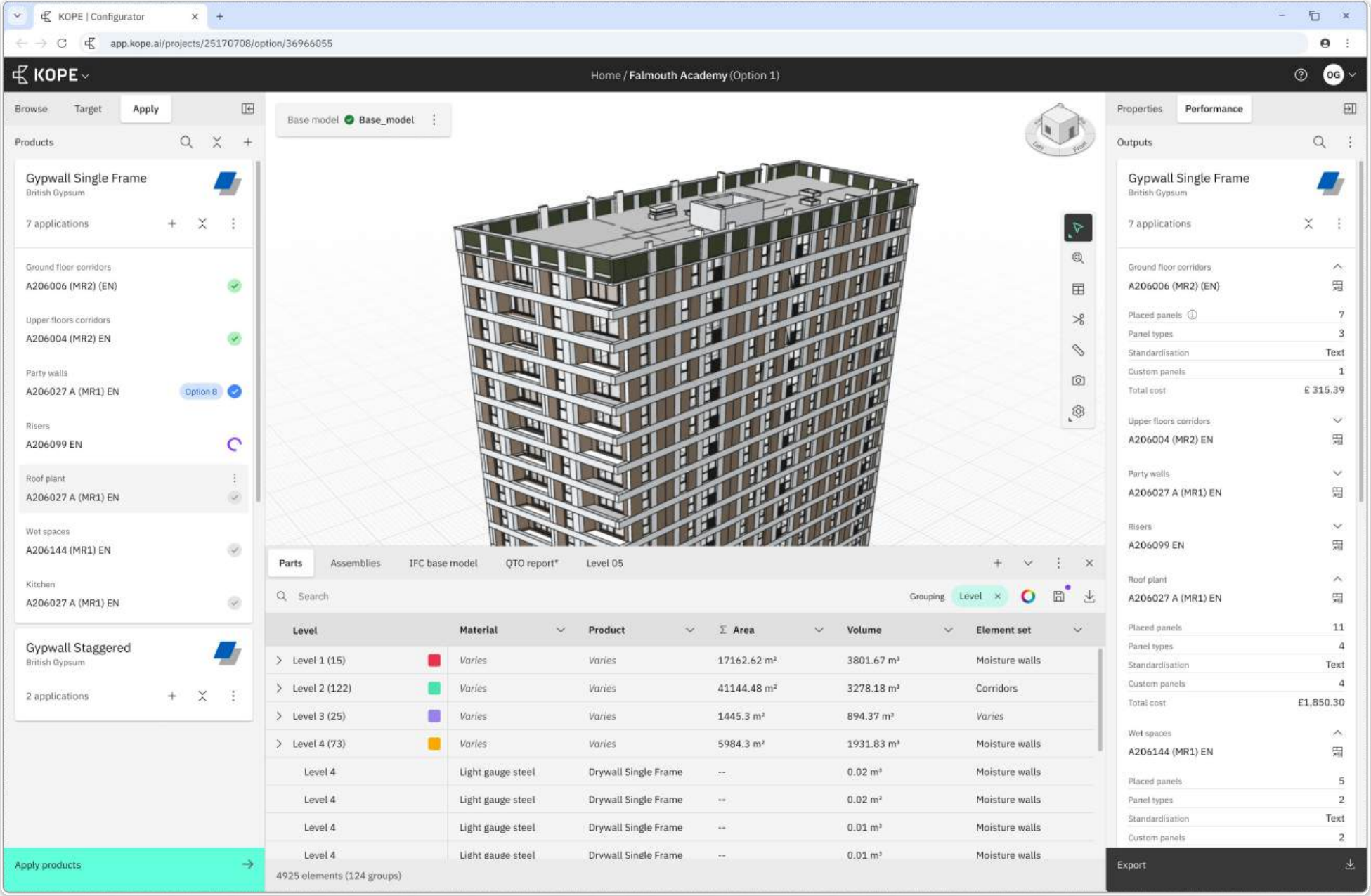
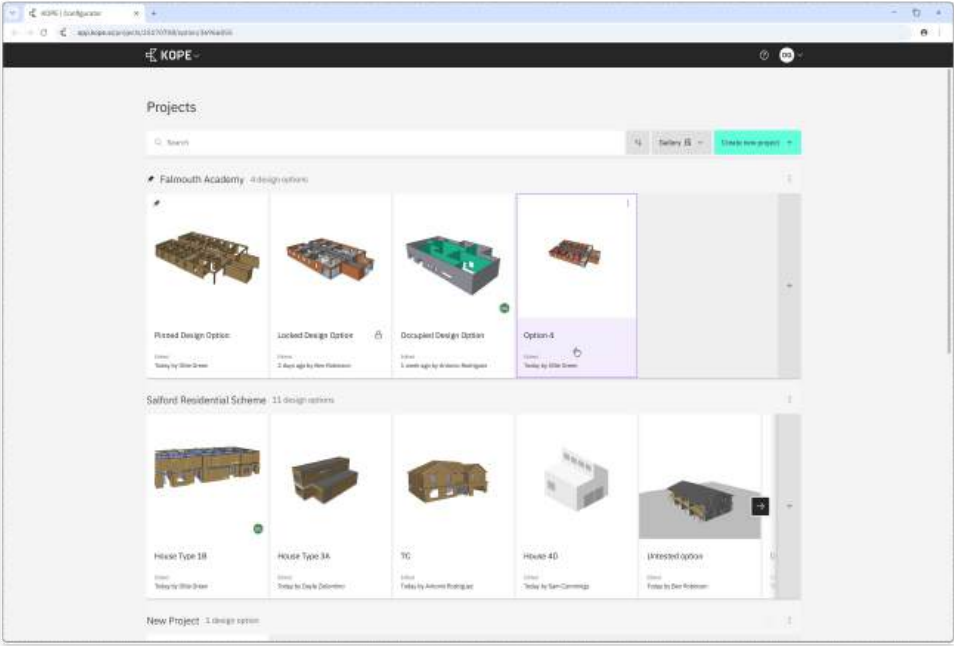
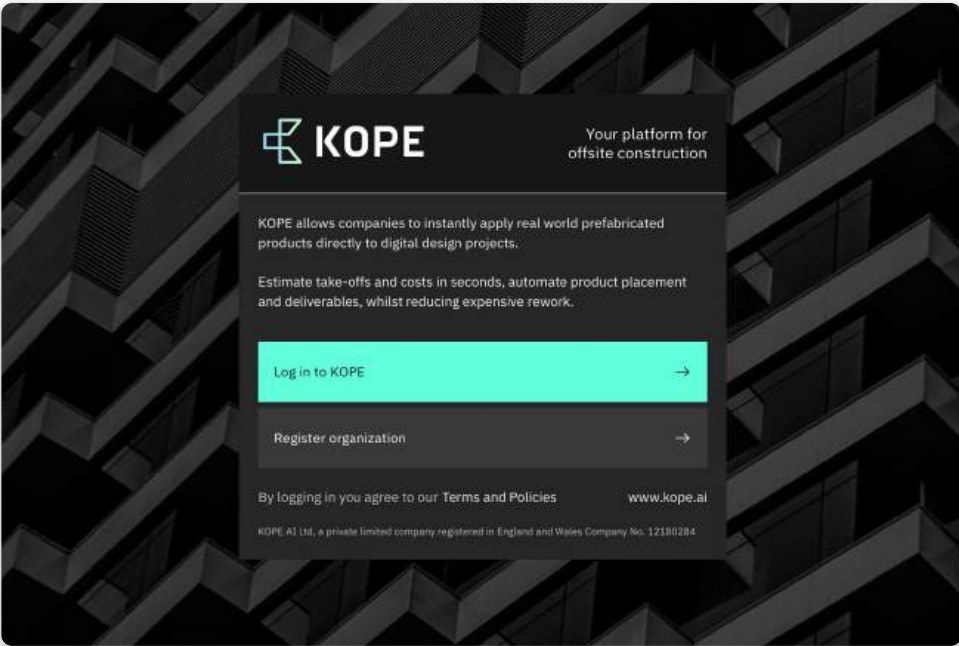




