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India SMART UTILITY Week 2025

Session : Workshop on Immersive Technologies: AR/VR,Digital Twins,Drones & Assisted Reality for Enhanced Operations & Efficiency

Revolutionizing Utilities with AR & VR: Enabling Smart, Secure, and Sustainable Operations

Presented By

Bhagyesh Patel, Technical Director, Khodiyar CAD Center



isuw@isuw.in



www.isuw.in



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Khodiyar CAD Center

- 22+ years of transforming ideas into reality.
- Providing **end-to-end engineering services and expert consultations** across industries.

Khodiyar Infotech

- **Official Sales Partner** for leading design and engineering software.

Our Expertise Includes:

- 2D Drafting, 3D Modeling, BIM, AR/VR Simulations and Reverse Engineering.

Our Mission:

- Empowering industries to **optimize workflows, enhance workforce efficiency, and drive innovation.**



- **Training & Simulation – Substation Safety Procedure**

In the utility sector, **safety is paramount**, especially when dealing with high-voltage equipment in substations. Traditional training methods often fall short in providing hands-on experience without exposing trainees to real dangers.

This is where Virtual Reality (VR) steps in as a game-changer. **VR training allows utility workers to immerse themselves in realistic simulations of substation environments**, where they can practice critical safety procedures such as donning Personal Protective Equipment (PPE), performing rack out operations, and executing Lockout/Tagout (LOTO) procedures, **all from the safety of a virtual setting.**



