Calgary

Engaging Communities Through Visualizing Change

Opportunities for Interactive and Diverse Media in LAP Community Engagement

August 21st 2025


NORTHWEST ENTRY GATE

Contents

1 Introduction

Image: Watercolour style in Enscape

1.1 Project Objectives

This research project involved an in-depth investigation into new types of media and technology that could be integrated into the City of Calgary Planning Design processes to increase levels of interactivity in Local Area Planning (LAP) community engagement. While this project specifically focused on LAPs, the concepts and key findings from this report could be beneficial to consider for a variety of other Planning Design projects in the future.

Beyond identifying ways for new media to be integrated into LAP community engagement, this project also included an analysis of how the Planning Design Team could implement interactive media and what software would be most compatible with the team's existing workflows.

1. Investigate opportunities for interactive media within Local Area Planning community engagement.

2. Research and test software platforms to assess compatibility with current workflows and alignment with LAP and City of Calgary goals.

1.2 Key Terms

1 Virtual Reality

A completely virtual 3D environment experienced through a VR headset or a 360-degree VR room.

2 Augmented Reality

A partially virtual 3D environment experienced through a combination of the real world and a mobile device.

3 3D Printing

3D models that are typically printed in PLA (Polylactic Acid) filament using 3D modeling software, a slicer, and a 3D printer.

4 Standalone Executable File

An export setting from a rendering engine that allows a user to interact with a 3D model without installing the software or having any licenses.

5 Rendering Engine

Software that enables a designer to bring a 3D model to life through environmental controls, 3D asset libraries, and a diverse range of output options.

6 Phasing Animation

A 3D model animated in a rendering engine to simulate the building being assembled in pieces.

7 Interactive Walkthrough

360-degree images connected through portals with links that allow users to navigate a scene similarly to Google Street View. Clickable graphic elements are often added to provide additional content.

8 Video Walkthrough

A video created using a rendering engine and 3D model, typically from a pedestrian's point of view.

9 Static Render

A single image generated from a rendering engine. Renders are often realistic or hyper-realistic, though illustrative styles are also available.

1.3 Summary of Key Recommendations

Based on the research, testing, and analysis conducted throughout this project, several opportunities for integrating interactive content into Local Area Planning (LAP) community engagement have been identified. The following options outline the most highly recommended applications of new forms of media, based on current software capabilities and project findings.

1. 3D Printing

Use 3D printing to introduce tactile learning elements that support kinesthetic learning styles. It is recommended to use 3D printing to communicate program-level planning concepts, allowing models to be reused across multiple LAPs and various engagement events.

2. Standalone Executable Export Files (.exe)

Utilize standalone .exe files exported from rendering engines for interactive walkthroughs, visual presentations, and user-operated flythroughs. These tools enhance interactivity and improve content comprehension across diverse demographic groups.

3. Rendering Engine Possibilities

Take advantage of rendering engine export options to produce interactive walkthroughs, storyboards, video and animated content, phasing animations, static images, and reference visuals for illustrations.

Based on testing and evaluation, D5 Render is recommended as the primary rendering engine for producing videos, animations, phasing sequences, winter scenes, and environments that accurately reflect Calgary. For illustrative renders and .exe file exports, Enscape is recommended.

Pencil Crayon Style in Enscape - Included in the How To Guide for Small Scale Housing Engagement Booklet

1.4 Testing Sources

For the purpose of this research and software exploration, illustrations developed for the How-to Guide for Small Scale Housing and the Scotia Place model were used as test cases. These models and illustrations are included in this report to showcase the possible applications of each type of media.

1.5 Research Process

To achieve the intended objectives of the project, a variety of qualitative and quantitative data was evaluated. This included an analysis of existing marketing tactics, feedback collected from the Future LAP Workshop in June, analysis of case studies, and reference material from last year's LAP Graphic Audit Report. Additionally, software testing was conducted and scored based on evaluation criteria to evaluate workflow compatibility.

Throughout this research project, the following forms of interactive technology were explored: virtual reality, augmented reality, 3D printing, standalone executable (.exe) files and web portals, static renders, video walkthroughs, phasing animations, and interactive walkthroughs. To assess the technology required to produce these media formats, 11 rendering engines were researched. Four of the rendering engines were tested and compared in depth.

1.6 Process Overview

A detailed six-step creative process was followed to effectively develop informed recommendations:

1 Process Planning

Outlining the goals for the project.

2 Objective Finding

Problem identification and goals.

3 Data Gathering

Researching types of media, testing software and technology, case study research, and the Future LAP Workshop.

4 Analysis and Synthesis

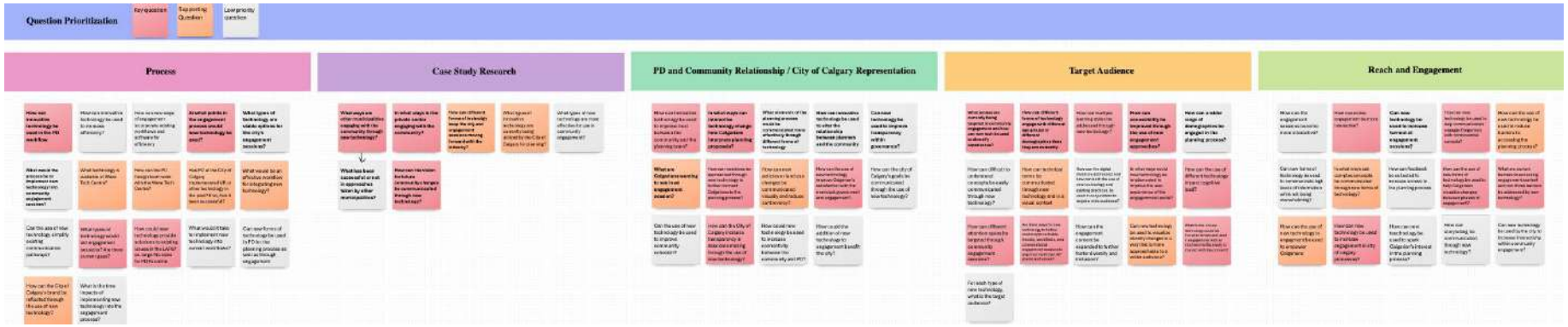
Software comoparison and evaluation of mediums.

5 Brainstorm and Ideation

Brainstorming ways for the reccomended forms of media to be applied to the LAPs.

6 Report Findings

Presenting to PDS and Creativeas well as creating this report for future reference.



1.7 Evaluation Criteria

1 Conversation Enhancement

Will the form of media enhance the conversations about community change?

2 Content Comprehension

Does the medium create the opportunity to demonstrate or explain a concept that is difficult to grasp within the current engagement materials?

3 Workflow Compatibility

Does this form of media integrate well with current workflows and software?

4 Demographic Diversity

Will the new media attract different demographics or engage the users in a different way?

1.8 Guiding Principles

Similarly to the previous work conducted for the LAP Graphic Audit, the following guiding principles remain highly relevant to LAP engagement content. In addition to the evaluation criteria above, each of the guiding principles were also considered in this evaluation of interactive content and media in this project.

1 Design for learning styles

Different users understand learning materials in different ways. The main learning styles include read/write, auditory, visual, and physical/kinesthetic.

2 Design for Low Cognitive Load

Different people have different ways of interpreting information. Creating content that applies to all cognitive abilities enhances the experiences for a wider range of audiences.

3 Inclusive Design Principles

Simplicity, familiarity, consistency, and relevancy.