DIGITAL PRODUCT MANAGER

PORTFOLIO



KOPE

Configurator platform for industrialized construction

2022 - 2026

Working on the KOPE platform has been a large part of my life for the last four years. When I joined the team, our startup was small and operating mostly as a consultancy. During these years, I have been fortunate enough to lead the vision, roadmap, go-to-market and design of our flagship app, bringing it to where it stands today.

KOPE was conceived as a global platform for offsite construction. Its origins are in our early days as a consultancy, as we were frequently undertaking contractual work, building process automation and design tools for manufacturers within the construction sector. As our experience grew and our technological approaches matured, the idea of a general platform to host and consume these naturally began to emerge.

I joined KOPE when it was still being marketed as a generic workflow automation tool, allowing users of all stripes to upload and interconnect their own custom C# functions, executing them in our cloud. I suggested we pitch ourselves as a place to simply let the industry ‘apply products to their projects’. Since then, we have never looked back.

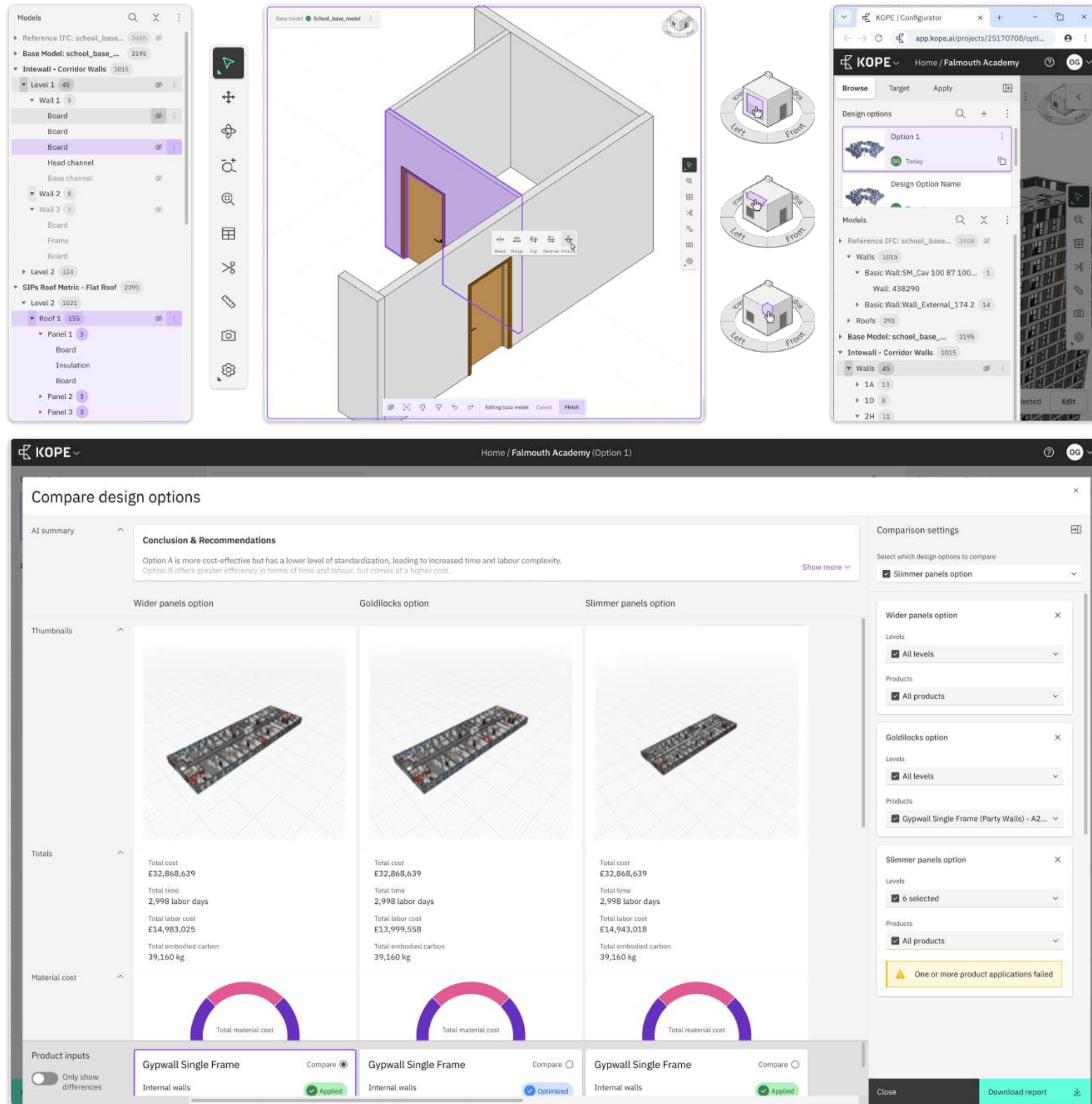
At KOPE I lead the platform team, a mix of front-end, back-end, DevOps and QA developers. I maintain a six-month roadmap using agile methodologies, overseeing delivery and collaborating with others to integrate user feedback, finding sensible solutions and ways of achieving our goals given resource constraints.

The KOPE app is a multiplayer B2B SaaS platform, built on Vue3. Central to this, is our project configurator environment; a highly flexible, dynamic environment, designed to give the user all the tools they need to carry out their project work. The core of the configurator orbits around a highly performant Three.js viewer, which we optimized to handle large and detailed building models.

At its heart, KOPE lets users apply a wide library of different construction products to their building designs, resolving them to a manufacturing level of detail within minutes (or even seconds). Each product is configurable according to the logic, options and limitations of its manufacturer. It also embodies information about its certified performance, allowing it to be discovered via the search engine in our sister app, KOPE Market.

The configurator’s datatable is a core feature of the environment, acting as a powerful, flexible toolkit for interrogating, grouping, searching and filtering data, creating reports and data visuals.

Products are targeted to various parts of the underlying building design via user-defined logic, using our flexible element set UI. When performance needs to be pushed to its limits, users are able to take advantage of our multi-objective evolutionary optimization technology.



KOPE

Configurator platform for industrialized construction

2022 - 2026

Creating a single-page configurator environment such as KOPE's has required exhaustive and rigorous UI specification and testing using Figma. Mockups have been prepared for a vast array of UI states, using hundreds of custom, battle tested components. A level of focus was brought to this task via an early business decision to align with IBM's Carbon Design System wherever possible.

