



Decision-making Framework to Support the End-of-Life Management of High- Activity Radioactive Sources

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Changing the World's Energy Future

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Xingyue Yang

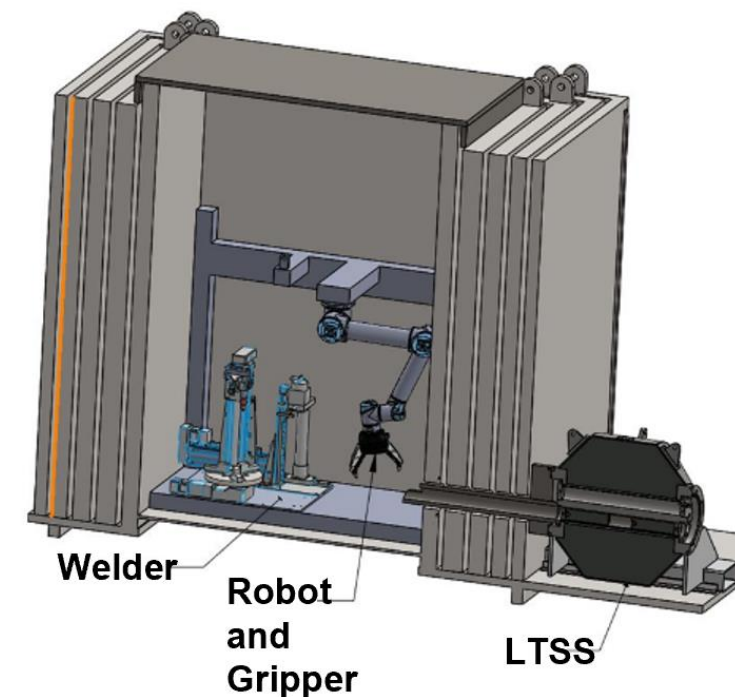
Visualization Researcher

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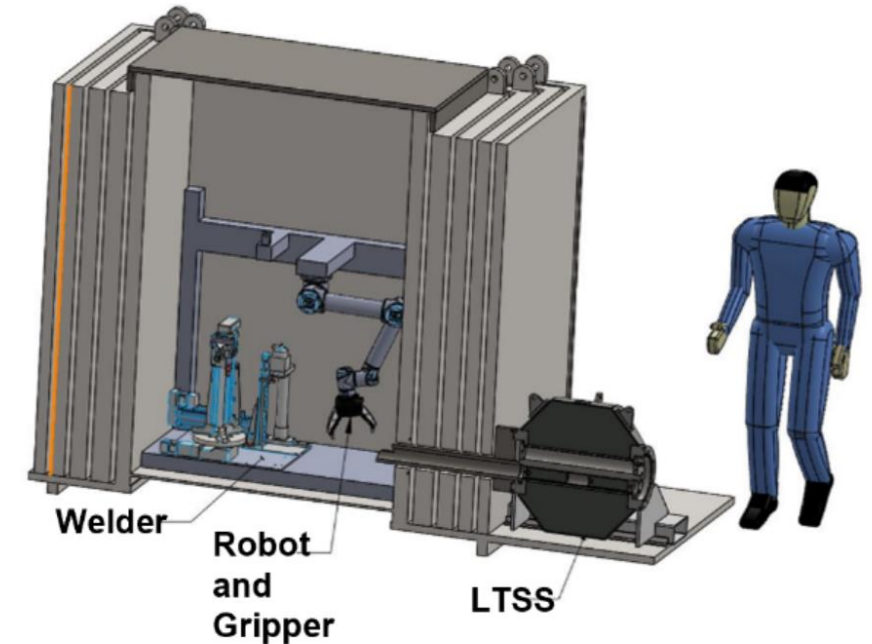
Background

- Radioactive waste can be generated from various facilities in different forms (i.e., solid, liquid, gas, or sealed)
- Proper management of sealed radioactive sources after they have reached the end-of-life (EOL) remains a global challenge
- The International Atomic Energy Association (IAEA) proposed using a mobile system – Mobile Hot Cell – for the conditioning and proper management of high radioactive sources