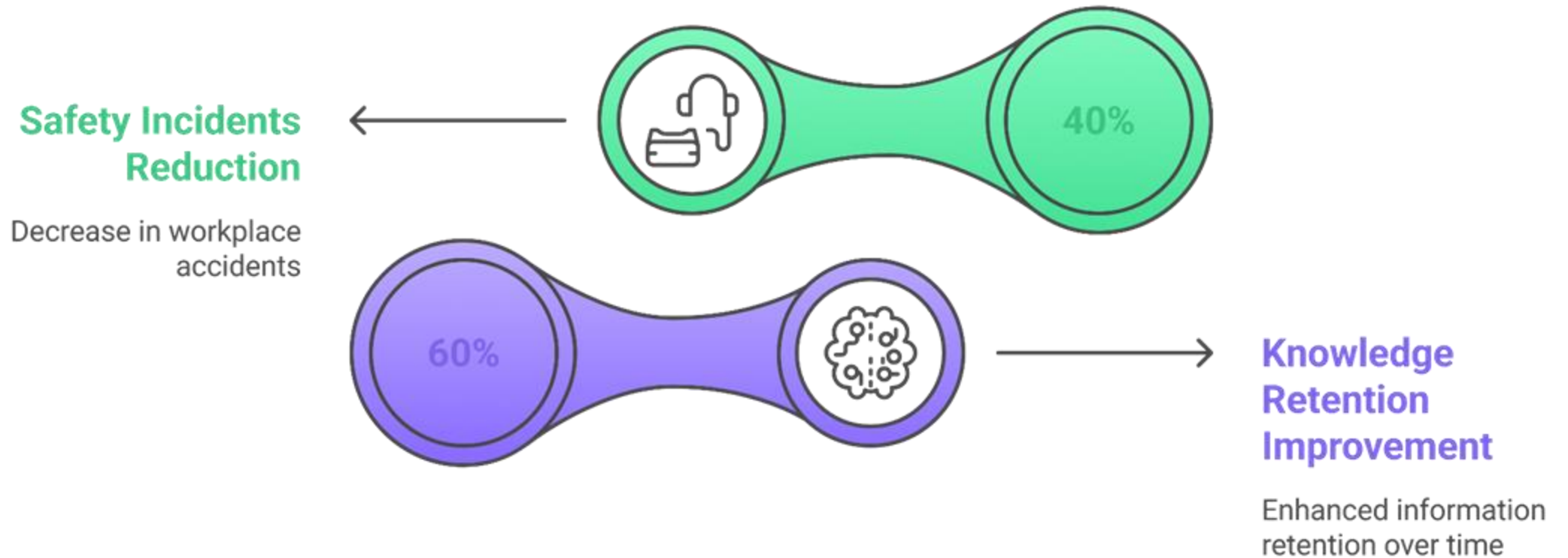




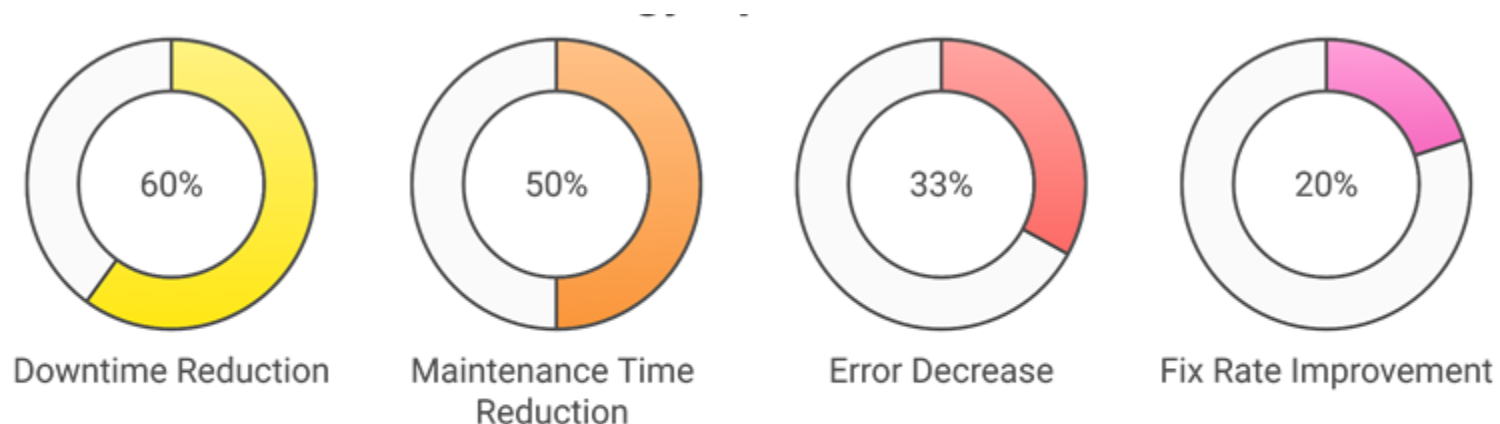


- Training & Simulation – Substation Safety Procedure

Impact of VR Training on Safety and Retention



- Augmented Reality (AR) is revolutionizing maintenance and troubleshooting in the field. For example, **A Leading Energy Company** has successfully implemented AR to streamline their maintenance processes. By overlaying digital information onto the physical world, technicians can quickly identify areas that need attention, access all necessary service documentation directly on their devices, and even connect with remote experts for immediate guidance.



Adoption and Use Cases:

VR is used for site reviews in the design and planning phase of utility projects, particularly for infrastructure like substations and power plants. Key applications include:

- Design review to identify issues early, such as equipment placement errors, as seen in the Smithsonian Institution's use of VR for capital improvement projects.
- Real-time collaboration among stakeholders to enhance coordination and reduce errors, as noted in *VR Design And Review*
- The Smithsonian saved several thousands of dollars in travel costs for Panamanian researchers and avoided costly change orders during the National Air and Space Museum design review, as mentioned in *Virtual Reality for Planning, Design, and Construction*





- **Adoption and Use Cases:** AR is utilized in smart grid management for fault detection and troubleshooting, leveraging technologies like Andy 3D platform, which combines AR, AI, ML, and 5G for remote troubleshooting. Operators wearing AR smart glasses, such as Microsoft HoloLens, can connect with remote experts for real-time fault resolution.
- **Benefits and Industry Insights:** AR enhances real-time monitoring of IoT-based smart grids, facilitating efficient fault detection and troubleshooting, reducing downtime, and improving grid reliability, as noted in *Leveraging Augmented Reality for Real-Time Cable Installation and Maintenance* Day of Dubai.



