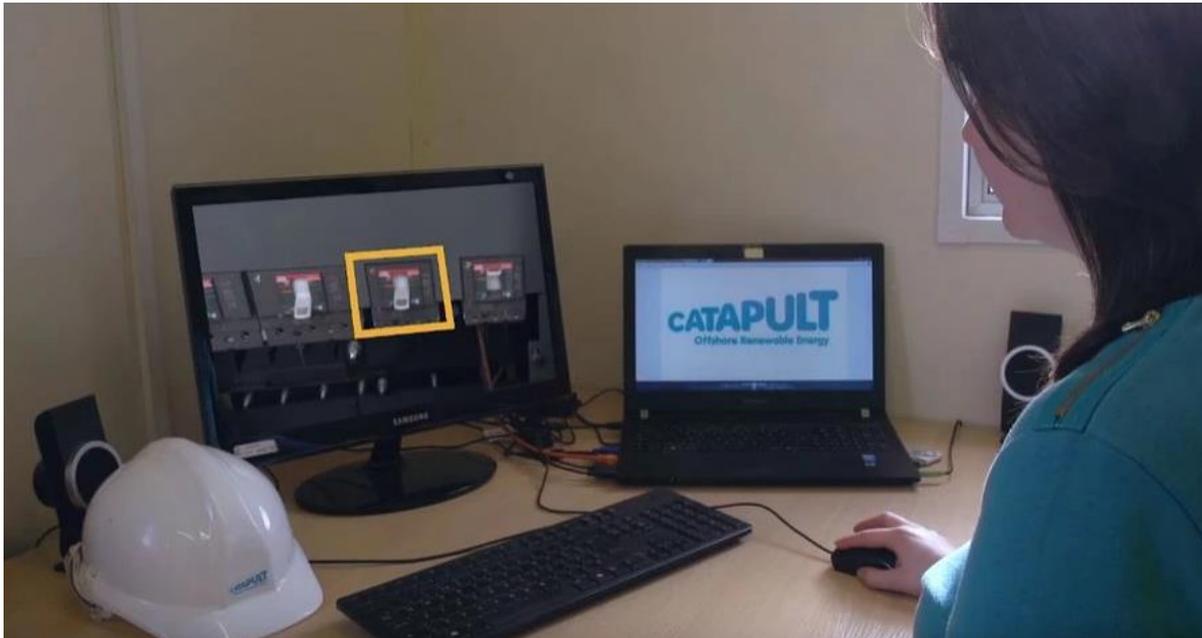


IT INVOLVEMENT

IT Considerations

Depending on the use case, IT will likely need to be involved from an early stage in your AR project. Many company firewalls and other security systems block new devices from joining the WIFI network, while others block things like video calling from new services. Your AR headset will need to be able to connect without need for pop-ups or sign ins added by local IT. If these extra steps are required, it will greatly increase the complexity of usage and reduce the likelihood of usage significantly.

We suggest showing IT how the technology could be used by them to reduce the pressure they are under and so make their lives easier. This will assist with getting their buy in and assistance on the project.



Staff Training

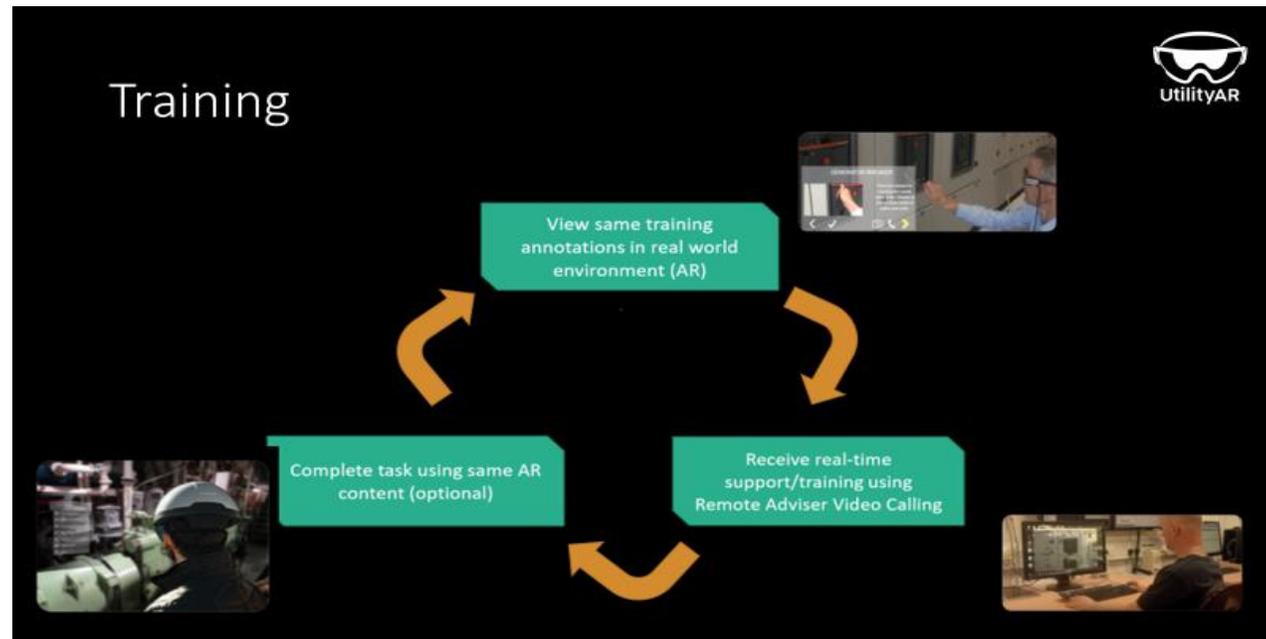
When you are ready to deploy the technology, staff training is an important area of focus. While this can be minimised by choosing an easy to use and intuitive solution, the “newness” of the technology is an important barrier to overcome.

