TESTING VISUAL AI GENERATORS AS A TOOL FOR TEACHING & LEARNING

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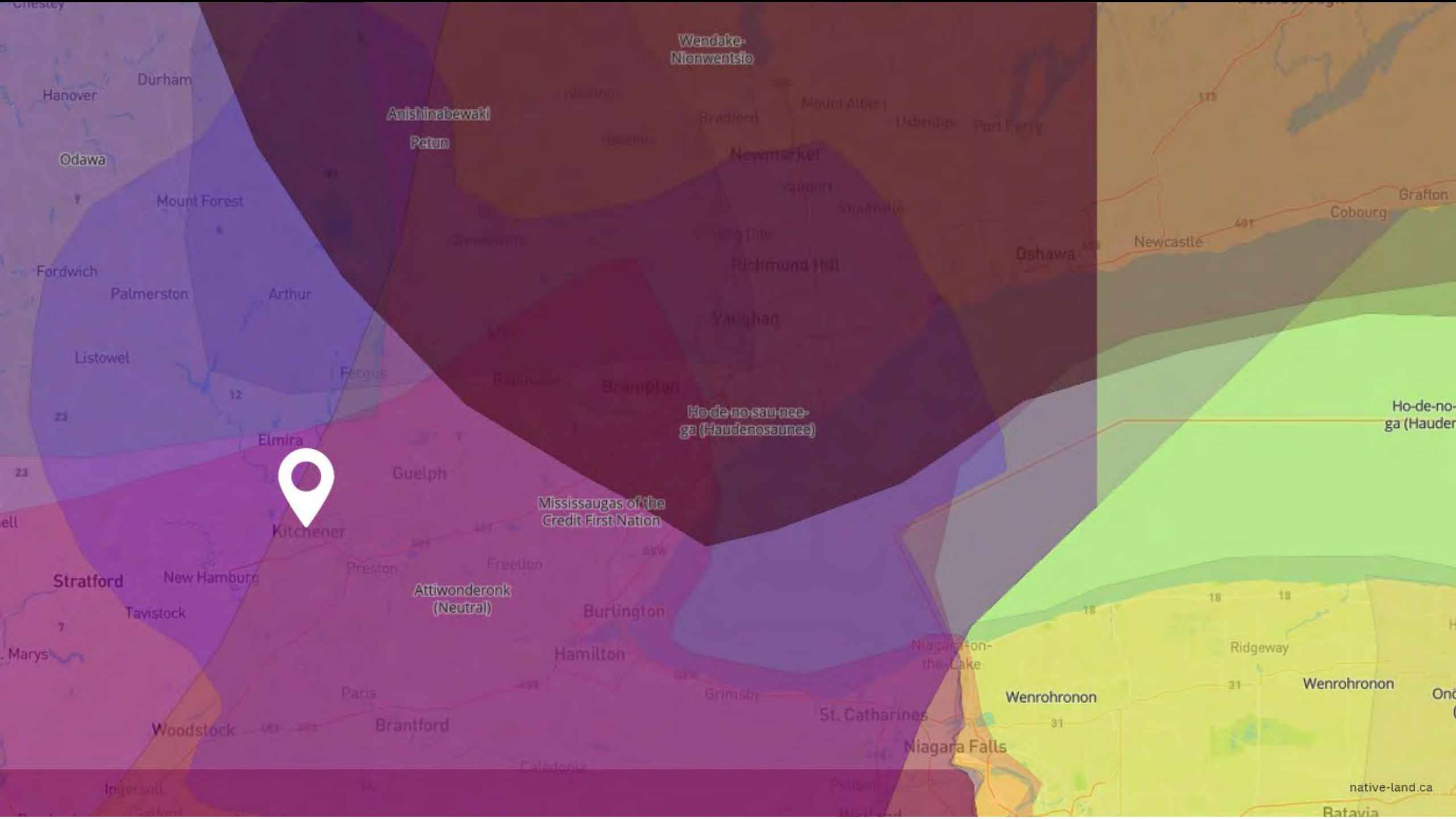
Dall-E 2 + Dylan Schnurr; Xavier Costa; Ananya Patel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Wenrohronon
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BIG TAKE-AWAYS

- Visual AI is here!
- Students are using AI.
- Potential tool for teaching & learning.
- It isn't perfect. Let's talk about it.
- Learning objective: exercise or assignment

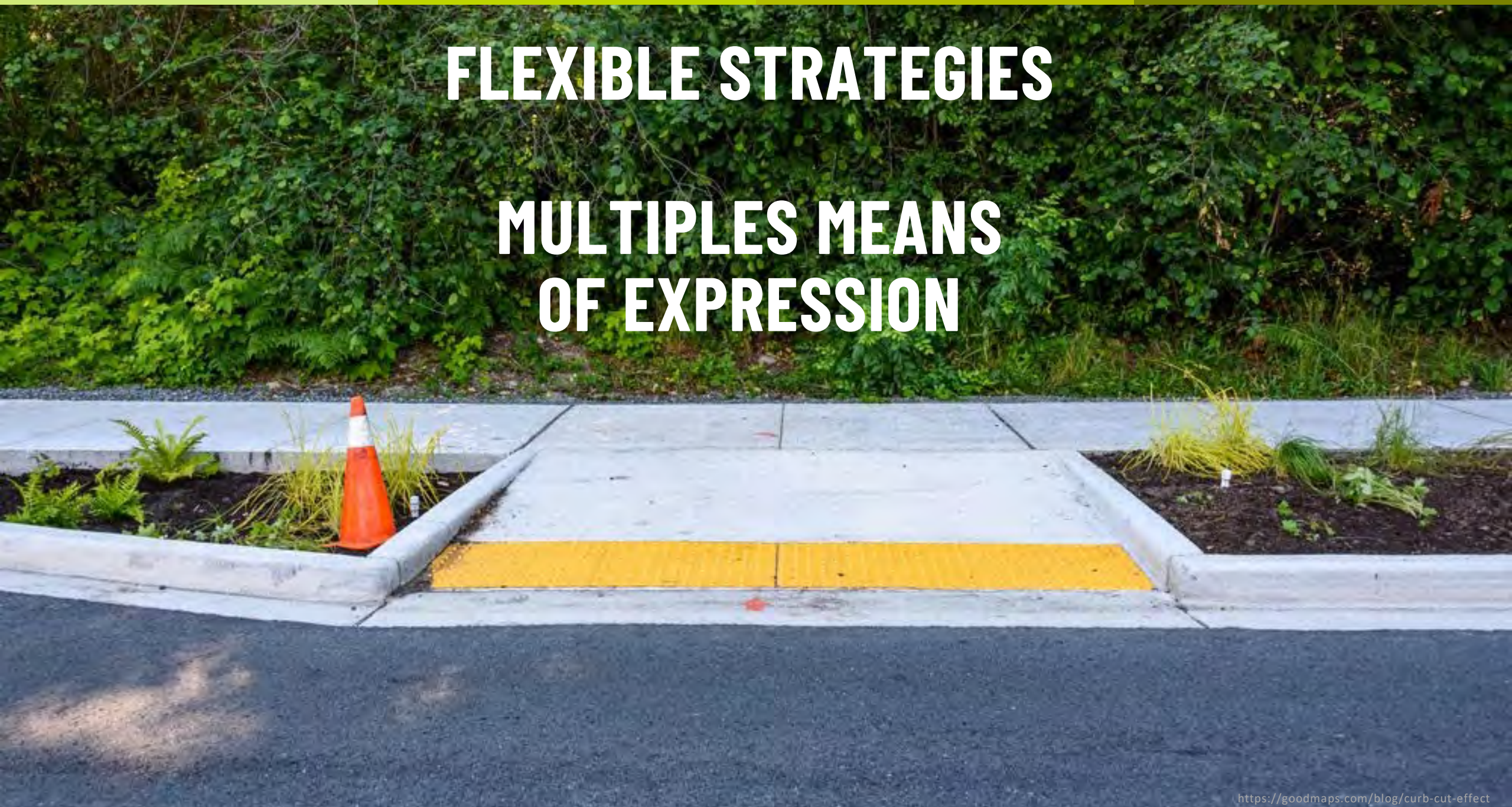
CURB CUTS FOR PARTICIPATION

A Universal Design for Learning Approach

https://goodmaps.com/blog/curb-cut-effect

FLEXIBLE STRATEGIES

MULTIPLES MEANS OF EXPRESSION



https://goodmaps.com/blog/curb-cut-effect

VISUAL AI IS

- a low-cost, low-stress, quick, and fun way to **turn ideas into sharable images**

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VISUAL BRAINSTORMING

“This is what I have in mind!”

