



CASE STUDY

Digital twins for the cities of Riyadh
and Sedra



TILT LABS
A PRODUCT REALIZATION COMPANY



EXECUTIVE SUMMARY

This case study delves into the development of digital twins for the cities of Riyadh and Sedra in Saudi Arabia. Leveraging Unreal Engine, Blackshark.ai, QGIS, and other tools, these digital twins provide immersive 3D visualizations of urban data to enhance urban planning and design processes. Despite challenges in data integration, file size management, and performance optimization, the digital twins have proven instrumental in guiding data-driven decision-making.





PROJECT CHALLENGES



Integrating Diverse Datasets

Consolidating urban data from various sources into standardized formats posed a significant challenge.



Managing Large File Sizes

Highly detailed 3D models resulted in large project files that were difficult to share and manipulate efficiently.



Optimizing Performance

Ensuring smooth operation on varying hardware configurations despite the visual complexity of the digital twins.



Creating Accessible Visualizations

Developing intuitive representations to meet the diverse needs of urban planners and designers.





GOALS & OBJECTIVES

- Develop interactive digital twins of Riyadh and Sedra using Unreal Engine to enhance urban planning and design processes.
- Incorporate urban data layers, including demographics, land use, transportation, etc., for comprehensive analysis and visualization.
- Enable analysis and visualization of data at block, district, and city scales to facilitate informed decision making.
- Provide user experiences tailored to urban planners and designers, ensuring usability and clear data representation.
- Leverage digital twins to gain valuable insights into urban dynamics and guide data-driven decision making for city improvement.





SOLUTIONS & METHODOLOGY

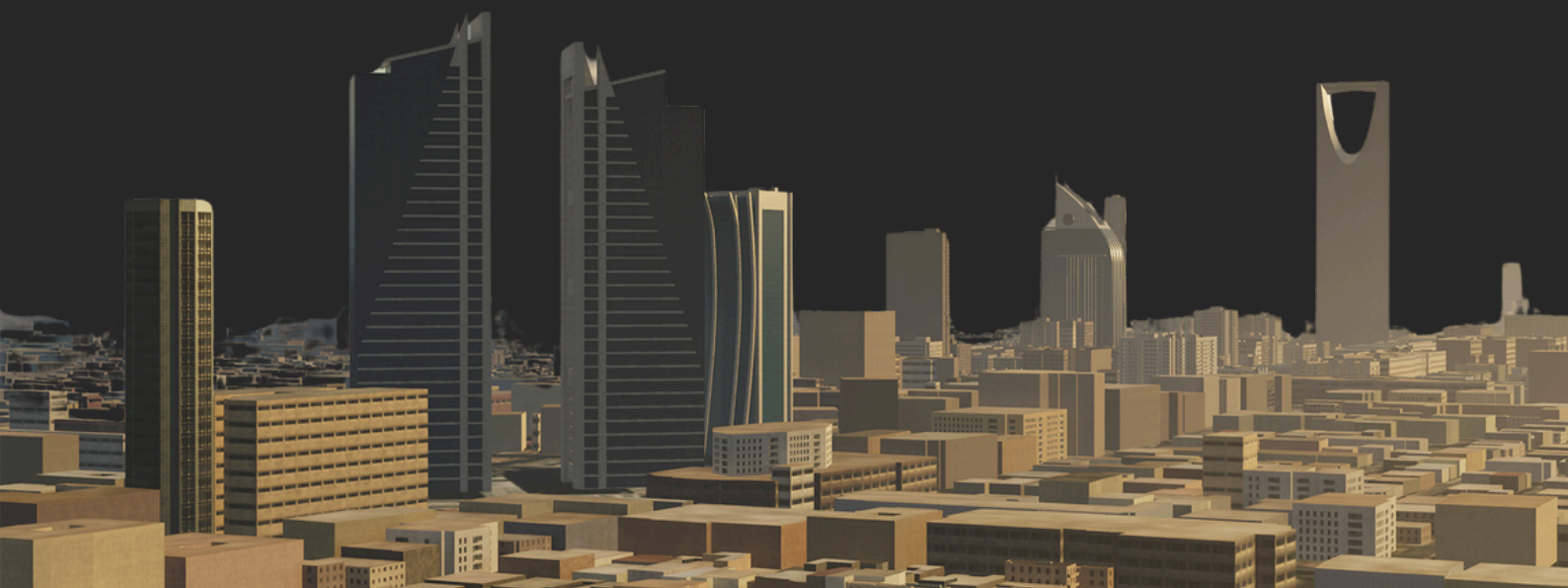
- Consolidated datasets into standardized GIS formats for seamless integration.
- Developed modular systems for swapping map areas and levels of detail (LODs) to optimize performance.
- Optimized rendering and memory usage to ensure smooth performance on various hardware configurations.
- Created UI mockups focused on usability and clear data representation to meet end user needs.
- Built custom tools in Unreal Engine's Blueprint for interactive data analysis and visualization.





