



## **Virtual Reality: Without the Hype**

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## Oculus Rift



Oculus Rift is the headset which started this new wave of interest in Virtual Reality with the launch of their Kickstarter campaign in 2012, and then their purchase by Facebook for \$2bn in 2014.

Development Kit 1 was released in 2013, and DK2 in 2014 – we’ve got both. Whilst DK1 was a dream to use and integrate DK2 was a real pig. And in terms of graphic performance (and ease of use) DK2 was soon surpassed by smartphone based systems.

The consumer version (CV1) is now out (we’ve got that too) and includes not only the headset but also a desk sensor to detect lateral movement, a small hand controller, and an Xbox type controller. Performance is notably better than DK2.

Later in the year Oculus are releasing a set of spatially aware hand controllers, so you’ll be able to see your hands inside of VR – something that people are already doing by putting the Leap Motion sensor onto the front of their headsets.

Interestingly Oculus has also developed the software for the Samsung Gear VR smartphone headset, so now has a foot in both camps. And with Facebook investing in them a Facebook Social VR play cannot be far off.

The consumer edition of the Oculus Rift costs \$599+shipping, with a 2 month lead time.

## Introduction

A lot has been written about Virtual Reality (VR) over the last year or so, and a lot of it has been so full of hype that businesses and organisations can find it hard to work out what is really going on, how important it is *right now* to their business, and how important it will be in the years to come.

The aim here is to give organisations a better idea of what VR can, and can’t, do for them now and for the rest of 2016, and some idea of what might be achievable over the next few years.

We’ve got no wish to discourage companies from making investment in VR (that’s where we make our money), but we do think that they should do so with their eyes open, and with the right facts in front of them.

## What is Virtual Reality?

Let’s start with the basics – what is virtual reality. VR involves users putting on a “head mounted display” (HMD). Inside the display are usually two screens, so each eye gets a slightly different view of the image they are looking at – resulting in a 3D stereoscopic effect. As they move their head the head-tracking in the display adjusts the viewpoint accordingly. There will then usually be controls to move around the scene, and to interact with it. All this can give the user a real sense of “being there”, and a world so real that people literally try and reach out to touch it. The key point is that most users put on a VR headset and just go WOW!

But what happens after the wow. Or is the wow just all you need?

## Smartphone vs Integrated Headsets

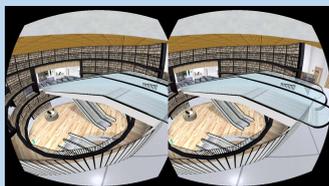
Two broad approaches to HMDs are emerging.

The **Smartphone** approach (e.g. Google Cardboard, but also Samsung Gear VR) is to use a smartphone as the display, processor and movement detector. You slip an ordinary phone into a holder (which often just has a set of lenses and nothing else), and voilà you have a VR headset. The proper Google Cardboard is made out of cardboard (except the lenses), and so may not last long in normal use. There are plastic versions though, and the Samsung Gear VR is an altogether more solid device.

The **Integrated** approach (e.g. Oculus Rift, HTC Vive, Sony Morpheus) is to create a headset with all the displays and functionality built into it, but using an ordinary computer or games console to generate the graphics. In both cases audio can be added to enhance the sense of immersion.

## Daden VR Projects #1

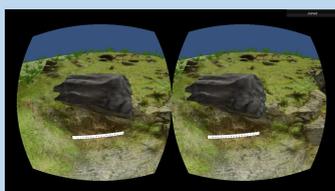
### - VR Library



One of our first projects on the Oculus Rift was the Virtual Library of Birmingham. Back in 2011 we'd created the new Library (which didn't open physically until 2013) in full multi-user 3D on a virtual world platform. Once the Rift DK1 was released we could use it to go into the same virtual world and explore the Library in fully immersive 3D.

The experience was already quite overwhelming, particularly in the central core of the structure where escalators seem to criss-cross up to the sky, but seeing it in VR was quite awesome. Mind you people did get vertigo when then started leaping from the top of the virtual Alpha Tower the other side of Centenary Square!