2 Interactive Technology in Planning and Engagement

Lai, 2024a

2.1 Introduction

Many major cities around the world have permanent public engagement centres where residents and tourists can come and learn about new proposed developments and policies in that city. These centres are typically where innovative technology is present within the context of community engagement. While it can be complicated to bring equipment and infrastructure for VR or large 3D printed elements to pop up community engagement events, at a permanent centre, these forms of technology can be easily implemented in a safe and inclusive environment.

2.2 Case Study - Singapore City Gallery

The Singapore City Gallery has interactive rooms to teach visitors about Singapore's development history and focus on sustainability. Youth engagement is a significant element to this gallery and the exhibits are designed to have students run around and interact with the content in a tactile approach. This example is a relevant example to the LAPs in it's ability to communicate development to a youth audience through interactive content.

Singapore City Gallery, n.d.

Singapore City Gallery, n.d.

2.3 Case Study - Stockholm City Space

Within the City of Stockholm's City Space, a 3D-printed model of the entire city is displayed beneath a glass floor. Each section of the model is hand-painted, with proposed developments highlighted in white. Users can use one of the iPad to explore the model to fly around it or go down and view any part of the model at street view. Interactive hot spots on the model educate users about new developments. The centre is open year-round and is a community gathering hub.

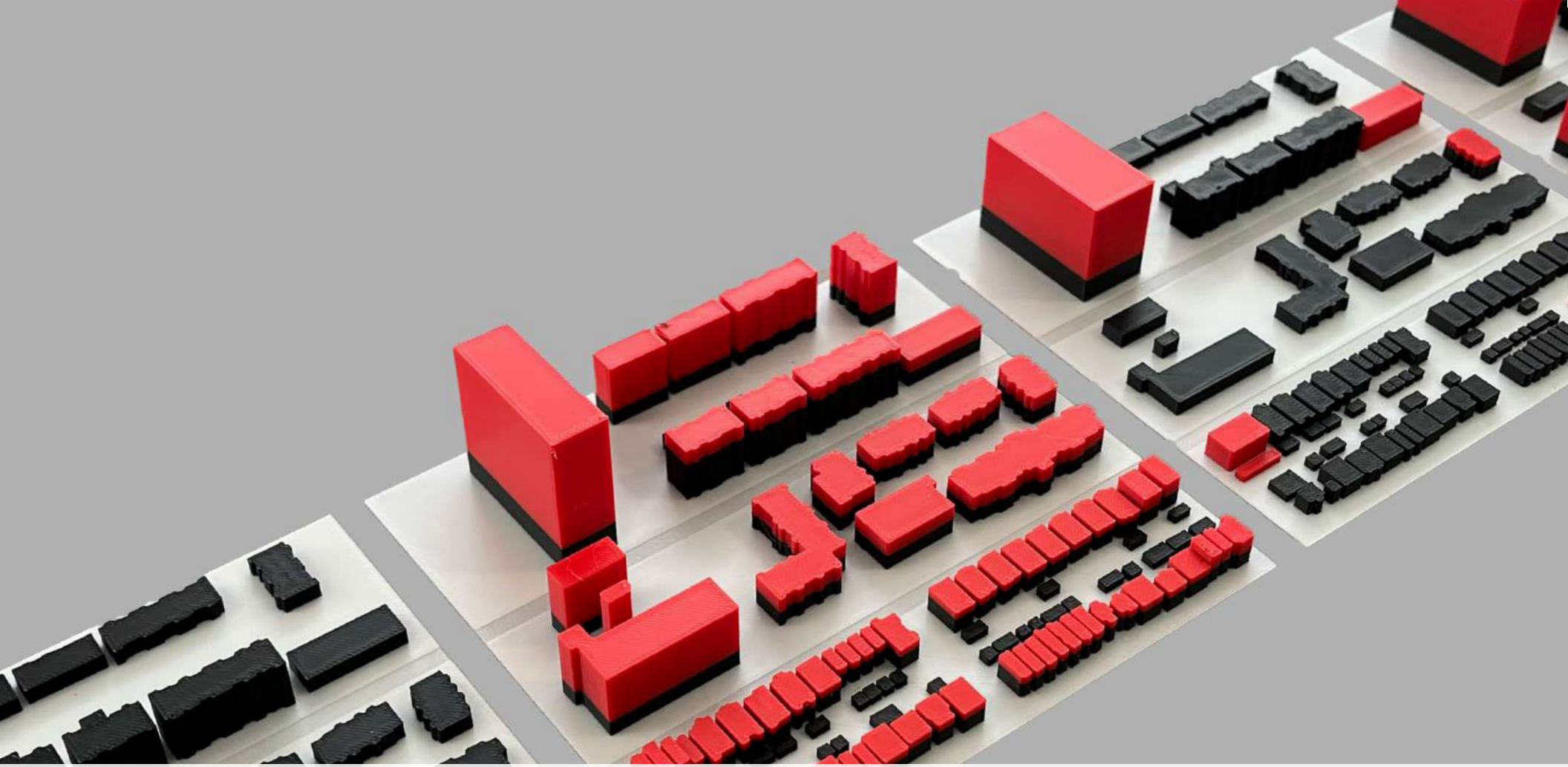
Stockholm City Space, n.d.

Stockholm City Space, n.d.

2.4 Case Study - Kitchener Ontario

In 2023, the City of Kitchener completed the Growing Together initiative that involved a temporary form of interactive technology in action. 3D printed models of varying heights were placed on a large-scale map of the development area by engagement participants. At the end of the workshop, the model was scanned and converted into a digital 3D model for the planning team to use to collect data from the event and inform the next round of revisions. This example highlights the ability to include interactive tactile mediums in community engagement while also being able to quickly document feedback through 3D scanning.

Modelur, n.d.



3 3D Printing

3.1 Introduction

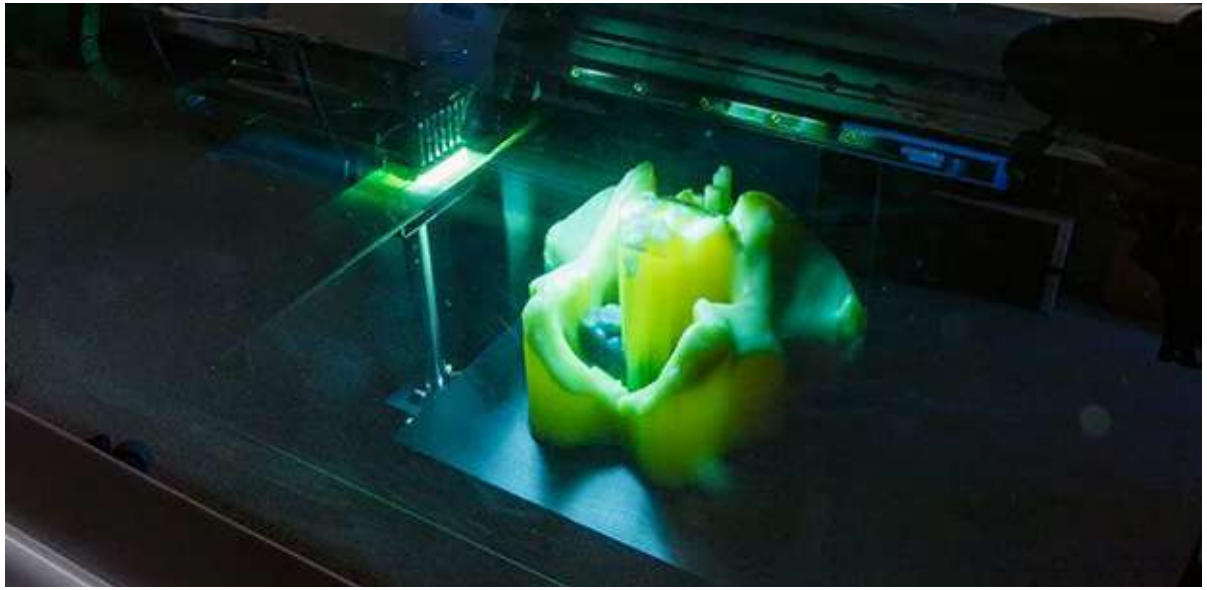
3D printing presents opportunities to transform complex urban planning concepts into tangible and interactive physical forms. Designers take models created directly in SketchUp and send them to a 3D printer through a slicer program. 3D printing is currently being utilized by a wide range of industries and scales. PLA, a thermoplastic polymer with a potato starch base is a commonly used material that is widely available and affordable.