Digital Twin Visualization:

Real-World Example: National Grid (UK)

Challenge:

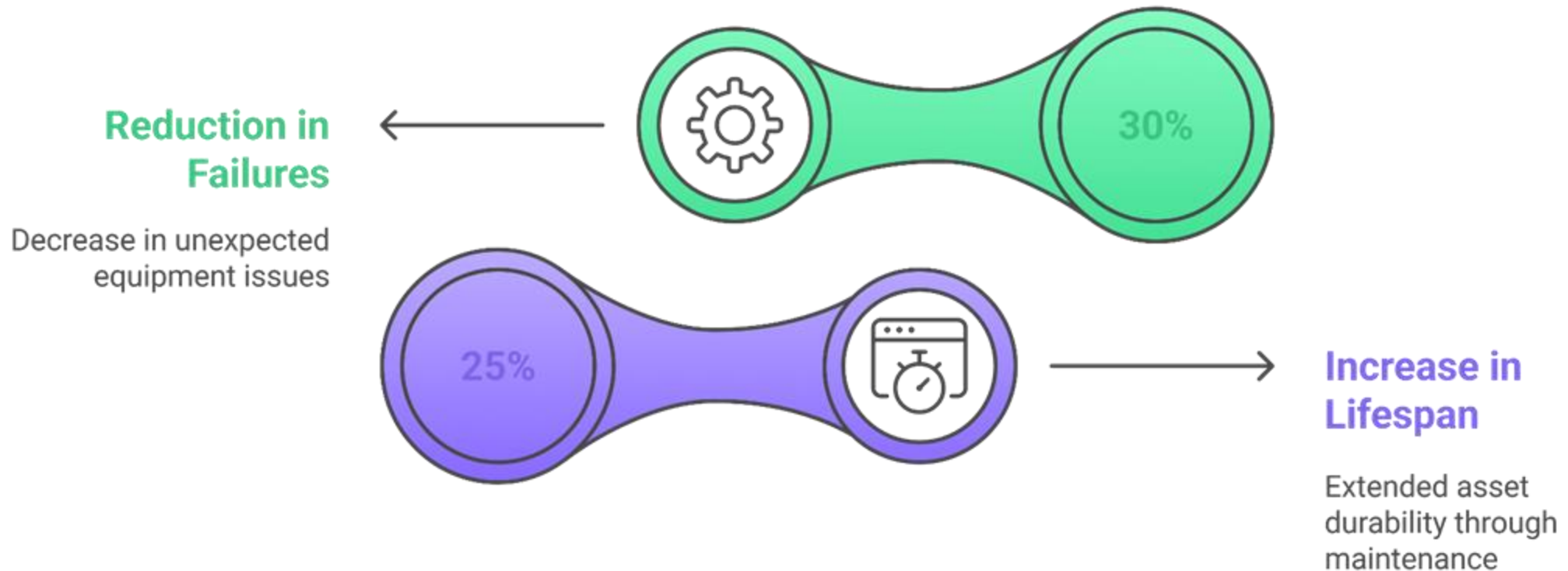
- Difficulty monitoring high-voltage substations and critical assets spread over vast geographic areas.
- **AI + VR** for anomaly detection and grid simulation.
- High operational risk due to asset failures and manual inspections.

Digital Twin + VR Integration:

- Substation assets were replicated in a digital twin.
- VR was used to allow remote operators to visualize equipment health, simulate operational scenarios, and test predictive models.



Impact of Implementing Digital Twin + VR Integration





- VR is used for emergency response training in hazardous situations within utilities, particularly for tasks like utility location in high-traffic areas. Companies like SRP use VR to simulate real-world hazards, as detailed in *Utility Training in VR* Motive.io, allowing workers to practice procedures without risk.
- **Benefits and Industry Insights:** VR training enhances situational awareness and responsiveness, significantly reducing workplace injuries and ensuring preparedness for emergencies, with studies proving better learning retention and real-world experience without risk

Adoption and Use Cases:

- AR is used to help consumers visualize and understand their energy usage, encouraging efficient consumption habits. A study showed participants using AR reduced energy use by 19.63% for air conditioners, 44.7% for humidifiers, and 25.86% for bulbs, without compromising indoor environmental quality.