Where possible hands on training is preferable, but where it is not, webinar based training can be used. Encouraging staff to try out the headsets in their work area should be facilitated and refresher training is also a good idea. UtilityAR also offers training videos and slides available at www.utilityar.com/useful-documents

USE CASE: TRAINING

- Reduced travel
- Improved record keeping
- Greater staff engagement
- Superior knowledge retention
- Linked to real work procedure delivery system
- Reduced need for language localisation

Training with Augmented Reality glasses allows a worker to view training instructions (pre-defined or provided by a live instructor) while they are at the physical location where they will be required to do the work. This immersive experience provides far better levels of engagement as well as being more time efficient and easier to document. Furthermore they can be assisted or assessed by a remote adviser using remote adviser video calling if required. Finally they can complete the actual tasks using the Augmented Reality Procedure Following system discussed above. This provides a unified training system and simplifies documentation while also giving the trainee a more engaging experience, leading to better results.



STANDARD OPERATING PROCEDURE



1. Remote Adviser – Glasses

Note that for Remote Adviser mode to work correctly, the system must be connected to an appropriate wifi.

Remote Adviser

- Depending on your settings, the software may begin on the "Main Menu" screen. In that case, you can choose "Remote Adviser" to start a video call. Your colleagues on their browser/phone will need to select your channel to view what you are seeing.
- Alternatively choose 1 to 1 call to make a direct call to a colleague



1 to 1 calls

- Alternatively choose 1 to 1 call to make a direct call to a colleague
- The top of the screen confirms your account ID. This name can be used by you to call an adviser.
- For headsets with voice control, say "Item 1" or "Item 2" etc to select a person to call. For headsets with a hand controller, select the user using the up/down buttons or mouse

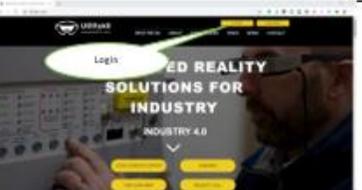


- During a Remote Adviser call you can speak to the adviser and hear what they are saying using headphones/microphone.
- On a Peer to Peer call you can end the call saying/selecting "end call".
- On a Group Call you can end the call by saying/selecting "Leave"



2. Remote Adviser – Browser

- Go to utilityar.com to login using the username and password provided by your system administrator



Preparing a SOP

Many organisations require a Standard Operating Procedure (SOP) to be written for use of a piece of technology such as Augmented Reality Glasses. This may mean one SOP for a use case, or several for different types of uses. Each organisation writes SOPs differently but to start you off some templates can be found on our webpage at www.utilityar.com/useful-documents

QUICK GUIDE AND HELP

Quick Guide

While training and SOPs are important official steps to take, a “Quick Guide” which can be stored with the glasses is a useful tool to help users who are getting used to the new technology. A quick guide should give a user a short snapshot of the information needed to do the most common actions with the headset.

Some templates can be found on our webpage at www.utilityar.com/useful-documents



enquiries@utilityar.com

+353879601725

Quick start guide

1	<p>Make sure headset has been charged</p> <p>Switch on the WIFI before starting the headset</p>
2	<p>Switch on headset using power button at the top</p> <p>Use the top of the controller to select up, down, left and right. Centre button to select</p>  <p>If required use the mouse using the touchpad at the bottom of the controller. Tap the pad to select</p> <p>Do not press the 3 lights as they take you away from the UtilityAR APP</p>
3	<p>Select who to call using drop down box, then press phone button</p> <p>Chose previously used contacts here</p> 
4	<p>End the call by pressing the power button at the top of the controller and then selecting power off on the screen</p>

INDUSTRY CASE STUDY – Engineering Consultancy

CDM Smith Provides International Expertise Using UtilityAR

CDM Smith is a full-service engineering and construction firm that provides consulting, design, and program and integrated construction management solutions in water, environment, infrastructure, energy and facilities projects for government and private clients. With over 5000 staff, they have offices throughout the world.

CDM Smith was looking for solutions that would enable them to improve their ability to bring their international expertise to regional projects, without the need for those experts to travel on every occasion.