3.2 Case Study - Mayo Clinic CT Scans

3D printing can be an effective tool to communicate complex concepts or definitions that may be challenging for users to visualize. Medical clinics around the world, including the Mayo Clinic have started 3D printing their patient's CT scans to help the patients visualize what is going on in their body. For users who learn through tactile mediums, this method significantly increases content comprehension.

This concept is directly applicable to the LAPs. While this is not a planning specific example, the use of 3D printing to enhance content comprehension in a similar way is recommended.

Mayo Foundation for Medical Education and Research, n.d.



Mayo Foundation for Medical Education and Research, n.d.

3.3 LAP Recommendations

Currently, there are no community engagement tactics in the LAPs that engage kinesthetic learners. As a result, the use of 3D printing for community engagement is recommended. To guide the brainstorming of potential applications for 3D printing within the LAPs, the following evaluation criteria was developed.

3.4 Evaluation Criteria

1 Reusability

- Can the model be used across multiple LAPs and types of engagement events?
- 3D printing involves time for printing and creating the model, cost of the materials, and the environmental impact of plastic models. Reusable models align with the City of Calgary values and LAP objectives.

2 Conversation Enhancement

- Will a physical model support more productive and meaningful engagement conversations?
- If a 3D print is primarily for aesthetics, it may not be relevant to the project goals.

3 Content Comprehension

- Does the model explain a concept that is difficult to grasp through the current engagement materials?
- 3D printed tactile models can help users understand concepts in a different way.

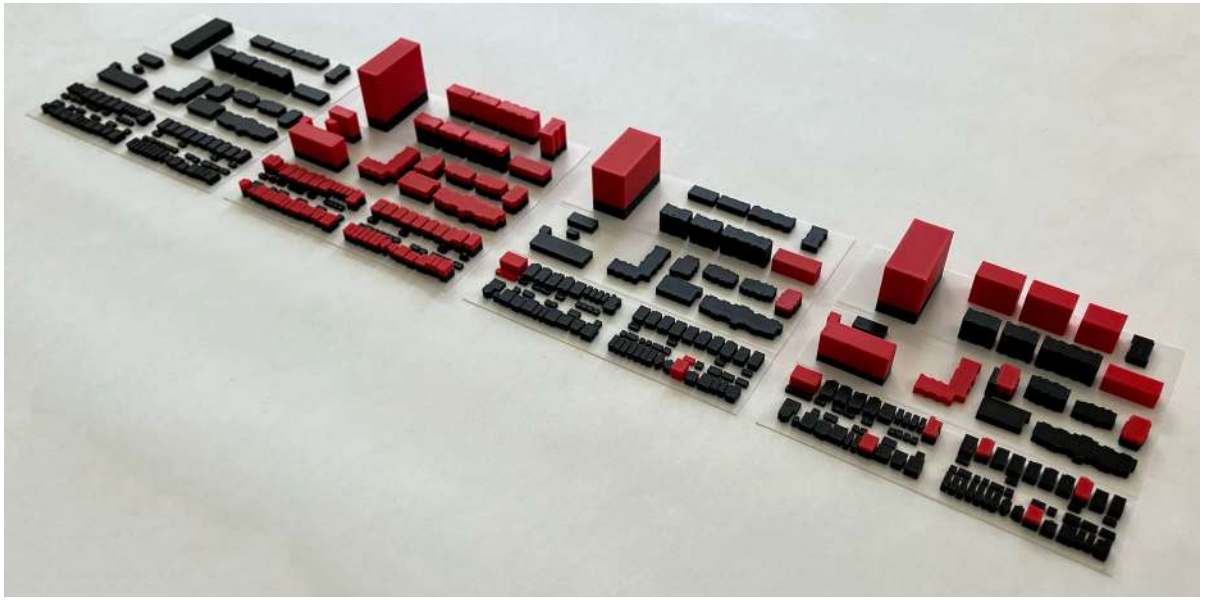
3D Printed Concept	Reusability	Conversation Enhancement	Content Comprehension
Physical or tactile maps of the LAP communities	X	X	✓
Heritage home massing	X	X	✓
Planning term (i.e. pedestrian realm)	✓	✓	✓
LAP term or concept (i.e. UFC map categories)	✓	✓	✓

3.5 Use Case 1 – Growth Timelines vs. Building Scale Zoning Changes

A set of four physical models were created to demonstrate how development realistically unfolds compared to maximum proposed building heights under new zoning. These models illustrate existing building conditions, maximum proposed height allowances, projected development after 5 years (1.5% growth rate), and projected development after 15 years (1.5% growth rate).

The model responds to common misinterpretations that if an area is zoned for a certain building height, the maximum building height will be rapidly built in all locations. Visualizing how growth happens can help participant better understand timelines and scale. This general example allows the model to be applicable to all LAPs and keeps conversations related to community growth without participants focusing on individual lots. As a result, this may help to de-escalate scale related conversations.

Dimensions	Material	Weight	Cost (approximate)	Print Time	Printer
150x150mm	PLA	4 x 54g	4 x $1.50	1hr 26m (current) – 3h 47m (maximum use) More colour changes increases time.	Bambu Carbon X1 4 Nozzle



3.6 Use Case 2 – UFC and Building Scale

Based on feedback from the LAP Workshop and discussions about community engagement, it was established that the UFC and Building Scale maps can be challenging to understand and the variation within each form category can be difficult to communicate in a single graphic or legend. To clarify how the UFC and Building Scale maps work together, a multi-piece 3D printed model was created. In this example, the Neighborhood Local UFC category is combined with the Limited Building Scale category. The buildings are reflective of the combined categories and can be placed on the sample site. This allows for users to develop an understanding of the variation of different outcomes within each combination of categories.

Similarly to the previous example, not every combination of category would need to be shown. Instead, this model could communicate a concept and inform how users read the maps. Future versions could also show colour coded commercial and residential sections of buildings. Similarly to the previous example, this model redirects conversations about particular lots to explaining the concept of how change could be implemented at a program level.

Dimensions	Material	Weight	Cost (approximate)	Print Time	Printer
Site: 200mm x 200mm x 1mm	PLA	50.35g	$1.31	1h 15m	Bambu Carbon X1 4 Nozzle
Buildings: Varying sizes	PLA	91.15g	$2.28	2h 47m	Bambu Mini

3.7 Conclusion

This analysis suggests that 3D printing offers a valuable opportunity to enhance understanding of planning concepts, fill gaps in existing engagement materials, and lead to more constructive conversations at engagement sessions.

4 Augmented Reality

4.1 Introduction

Augmented reality is a diverse and engaging method that uses anchors in the real world to connect to an interactive 3D model. Users can move around using a mobile device, tablet, or VR headset.

4.2 Types of Augmented Reality (AR)

Based on analysis, two types would be relevant to the LAPs and PDS at the City of Calgary.

1 Marker Based AR (Image Recognition)

Uses a marker in the real environment to connect to an AR scene. This method is used for architectural visualization, and product design.