What if [big idea]?!

How do others visualize a sustainable future?

VISUAL AI COMPLEMENTS SKILLS, NOT REPLACES

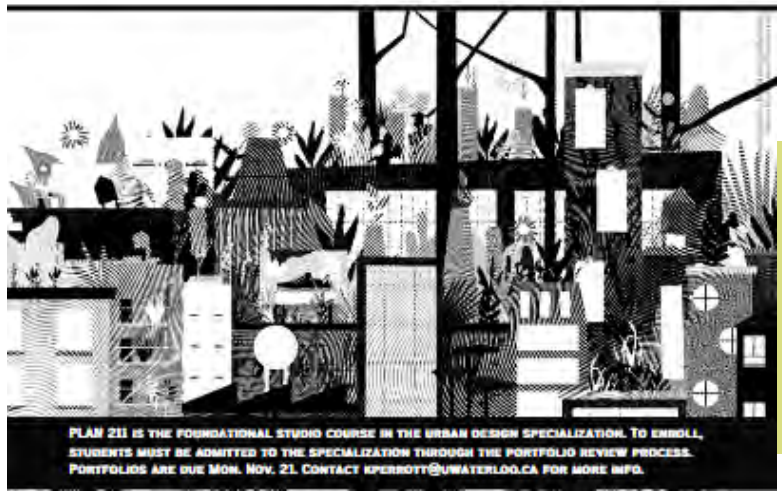
My students continue to learn a range of by-hand and digital design skills!
Real-world, existing precedents and case studies are still important!

PLAN 211, WINTER 2023

VISUALIZING A HOPEFUL CLIMATE FUTURE FOR THE UNIVERSITY OF WATERLOO

IMAGINE...

IT'S THE YEAR 2050 AND THE UNIVERSITY HAS MET ITS GOALS FOR NET ZERO EMISSIONS. WHAT DOES THIS FUTURE CAMPUS LOOK LIKE? IN WINTER 2023, PLAN 211 HAS AN EXCITING PARTNERSHIP WITH THE SUSTAINABILITY OFFICE TO PRODUCE URBAN DESIGN VISUALIZATIONS THAT CAN REFLECT, INFORM, AND INSPIRE GOALS FOR A HOPEFUL CLIMATE FUTURE FOR THE UNIVERSITY CAMPUS.



PLAN 211 IS THE FOUNDATIONAL STUDIO COURSE IN THE URBAN DESIGN SPECIALIZATION. TO ENROLL, STUDENTS MUST BE ADMITTED TO THE SPECIALIZATION THROUGH THE PORTFOLIO REVIEW PROCESS. PORTFOLIOS ARE DUE MON. NOV. 21. CONTACT KPERROTT@UWATERLOO.CA FOR MORE INFO.

CAN AI PUSH OUR IMAGINATIONS?

U of Topia - 2050

Kavishka Gomes + DALL-E

PLAN 211, Winter 2023, Dr. K. Perrott

Through my several AI generations, my focus was to create an image of a university that was centred around the themes of utopia, sustainability, walkability, and lots of green space. My initial generation consisted of the commands "green, university, sustainable, naturalistic, geese, vegetation, architecture, minimalistic, urban, solar energy, green roof, courtyard, and public square". This combination of commands resulted in a very basic image of something that could be seen in our world today. However, I felt the initial image I generated was a good foundation, therefore, I started experimenting by adding different commands on top of the commands from the initial generation to create an image that looked more futuristic. These commands included "cyber-punk, utopian city, concrete jungle, futuristic, eco-friendly architecture, and green walls." After a lot of back-and-forth experimentation with commands, my final image consists of the commands "concrete jungle, high resolution, tall buildings, naturalism, realism, crowds of students walking around, active transportation, futuristic, high density, smart city, utopian city, eco-friendly architecture, sustainable, university, skyscrapers, wooden architecture, 3D Render, 4k, ambient lighting, bridges, and green walls." I added commands such as "4k, 3D Render, high resolution, and ambient lighting" to ensure that my final image had adequate lighting and looked realistic and presentable as if I were using the image for a future development proposal.

One strength of AI is how well it formed images that were very focused on green space and big futuristic architectural concepts that will most likely be used more prominently within the next few decades. A limitation, personally, was that the people in my generations weren't as clear as I would've liked them to be, as well as that other small details that did not pixelate well. However, as a big picture, the AI generations looks decently clear. Overall, I think that AI is the future in any field, especially in the field of urban design because I believe that AI generated images help spark new, innovative, and ground-breaking design ideas. I also think it should become an industry standard to use some form of AI in the field of Urban Design as it is a great tool to help create and express images that you visualize in your head.

tomorrow's

TERRA FIRMA

By: Mariella Leccese + DALL-E

PLAN 211, Winter 2023, Dr. K. Perrott

Describe your image objective and AI generation process. My objective for this image was to create a visualization of a sustainable built environment that prioritizes the natural environment and targets solutions that neutralize operational carbon. The AI generation command inputted into DALL-E was "3D rendering of contemporary buildings with solar panels and roof-top gardens + people riding electric bicycles and walking on paths." While little edits had to be made to generate this image, an edit command I made was "add a colourful paved pathway." Colour is extremely important to me in the urban design context because I think it brings life and culture into a functional-based design. The AI generation process perfectly captured the eco-friendly nature that I had in mind for a sustainable future university as greenery is a dominant characteristic in this image. However, throughout the process, DALL-E lost track of minor details as the command became lengthier. For example, it did not fully represent people riding electric bicycles as intended.

Take a stance on the question: Is AI the future of Urban Design, why or why not? I believe AI will have a presence in urban design in the future, but I do not think it will be *the* future. AI has many technological capabilities such as being able to convert simple text into visualizations to benefit brainstorming and problem-solving processes by respectively generating designs for inspiration and solutions. On the other hand, urban designers tend to have pre-conceived ideas for a given space, and through experience, AI could not fully capture what I had envisioned. Additionally, AI would have to be able to evolve frequently and quickly to new terms, phrases, and concepts used by urban designers and adjacent fields which can become challenging. Essentially, AI would enable open-minded thinking; however, its limitations may only make it an intrinsic step in the design process.

THE FUTURE OF UNIVERSITY CAMPUSES

IS IT GREEN?

By: Dylan Schnurr + DALL-E

Plan 211, Winter 2023, Dr. K. Perrott

My goal was to generate an image that emphasizes outdoor education spaces. I firmly believe that outdoor educational spaces create positive learning environments and create spaces where creativity and collaboration flourish. As educational institutions are often known for their innovative and cutting-edge architecture, it was essential to create buildings with a lot of visibility of these outdoor spaces to give those inside the same benefits that they would have being outside. The initial command into DALL-E was a "futuristic utopia university campus with a lot of trees, ecologically friendly, sustainable, outdoor seating, lots of people walking around, busses, green transit, year 2100," which provided the majority of the rendered image. A few sample edits were made, primarily in the interiors of the courtyards and surroundings of the buildings, with the prompts "add outdoor seating" and "add outdoor classrooms" to truly capture the image of a campus with an emphasis on outdoor education. Similarly, I used the commands "add large courtyard" and "increase walkways" to create more spaces in the back right of the campus. DALL-E understood the prompts of emphasizing greenspace and outdoor seating areas but did not understand how to link pathways together and struggled to add trails underneath some of the seating areas, taking realism out of the rendering. When I prompted DALL-E to add transit options, like bus networks, it failed to smoothly and realistically integrate the network onto the existing pathways.