### - Virtual Skiddaw



We developed Virtual Skiddaw as a geology virtual field trip for the Open University. Originally designed for use with 2D screens it was a relatively painless exercise to create an Oculus Rift compatible version.

In one section the user can lift up a rock – which then just hangs there in space as a huge boulder in front of the user – who almost always then starts to peer around, under and over it – to the bemused looks of everyone watching!

The pros and cons of each are summarised below but the key point is that right now (mid 2016) the only ones you can go onto Amazon or into the High St and buy easily (and cheaply) are Google Cardboard (for around £10), or Samsung Gear VR (slightly less cheaply at around £90).

	Smartphone	Integrated
<b>Screen Quality</b>	Depends on phone 1920x1080 pixels with Nexus 5 ~100 degrees FOV	2160x1200 pixels @ 90Hz for Oculus CV1 ~110 degrees FOV
<b>Latency</b> (see below)	~ 75- 100ms	~ 30 – 100ms, trying to target 20ms
<b>Controls</b>	Single button Optional controllers	Usually come with one or more controllers, and possibly additional sensors for lateral movement
<b>External PC</b>	None	Oculus recommends: - NVIDIA GTX 970 - Intel i5-4590 - 8GB+ RAM
<b>Cables</b>	None	One to interface, then HDMI and one or more USB
<b>Examples</b>	Google Cardboard Samsung Gear VR	Oculus Rift HTC Vive Sony Playstation VR
<b>Key Use Case</b>	B2C Engagement Stands/travelling sales Quick look	Gamers Training & Learning Presentation sales
<b>Availability</b>	Now	Oculus: Now, limited qty HTC: Now Sony: Oct 2016
<b>Cost</b>	Cardboard - £10 - £20 Samsung - £90	Oculus: \$599 (exc UK P&P) HTC: £689 (inc UK P&P) Sony: \$399

An important point to remember is that what you experience in terms of content in both can be identical. Yes each approach, and each headset, may have its strengths and even uniques, but in general they are just different ways of accessing a VR experience.

## Photospheres, 3D Video and 3D Models

The second absolutely essential distinction to make is between the different types of experience you can have in VR. They fall broadly into two camps:

- those sourced from 2D content, and
- those sourced from 3D content.

## Google Cardboard



Google Cardboard launched in 2014. As its name suggests the first versions were simple folded cardboard (for which Google provided a template), with the addition of a couple of cheap lenses and a small button to “touch” the screen in one place to trigger an action. The user just slips their phone into the device, downloads the Cardboard application, and then whatever other VR applications they want. Although first released for Android the Cardboard is now available on iOS too.

Many companies make Cardboards of varying build quality, and branded versions are also available. There are also a number of “plastic” cardboard, which look similar to the Oculus Rift, adding a plastic case/visor for the smartphone, and head-straps.

According to Wikipedia “by January 2016, over 5 million Cardboard viewers had shipped and over 1,000 compatible applications had been published” – including a couple from us!

Compare those numbers to the quantity of Oculus Rift in circulation (~200,000) and you’ll see why we’re so bullish about the use of Google Cardboard.

A LOT of the current VR hype is actually around **2D content** – typically a 2D image (still or video) stretched into a bubble with you the viewer in the centre. In VR the 3D effect of such a photosphere can be very effective, and in many examples you can move between photospheres by clicking on hotspots – just like the “virtual tours” on web sites over a decade ago. However you can only see what has been captured in the image, and interactivity is often very limited.

By contrast VR experiences derived from true **3D models** can allow you to go anywhere and interact with anything. Which is best depends very much on what you are trying to achieve, and what your budget is. The table below summarises some of the key points.