2 Location Based Marker-less AR

The AR scene is linked to a geolocation in the real world. This method is commonly used for way finding, interactive tours, and architectural visualization, and even interactive art exhibitions.

4.3 Case Study - Singapore Tourism Board

In 2024, the Singapore tourism board launched a pilot project using Location Based animated AR content and the Google AR Core and Geospatial Creator. Users can explore illustrative tours of the city through google maps or the Singapore Tourism Board app. Landmarks, local food vendors, murals, and other cultural elements are brought to life through this project.

Lai, 2024

4.4 LAP Recommendations

On August 8th, 2025, Adobe announced that Adobe Aero will be discontinued in November 2025. At the time of doing this analysis of Augmented Reality, Adobe Aero had been the recommended option for use in the LAPs due to its compatibility with current workflows and success with testing. However, since it is being discontinued, this recommendation is no longer valid.

Initial exploration revealed that AR may be useful for helping users understand content in an interactive format and additional exploration into programs and methods for displaying AR scenes is recommended. AR can be a highly interactive and user-friendly method for introducing interactive content into the LAP community engagement tactics.

Augmented Reality Software	Conversation Enhancement	Content Comprehension	Workflow Compatibility	Demographic Diversity
Adobe Aero and Google Geospatial Creator	✓	✓	✓	✓
Other AR programs and SketchUp programs researched.	✓	✓	X Requires coding or expensive licenses for commercial use.	✓

AR scene in Adobe Aero with an imported SketchUp model

5 Rendering Engines

5.1 Introduction

Rendering engines have significant potential to simplify PD Designer workflows while enabling the creation of a wide range of interactive engagement materials. These include video walkthroughs, phasing animations, illustrations, storyboards, and virtual reality experiences. While the final outputs are often the focus, it is the capabilities of the rendering engine itself that determine what can be produced within a given timeframe and to what quality.

To accurately assess the compatibility of various rendering engines with LAP and PD Designer workflows, extensive software testing and comparison was completed.

5.2 Evaluation Criteria

1 Efficiency to create high quality results

2 Compatibility with SketchUp and current workflows

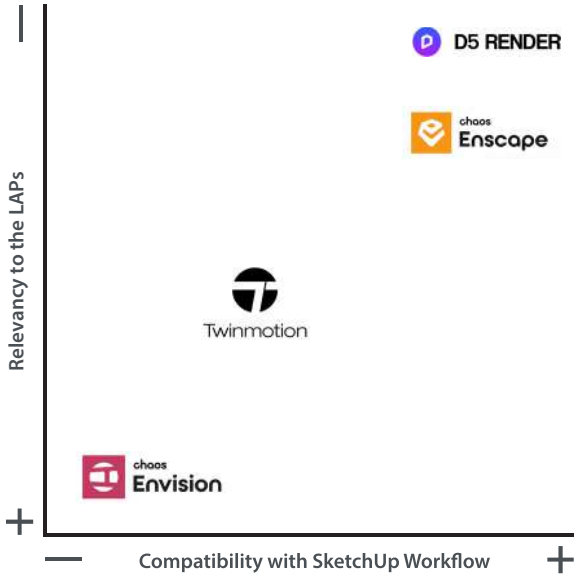
3 Ability to make quick changes as the project evolves

4 How accurately Calgary environments can be represented (i.e. drought resistant vegetation and winter conditions)

5 Output options that would benefit the LAPs

5.3 Overall Comparison

Initial consideration of Blender, D5 Render, Enscape, Chaos Envision, VRay, Vantage, Twinmotion, Thea Render, Unreal Engine, Maxwell, and Corona was completed. Rendering engines that are not easily compatible with SketchUp models or ones without built in 3D asset libraries were eliminated from further testing due to their incompatibility with the needs of the PD Design team. After initial consideration, Enscape, Chaos Envison, D5 Render, and Twinmotion were tested in depth. Note that D5 Render and Envision are only available on Windows OS at this time however, Mac versions may be available within the next several years.



5.4 SketchUp Workflow Comparison

Both D5 Render and Chaos Enscape operate in a live update environment within SketchUp where all changes in SketchUp are updated live in the rendering engine. This feature aligns with the quick changes and iterative process that occurs within the LAP graphic process. Twinmotion and Envision require a designer to export their SketchUp model and import it into the rendering engine. If changes are needed, the model must be re-exported and re-imported making them less compatible with the PD Designer workflow. Chaos Envision crashes frequently and is inconsistent in its ability to read SketchUp models successfully.

5.5 Output Analysis

Rendering engines offer a wide range of opportunities for the LAPs. In the table below, the opportunities to create different output options that could be relevant to the LAPs are evaluated. For illustrative content and simple renders, Enscape provides an efficient and effective interface. However, for complex video content or phasing animations, and additional advanced export options, D5 Render provides the most effective possibilities.

Output	Enscape	Chaos Envision	Twinmotion	D5 Render
Static Realistic Renders	✓	✓	✓	✓
Static Illustrative Renders	✓	X	X	✓ (Only with AI - no SSO)
Static Linework	✓	X	X	✓ (Only with AI - no SSO)
Illustrative Simple Video	✓	X	X	✓ (Only with AI - no SSO)
Illustrative Complex Video	X	X	X	✓ (Only with AI - no SSO)
Hyper-realistic Render (ray-tracing)	✓	✓	✓	✓
Complex Realistic Video	X	✓	✓	✓
Phasing Animation	X	✓	✓	✓
Panoramic Static Images	✓	✓	✓	✓
Key frame or Storyboard Batch Export	X	X	X	✓
Panoramic Batch Export	X	X	X	✓
Live Ray-tracing	X	X	✓	✓
Standalone Executable Files	✓	X	X	X
VR Headset Compatibility.	✓	X	✓	✓

5.6 Vegetation Libraries

The vegetation quantity, quality, seasonal variation, and quantity of Alberta native plants were considered in the evaluation of the rendering engine's vegetation libraries. D5 Render had a significantly more successful ability to accurately represent Calgary's vegetation than other rendering engines. In addition to the high-quality plant assets, the ability to display any plant in a winter condition and control the age of the plant sets this rendering engine apart from its competitors. While Twinmotion also has a winter setting, their asset library contains mainly tropical plants. Additionally, the diversity and efficiency of plant scatter presets with D5 render have the potential to significantly reduce model production time. Enscape and Envision have similar vegetation libraries at a lower range of quality and diversity from D5 Render.

Program Comparison

Program	Vegetation Diversity	Vegetation Quality	Alberta Native Plants / Drought Resistent Plants	Seasonal Variation
chaos Envision	Low	Medium	Low	None
chaos Enscape	High	Medium	High	None (some fall, no winter)
D5 RENDER	High	High	High	High
Twinmotion	Low	High	Low	High

Vegitation scatter in D5 Render

Vegitation scatter and trees in D5 Render

5.7 People Asset Libraries

The 3D people assets from each of the rendering engines were evaluated for their diversity as this quality is particularly relevant to the LAPs and all other planning projects in Calgary. With a significantly higher number of people assets across all categories, D5 Render is also the leading engine in this category. D5 Render also can drop group presets onto any surface. For example, if you want a group of people on stairs, they can be dropped down onto the stairs with the click of a button. Twinmotion, D5 Render, and Enscape can all apply scatter groups to any flat surface. However, in Envision, each person must be placed on a spline or surface manually.