I believe that AI has a future in Urban Design, but only with the assistance of the design process. I firmly believe that Urban Design is an intimate process where one needs to have complete knowledge and understanding of the local context, including the history of the area and its people, along with the surrounding character of the buildings and neighbourhood around it, to entirely create a design that will remain timeless within that particular area. AI cannot fully capture the true character and vibe of space quite as one-on-one interactions or town halls can. Humans can effectively put thought and effort into minuscule details every step along the way. In contrast, computer algorithms cannot do an area justice to the same level of detail and care for the local context.

That said, however, AI provided me with structures that I had never even imagined, with each initial drawing featuring different layouts and building shapes along with different overall features. AI is a great starting point, allowing designers to visualize ideas for a particular area quickly, and then from those ideas, more personal, thought-out designs can be implemented. With technology constantly advancing, AI software will ultimately become more realistic and detailed, providing designers with a plethora of new ideas and styles, all with the quick push of a button.

Visually brainstorming sustainability with DALL-E 2

Final visualizations using SketchUp, TwinMotion, Photoshop, Illustrator & InDesign

CLIENT: University of Waterloo Sustainability Office
COURSE: University of Waterloo, School of Planning: PLAN 211 Design Studio Foundations. Instructor: Dr. K. Perrott,
Student work shown by Ealy Fong+DALLE2 & Ealy Fong

Visually brainstorming sustainability with DALL-E 2

Final visualizations using SketchUp, TwinMotion, Photoshop, Illustrator & InDesign

CLIENT: University of Waterloo Sustainability Office
COURSE: University of Waterloo, School of Planning: PLAN 211 Design Studio Foundations. Instructor: Dr. K. Perrott,
Student work shown by Khalil Heron & DALLE2 +Khalil Heron

Visually brainstorming sustainability with DALL-E 2

Final visualizations using SketchUp, TwinMotion, Photoshop, Illustrator & InDesign

CLIENT: University of Waterloo Sustainability Office
COURSE: University of Waterloo, School of Planning: PLAN 211 Design Studio Foundations. Instructor: Dr. K. Perrott,
Student work shown by Cherilynne Chau & DALLE2+Cherilynne Chau

Visually brainstorming sustainability with DALL-E 2

Final visualizations using SketchUp, Lumion, Photoshop, Illustrator & InDesign

CLIENT: University of Waterloo Sustainability Office
COURSE: University of Waterloo, School of Planning: PLAN 211 Design Studio Foundations. Instructor: Dr. K. Perrott,
Student work shown by Micheal Glazyrin & DALLE2 +Micheal Glazyrin

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Kitchener-Waterloo · Photos

These University of Waterloo students reimagined a more sustainable campus using AI

AI system called DALL-E can design images based on written prompts

Aastha Shetty · CBC News · Posted: Feb 18, 2023 6:00 AM EST | Last Updated: February 18

University of Waterloo students Myah Sachedina (top) and Khalil Heron used artificial intelligence to help create an image of a more sustainable life on campus. Sachedina's creation is on the top left and Heron's image is on the bottom right. (Photos submitted by Katherine Perrott, Myah Sachedina and Khalil Heron)

4 comments

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Using AI (DALL-E 2) to Visualize the Future in PLAN 211

FRIDAY, FEBRUARY 3, 2023

This year, the PLAN 211: Design Studio Foundations course, taught by Dr. Katherine Perrott, has partnered with the Sustainability Office to produce urban design visualizations that explore the possibilities of what the future of the University of Waterloo campus could look like when meeting the University's sustainability goals. The students' first project was to create a general idea of a sustainable campus by submitting prompts into the new cutting-edge technology: DALL-E 2.

Pictured from left to right: Valentina Casas, Paige Thompson, Kavishka Gomes, Tim Ross & Michael Barone.

DALL-E 2 is an artificial intelligence (AI) system that can design an entire image based on written prompts and was created by the same developer as ChatGPT: Open AI. It can recreate photos and art in a range of artistic styles, or design something never seen before. DALLE-2 opens many possibilities for creation and discovery. Being new, there is still much to discover about the platform and its potential. For design instructor Dr. Perrott, "it is important to show students how AI can be an appropriate tool for idea generation and exploration as long as students clearly acknowledge AI use as part of the broader creative process." Her goal is to facilitate opportunities for students to critically engage with, and evaluate, new technologies like DALLE-2.

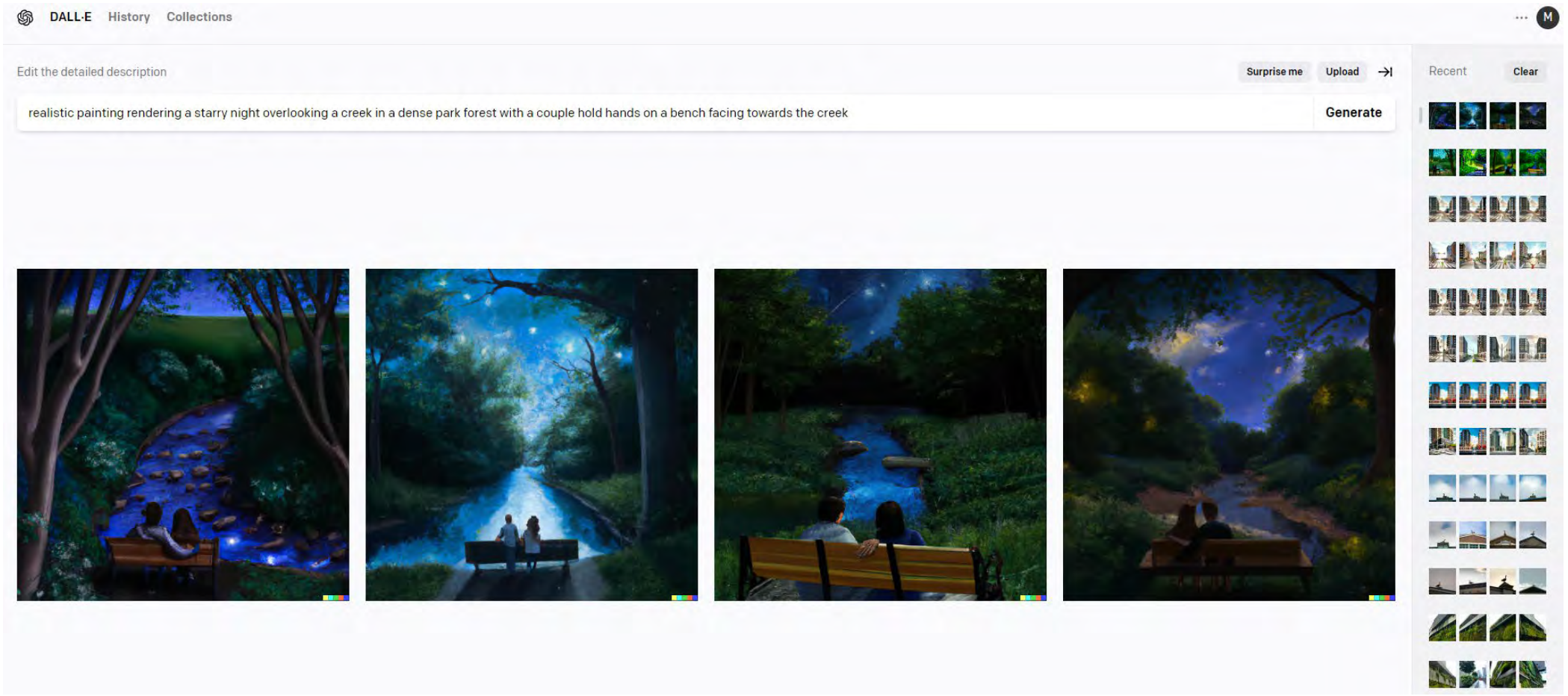
In this project, students were asked to start with an initial command for DALL-E 2 that captured components of a sustainable campus. They then continued to add commands and edits until the displayed image aligned with their vision. Students created posters with their images and a brief discussion about the strengths and limitations of the platform. The students took a stance on the question: "Is AI the future of Urban Design?" Students identified the limits of an algorithm for replicating the contextual knowledge, critical perspective, attention to diversity, and nuanced iteration of a human designer, but they recognized the power of AI to quickly turn ideas into images. These technologies are becoming increasingly powerful and accessible and as one student, Myah Sachedina, concluded: it's not a question of if AI will be the future of urban design, but rather: "What will the future of urban design look like with AI?"