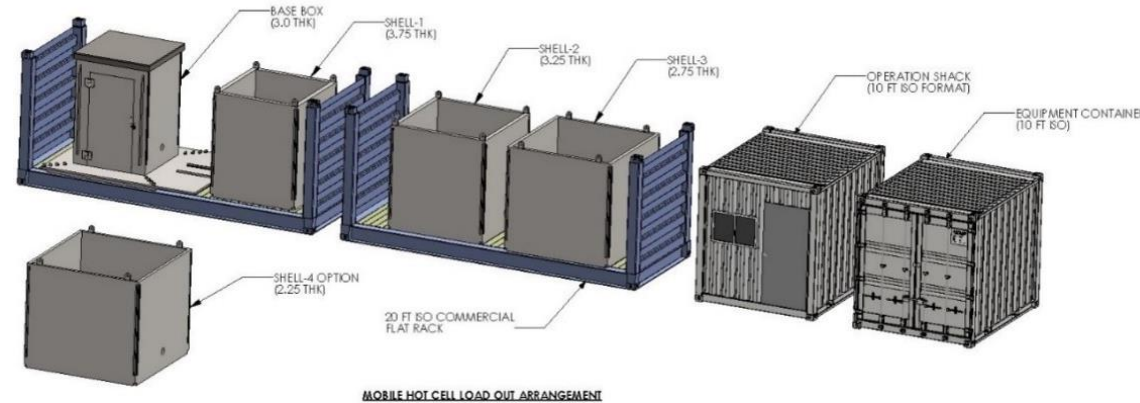
Background

- Mobile Hot Cell for radioactive sources recovery
 - Handle sealed types of spent high activity radioactive sources (SHARS)
 - Maintain spend sources at low radiation levels
 - Employ various manipulation capabilities
 - Protect operators from excess doses of radiation

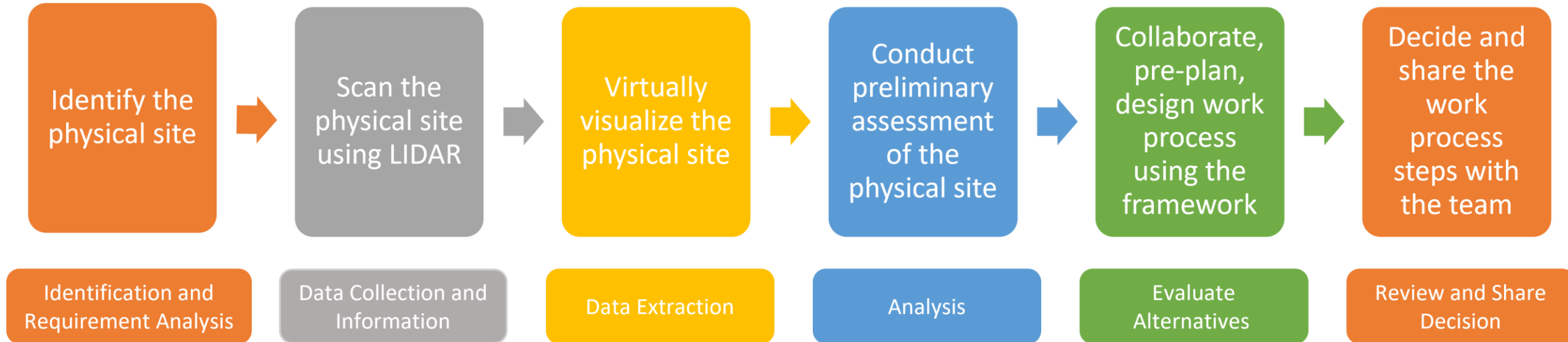


Challenges

- Source recovery process is tedious, uncertain, and time-consuming.
- One critical challenge encountered by source recovery teams is finding adequate space—as well as access to that space—to complete the staging and recapture process by using a MHC.
- No tool currently exists that can serve as an effective medium for making plans, or for informing, educating, and communicating