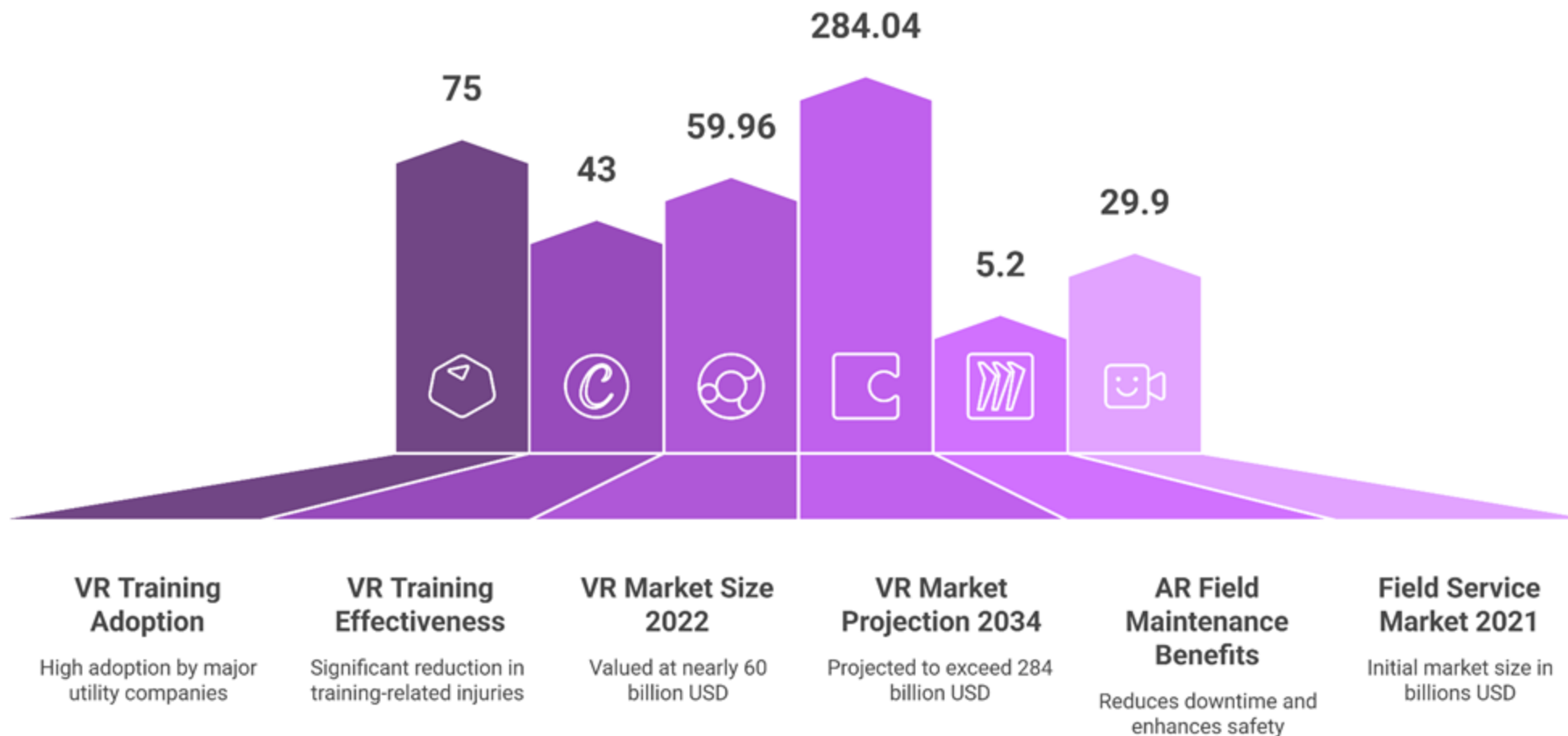
Benefits and Industry Insights:

- AR visualization positively perceived by users, with frequent checks leading to greater reductions, enhancing consumer engagement and energy savings, as noted in the study.

Market and Adoption Rates:

- The AR market growth, as previously mentioned, supports its use in consumer engagement, with specific applications in utilities gaining traction due to sustainability goals.

Key Statistics of VR and AR in Utility Sector



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THANK YOU

For discussions/suggestions/queries email: isuw@isuw.in

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Links/References (If any)