Program	Total	Animated	Children	Winter	Mobility Aids	People of Colour	Body Diversity	Group presets (3+)
Enscape	1051	0	87	22	4	323 (31%)	Moderate	1
Envision	831	141	66	43	4	347 (41%)	Low	0
D5 Render	**2209**	**All can be added to splines**	**208**	**98**	**15**	**1762 (80%)**	**Moderate**	**133**
Twinmotion	737	61 (3 youth)	93	39	0	236 (32%)	Limited	16

5.8 Other Assets

All of the asset libraries contain a diverse mix of street furniture and lighting that would be relevant to the LAPs and other urban visualization purposes. In terms of animals, all of the rendering engines also have multiple dogs and people interacting with dogs. D5 Render also contains multiple animals that can be found in Calgary's environments including animated mallard ducks, hawks, deer, and gulls.

5.9 Environment Settings

In terms of environmental manipulation in the rendering engines, D5 Render and Twinmotion performed the best for the purposes of representing Calgary's environmental conditions. With D5 Render it is possible to replicate Calgary specific weather patterns such as the simultaneous combination of snow, rain, sun, and clouds. For hyper-realistic scenes with high levels of control over the ambiance of the scene, D5 Render or Twinmotion are the most compatible.

Program	Snow on ground and vegetation	Animated precipitation	HDRIs	Ray Tracing	Post processing (i.e. colour grading)
Enscape	X	X	✓	X	X
Envision	X	X	✓	X	X
D5 Render	✓	✓	✓	✓	✓
Twinmotion	✓	✓	✓	✓	✓

5.10 Efficiency to Create Similar Outcomes

As part of the testing, similar scenes of the Scotia Event Centre were replicated in Enscape, Twinmotion, and D5 Render. The same was attempted in Envision as well however, after the program crashed 14 times, the attempt was abandoned. D5 Render was the most efficient to create the render in both summer and winter conditions. At 35 minutes to create these results, the scatter presets, material swatches, and high-quality environmental features resulted in fewer adjustments than in Enscape. The Enscape render took about 1h 30 minutes with most of the time focused on adjusting the materials and environmental settings. Twinmotion took about 1h 50 minutes because after getting part way through the render, an import error was encountered resulting in going back to SketchUp, fixing the surface, and restarting in Twinmotion.

Twinmotion

Enscape

D5 Render

5.11 LAP Recommendations

To increase the interactivity of the LAP community engagement materials, the use of rendering engines to support the creation of these materials is highly recommended. Enscape has already been approved and can be used to create simple, non-hyper realistic static renders, illustrations, and the assets from the 3D library can be used to create character references from multiple positions.

However, when it comes to the more advanced features that lead to more realistic renders, video walkthroughs, phasing animations, and more diverse opportunities to represent Calgary's demographics and environment, Enscape does not meet all of the needs. Based on these output opportunities relevant to the LAPs, workflow compatibility, efficiency and quality of outcomes, and ability to quickly make changes to models, D5 Render is highly recommended for future use.

Pencil Crayon style in Enscape - Included in the How To Guide for Small Scale Housing Engagement Booklet

6 Interactive Walkthroughs

Water colour style in Enscape

6.1 Introduction

Interactive walkthroughs involve exporting a series of panoramic images from a rendering engine and uploading them to a portal or web environment where hotspot info points and move points can be added. When complete, the interactive walkthroughs can introduce content in a narrative approach that aligns with memory chunking principles without overwhelming the users.

6.2 Case Study - Stockholm Meatpacking District 3D Model

A 3D model of the Stockhom Meatpacking District with an interactive walkthrough component was explored. On the landing page of the project, an overview of the area with info hotspots and streetview locations is included. Then, the user can jump to 360 degree rendered scenes that include labels, landmarks, and additional information about the project. From each scene, you can also jump to the next location. This approach clearly communicates important content to the users using a collection of static renders.

Stockholm Meatpacking District, n.d.

Stockholm Meatpacking District, n.d.

6.3 Testing and Analysis

The time it takes to produce a complete interactive walkthrough is not minimal. Since the interactive walkthroughs rely on 360-degree images, the SketchUp model must be built out in every direction that appears in the model. Depending on the type of content and the length of walkthrough, this could be a very time-consuming approach. Some rendering engines such as D5 and Enscape allow for batch exporting. Each panoramic image in Enscape took about 4 minutes to render, 15 minutes in Twinmotion, and D5 render, the same images took 3 minutes.

Alternately, regular exported images can also be uploaded and used in interactive walkthroughs. The difference would be that the user could not look around a space, only click on info hotspots or swipe between images. In the example shown here, an illustrative render was exported from Enscape and hotspots were added. The user can switch between images and interact with the hotspots but not look around the scene.

6.4 LAP Recommendations

Interactive walkthroughs could be considered for use in the LAPs to introduce a narrative and interactive element into community engagement. However, the creation of full interactive walkthrough environments can be highly time consuming and hard to quickly update. Further exploration into how info hotspots score in terms of accessibility would be needed. See section 9 on Standalone .exe files for an alternative recommended medium.

	Conversation Enhancement	Content Comprehension	Workflow Compatibility	Demographic Diversity
Interactive Walkthroughs	✓	✓	✓	✓

Virtual tour created in Chaos Cloud

7 Virtual Reality

7.1 Introduction

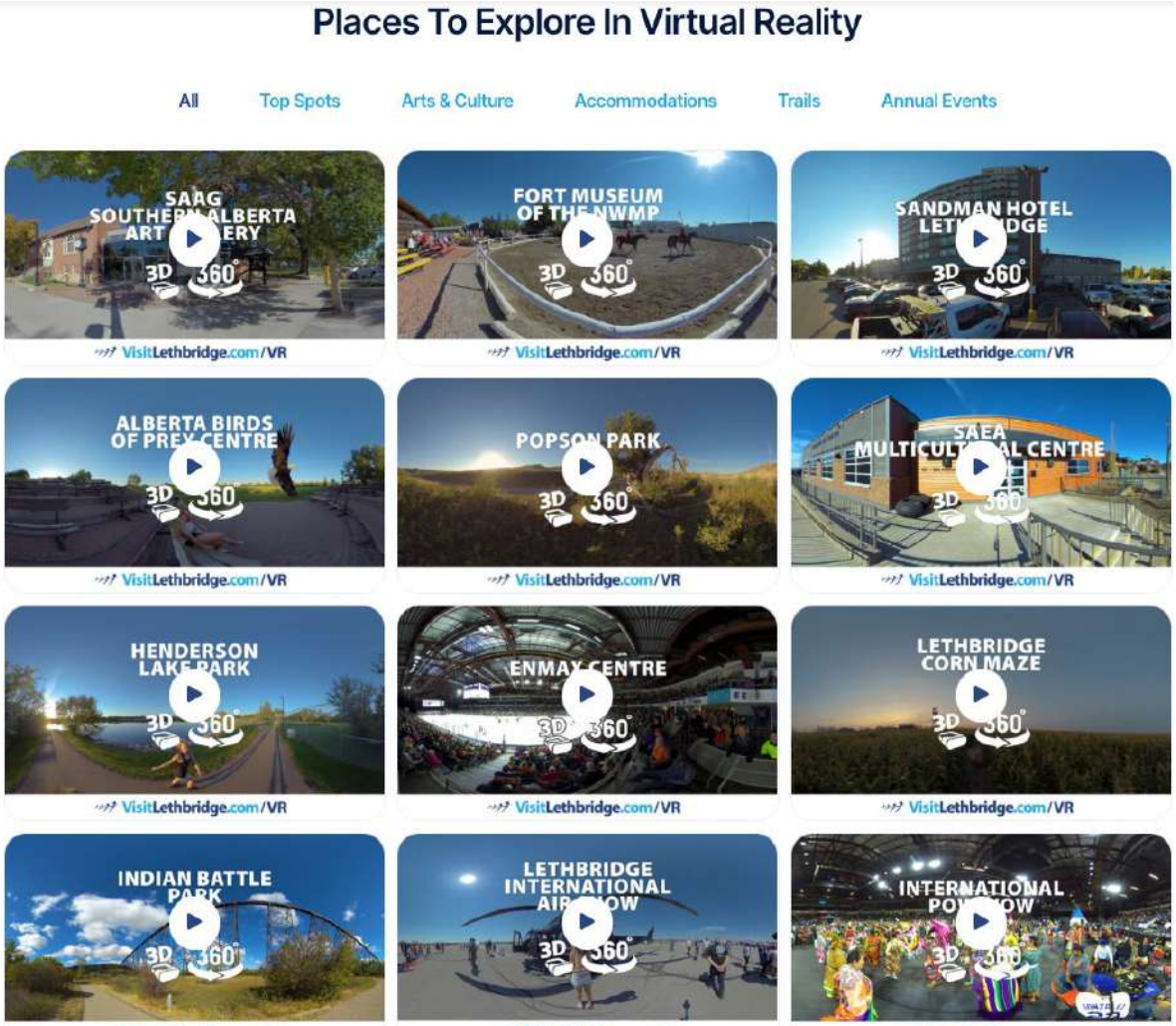
Virtual reality (VR) has become a common form of interacting with a 3D environment across a wide range of industries. VR involves placing a user directly into a virtual 3D scene and can help them experience a digital environment at a human scale.

