VISUALIZATION EXPERIENCE

Theorem Solutions has invested significantly to understand how **Spatial Computing**, or '**XReality**' (**XR**) technology can be exploited today to bring real business benefits to product development and manufacturing businesses. We have created a suite of task-orientated '**Digital Realities Experiences**' that get the most from the XR toolset, embedded with a suite of targeted tools to deliver the greatest gain.

The Digital Realities Experiences, tightly integrated with Theorem's **Visualization Pipeline**, engage the problem of '**cognitive distance**', bringing engineers closer to their designs, while simultaneously addressing the realities of collaboration at a distance. Our device agnostic solutions maintain a razor sharp focus on the objective of improving the quality and productivity of engineering and manufacturing processes through enabling technologies.

> We believe that these technologies have now matured to a point where it is possible to blend digital assets into the physical world, dramatically increasing engineering value creation.

Engineers struggle daily to apply physical context to digital data. As Porter and Heppelmann noted in the December issue of the Harvard Business Review[1], "the rich data we now have to inform our decisions and actions remain trapped on 2D pages and screens". For around 30 years, larger product development organisations have been harnessing **Virtual Reality** (**VR**) to bring their engineers closer to their digital creations. However, commercial applications of VR, such as CAVES and Powerwalls, are extremely expensive, requires dedicated real-estate, and even specialist teams to manage the associated data management and preparation.

Spatial computing has been on a parallel, but accelerated path. The result has been a new generation of low cost, widely available 'consumer' technologies. Beginning with wearable VR technologies, spatial computing has evolved to include **Augmented Reality** (**AR**), and **Mixed Reality** (**MR**) solutions (see 'Digital Realities', right). To date exploitation has focused on gaming and retail applications. However, we believe that these technologies have now matured to a point where it is possible to blend digital assets into the physical world, dramatically increasing engineering value creation.

Theorem Solutions

Theorem Solutions Digital Realities
Closer | Better | Together

'Theorem Solutions provides enabling technologies for engineering and manufacturing businesses to improve their design, engineering and manufacturing processes, by utilising existing digital assets to collaborate within innovative Virtual, Augmented and Mixed Reality Experiences'. Our goal has been to produce a technology agnostic collaboration platform for businesses of all sizes.

The **Visualization Experience** is the foundational layer for the Digital Realities suite of experiences. Exploiting the power of 'consumer XR', the Visualization Experience empowers engineers to interact with data in a 3D spatial context, visualising their models at full scale. In Virtual Reality engineers can view their models at full size in a virtual context (scene), potentially simulating an environment that is not readily accessible, or doesn't exist physically yet. In Augmented Reality a view of the natural world is overlaid with a layer of digital content. In Mixed Reality engineers can view a projection of their digital models at full size in the real world, which gives true spatial context to the model. Mixed Reality can instantly highlight any interfere with physical objects (such as factory infrastructure).

The Visualization Experience provides the essential tools to view, navigate, explode, section, and measure, in addition to interrogating materials and other information (including data pulled from external databases).