	Photospheres	3D Models
<b>Technique</b>	Take a set of images covering a 360 degree sphere around you and then use software to create a single “bubble” image	Hand craft or use techniques such as LIDAR or photogrammetry to build a volumetric 3D model using software such as Maya, SketchUp or 3D Studio Max
<b>Download Size</b>	Minimal, although depends on rez	Can be huge, typically 100MB – 500MB
<b>Good for...</b>	Quick and cheap development  Situations where you want to constrain what user sees  Sights/Sites and building interiors	User freedom Interactivity Games Building exteriors Training Objects Data visualisation Multi-user
<b>Bad for...</b>	Interactivity Giving user agency Games Objects Building exteriors Data visualisation Multi-user	Quick and cheap development  Complete photo-realism (unless you have a lot of money)
<b>Development Time</b>	Low (days to a couple of weeks)	Medium to High (weeks to months)
<b>Cost</b>	Low, £5k - £15k for system	Medium to high, £10k - £100k for system

Note that there is some possibility to combine techniques, for instance creating a 3D model and then generating photospheres of the model. This can be useful to show future buildings in hi-rez, but in something with a small download size.

## Controllers



One of the first things that most people do in VR is point at something, and then discover that a) they can't see their own hands and b) the people watching can't see what they are pointing at!

Getting hands into VR is attracting a lot of activity, with both Oculus and HTC launching spatially aware hand controllers. Another approach is to put a depth camera (e.g. Leap Motion) onto the headset to track your hands, or to place it in the room (e.g. Kinect) to track your whole body.



Another area of interest is around locomotion. Once in VR it seems odd to have to use a joystick or on-screen buttons to move around – why can't you just walk?

A number of companies are developing solutions, often based around 360 degree treadmills, or very slippery shoes! None of these are likely to be cheap!

One way of bypassing the whole issue is to sit the user in the physical world and VR (e.g. roller coaster, hover-chair), and then move that – so that the physical and virtual sensations are more closely matched.

## Single or Multi-User

Most VR experiences are single user – there's just you inside the world. However a lot of people, ourselves included, are excited by the idea of multi-user VR apps – so called social VR. Here each user is represented as an avatar – just as in a multi-user game or virtual world, and can see and communicate with other users. This enables the experience to be not just immersive but collaborative and social as well.

As well as bespoke multi-user systems (which is what many of our projects are) there are a number of social VR systems under development, principally:

- **AltspaceVR** – integrates 2D web, and allows you to import WebGL “widgets” into the VR space
- **JanusVR** – also integrates the 2D web and uses an HTML like syntax for world building.
- **Project Sansar** – the “next generation” Second Life from Linden Lab, owners of Second Life
- **High Fidelity** – the “next generation” Second Life from Philip Rosedale – the creator of Second Life. Uses a webcam to animate your avatars facial expressions (even when using VR!).
- **vTime** – a UK based Social VR start-up, based in Liverpool and launching on the Gear VR.

We are tracking all these and will be reporting our experiences on our blog.

## The Bad Stuff

Unfortunately it's not all plain sailing with VR, and there are a number of challenges which we just don't find with 2D screen based applications (even when being used to view a 3D world). Some of the most important, and which any project needs to consider, are:

- **Latency** – Latency is the delay between you doing something in the physical world (e.g. pressing a button, moving your head), and the image on the screen changing in response. If the latency is high (> 20ms) then not only do you lose some immersion but you can also start to feel nauseous – the motion sickness that many people get from using VR. How much latency and nausea effects people varies from person to person, and also on the application design, but it's a good reason to keep VR experiences short if working with the public. Note that for some the effect is more acute when they leave VR and return to the physical world – in the same way that a seafarer can take their time to find their land-legs.

## Samsung Gear VR



The Samsung Gear VR was released in November 2015. It is a smartphone type device, and uses a Samsung Galaxy (Galaxy Note 5 or Galaxy S6/S6 Edge) as its smartphone. The software that is used on the phone to drive the system was developed by Oculus Rift – and it's an interesting debate as to whether Oculus' future is in its own hardware (like the Rift) or in developing and licensing its software to other manufacturers (as in the Samsung Gear VR).

Whereas Cardboard features just a single button, and Oculus Rift uses an external controller the Gear has a large, cross-shaped touchpad, a volume rocker, and a back button, all on the side of the headset.