7.2 Case Study - City of Lethbridge

The City of Lethbridge has an extensive library of 360-degree VR environments as part of their tourism board. VR tours of public spaces, cultural events, and tourist attractions are available. They are hosted online through YouTube and anyone with a VR headset can experience the scene. You can also explore them without a headset directly through YouYube.

7.3 Testing and Analysis

Through this research project, VR compatibility within Enscape and D5 Render were explored, as well at the potential for using a 360 degree VR room. There were several challenges encountered with VR. First, the SketchUp model must be modeled in all directions to allow the user to look around a 360-degree view from any point within the scene. Secondly, Enscape and D5 Render are only compatible with specific VR headsets that the Wave Tech Centre does not currently have. Without the direct link to the rendering engine, creating a VR compatible environment would involve exporting a large quantity of panoramic images manually and then compiling them into an interactive scene. The same process would be required to view a scene in a VR room. This approach is very labor intensive. Additionally, using a VR headset is challenging for new users or those with accessibility needs and could lead to injury or frustration.



City of Lethbridge, n.d.

7.4 LAP Recommendations

Given these challenges, the use of VR in LAP community engagement is not advised at this time, and other mediums such as Standalone .exe models may be more effective for reaching a wider audience.

8 Video Walkthroughs and Phasing Animations

Image: Singapore City Gallery

8.1 Introduction

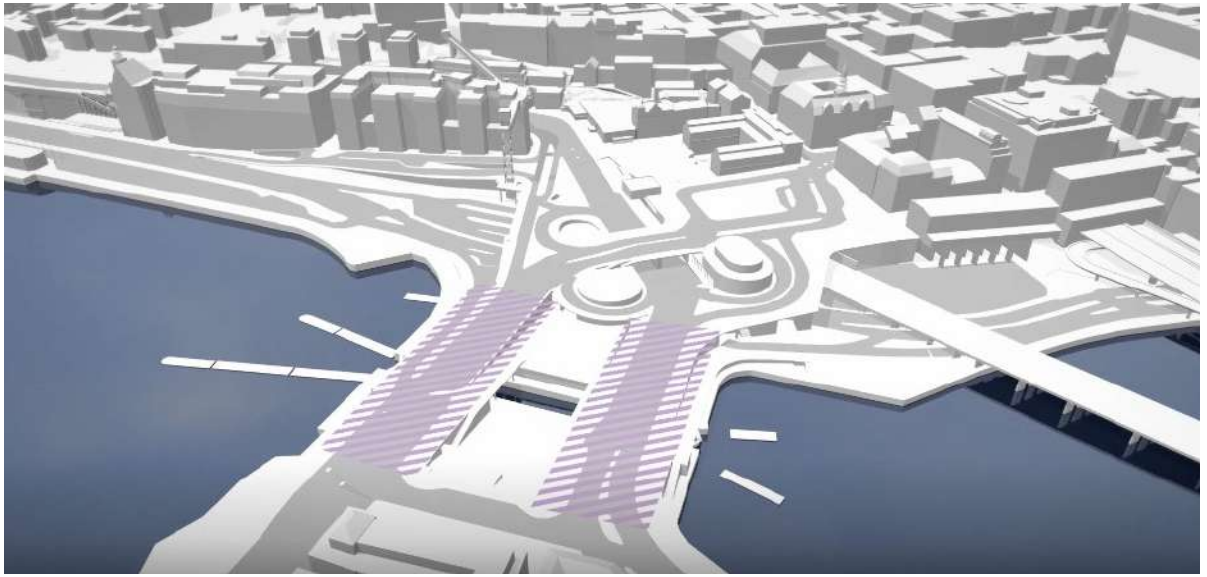
Interactive walkthroughs involve exporting a series of panoramic images from a rendering engine and uploading them to a portal or web environment where hotspot points can be added. When complete, the interactive walkthroughs can introduce content in a narrative approach that aligns with memory chunking principles.

8.2 Case Study - Stockholm Slussen Phasing Animation

There are many different forms of phasing animations at a variety of levels of complexities and detail levels. However, for the purposes of the LAPs, this example from the Stockholm Slussen project is highly relevant. While it is more simple than other examples such as the phasing animation completed for the Arts Commons development, the simplicity clearly highlights important content at a scale that is relevant to the LAP program. Specific building facades and colours in more detailed or hyper-realistic are not as relevant to the LAPs. In this example, content is introduced in a clear and accessible format without any flashing images or intense movements.

Static renders are used in the animation to supplement the simple 3D modeled animated content.

Stockholm Slussen, n.d.



Stockholm Slussen, n.d.

8.3 Testing and Analysis

There are a number of opportunities for the use of phasing animations and video based content in the LAP engagement materials. The four rendering engines were tested again for their compatibility with the PD Designer workflows and LAP goals.

Enscape

It is a highly successful and user friendly program for creating very simple videos or illustrative walkthroughs. However, there are no animated people and complex camera movements lead to frequent program crashes.

D5 Render and Twinmotion

D5 and Twinmotion performed similarly in their ability to create complex video content and phasing animations. D5 Render's ability to deliver high quality graphics and animated content in addition to their diverse array of animated people and assets can quickly and easily bring a scene to life.

Envision

Chaos Envision performs poorly in terms of video creation and phasing animations. The program crashed frequently in testing and is not recommended for use in the LAP program.

8.4 LAP Recommendations

The use of more complex video content and phasing animations are a recommended addition to the LAP engagement materials. The ability to demonstrate content in a narrative approach aligns with memory chunking and low cognitive load design considerations. The use of D5 Render for complex animations and phasing animations is recommended.

Pencil Shading Style in Enscape - Included in the How To Guide for Small Scale Housing Engagement Booklet

Program	Enscape	Chaos Envision	D5 Render	Twinmotion
LAP Recommendation	Best option for illustrative and simple videos without ray tracing. It is the only engine that supports video creation using pencil crayon, sketch, and watercolour styles.	Not recommended based on inconsistent product reliability (frequent crashes)	Recommended for phasing animations and complex walk throughs especially if vegetation is included.	Recommended for phasing and complex animations as an alternative to D5 Render if vegetation is not being used.