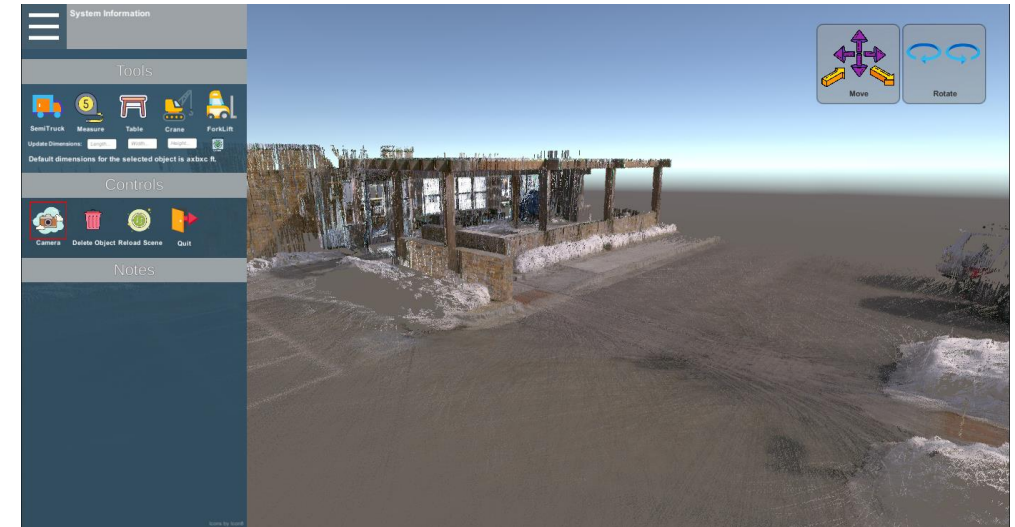


Decision-making Framework

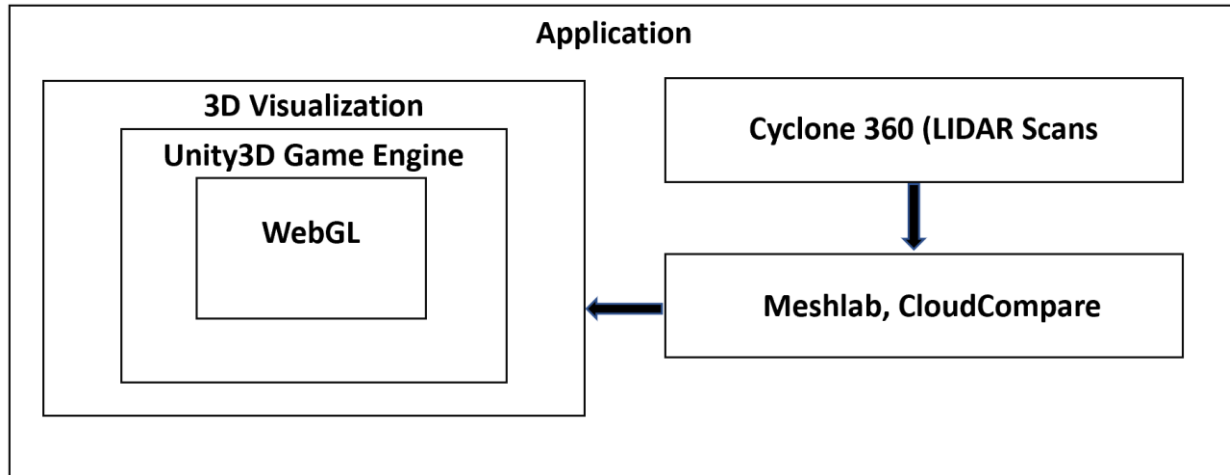


Solution

- A novel approach to planning and managing the deployment of MHCs at different sites that rely on such technology.
- This planning tool will support MHCs to be more efficiently and reliably set up and used for source recovery purposes by promoting
 - Collaboration
 - Information sharing
 - Decision-making