A core part of our product vision is making the environment entirely no-code. This presents a number of difficult UI/UX challenges. The build-up of each product is geometrically complex and often unique. The user needs to be able to define spatial layout logic for a range of scenarios - punched hole openings in walls, edges, corners and intersection details - across a range of framing and boarding layers using different materials.

Furthermore, manufacturers have extensive product libraries that often reuse their detailed componentry across their product lines, so an element of reusability requires the existence of a product part library, which itself needs to be easily maintainable.

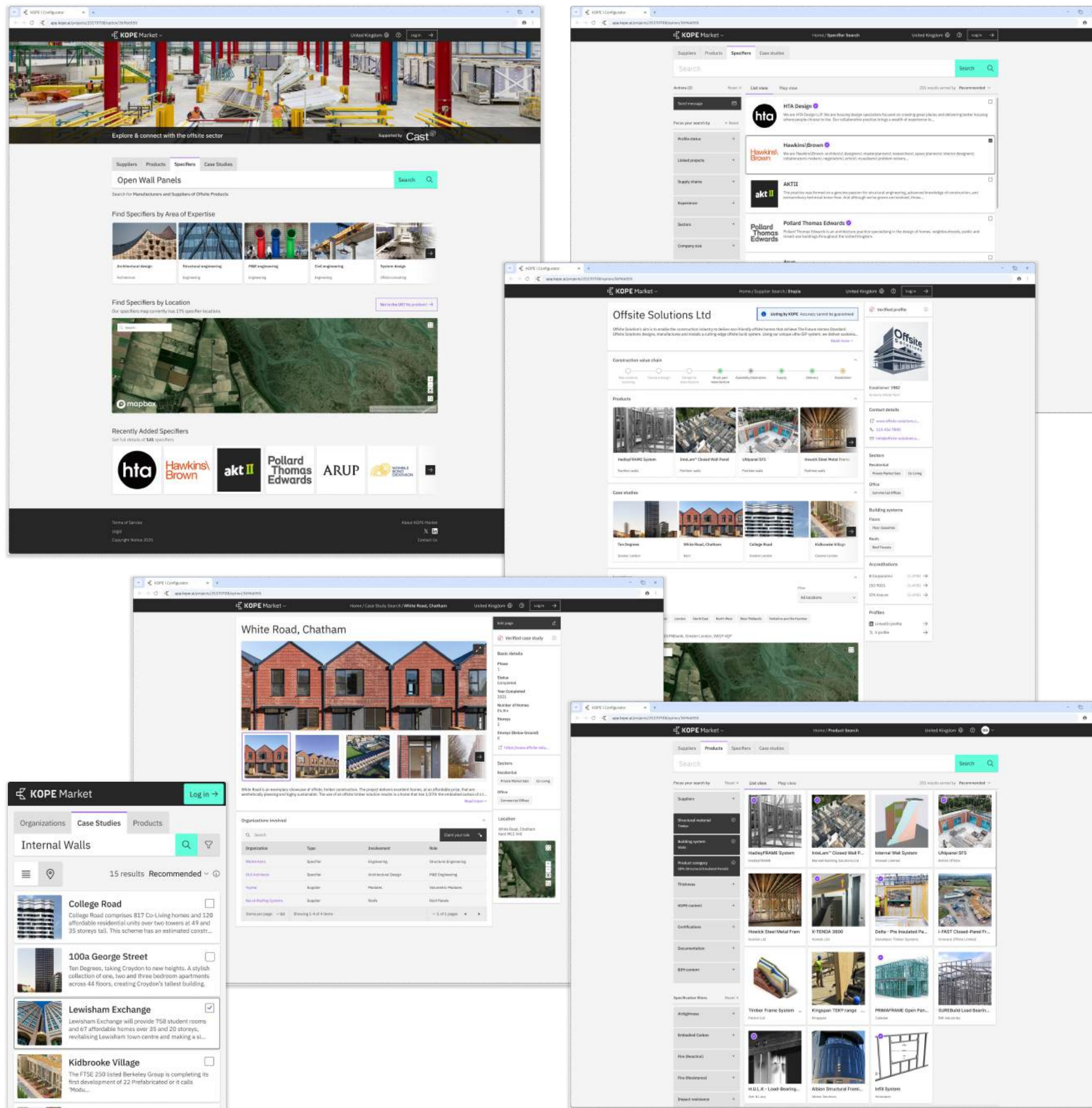
All important data for products must be overridable. Properties such as costing logic, embodied carbon or weight can be entered using varying measurement logics, formats, international currencies and systems of units.

Our platform's approach to multi-player usage also required nuance; while it might not be possible for users to work in the same project simultaneously, they might wish to work side by side and cannot block each other from working. Our solution uses live low-latency connections to telegraph the presence of other users using subtle UI indicators and clear messaging.

Related to this, a frequently-requested feature of the app was the ability to compare design options side-by-side, letting users filter and slice the data in every which way possible. The goal was to compare the various product input configurations against a series of KPI outputs. This was tricky, as product inputs cannot be compared apples-to-apples as their schemas are different.

Furthermore, loading this much data for live interrogation required our back-end team to utilize Azure's most cutting-edge containerization technologies.

I have recently been focused on developing a range of 3D model editing tools for our configurator environment. Going from a read only state to an interactive design environment has required significant upskilling in the highly particular world of 3D UX design. I have found this process very enjoyable; I've worked in 2D since I was a teenager, but never in 3D.



KOPE MARKET

International marketplace for offsite construction

2021 - 2026

Our marketplace started its life as a research task. I was to go forth and learn as much about the offsite construction industry as possible. Within a month, I'd amassed an enormous database, with thousands of interconnected datapoints ranging from people, places, media, manufacturers, exemplar projects and software.

Our partners immediately saw value in this, which led us to shift our thinking. Instead of keeping this data to ourselves, we could launch KOPE Market as an MVP - a standalone, open and free website - to quickly gauge the market's response.

Strategically, this acted as an advertising tool for our new startup, while simultaneously solving an industry problem by bringing transparency to construction's infamously opaque supply chains.