The final product is a studio gallery wall showcasing unique visualizations of what a sustainable future

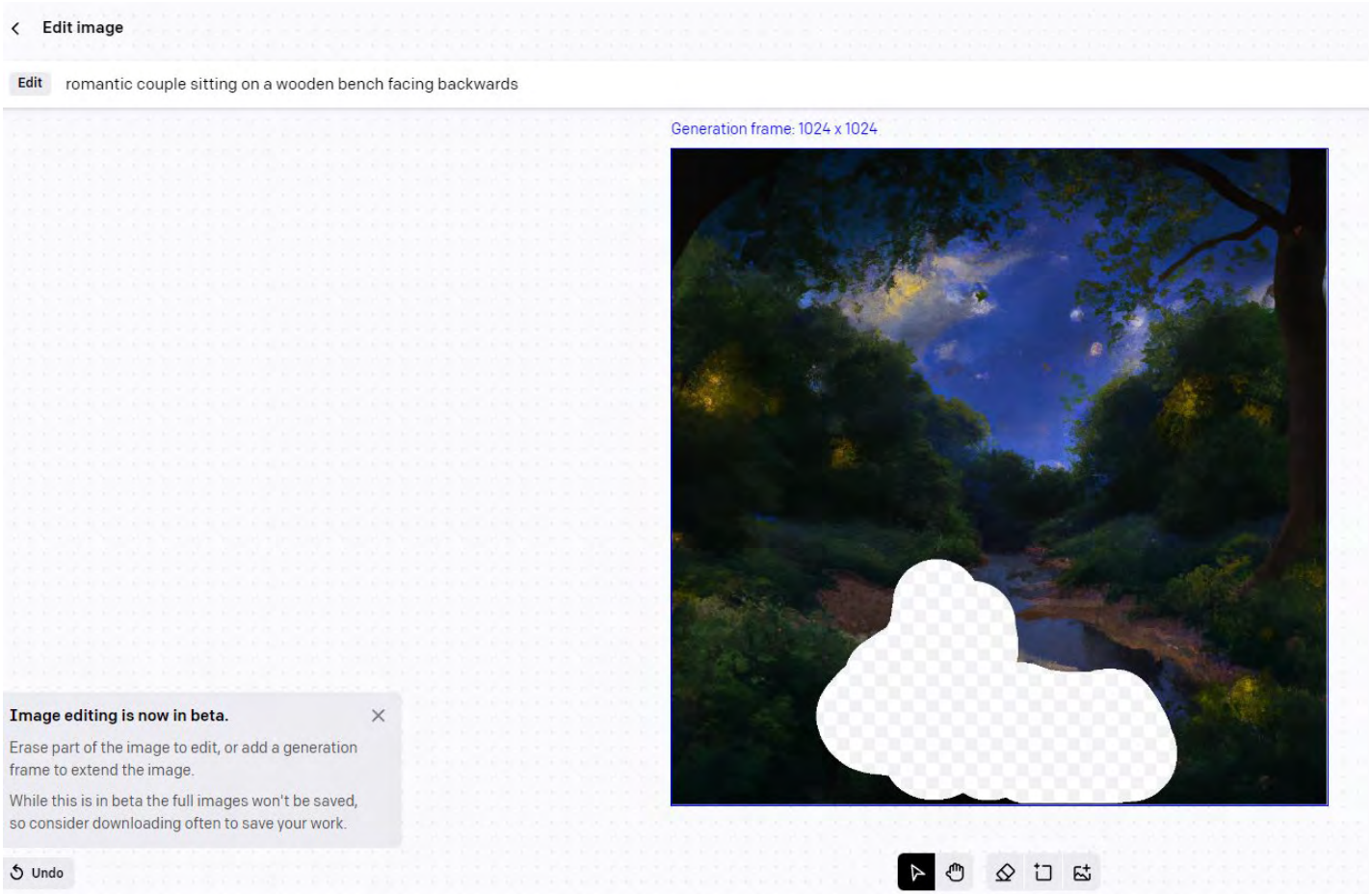
UW-TMU Student Conference

PLAN 210 FALL 2023

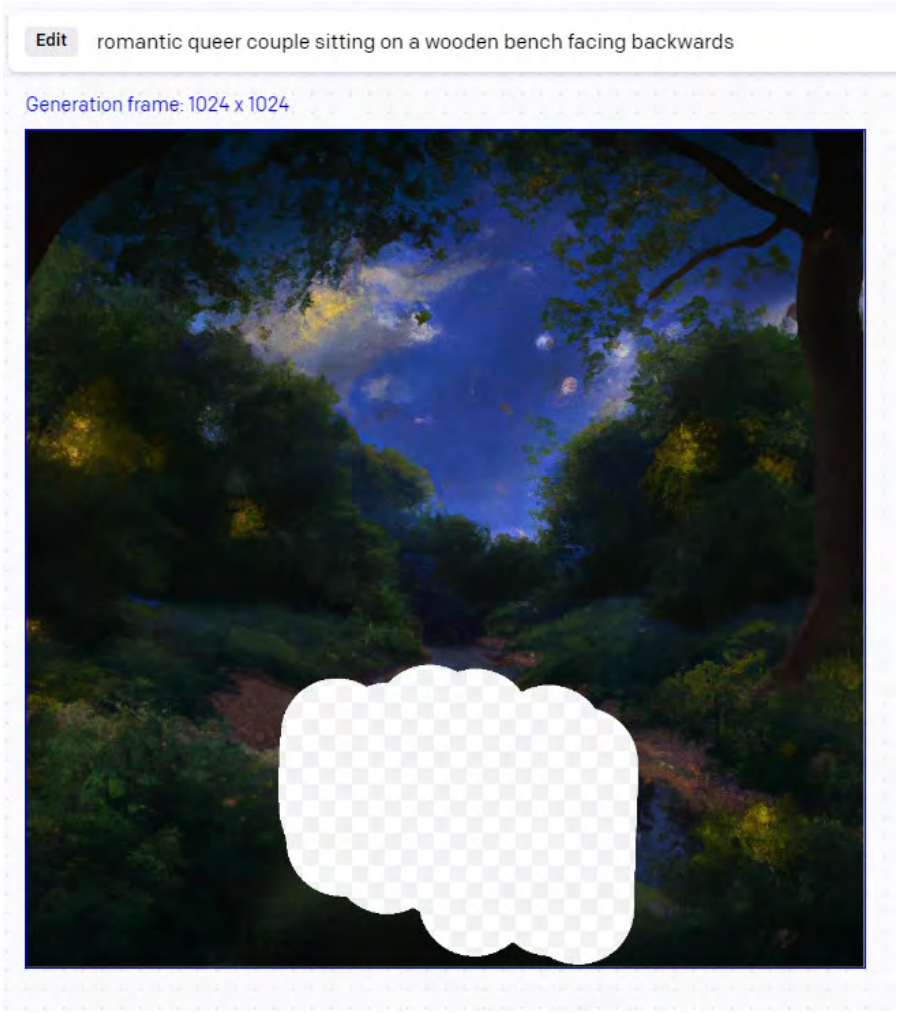
DEMO: DALL-E - Image generation