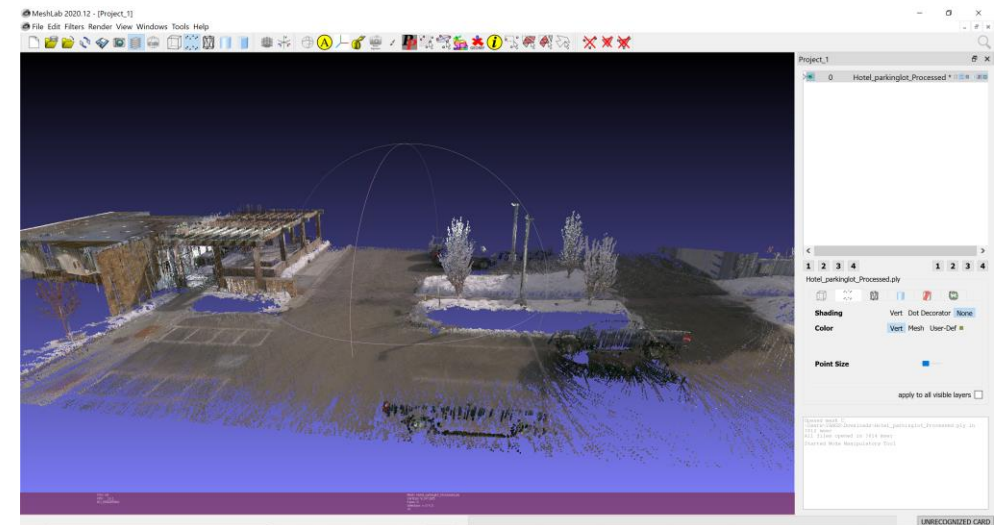


Framework and User Interface



LiDAR Scans and Data Preprocessing

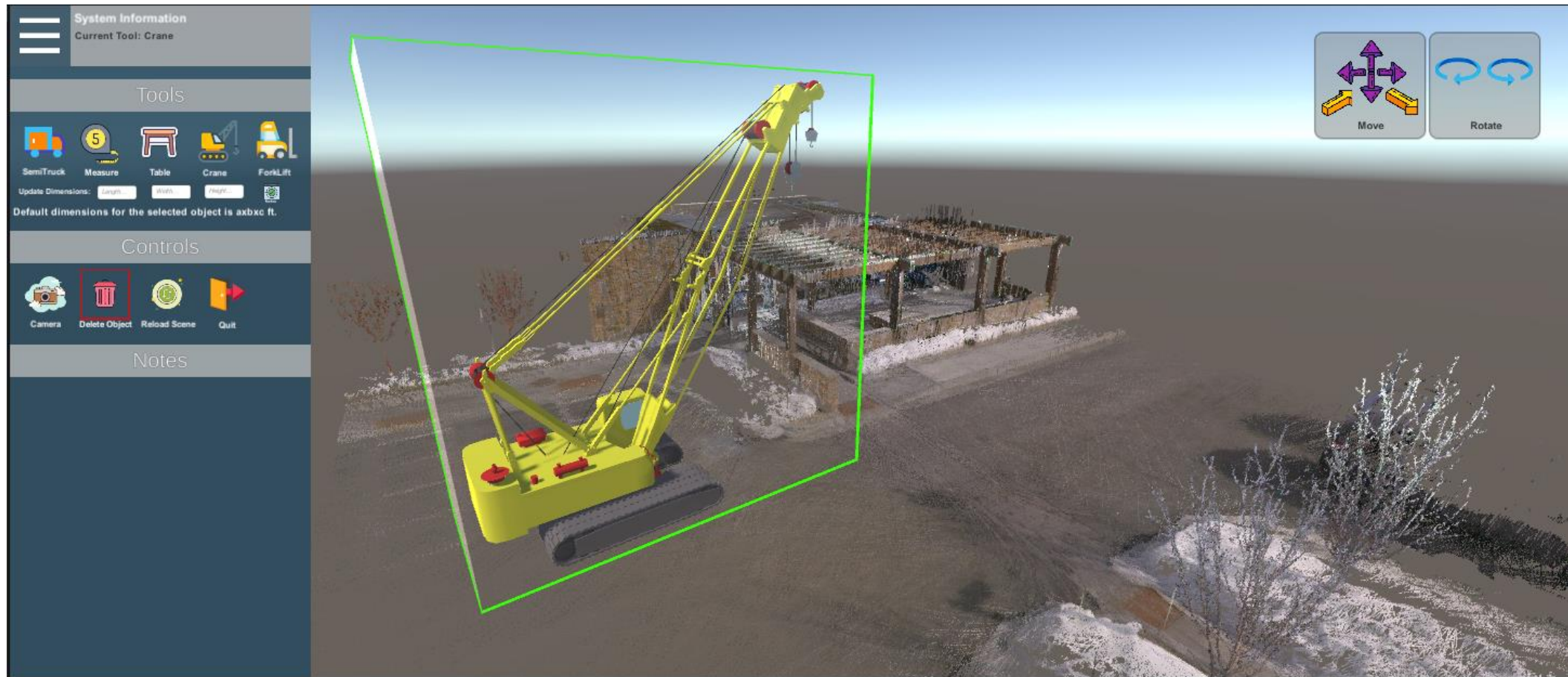
- LiDAR scans
 - Leica BLK2GO scanner
 - Cyclone Register 360 software
- Data preprocessing
 - Point cloud dataset with vertex render
 - Point cloud simplification
 - Reduce noise, errors and inconsistencies
 - Potree renderer