The Gear VR retails at just under £100, but of course you need to add in the cost of the smartphone if you haven't already got a Galaxy 5/6.

Since the Gear is using Oculus' software you need applications (or versions of them) that are developed for the Oculus/Gear platform. Standard Oculus Rift apps won't work as there is no PC to run on, and Cardboard apps won't run as they aren't compatible at all.

On the plus side Samsung has gone to some lengths to make a very usable system, and to extract the maximum performance from the headset-smartphone combo.

Whilst there appears to be big differences in latency between smartphone and integrated headsets there is a danger of getting very audiophile about all this – so try it and see if you are happy with it, and use that as a guide.

- **Safety** – When you are wearing a VR headset you can't see the outside world – so if you are standing there is a real danger of tripping over or bumping into cables, furniture and other people. So either make sure you have a clear space, and/or someone “spotting” for the person wearing the headset – or sit them down. There is a big debate about “standing” vs “sitting” use of VR, and how that then effects perceptions of movement in VR (see Controllers sidebar). Interestingly the HTC Vive headset has a forward facing camera which “bleeds” the physical world into your VR view if you get close to a wall or other obstruction.
- **Text** – We are so used to reading text on a PC screen that it comes as surprise to find that reading text in VR can be really hard. It can be difficult to position yourself to read text on an in-world piece of paper or PC screen, and having it go “full-screen” but then move as you look around is also disconcerting. This can make things challenging when it comes to creating training and learning materials in VR, so you are best focussed on learning by doing (or hearing), than learning by reading.

## So Can You Use VR Now?

So is VR something that you can make use of now – most certainly yes. But you do need to know what you want to achieve, what the best way of achieving it is, and what budget and timescale you have available.

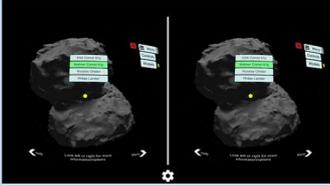
Quite honestly until probably 3Q16, possibly well into 2017, a smartphone approach is almost the only way forward. Devices such as Oculus Rift DK2 are in very short supply, and even the consumer version will also be hard to come by once it launches in March (new orders won't be delivered til July). Set that against your smartphone and £10 on Amazon for a Cardboard and it's not a hard decision to reach – but see later for why you might consider the Integrated approach.

## So What Can I Do with Google Cardboard?

Google Cardboard (by which we mean it and any of its clones) is ideally suited to very quick VR experiences – probably 2 minutes at most. Although you can get straps it works best when you just lift it to your eyes and look. The only control is a single button, so interaction can be limited, but it's more than enough to get someone into a VR environment, look around, go “wow”, explore a bit, learn something and come out. Anything more than that and you start to need a head-strap, probably a separate controller, and

## Daden VR Projects #2

### - Rosetta VR



Our first Google Cardboard project was a visualisation of Comet 67P and the Rosetta orbiter and Philae lander.

Within the application the user can select which object they want to view, and then control the rotation and zoom of the object so that they can look all around it.

Placed in a ring around the user are a further set of information screens, telling them more about the comet and Daden, and links to relevant website.

You can download a copy of Rosetta VR for Android phones from the Google Play Store.

### - FieldscapesVR



As part of our Fieldscapes project we have created a Google Cardboard viewer for our Carding Mill Valley model. At present you can walk and fly anywhere in and around the landscape, but later you'll be able to work through any of the exercises that have been created. Compare that to Google Expeditions which just shows a series of geographical photospheres.

FieldscapesVR is on Google Play Store now, and an iOS version is coming in July.

you need to make sure you're in a safe environment (and preferably sitting down).

Here are just some of the ways in which you could use a smartphone approach now, and whether a photosphere or pure 3D approach will work best.

