DIGITAL REALITIES SUITE

We live in a world that is experiencing change at an unprecedented pace; a world that is demanding greater choice, increased personalisation, and superior performance. Manufacturers are responding with more products, bringing them to market faster than ever before, and pursuing every opportunity to gain a competitive advantage. Product development, validation and industrialization has become an end-to-end digital lifecycle. However, there is a fundamental disconnect between the wealth of digital data available to product and manufacturing engineers, and the physical world in which we are attempting to apply it.

Engineers struggle daily to apply physical context to digital data. As Porter and Heppelmann noted in the December issue of the Harvard Business Review, “the rich data we now have to inform our decisions and actions remain trapped on 2D pages and screens”. Advances in computer aided engineering have helped to accelerate development, and to remove some costly physical prototyping. Ironically however, the digital development process is arguably increasing the gap between engineers and their creations. Psychologists refer to this gap as ‘cognitive distance’. This is both inefficient and introduces the risk of quality related problems downstream.

Today products are rarely developed with the luxury of co-located teams. The reality often involves collaboration across international borders. Driven by skills shortages in traditional markets, developers are accessing skills further afield. Similarly, engineering is moving from in-house and supply chain sources, towards partnerships with Engineering Services Providers (ESPs). Globally distributed engineering is practically unavoidable, and this will increasingly place a challenge on effective collaboration between engineering teams.

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.

Placing information in context, reduces cognitive distance and therefore minimises cognitive load.
Harnessing Technology to Close ‘Cognitive Distance’, and Improve Collaboration

For around 30 years, larger product development organisations have been harnessing Virtual Reality (VR) to bring their engineers closer to their digital creations. Virtual Reality (VR) is an interactive computer-generated experience taking place within an entirely simulated environment, incorporating auditory and visual feedback, but can also include other types of sensory feedback like haptic. In a literal sense, VR can make it possible to ‘experience’ anything, anywhere, anytime. It is the most immersive type of reality technology. However, commercial VR, such as CAVES and Powerwalls, is extremely expensive, requires dedicated real-estate, and specialist teams to manage the associated data management and preparation.

On a parallel path, a new generation of low cost, widely available ‘spatial computing’ or ‘XReality’ (XR) technologies have been emerging. Spatial computing, beginning with wearable VR technologies, has evolved to include Augmented Reality (AR), and Mixed Reality (MR) solutions (see side bar). 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.

The solution begins with a technology agnostic ‘Visualization Pipeline’ at the core of immersive, contextual and spatially relevant XR collaborative workspaces. The Visualization Pipeline is a server-based technology that enables fast, efficient, flexible, and automated processing of CAD and visualization data, while maintaining the associated metadata. It has been designed to optimize the output for all visualization workflows, supporting and improving any existing Commercial VR or photorealistic rendering processes. Our goal has been to produce a technology agnostic collaboration platform for businesses of all sizes.

Theorem Solutions has invested significantly to understand how XR technology can be exploited today to bring real business benefits to product development and manufacturing businesses.
We have created four 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:

1. **Visualization Experience** – provides individual or collaborative viewing and interaction with 3D models at full scale.

2. **Design Review Experience** – adds additional functionality for interactive design review and analysis.

3. **Production Layout Experience** – adds additional functionality to support the effective development of production line or factory layouts.

4. **Production Build Experience** – adds additional functionality to create interactive, immersive training for production operatives.

The Digital Realities Experiences, tightly integrated with the core 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 and methodologies maintain a razor sharp focus on the objective of improving the quality and productivity of engineering and manufacturing processes through enabling task-orientated XR experiences. Digital Realities also hails the beginning of the next frontier of collaboration by bringing together globally distributed teams in a manner that has not been possible until now.

Digital Realities embrace the latest advances in spatial computing technology to provide unique collaborative workspaces designed to bridge the barriers of cognitive and geographical gaps.
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.