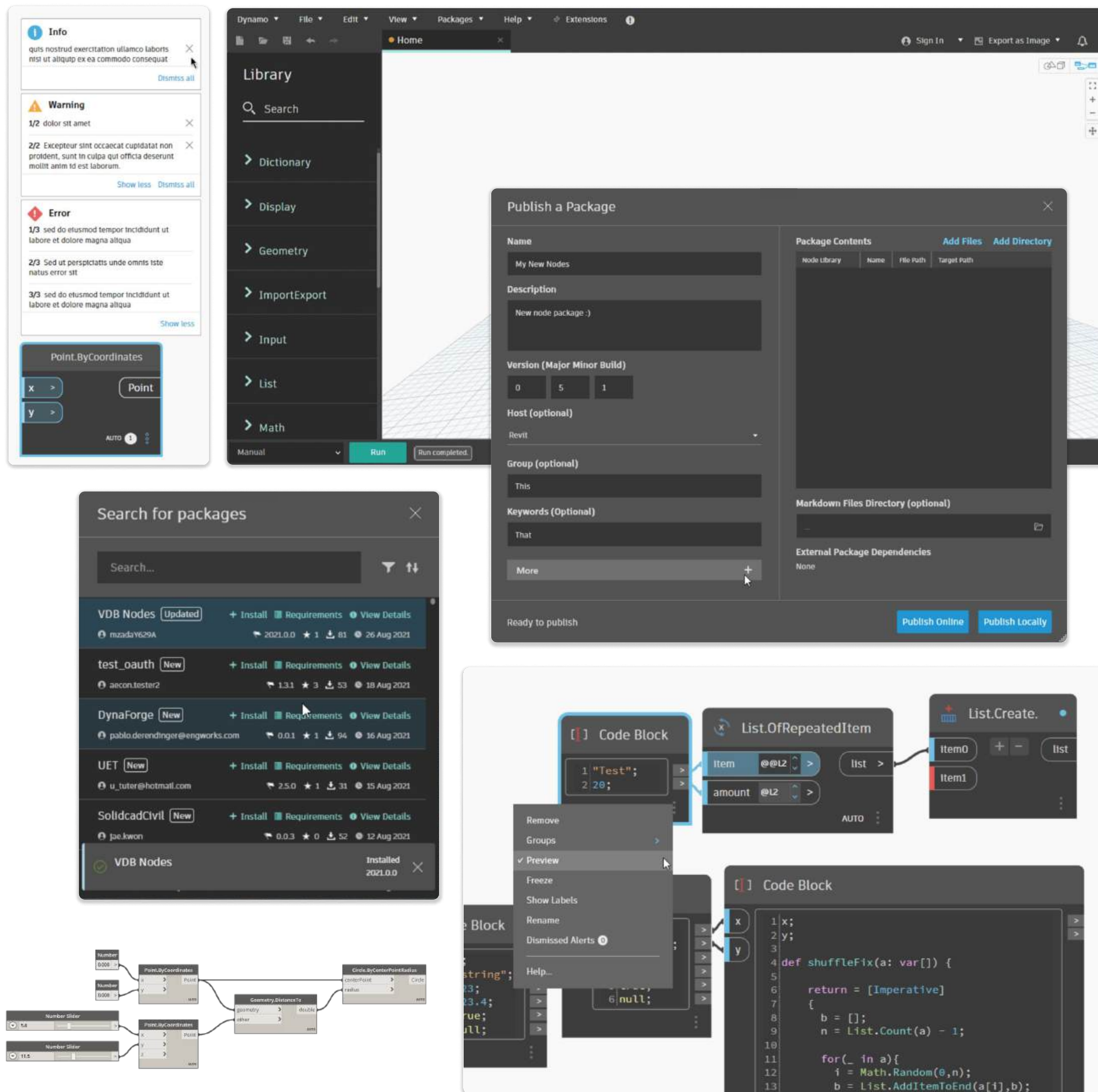
Over time, we came to see the market as an industry research and advertising platform, helping us establish personal connections with the major players in our space, while driving conversion from free licenses to paid subscriptions to KOPE.

I led development of the market from day one, designing the website to responsively suit both desktop and touchscreen devices, writing all requirements and even specifying the required database tables and relationships. I created customer-facing registration and management flows, while keeping a vigilant eye on industry news to ensure our data was always up to date.

Recently, we partnered with industry experts Cast Consultancy to develop a paid 'verification' program, driving both revenue and bolstering our industry awareness and reputation.

All the marketplace data remains fully integrated into our data model, with thousands of construction products listed that are able to be searched and filtered according to a range of international certification standards.

Today, the marketplace is fully internationalized and able to be white-labeled, which has become a supplementary business offering. I have recently overseen development of a white-labeled version for delivery to the NHS New Hospitals Program.



DYNAMO

Contract UI rebuild of visual programming software

2021

This project represents a full circle moment for me. Working under contract for Autodesk, I was tasked with rebuilding the UI of Dynamo, a visual programming software popular among architects.

I knew Dynamo well, having first learned to program using its interface. Much of the initial workload came from feature request tickets that I had logged on GitHub several years earlier.