9 Standalone Executable Export Models (.exe file)

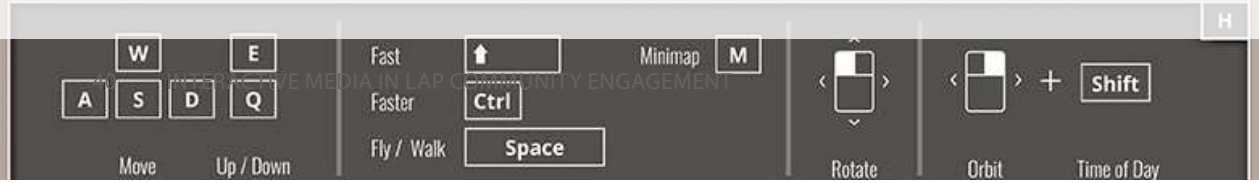


Image: Singapore City Gallery

9.1 Introduction

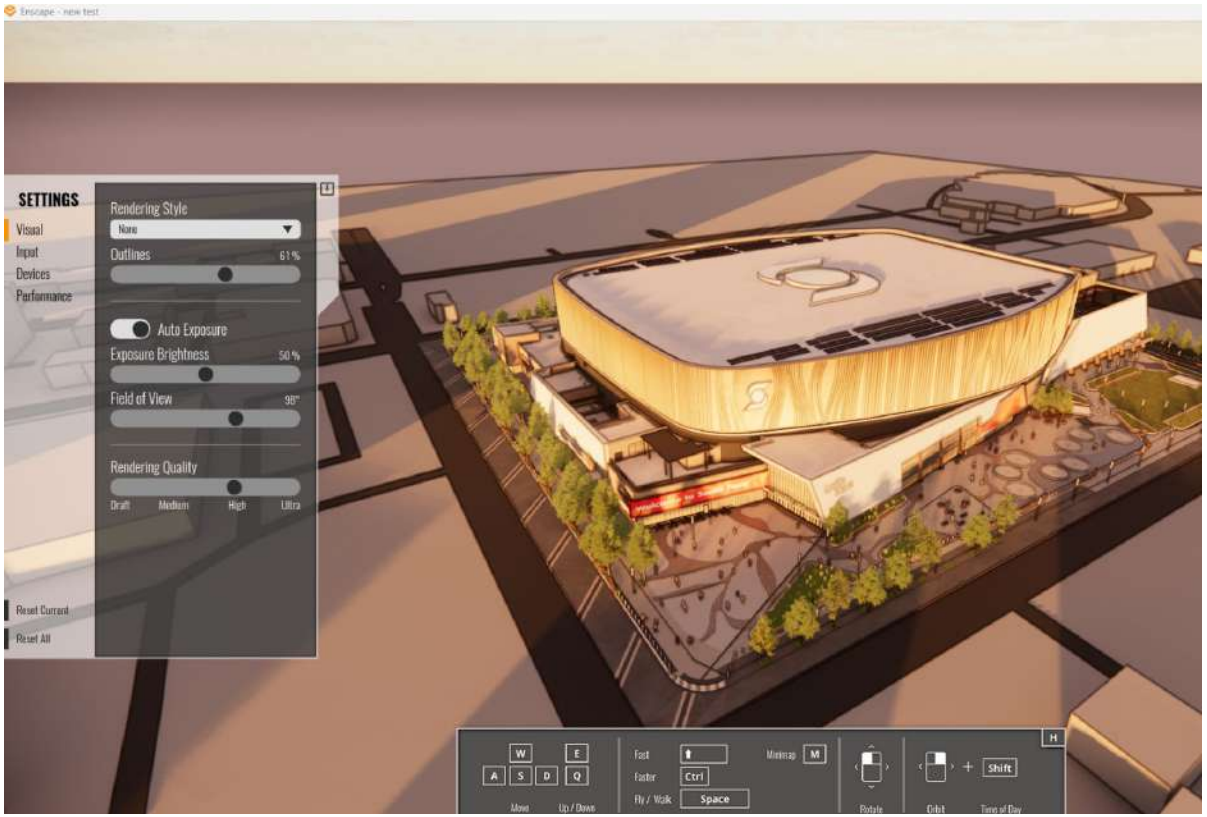
Standalone Executable Exports (.exe files) allow a designer to export a rendered 3D scene from a rendering engine. The entire 3D environment is then viewable to any user with the file without needing to install any software of have a license to any program. They are used frequently in the architectural industry to communicate concepts to a client. The user cannot edit the model, just navigate around it as you would a video game such as Minecraft. Standalone file types are only able to be viewed on Windows OS however, web standalone environments can also be viewed on Mac devices.

9.2 Benefits of Standalone Models

1. They an be accessed on any windows computer or browser.
2. They can be easily updated and re-exported without significant extra work.
3. The user can view the environment in different lighting conditions.
4. There are multiple visual presets that allow the user to view the environment in a draft outline style or in a realistic style.
5. Users can navigate through the scene at their own pace which aligns with different user's processing speeds and cognitive load capacities.

9.3 Use Case

For this example, the Event Centre model was used in Enscape with imported site context. The focus on the Event Center was maintained with the model detail concentrated to the building. The outline mode aligns with the goals of the LAP graphic style and the intent to stay away from realistic rendering approaches. While the watercolour setting is not available in .exe format, the outline style is similar to the cover style for the PH1 LAP engagement booklets.



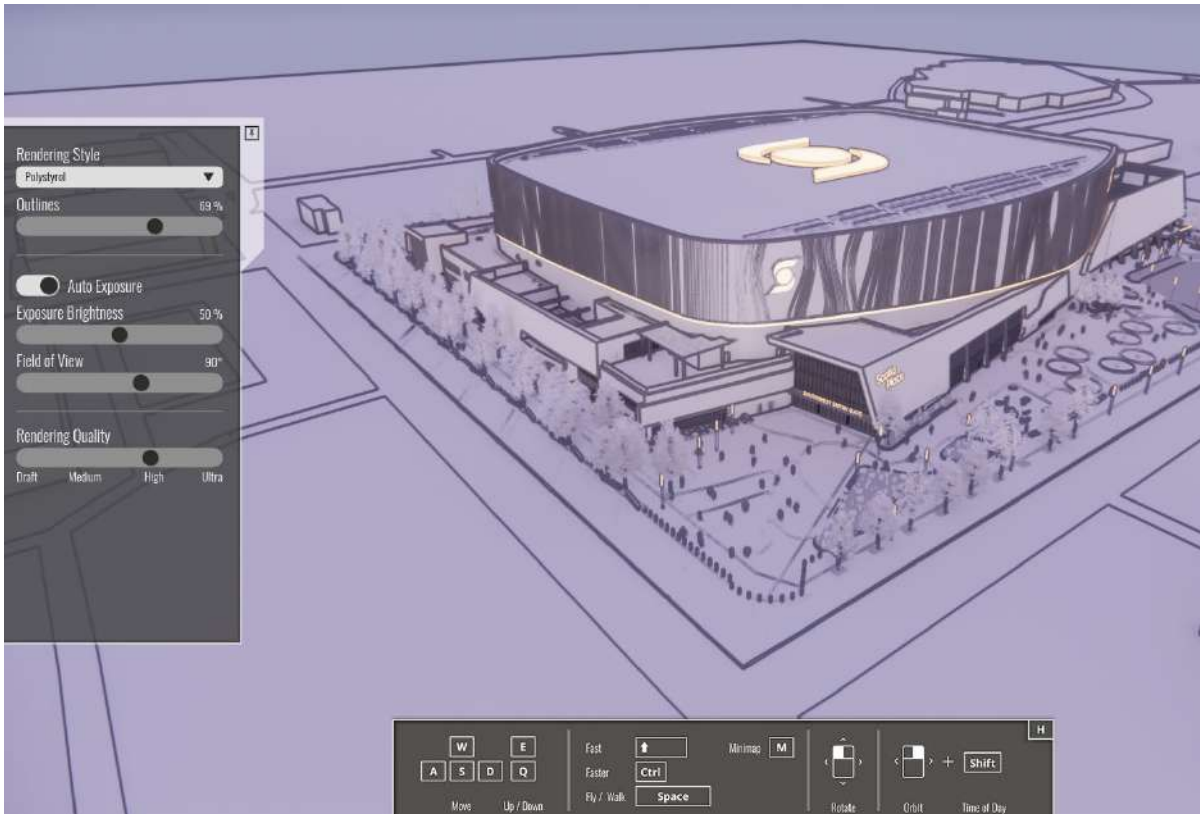
Enscape .exe file in realistic rendering mode with outlines