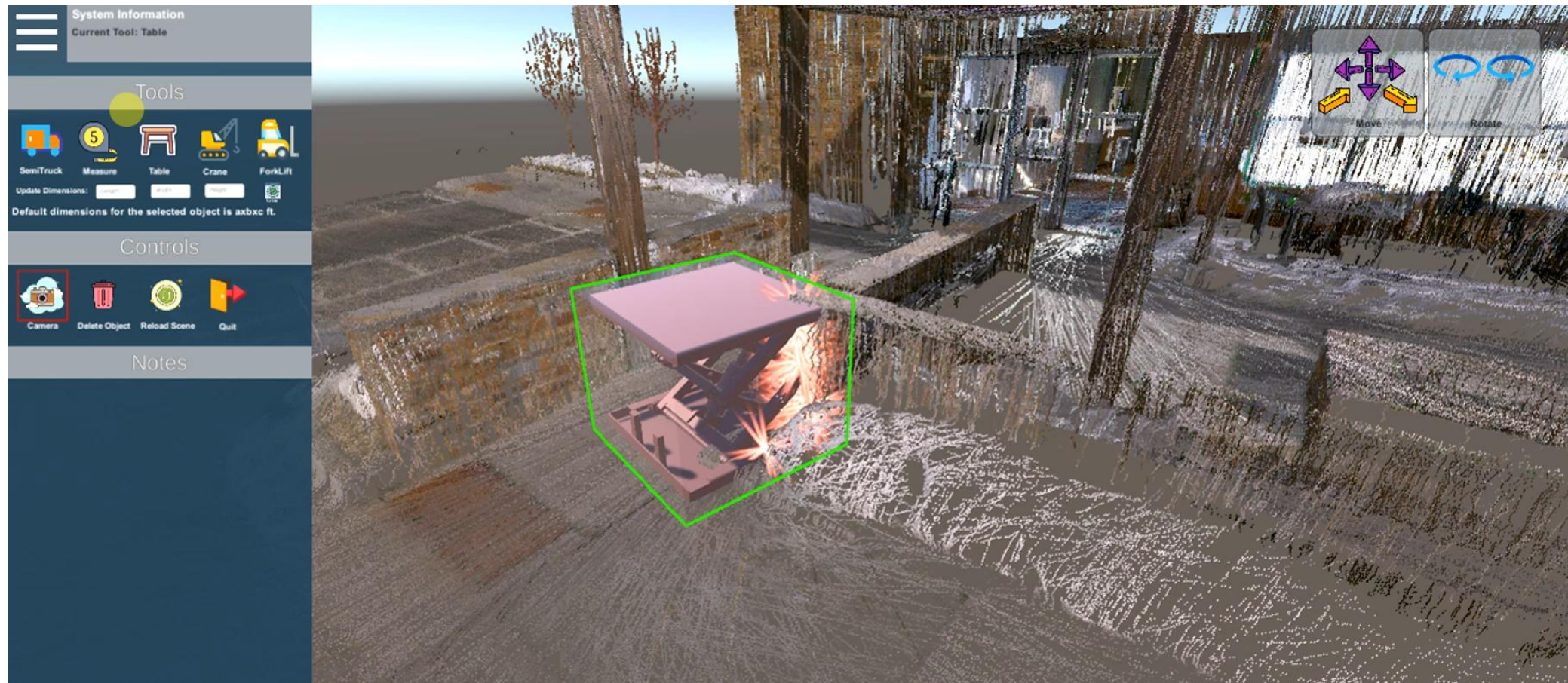
User Interactions – Measurement and Navigation