However, today's products are rarely developed with the luxury of co-located teams. The reality often involves collaboration across international borders. Globally distributed engineering is practically unavoidable, and this will increasingly place a challenge on effective collaboration between engineering teams. Exceeding the capabilities of significantly more expensive commercial VR solutions, the Visualization Experience has been developed with the goal of bringing globally distributed teams closer together. With the built-in collaboration functionality, the spatial context can be applied to the demonstration of a new idea to a colleague, or it can enable complete teams to come together to address a problem that would be tough to explain out-of-context. With AR and MR, teams in the same room will see each other through their devices.
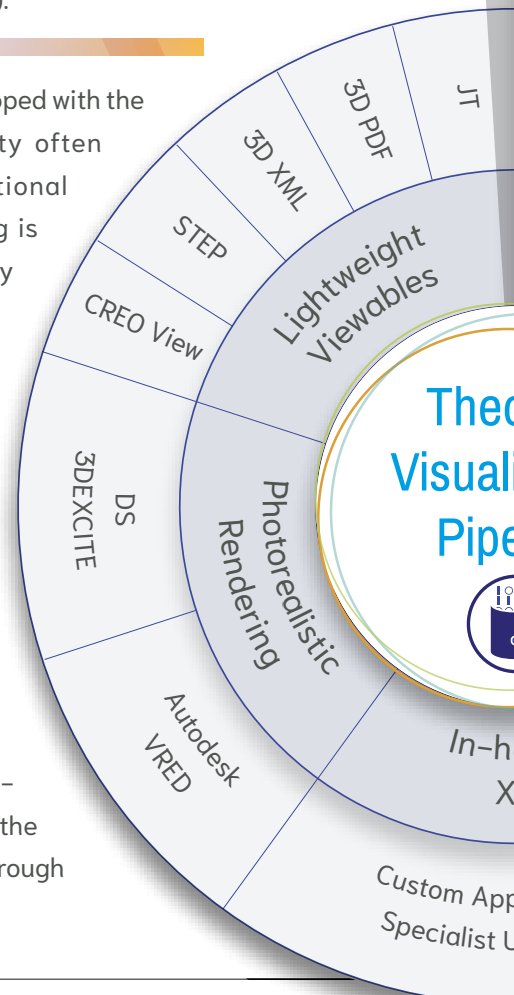
However, using any XR technology, distributed team members can also be 'present' in the room, represented by a virtual avatar that moves as they do, and mimics their gestures – it's a close as currently possible to having them physically present in the room.

Out-of-the-box

The Visualization Experience provides an entry point to the Digital Realities suite of XR–based experiences, and it provides users with the ability to quickly access and interact with assembly and component data to better understand the details and complexities of their models – The out–of–the–box Visualization Experience is available across all devices.

A Real Competitive Advantage

Our world that is experiencing change at an unprecedented pace; Manufacturers must respond to demands for greater choice, increased personalisation, and superior performance. This is a competitive landscape, resulting in more products, bought to market faster than ever before, in an increasingly end–to–end digital lifecycle.

Digital Realities Suite

Design Review Experience

Production Layout Experience

Production Build Experience

Visualization Experience

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Commercial Virtual Reality

Power Wall

CAVE

...ouse ...R

...lications by ...User Groups

We believe that closing the gap between the digital and physical world, and bringing distributed teams closer together presents an opportunity to exploit the power of digital product development and digital manufacturing as a competitive advantage.

DIGITAL REALITIES

Digital Realities is a suite of client/server based applications that streamline the delivery and interactive manipulation of 3D CAD and PLM data on Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) devices.

VR
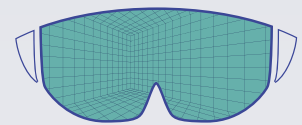
VR places the user into an entirely simulated (computer generated) environment, by standing in a CAVE or using a headset (e.g. HTC Vive). It entirely occludes the user's natural surroundings.

AR

CHURCH LANE

AR presents a view of the natural world overlaid with a layer of digital content. The can be viewed through the screen of a smartphone or tablet (e.g. Apple's ARKit), or limited information presented using a helmet device (e.g. Google Glass).

MR
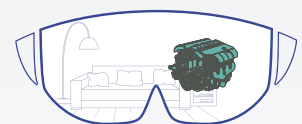
MR places a holographic projection of digital data into, and in some cases responsive to, the physical world (e.g. Microsoft HoloLens, or Magic Leap). An MR head mounted 'visor' is clear, providing a comfortable view of the natural world (rather than viewing through a device screen).

About Theorem Solutions

Theorem Solutions have been helping engineering and manufacturing users leverage the value of their CAD and PLM assets for over 25 years. We help the world's leading Automotive, Aerospace, Defense, Power Generation, Transportation, and White Goods manufacturers and their end–to–end value chains to optimize the use of their Digital assets. Our solutions enable product development and manufacturing businesses to compress design and manufacturing lifecycles, whilst improving product quality. Our core strength is in the visualization and utilization of data across complex organizations to maximize efficiency.

Theorem Solutions offers a consultative approach to help customers get the most from technology. We advise on optimum use cases, deployment strategy, and custom development as required to maximize the Return on Investment.

UK, Europe, Asia Pacific Regions
+44 (0)1827 305350
sales@theorem.com

US and the Americas
+1 (513) 576 1100
sales–usa@theorem.com

www.theorem.com