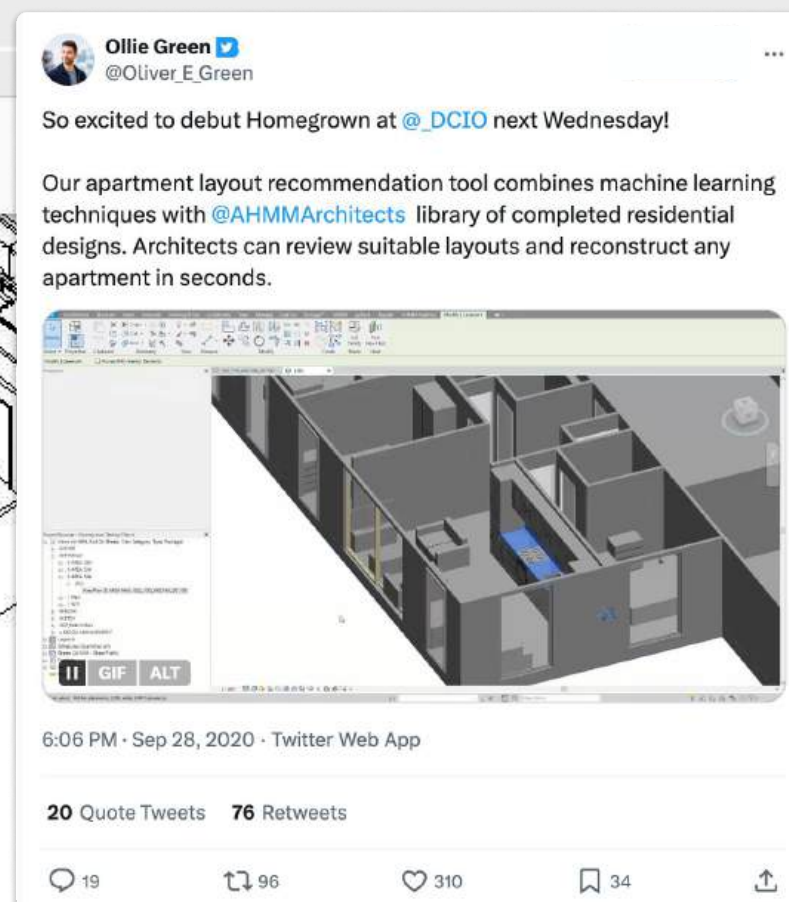
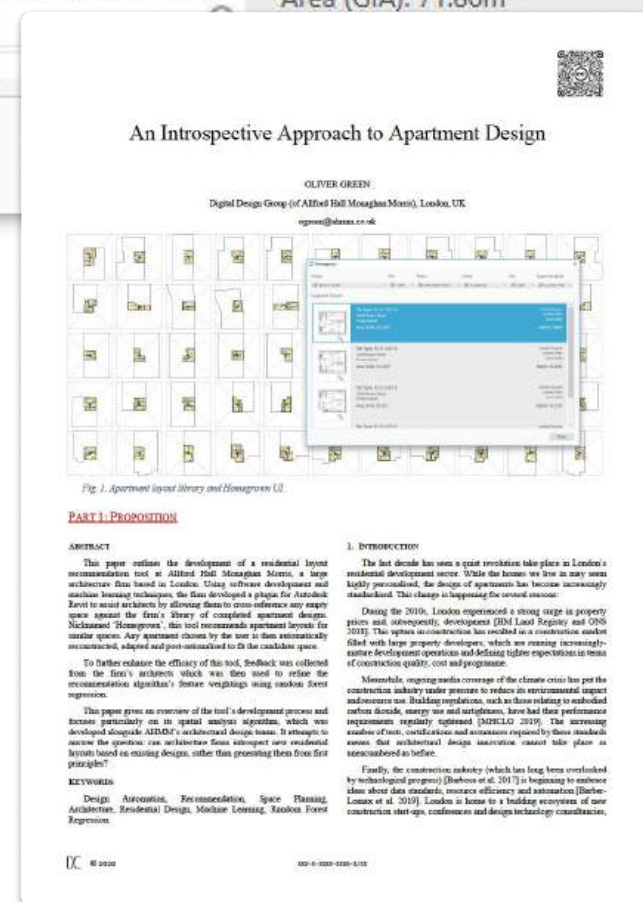
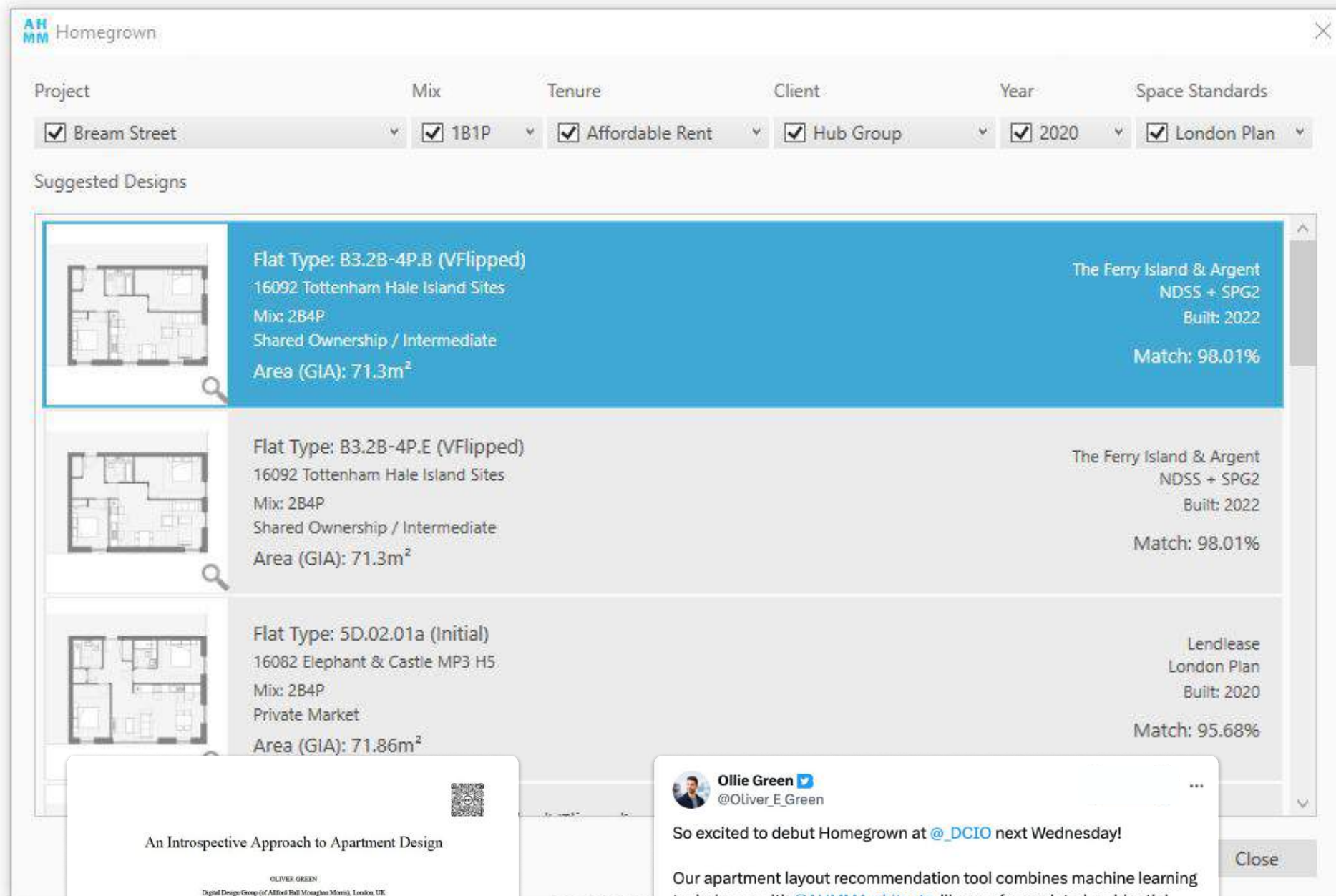
In close cross-functional collaboration with Autodesk's product and UI team, I rebuilt the core of the app UI over several weeks, including the highly configurable node UI around which the app is based. Beyond this, I upgraded the node library and search functionality, rewrote much of the app's native package manager and introduced a new hierarchical warning system.

In the end, I was able to add dozens of minor usability and QoL enhancements for our users, which was a tremendous experience of using XAML, C# and WPF's signature MVVM architecture while working with others in a shared code environment. I also learned about enterprise grade testing, with each build being subjected to over 10K tests.

The rich UI we developed also added significant complexity, which led to a noticeable performance hit; I was told that Dynamo was pushing the reasonable limits of what WPF can achieve. For a before and after reference, see original UI (bottom left) versus new UI (bottom right).

In order to counter this slowdown, I used a memory profiler (JetBrains' dotMemory) to analyze the load and adjust the code accordingly. In the end, the rebuilt app now outperforms the old version.

Our teamwork was excellent; whenever requirements were unclear or missing detail, I was able to propose sensible suggestions back to the product team. Soon after finishing this contract, I was offered employment with Autodesk but, while I love UI design, my heart was set on a product manager role.



HOMEgrown

Machine learning apartment recommendation

2019 - 2020

After completing a 12-week course in Applied Machine Learning, I was keen to put my newly acquired knowledge of linear algebra and ML algorithms to practical use.

With this in mind, I proposed to my firm that we develop an ML based tool to help our architects design apartment layouts. Traditionally, this process can be slow, iterative and include many different technical nuances.

The question of automated space planning has been discussed for decades, with approaches ranging from physics-based systems, Bayesian analysis and evolutionary algorithms to deep learning. Yet, for a range of reasons, these approaches had largely failed to take hold; architects were still designing apartments manually.

I proposed a novel approach; instead of developing generic spatial layout intelligence, we could work backwards from what we already have - our firm's library of existing apartment designs.

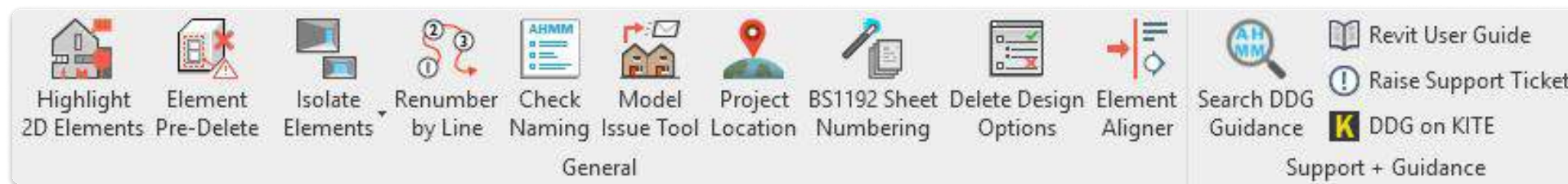
What resulted is Project Homegrown, an apartment layout recommendation engine, which can recognize similarity between spaces (regardless of size, shape, mirroring or rotation). For ease of use, it was developed as a plugin to popular construction industry software, Autodesk Revit.