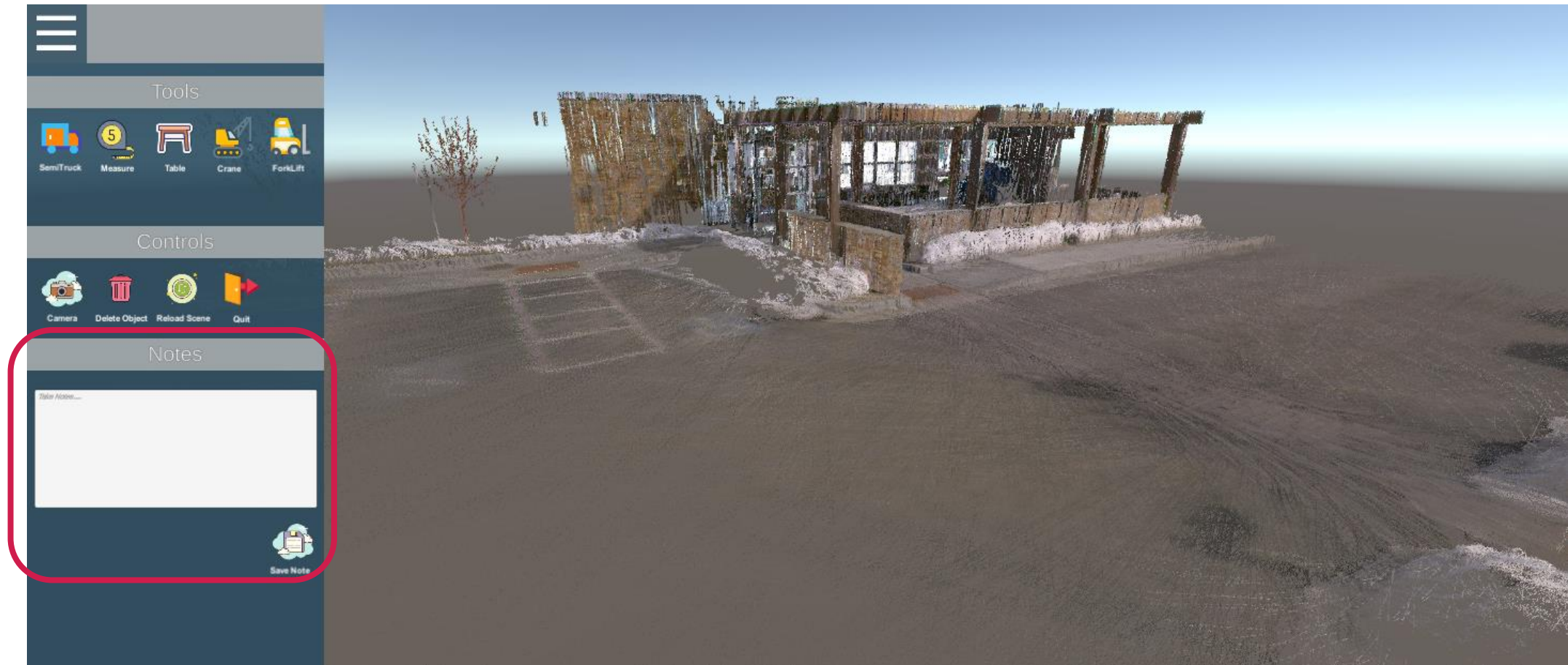
User Interactions – Virtual Objects and Dimensions



User Interactions – Collision Detection



User Interactions – Notes



Demonstration

Loading the environment...

Conclusion

- We presented this novel framework for virtually conducting preliminary assessments of physical sites in order to evaluate a given area and decide what actions are necessary to store and transport sealed sources safely and reliably.
- This novel framework bridges the technological gap and meets the challenges that currently exist in conducting preliminary assessments and making EOL-management-related decisions in a trustworthy, reliable, and risk-reduced fashion.
- This framework will support informed decision making, speed up pre-planning activities, maximize the utilization of resources, reduce human errors, and foster increased reliability.



Acknowledgement

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THANK YOU



Idaho National Laboratory

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