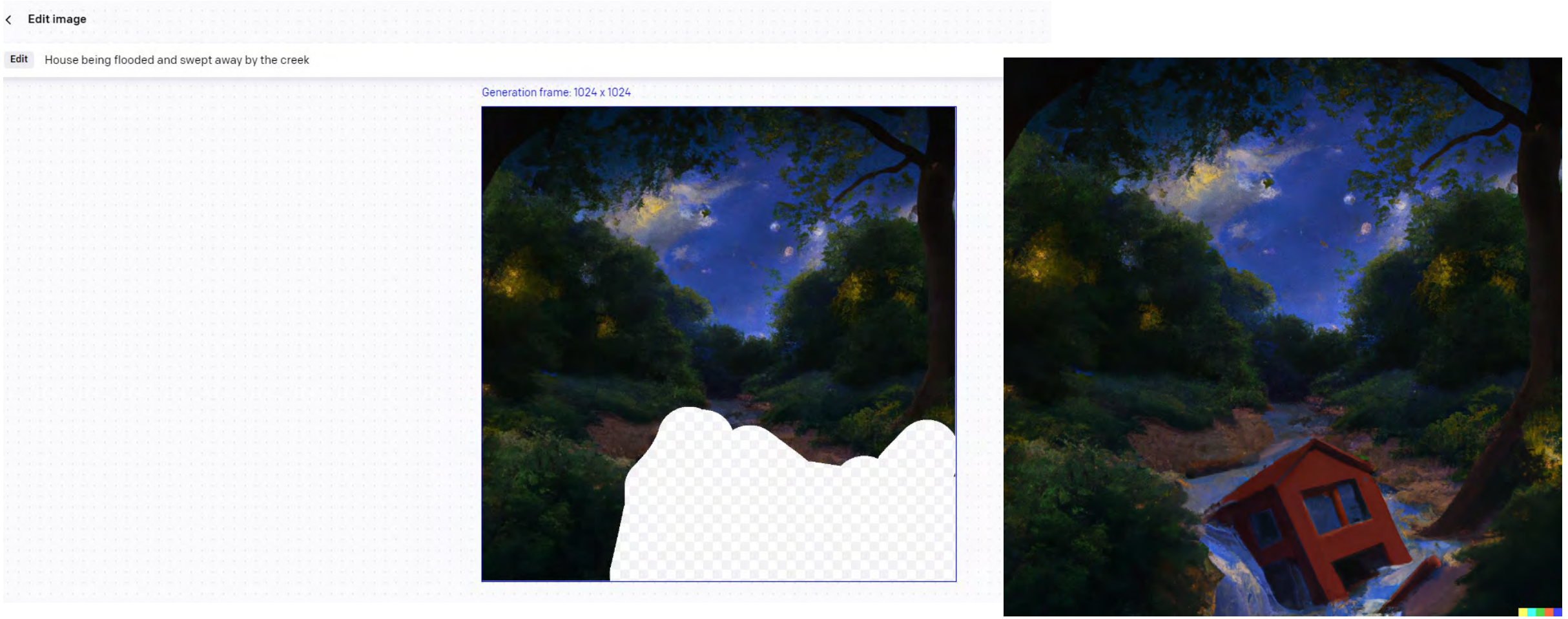
DEMO: DALL-E – editing capabilities – “inpainting”



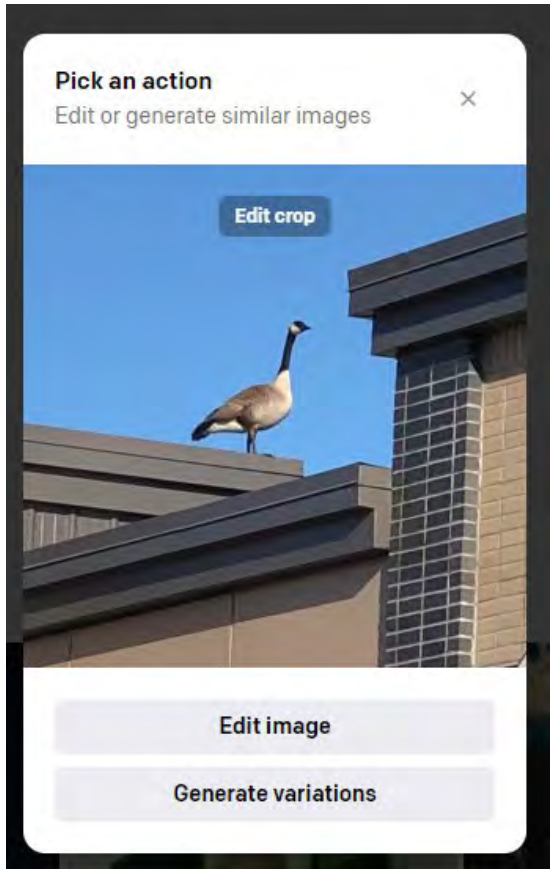
DEMO: DALL-E – editing capabilities – “inpainting” - Bias

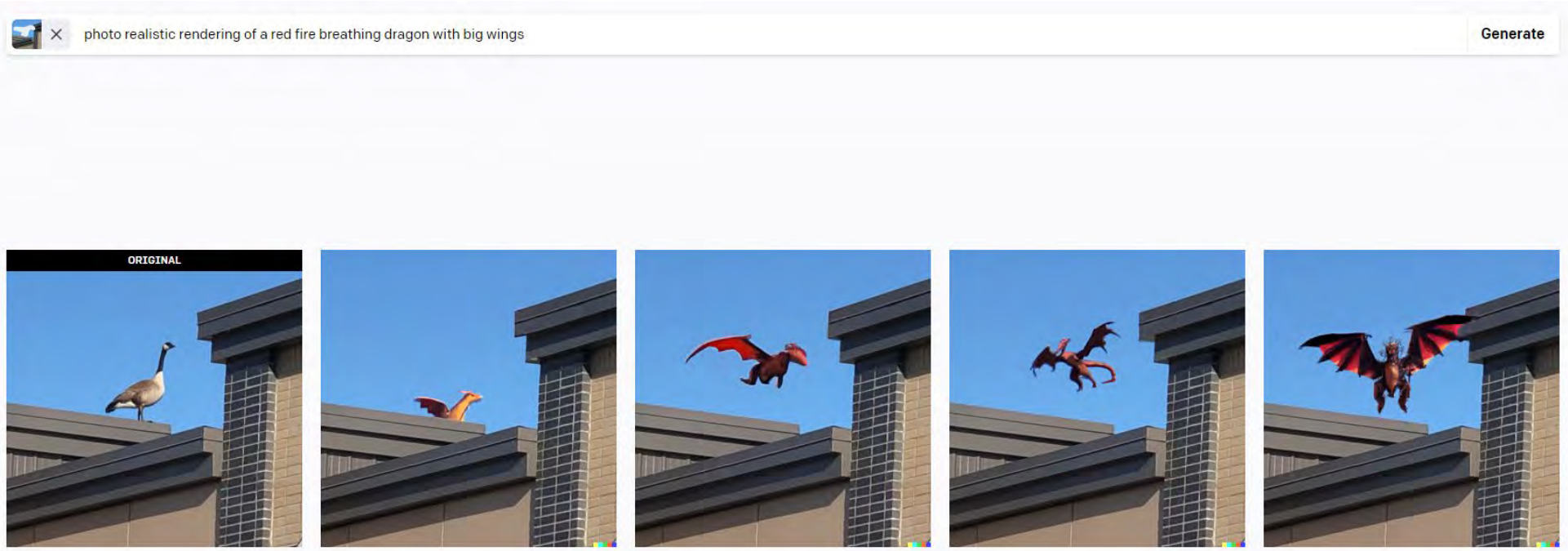


DEMO: DALL-E – editing capabilities – “inpainting”

