PAS
QUICKNOTES

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Reality Capture for Planning

Reality capture technology is transforming how planners document and visualize the built environment. These technologies leverage a combination of data and images from cameras and drones to create 3D models of sites and communities. Reality capture allows planners to efficiently collect data, assess potential impacts, and create visually compelling materials. It can facilitate clearer communication with diverse stakeholders and provide accurate modeling of the built environment to better inform planning, design, and construction decisions.

Reality capture technologies use drone imagery and other data to quickly and cost-effectively create visualizations of the built environment. Image courtesy of VHB.

BACKGROUND

Reality capture technologies, such as laser scanning, lidar (light detection and ranging), drone footage, photogrammetry, and 3D modeling, collect detailed spatial and visual data to create highly accurate representations of real-world environments. Laser scanning and lidar measure distances and dimensions using light pulses, creating point clouds that are processed into 3D models. Photogrammetry and drone footage methods use high-resolution imagery, analyzing overlapping photos using a combination of computer vision and classification algorithms to create spatial geometry.

These processes allow planners to effectively and efficiently create digital twins of natural and built environments, enabling data-informed planning and design, scenario exploration, and visualization to support decision-making. Importantly, this technology has become increasingly user-friendly and affordable, enabling planners and communities to use consumer-grade drones, smartphones, and accessible software to engage in high-quality data collection and analysis.

APPLICATIONS FOR PLANNERS

Reality capture offers many possible applications to help planners do their jobs more effectively and efficiently, including the following:

- **Streamlining project design, construction monitoring, and operations**. Integrating reality capture into project design and construction workflows can significantly improve project timelines, cost control, and stakeholder collaboration. During the design process, planners and architects can use reality capture to create 3D models of existing site conditions; they can then use these models to refine proposals, ensuring that designs align with physical constraints and community needs. During construction, planners can use drones or laser scanning to identify discrepancies, track progress, and mitigate risks. Once a project is operational, this data becomes invaluable for facilities management and ongoing maintenance, ensuring long-term efficiency and reducing costs.
- **Climate resilience and environmental planning**. Accurate scans of the built environment can enhance climate resiliency and adaptation planning. Reality capture provides planners with detailed site-specific data that can be used to digitize assets and environments and assess risks such as flooding, urban heat islands, and stormwater runoff. These insights are vital for creating climate-resilient infrastructure and ensuring that planning efforts reduce environmental impacts.
- **Historic preservation and cultural equity**. Through digitizing historic structures, landmarks, and landscapes, preservationists can capture the present and its history. This can help planners document and digitally preserve culturally significant sites, an important part of ensuring that diverse histories and community identities are preserved as places continue to change over time.
- **Infrastructure and transportation planning**. Reality capture aids in evaluating infrastructure systems, including transportation networks, utilities, and public spaces. Its detailed and accurate representation of existing assets enables planners to prioritize maintenance, guide upgrades, and make more informed decisions that address immediate needs and long-term growth.

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- **Affordable housing development**. Reality capture tools can help planners visualize how affordable housing developments will fit into existing communities, assess potential constraints, and engage stakeholders early in the planning process to address concerns. This ensures that affordable housing development is efficient, sustainable, and context sensitive, optimizing efforts to address the country's housing crisis.
- **Community engagement**. Planners can use reality capture scans to create traditional or interactive visualizations that enhance public participation by transforming complex technical details into accessible, visual content. Whether used in public meetings or digital outreach, 3D models and high-quality visualizations help all community members understand proposed developments, regardless of their technical backgrounds.

By making digitalization and 3D representation of buildings, infrastructure, and landscapes a more efficient and cost-effective process, reality capture can support and transform local planning and decision-making.

REALITY CAPTURE FOR COMMUNITY CO-CREATION

New consumer-grade applications, such as Polycam, now allow users to scan and create 3D models of key areas and assets using smartphones, drones, or other easily accessible tools. With such applications, community members can use their devices to document streetscapes, landmarks, or natural features and upload the data to platforms that process it into usable 3D models.

This approach reflects the principles of community co-creation, a collaborative method empowering stakeholders to act as co-designers and co-initiators of urban environments. Co-creation emphasizes inclusivity and shared ownership of planning outcomes, ensuring the process draws on local creativity and knowledge to address urban challenges effectively.

Paired with 3D-modeling software, such grassroots input allows for more detailed, collaborative urban models that reflect real community needs and priorities. Importantly, this approach supports a shift from top-down to bottom-up grassroots planning processes, enabling better co-creation of solutions.

CONSIDERATIONS FOR PRACTICE

When adopting reality capture tools, planners must account for the costs of acquiring and maintaining the technology, as well as ongoing training or hiring of consultants to ensure optimal outcomes. Different approaches for data collection also result in different accuracies. A drone aerial survey may not have the accuracy to satisfy the needs of a professional survey, while a terrestrial scan may provide more precision than needed for visualization purposes, so planners should choose tools that best meet the needs of the project. Scans often require processing and cleaning before they reach their full potential, so working with a reality capture or surveying professional can greatly improve the process. Data privacy is another critical consideration, particularly when collecting information from public spaces or sensitive areas. Planners should establish clear guidelines for managing data to ensure that it is stored and shared responsibly, especially in the context of community engagement.

CONCLUSIONS

Reality capture offers a powerful set of tools that can enhance planning processes by making them more data-driven, inclusive, and responsive to environmental and infrastructural challenges. The use of reality capture in community planning projects can be greatly enhanced by integrating community co-creation approaches. These methods ensure that stakeholders actively participate in capturing, visualizing, and shaping their environments, leveraging shared knowledge and innovative tools to create more inclusive and actionable planning outcomes. By integrating these emerging technologies into their work, planners can foster greater public trust, improve project outcomes, and contribute to more resilient, equitable, and sustainable communities.

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FURTHER READING

Published by the American Planning Association

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Stephens, Ric, Robert Dannenberg, Wendie Kellington, and Patrick Sherman. 2020. *Using Drones in Planning Practice*. PAS Report 597. Chicago: American Planning Association.

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Other Resources

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