For me, it was imperative that Homegrown be a tool that effortlessly fits into an architect's workflow. With that in mind, the UX is as streamlined as possible, with all data starting off and ending up back in Revit, entirely under the user's control.

With zero prior setup requirements, the user can simply click inside any space and Homegrown presents them with a list of recommended previously-built apartment designs. Architects can quickly review these layouts, selecting the option that they believe works best. Revit instantly reconstructs the chosen apartment within seconds, using approved 3D content and populating all metadata values according to industry best practice.

The tool offers a wide range of benefits: my team (Digital Design Group) had complete control over content and data standards, even building out 80+ unit tests to ensure compliance with UK space standards.

Upon launch, Homegrown immediately went viral within the construction tech space. Following this, I was able to publish a research paper outlining our novel approach at the first DC I/O conference, hosted by UCL, entitled 'An Introspective Approach to Apartment Design'.



AHMM TOOLS

Custom design and workflow tools for architects

2017 - 2021

My interest in product management came while working at a large architecture firm, AHMM. Throughout my four years there, I worked closely with project teams, developing a wide range of custom digital design and workflow automation tools to suit their needs.

While each team came to me with their own unique needs, the AHMM Tools plugin I developed represented the most commonly requested workflows I encountered. As such, it is deployed to all architects across our multiple international offices. Throughout my time building tools at AHMM, it was vital for me to speak to as many users as possible, understanding how their needs might vary and how each tool would need to support different approaches or incorporate a level of flexibility.

Building these tools has given me an extensive knowledge of the enormous Revit API, including libraries that are poorly or entirely undocumented. Some examples of tools I developed include:

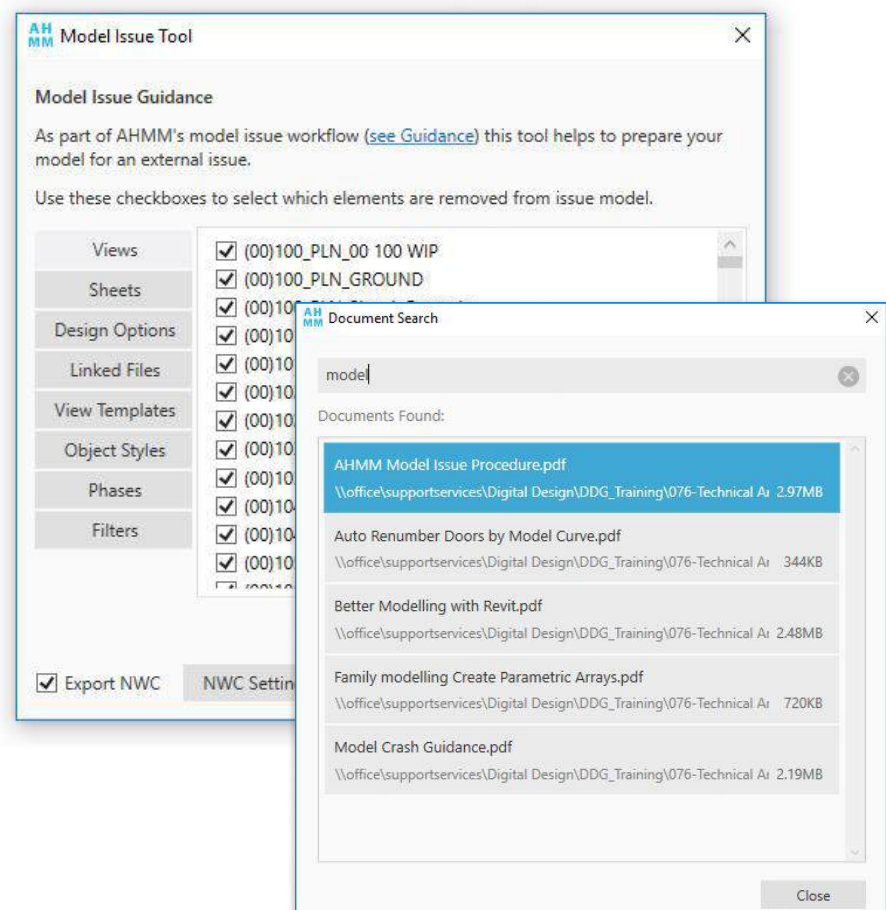
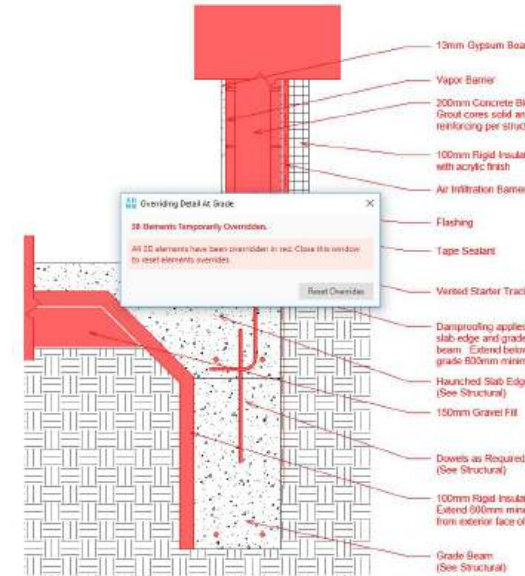
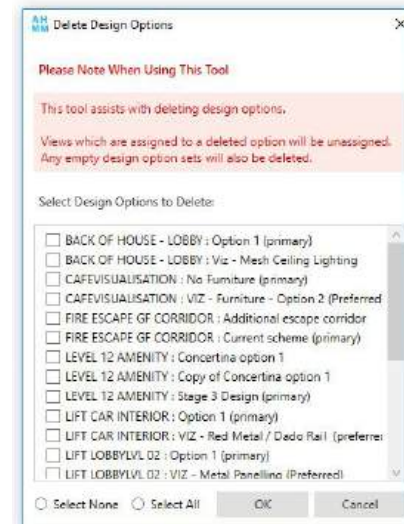
- Element pre-delete - allowing users to see the knock-on consequences of any element(s) that they would delete. This would often save teams from accidental disaster.
- Embodied carbon calculator - an intuitive, visual workflow to help users calculate the environmental impact of their designs, aligned to the industry-standard RICS categories.
- Model issue tool - a multi-step workflow to both validate and strip our models of unnecessary assets before issuing them to external partners and clients.
- Project location setup tools - an easier way to avoid the commonplace pitfalls of geolocating architecture projects.
- A flexible and rapid (2D and 3D) aligner and distributor tool.
- A range of industry standard data validation checks.
- Guidance search and quick links for instant access to help.

I was also able to build several automation workflows that connected Autodesk Revit to other applications, such as:

- Adobe InDesign
- Microsoft Excel
- SQL Databases
- Local network knowledge stores

In developing AHMM Tools, I gained expertise in using the .NET Framework, applied machine learning, vector mathematics, data analysis, data visualization, database creation and UI/UX design, utilizing C#, IronPython, SQL, XAML and WPF technologies.