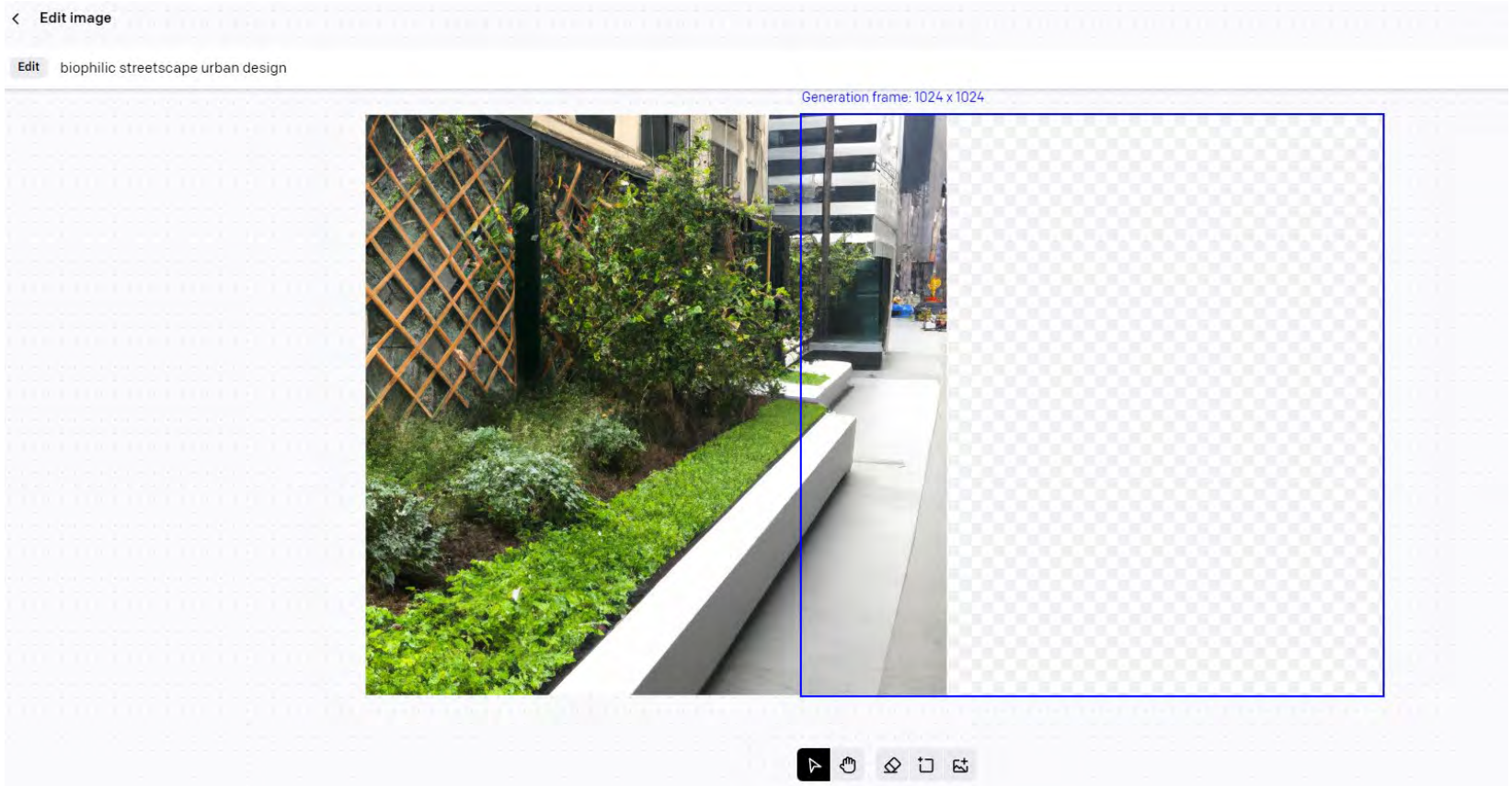


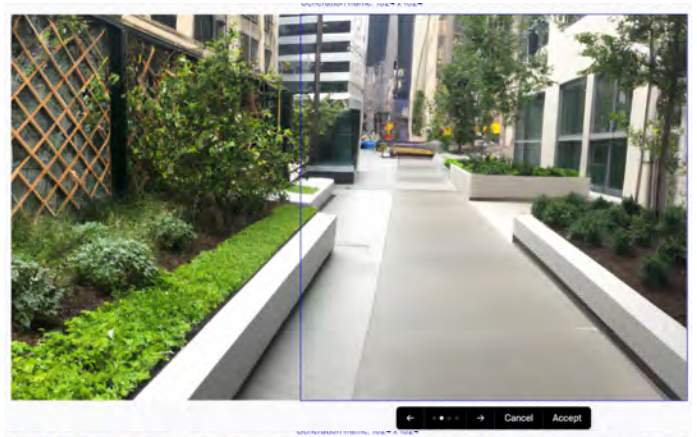
DEMO: DALL-E – editing capabilities – “inpainting” a photo