VR Opportunity	As Photosphere	As 3D Model
Real Estate & Heritage Internals	Good fit, very quick, as long as you have access to the location	Quite expensive in time and money, and large download. Can reduce download by making photosphere from model
Real Estate & Heritage Externals	Not quite so good as people like to look "around" and "over" a building. Could so with drone/3D video but significant increase in cost.	Better fit, particularly if architects 3D models available
Product catalogues/object viewers	Poor fit as photosphere's typically look outwards	Good fit as user can look all around an object, and interact with it.
Virtual Field trips	OK, but user limited to places photos taken from	Good fit as user can walk (or fly) anywhere within the area
Knowledge Education	Poor as hard to put text in, or animations or interactivity	Better, but still problems with text, so use graphic animations and audio for explanations
Skills Training	Poor again	Good fit, as focus is on doing, but may need some form of hand controller
Location Familiarisation (eg onboarding, health & care)	Good as can create photosphere walkthrough with audio narration	Good, but probably more expensive
Games (inc "serious games")	Poor, can only really do treasure hunt type games	Good fit, full scope of interactivity, including non-player characters/bots
Data visualisation	Poor – just 3D "infographics"	Good fit, full ability to use as a visual analytics tool
Passive "Film" Entertainment	OK, and being seen as the next thing after "3D glasses" – but may be about as successful in the near term	Poor – having created the space you may as well make it more of a game
Documentary/News Reporting	OK, and getting a lot of hype, but small current audience and needs a relatively high level of user commitment	Not really feasible unless turned into more of a game/educational experience

## And If I Insist on Oculus Rift?

If you really love the tech and must have something that uses an integrated headset such as the Oculus Rift then there are three prime uses cases that work:

- Something that you can use internally, or at a trade show/customer experience point, with your own (small) supply of headsets (maybe only 1) – giving them a slightly longer and fuller experience than they'd get from a Google Cardboard, maybe up to 10 – 20 minutes.
- Using as part of a research project where quantity is less likely to be an issue. Either an academic or in-house /commercial project, focussed either on psychological effects or product/service development of just increasing organisational awareness of VR.
- Something that appeals to early adopters and influencers who will already be buying their own headsets, helping to show that your company/organisation is embracing new technology, but not really as an immediate sales or lead generator.

Otherwise we'd recommend waiting til later in 2016 to see what the availability, uptake and cost of integrated headsets is like.

## The VR Options Landscape

The diagram below summarises the two key decisions in any VR project just now – photosphere or 3D models, smartphone or integrated headset.

**HTC Vive**

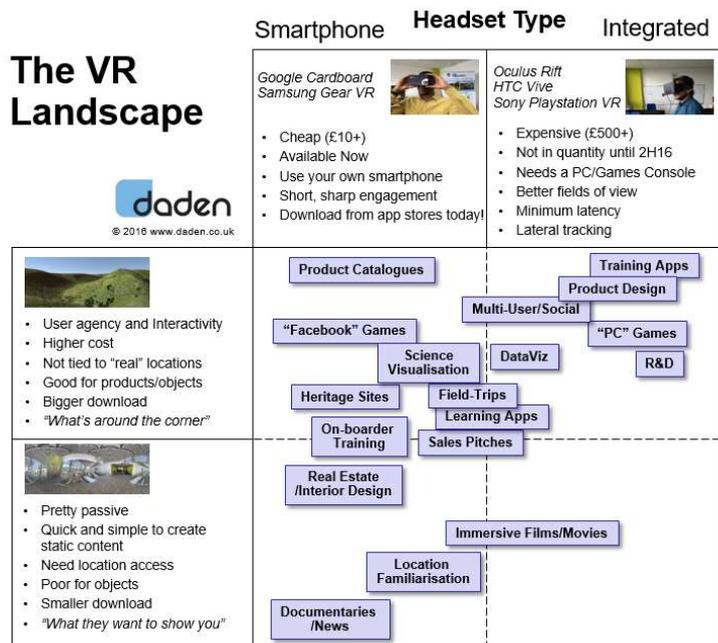


The HTC Vive is an integrated headset, and is expected to have a higher specification than the Oculus Rift. Rather than using a single landscape screen which is then split into two images (as in Cardboard, Gear VR and Rift) the Vive has two separate portrait displays, giving greater resolution and field of view.