The plugin was maintained and compiled for multiple simultaneous versions of Revit's API, and was code-signed so it could be silently deployed across the architects' PCs. Each tool reports basic telemetry data, which helped our team (Digital Design Group) understand how our tools were being used.





COMPUTATIONAL CHANDELIER

Math-driven artwork for Broadgate

2017 - 2018

I was asked by the sculptor Vlad Tenu to build a custom tool that would aid him in exploring ideas for a large lighting feature, the centerpiece of a fit-out project in Broadgate.

Together, we devised a math-driven approach that was both elegant and flexible, enabling him to explore the design in a multitude of nuanced ways; lamp density, curve steepness, various offsets, total sculpture depth and even the color temperature.

I knew that Vlad had to have a range of tools at his disposal to make the chandelier form work within this complex space. The end-result was primarily defined by two colliding sine waves, with an exponential function applied to control for sculptural tension.

To aid us in ensuring the sculpture would work in this limited lobby space, we were able to pair this workflow with Dynamo and Enscape, allowing it to be sculpted in real-time using VR.



FACADE EXPLORER

Instant VR concept optioneering tool

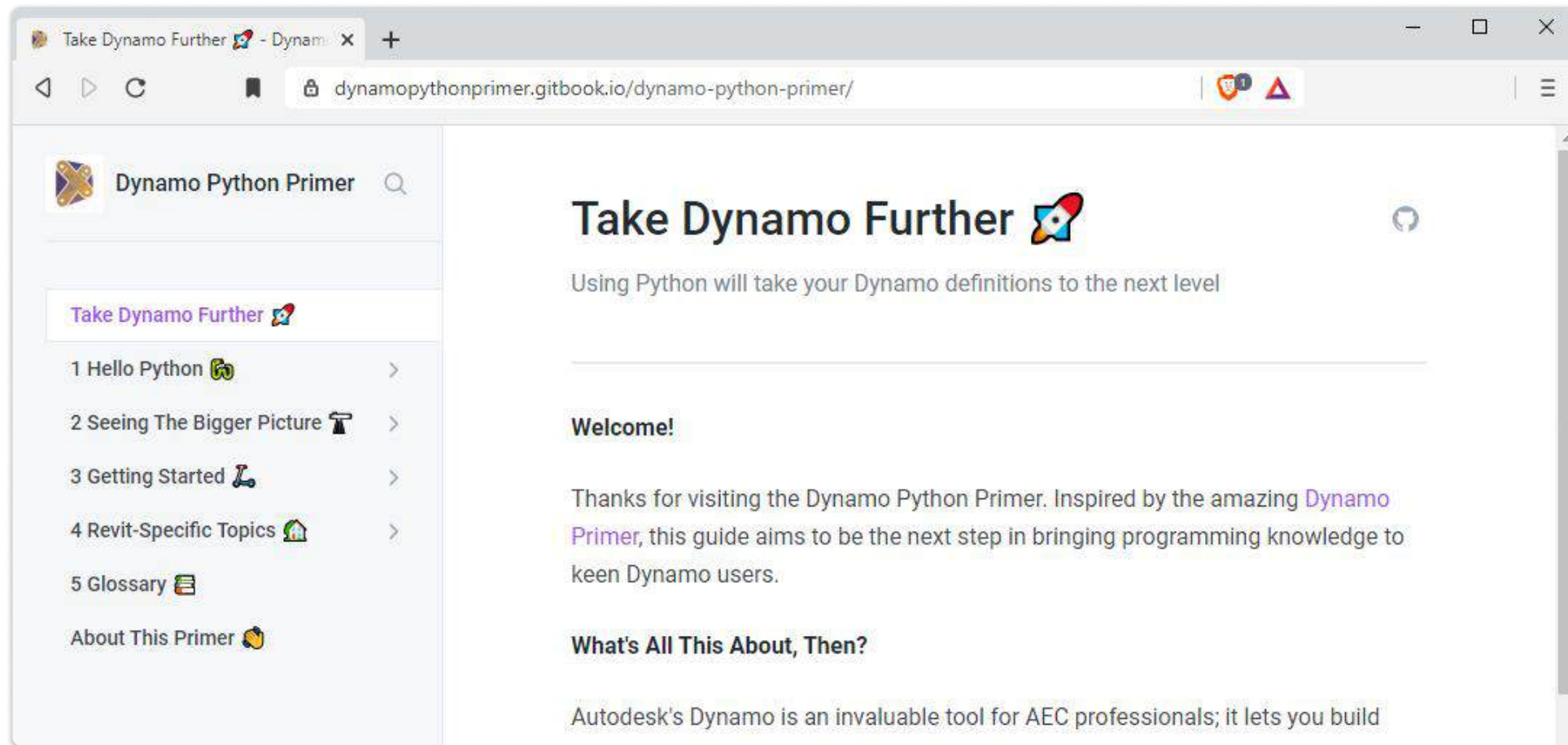
2018 - 2019

I was approached by an Associate Director at AHMM about building a novel design tool for early-stage project bids.

The Facade Explorer tool I developed was an opportunistic mash up of a few different technologies. It began with a Revit family, driven by internally-defined rules to create an L-System. This family was highly adaptable, with over 60 instance parameters, letting the user control facade dimensions, optional features and materials in many different ways.

I then developed a Dynamo script which let the user recreate the optioneering aspects of Autodesk's Fractal while achieving the high-quality visuals we required for bids using the visualization plugin Enscape.

A side benefit of using this approach was that it could be run with a game engine in VR, so a user could walk around a facade while trying out new options every few seconds. When they liked a certain feature, it was possible to 'lock' that aspect down, allowing for the exploration of a large design space in a playful and engaging manner.