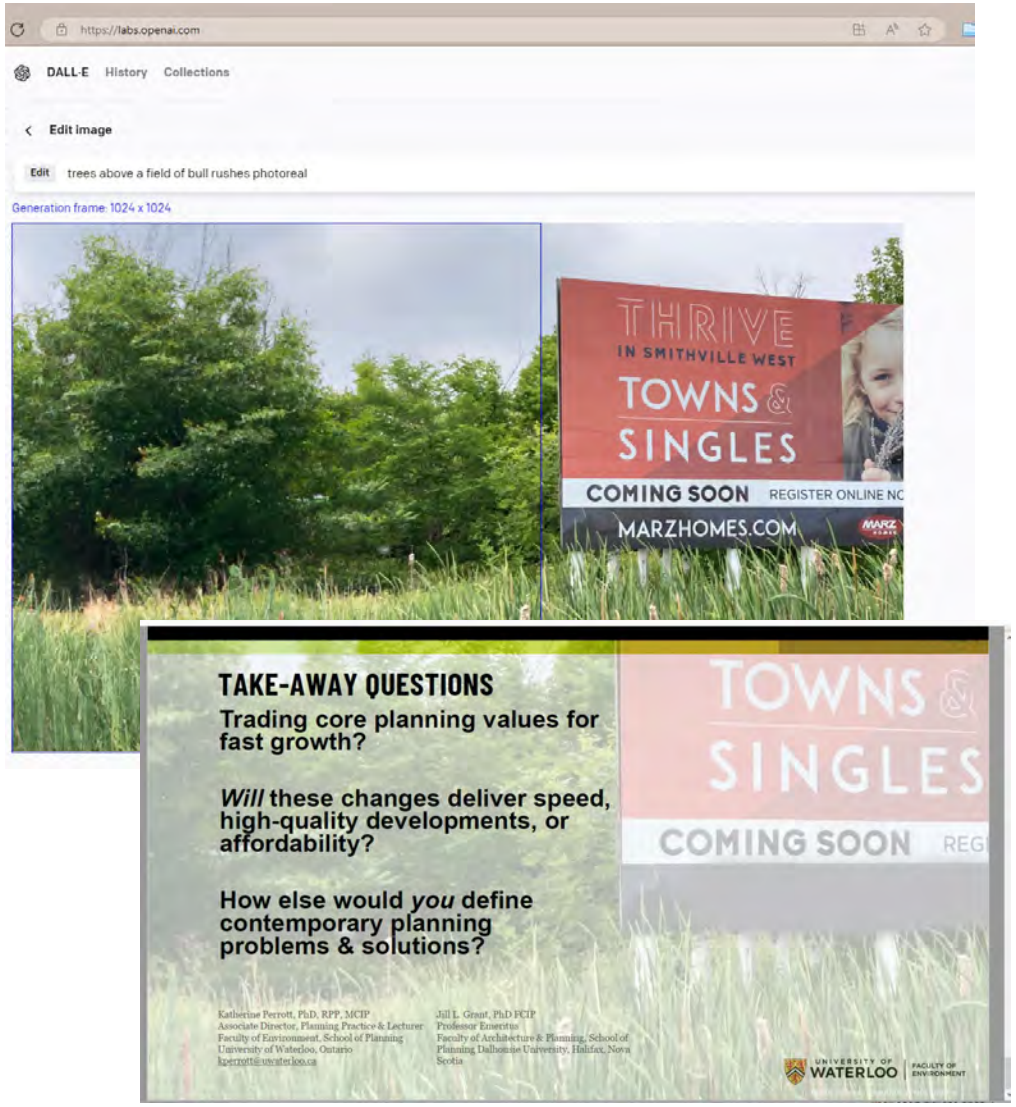


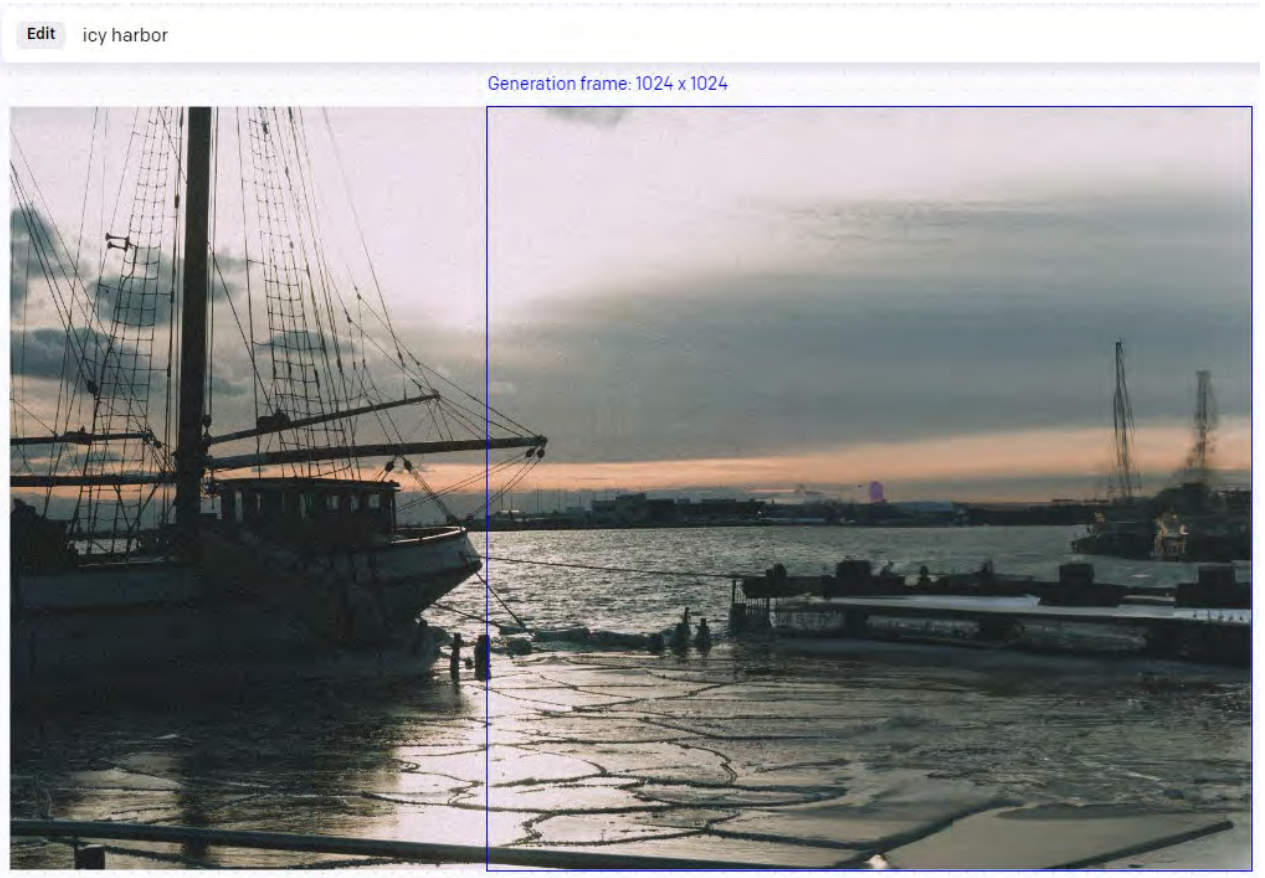
DEMO: DALL-E – editing capabilities – “outpainting”





DEMO: DALL-E – editing capabilities – “outpainting”





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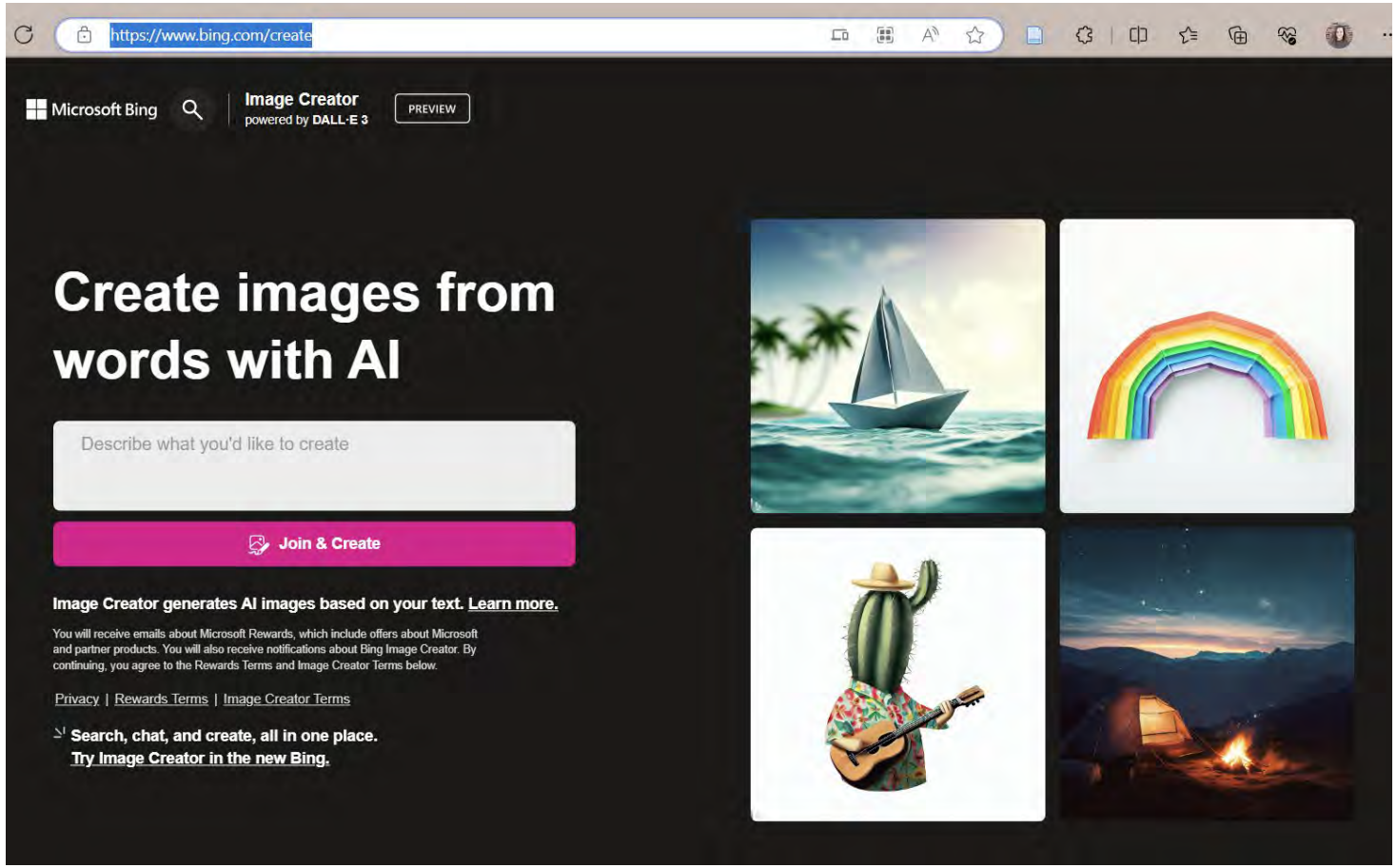
INTERACTIVE: Get into Microsoft Bing Image Creator