CDM Smith reports **10-20%** cost savings by using UtilityAR Solutions. It is allowing CDM Smith to offer better outcomes to their customers in the project development, energy and utility sectors. Using AR software, the company have reduced the amount of travel required by their specialists while also improving the availability of those specialists for their regional projects. This is allowing the company to deliver savings in time and costs while improving their service.



“ UtilityAR has allowed us to provide specialist services across the world without our specialists having to travel to the site. ”

Jon Hunt
Client Services Manager, CDM Smith.

INDUSTRY CASE STUDY – Data Centre

CIX Data Centre Improved Resilience Using UtilityAR

CIX are innovating to provide greater levels of security, reliability and transparency to their cloud platform customers by using UtilityAR's software. The Augmented Reality glasses-based software helps the Cork based Data Centre to train staff faster and to provide staff with guidance in the event of a utility interruption. It also allows them to offer their customers real-time remote eyes in the event that a customers infrastructure requires troubleshooting

CIX improved their data centre reliability by using UtilityAR's Augmented Reality driven training systems. The technology allows staff to watch training videos while at the critical equipment and so be better equipped to take action when needed.

CIX allow CoLo customers to see their equipment live through their "Remote Eyes" service. This unparalleled service means their customers have a superior service to any other CoLo providers.



“ UtilityAR technology enables us to deliver a resilient service so our customers have peace of mind and also it enables us to invite them into the building at critical times.

Jerry Sweeney, CIX Founder

”

INDUSTRY CASE STUDY – Utilities/Field Service

BIOVERDA Power Systems Improved Functionality Using UtilityAR

BioVerda Power Systems operate gas and diesel engines across nine sites nationwide. BioVerda were looking for solutions that would enable them to maintain the operations of their Galway based site, without the need for full-time engineers. With their main office located in Dublin, it was critical they maintain their high-safety and maintenance standards while reducing the time required on site.

Dealing with complex machinery, training at BioVerda is highly important. Using Augmented Reality, they reduced training process times and ensured learning outcomes continued after the training period. UtilityAR Solutions now allow more experienced members of the BioVerda team to communicate their knowledge and problem-solving skills to less experienced workers from any location.

BioVerda's Galway site is a considerable distance from their head office in Dublin. When the site encounters issues, an engineer must visit the site, causing significant downtime and a backlog of work. UtilityAR's 'Remote Adviser' is providing AR solutions, allowing an expert engineer to communicate with the on-site operators, reducing downtime and fixing the problem sooner for BioVerda.



“ UtilityAR is helping us improve uptime, training and our response to unscheduled outages. We also believe it will improve the maintenance on our remote sites. ”

Donal O’Cinneide, Bioverda

OTHER ISSUES



Include Vendors

For many projects, connecting with Vendors is the stated purpose of the endeavour, connecting with them more quickly and reducing the need for them to come to site. Where it is not the main objective, we still suggest that it be considered as an add-on, as the value that it will provide to your business, coupled with the energy a good vendor will provide to the project, can make the results much better.

Location of Headsets

Where headsets are located in your organisation will significantly influence how they will be used. While security and safety of the devices is important, if they are locked away or difficult to access when needed, they are unlikely to be used. We suggest leaving the headsets in plain view of the workers who are going to use them so that they know where to find it when they need it. There may also be a case for locating several headsets at “hotspot” locations around the site, improving the likelihood that they will be used.

Link to Other Projects

Augmented Reality glasses are likely to influence how many parts of the industry get their work done. Many projects relating to process improvement or new development which are currently underway will later be adapted include AR glasses. Why not include them at this state. That will provide an economy of scale and improved focus which will likely improve both projects

OTHER ISSUES



Linking with a Data Base

Augmented Reality Glasses projects generally involve the consumption of or generation of data or content. This may be content for procedures, live meter or alarm information, and check lists, or it may be images, videos or results collected by the glasses. It is important to link this content with existing databases that your organisation has in place. It is likely that these databases will require some modifications to facilitate this new data types used and generated by the glasses. We suggest linking the systems early to allow all involved to begin to learn what is required as soon as possible.

Promote Your Achievements

When your AR project is beginning to get off the ground, it is important to celebrate and publicise your innovative achievements. This will help you gain further resources within your company as well as helping to identify other areas in which the technology could be applied. Vendors are generally happy to provide assistance with Case Studies, publicity or other forms of promotion.

CPD Training

AR is a new technology and the majority of your colleagues are unaware of the opportunities that it provides. Why not try running some CPD training to educate your colleagues about the potential use cases and to spur their minds to think of the best places in your business to use it. Your vendor will likely be happy to assist of many consultants offer this service.



About UtilityAR

UtilityAR (www.utilityar.com) creates Augmented Reality Solutions for Industrial Sectors like Manufacturing, Pharmaceutical, Utilities, and Data Centres. Driven by the team's experience in utilities and the industrial sector, UtilityAR is building the next generation of workplace and asset management tools for those industries. We understand the importance of ease of setup and use of the platform. This has been a focus in the design of the product and means that it is the easiest to integrate solution on the market.

Contact us at enquiries@utilityar.com

Request a **Free Live Demo** and see Augmented Reality in Action!

LIVE DEMO