Like the Rift the Vive has lateral sensing, but using two floor mounted sensors, so you can move around an entire (empty!) room and have your location tracked and reflected in VR. The headset also has a forward facing camera to warn you when you are about to collide with something in the physical world – and which may also have some potential for augmented reality (AR).

Also like the Rift the Vive will have a set of spatially aware handset controllers to put your hands into VR space.

HTC Vive is now available on general availability with a UK price of £689 (inc P&P).



### Daden VR Projects #3

#### - iCentrum Photosphere



iCentrum is a new innovation centre in Birmingham. To help the business development team market and sell space in the building we've created a mobile VR app for them which uses Photospheres to provide a 6 point tour of the building, and an additional information zone to provide background information.

The app is intended to be used by their sales team during a sales call, as a leave behind by getting the prospect to load it onto their own phone, and by the marketing team to advertise the building through digital marketing and also the mail-out of branded Google Cardboard headsets to key prospects.

The app is available on Google Play Store now (search icentrumvr), and will shortly be available for iOS devices.

As with all our mobile VR solutions you can still use the app in a single screen mode if you don't have a VR headset.

#### - Carding Mill Photosphere



As part of our Fieldscapes project we've used the same Photosphere approach to provide a tour of Carding Mill valley – and for comparison with the 3D model. On Play Store now and iOS to come.

There are of course blurred edges between the categories, for instance:

- Stereoscopic images/video give a better 3D effect, but still offer minimal agency
- 3D objects can be displayed or animated against a 2D photosphere background
- A 2D photosphere can be made of a hi-rez 3D rendering in order to reduce file size, but with a constraint of movement

In the future there may also be a case for the splitting out of the integrated category into “tethered” – which all the current consumer systems are (both by cable and computer) and untethered (or even wired/wireless and independent from any local computer).

## The Benefits

The benefits of using VR very much depend on the use case. The key benefits for now are likely to be:

- **Brand Identity/Awareness** - A lot of initial use of VR is going to be about brand identity – showing that you “get” new technology and can see how it can be applied within your sector.
- **Direct Sales** - For some sectors (e.g. real estate, architecture, manufacturing) there can be a very real and direct link between showing your customers your products in full 3D and getting increased sales, in some cases there and then.
- **Communicating Messages** - For others the power of immersion can help to get a message across (e.g. education, health, safety), and make that message far more memorable.
- **Organisational Learning** – Increasing your own organisations knowledge about the potential (and challenges) of VR in order to better prepare you for future developments.

And given that the investment can be comparable to video or more conventional 3D animation then there can be a clear argument for return on investment.

## Costs and Practicalities

So what does a VR project cost? All projects will have three key elements – the headset, the content and the application.

- **Headset** - In most cases the cost of headset may well be borne by the user, but we've seen some companies (e.g. New York Times) giving away branded Cardboard headsets (less the phone of course) – a reasonable move as they cost only about £7 in quantity and can be an ideal stand give-away. If

## Augmented Reality



The focus of this paper has been on virtual reality (VR), but we are also tracking what is going on in augmented reality (AR).

VR is about completely replacing what you see with a digital version, whereas AR is about letting you see the physical world but digitally changing some items in it. A typical example is shown above where the sheet of paper on the table has been replaced in the iPad screen by a 3D landscape model.

However the next generation of AR (typified by Microsoft's HoloLens, and Magic Leap) will go well beyond that. Like VR they use a headset, not a camera screen, but unlike VR the headset is clear, with the digital augmentation projected on to it.



The neatest trick though is that the digital image can now follow the physical world surfaces, so it really does seem to "be there" in the physical world.

HoloLens is only available to US developers at the moment, and we don't expect a consumer edition until 2017 at earliest. But the potential of this new AR, and of AR/VR hybrids, is fascinating.

you're buying your own integrated headsets then reckon on at least £500 each, plus the high spec PC to run them on.