https://www.bing.com/create

Login to your personal Microsoft account, or quickly create one if you don't have one yet.



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INTERACTIVE: Generate an image with the same prompt

Prompt: A happy Canada Goose sitting in a blue lecture hall during a presentation

Show each other.
What did you get?

How to write a good AI prompt

- Stick to a single clear idea
- Be specific about the clear idea
- Style it

Clear Ideas	Specificity	Style it
- University campus - Subway - Clown - Goose	- Crowded - Red - Laughing - Gigantic	- Oil painting - Photorealistic - Scary - Colourful

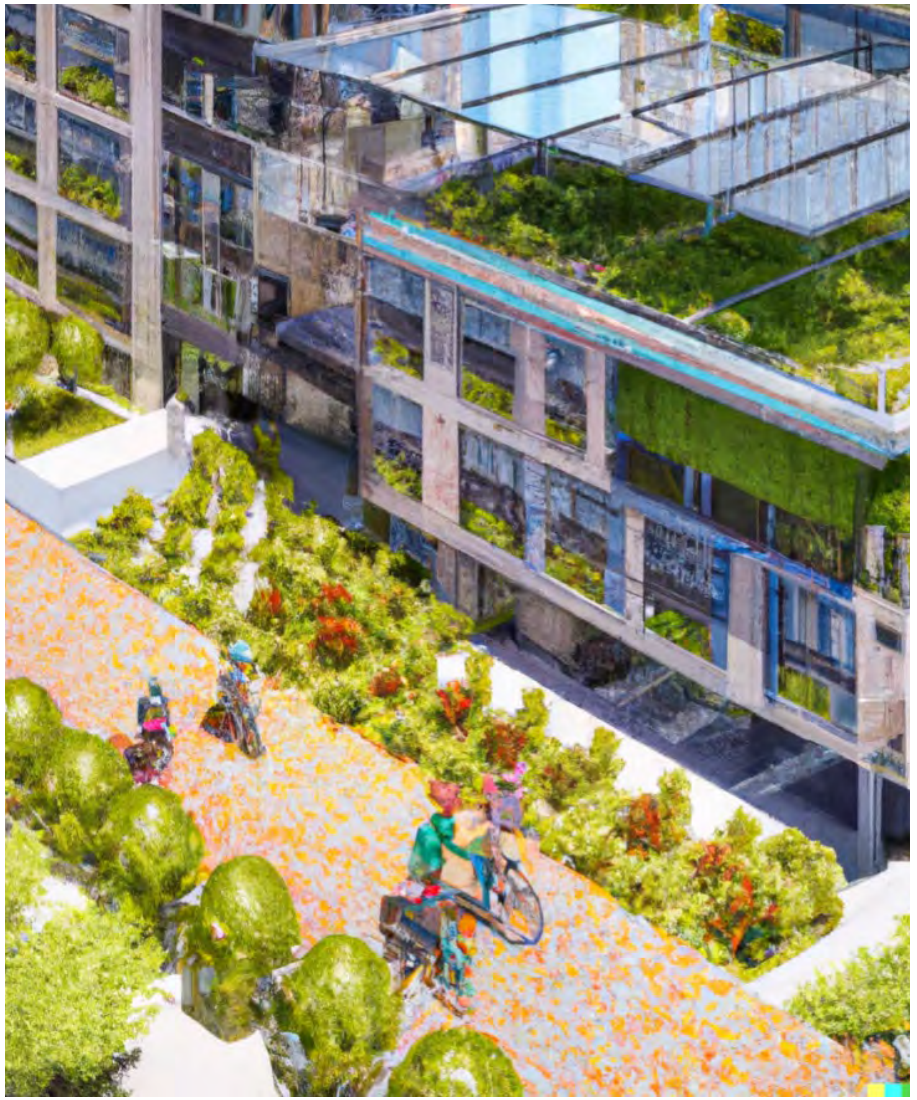
INTERACTIVE: Create an assignment using visual AI

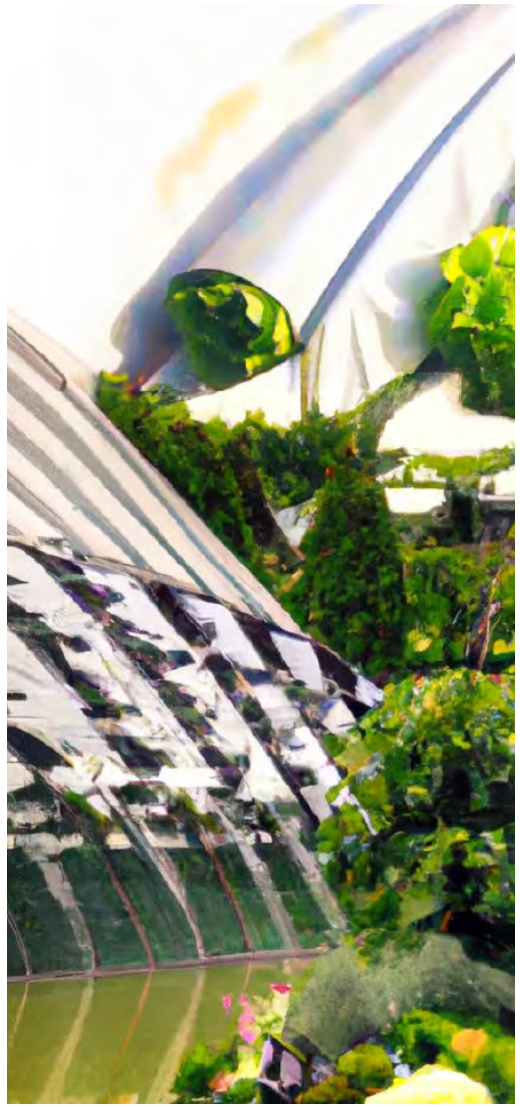
- Course
- Grade weight
- Stand-alone or part of a bigger assignment, or an in-class activity
- Learning Objectives
- Generative AI + _____
  - Comparison to exemplar or principle
  - Reflection component
  - Brainstorming (demonstrate iteration)
  - Labeling/notations
  - Critique
- Assessment

CTE, UW, Bloom's

FINAL REFLECTIONS

- AI Offers both potential and limitations.
- Contextualization, reflection & debate is necessary.
- Limited by what's on the internet – radical imagination demands more.





Dall-E 2 Mariella Leccesse; Ananya Patel

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How might you use Visual AI generators in your courses?
What potential opportunities and limitations do you think visual AI holds?

Thank you! Connect: kperrott@uwaterloo.ca and on LinkedIn.