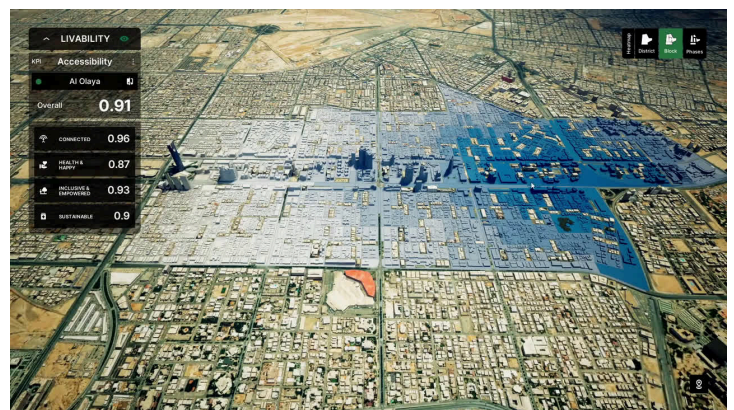
PROJECT EXECUTION

- Received base Unreal Engine projects and config files from Blackshark.ai.
- Integrated geojson datasets into the projects and developed data visualization UI.
- Created Blueprint tools for camera control and data filtering/analysis to enhance interactivity.
- Optimized projects to maintain performance with large city scales and complex visualizations.
- Developed Sedra and Riyadh apps with tailored feature sets and user interfaces to meet specific project requirements.
- Delivered executables optimized to run on high-end consumer PCs for enhanced user experience.

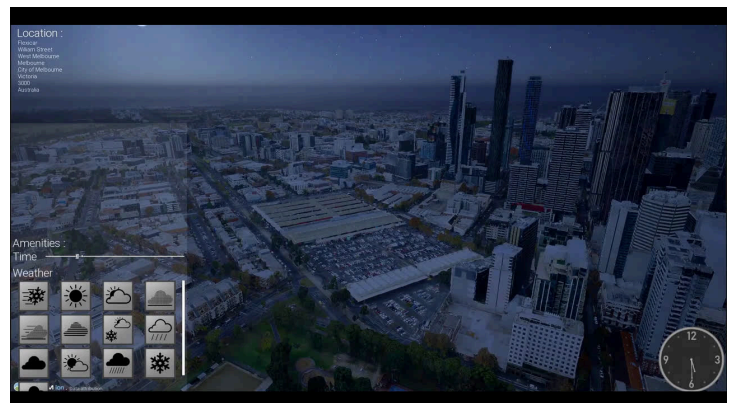


OUTCOMES & RESULTS

- Interactive digital twins with integrated urban data layers offering comprehensive analysis and visualization capabilities.
- Smooth performance capable of visualizing entire city extents, facilitating informed decision making.
- Intuitive data representation and analysis tools tailored to the diverse needs of urban planners and designers.
- Valuable insights into urban dynamics at varying geospatial scales, guiding data-driven planning and design decisions.
- Empowerment of urban planners and designers through the transformative potential of interactive digital twins with integrated datasets.



[Sample Video Link](#)



[Sample Video Link](#)



CONCLUSION

The Riyadh and Sedra, digital twin projects have successfully delivered immersive urban-scale environments integrated with interactive data analysis features. Despite challenges with data integration, file size management, and performance optimization, these digital twins provide urban planners and designers with impactful capabilities for understanding and improving their cities. The project exemplifies the transformative potential of interactive digital twins with integrated datasets for city-scale decision making, paving the way for more informed and data-driven urban planning and design processes.



THANK YOU!



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