- **Content** - The big factor here is 2D photosphere or 3D model. 2D photospheres using static images can be made using an ordinary camera or a dedicated 3D camera, and cost little more than an ordinary photoshoot. So maybe just a few thousand pounds. Moving to video can put the price way up, with dedicated camera units costing up to £40k or more, although they are available for hire. With 3D models the cost will be more than the photosphere, but they will allow more agency for the user, more interactivity, and give you greater flexibility to change the experience. Reckon on anywhere between a couple of thousand pounds for a few manufacturing type 3D models to £10k or more for extensive building models.
- **Application** - This is all about how the user chooses and interacts with the models, changes their viewpoint, moves around, interacts with objects and supporting information. We can also build in analytics so you can track what people do, what they look at and so on. Costs can be anywhere from £2k - 5k for a very simple app, to £40k or more for something very complex.

So in total you can be looking at anything from just £5-10k for a simple photosphere (or very simple 3D model) based VR app, to around £20k for something with a bit more content and interactivity with proper 3D models, to £50k - £100k for a very sophisticated and extensive VR experience.

## The Coming Years

So if that is the outlook for most of 2016, what's it looking like into 2017 and onwards? Realistically, we still think that Smartphone approaches will dominate into 2017. However for corporates that are interested in using VR for training, education and operational uses then that is an area where integrated headsets may begin to get a foothold. But for most consumers (except hardcore gamers) integrated devices will be just too expensive, whereas a simple smartphone headset will allow them to leverage their existing smartphone investment, and only needs an outlay of £10 – and so is ideal to view more incidental content.

Going beyond 2017 we're really looking for one of two things. Either a good reduction in integrated headset costs (to £100-£200), with performance well surpassing smartphones, and compelling content or social VR environments to match, or the arrival of a game changing piece of technology, possibly related to AR/VR integration (see sidebar), or maybe something that begins to get close to the holobands of science fiction.

## Glossary

3D Studio Max	A 3D design application
AR	Augmented Reality
Avatar	A visual representation of a user
Latency	The delay between making a physical action and seeing the image on the screen respond
LIDAR	A way of scanning an object to create a 3D model
Maya	A 3D design application
Photogrammetry	A way of making 3D models of objects from 2D photos
SketchUp	A 3D design application
Unity3D	A leading 3D game engine
VR	Virtual Reality

## Reading Deeper

If you'd like to read a bit more about Virtual Reality, its strengths and weaknesses then you might like to read another of our white papers - *Virtual Reality: for Training, Learning, Collaboration and Visualisation* - downloadable from our web site.

## Daden Solutions

Daden works almost exclusively in 3D environments, delivering projects ranging from training and education to marketing and data visualisation. Trainingscapes is our baseline 3D immersive learning environment, on top of which we can deliver a wide range of user experiences, both to PC/Mac and smartphone/tablet users and to VR users – so you can massively leverage your investment in an application for “ordinary” users whilst also making it available to VR users. In fact adding VR support to one of our “normal” projects probably only adds 10%-15% to the overall price.

Fieldsapes is a specific instance of Trainingscapes aimed at the exploration of, and learning within, open spaces and other geo-spatial areas.

As well as Trainingscapes we also have a set of frameworks for VR specific projects, both photosphere and 3D model based, which enables us to deliver sales, marketing and awareness virtual reality projects quickly, cheaply and safely.

For more information please contact us at [info@daden.co.uk](mailto:info@daden.co.uk).

## Who are We?

Daden Limited ([www.daden.co.uk](http://www.daden.co.uk)) is a 3D immersive environment and visualisation solution provider. We enable our clients to use innovative new technologies to deliver real business benefit, whether that is through more efficient and effective training and marketing, or using immersive visual analytics to make better decisions. We have been working with immersive worlds and artificial intelligence technologies for over 10 years, and our clients have included Government departments and agencies, city and local councils, educators and health providers and private sector organisations in the UK and abroad. We are based in Birmingham, England.

## **Next Steps**

If you can see how virtual reality could be used now to help to your business or organisation, would like a demo, or would just like to talk through the longer term potential in more detail then please contact us at:

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- DadenLimited on Facebook

We look forward to hearing from you....