9.4 LAP Recommendations

Given the analysis completed, the use of Standalone Models is highly recommended for use in LAP community engagement. It is a format that is highly compatible with existing workflows within SketchUp, can very easily be updated as the project evolves, and creates diverse opportunities for interactive content. The diversity of outcomes allows for high levels of customization without additional design work. For users who are less familiar with technology, looking at static placement within the model or navigate around at their own pace. For users who are comfortable with technology, the flying or walking around features significantly increase interactive possibilities in community engagement.

This approach could be considered as a highly recommended alternative to AR, VR or more labor-intensive interactive walkthroughs that would need to be hosted on a cloud program. The efficiency of this approach aligns with the LAP quick timelines

	Conversation Enhancement	Content Comprehension	Workflow Compatibility	Demographic Diversity
Standalone Executable Export Models	✓	✓	✓	✓



Enscape .exe file in polystrol mode with outlines at night

10 Conclusion and Next Steps

Enscape Pencil Crayon Style - Included in the How To Guide for Small Scale Housing Engagement Booklet

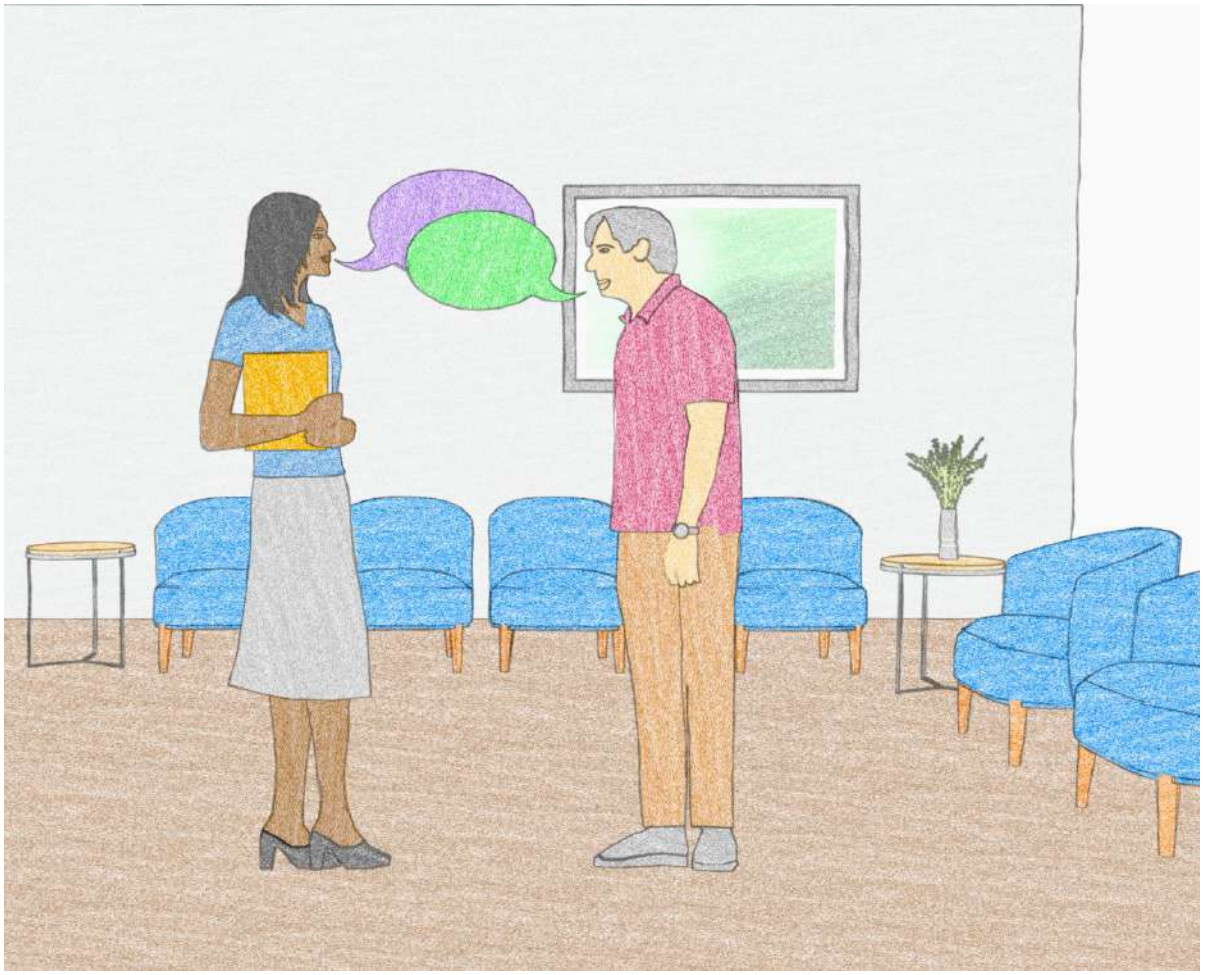
10.1 Conclusion

Given the analysis completed, there are many opportunities for interactive media and the extensive possibilities of rendering engine export options to be applied to LAP community engagement. The use of the recommended forms of media have the possibility to enhance conversations, increase levels of content comprehension, and attract a wider range of demographics to engagement sessions. The recommended approaches are also compatible with PD Design workflows and software. These approaches may also be beneficial beyond the LAP program and could be used across PDS.

10.2 Recommended Next Steps

User testing is a recommended next step that was not included in this research project. Gathering feedback from users about 3D printed models and Standalone Executable Export files in particular is an important data point that is advised.

In the future, D5 Render is recommended for any complex video content or phasing animations.



Enscape Pencil Crayon Style - Included in the How To Guide for Small Scale Housing Engagement Booklet

11. Other Projects of Interest

Augmented Reality

https://theamp.org/artwork/augmented-reality-app/

https://www.architectmagazine.com/technology/ikea-launches-augmented-reality-application

https://www.researchgate.net/publication/364943047_An_Augmented_Reality_Application_for_the_Frescoes_of_the_Basilica_of_Saint_Catherine_in_Galatina

https://www.computerweekly.com/news/450419533/Gatwick-launches-augmented-reality-airport-navigation

https://zubr.co/case-study/future-places-toolkit/

https://www.superbright.me/work/la-river/

Virtual Reality

https://medicalgiving.stanford.edu/news/virtual-reality-system-helps-surgeons-reassures-patients.html

https://blog.chaos.com/best-practices-using-virtual-reality-for-project-presentations-with-enscape

Public Engagement and Gathering Environments

https://praha.camp/en/

https://crossriverrailexperiencecentre.qld.gov.au

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Other Interactive Media

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Twinmotion. (n.d.). Twinmotion | A cutting-edge real-time visualization tool - twinmotion. https://www.twinmotion.com/en-US