DYNAMO PYTHON PRIMER

Open source: Guidance passion project

2019

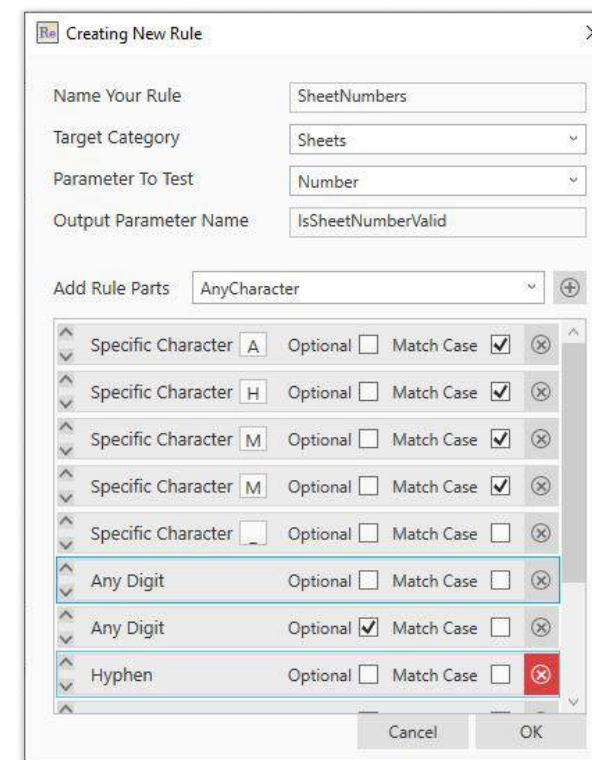
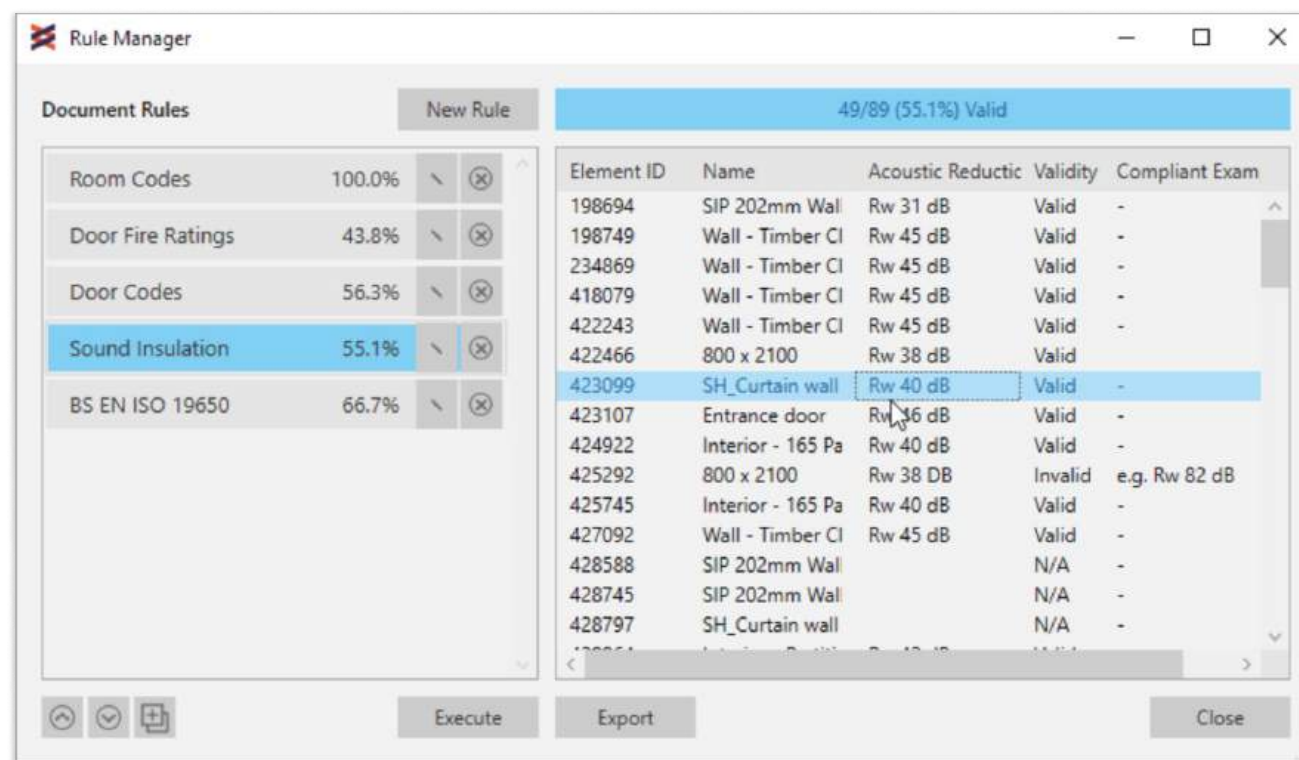
I am a big believer in open source, publishing and building what I can to help make a positive impact in my sector.

After teaching myself how to code, it occurred to me that many capable Dynamo users were struggling to make the jump from node-based usage to using API calls in Python.

While learning Python is relatively straightforward, there was no guidance for them on implementing their code, on how IronPython works or what .NET is.

During Christmas 2019, I spent much of my time writing an open-source guide on Gitbook, explaining all of the knowledge that I felt was hard to come by.

The Dynamo Python Primer was the result, becoming a huge success. It has been visited tens of thousands of times, and was eventually merged into the official guidance by Autodesk.



REGULAR FOR DATA

Open source: Intuitive data validation for architects

2019 - 2020

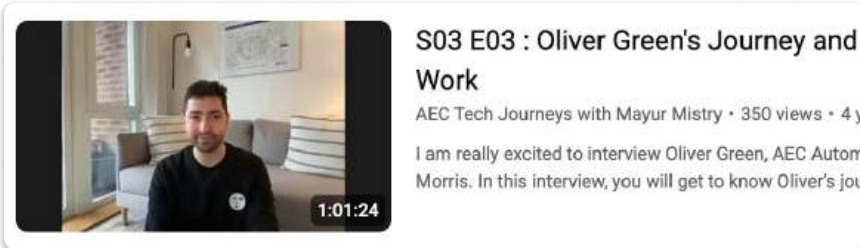
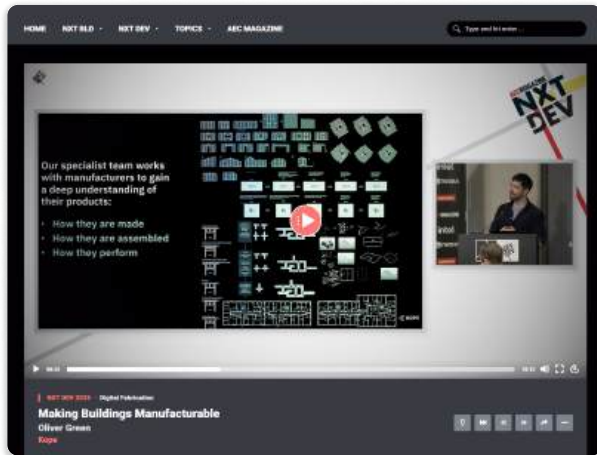
I had long felt that Autodesk Revit lacked intuitive tools for data validation and management. In my role at AHMM, I regularly interfaced with BIM managers, for whom it was vital that our building data was consistent.

Knowing the benefits that regular expressions can bring to these kinds of tasks, I also knew that writing them is difficult (even for many programmers!).

At the 2019 AECTech Hackathon, I set out to build a tool which would bring the benefits of regular expressions to non-coders; they would be able to define data format rules in plain-English using an intuitive and attractive UI.

Using Revit's Extensible Storage API, I was able to save data format rules inside Revit models, and the Dynamic Model Updater meant I could constantly validate a model's data against these user-defined rules. The plugin then wrote either True or False to indicate an element's compliance with the custom data standards.





TEACHING, PODCASTS, PRESENTATIONS

Regular speaker, conference guest and panelist

2017 - Present

I have a passion for teaching and evangelizing the benefits of new tools and approaches within architecture, having been a regular attendee, guest and speaker throughout the construction technology circuit for nearly a decade.

Over these years, I have been fortunate enough to present KOPE's work at Stanford University's Industrialized Construction Forum (ICF), as well act as guest lecturer for their Industrialized Construction Master's course. I have presented novel research at UCL's first ever DC I/O conference, and 3 separate times at Autodesk University, and 4 times at London's NXT DEV conference for construction tech startups.

In terms of community events, I have presented KOPE at the Archi-Tech network, multiple times at London's Dynamo User Group meetings, and a Foster + Partners ARD evening session. After a wave of interest in Homegrown, I was asked to speak about my work on several different AEC podcasts. I enjoy bringing new ideas to people and watching them get excited.

HACKATHONS

Mesh.ByFace and Regular

2019

At the inaugural Dynamo Hackathon in 2019, I organized a team from four different architectural practices. We called ourselves the Hackstreet Boys.

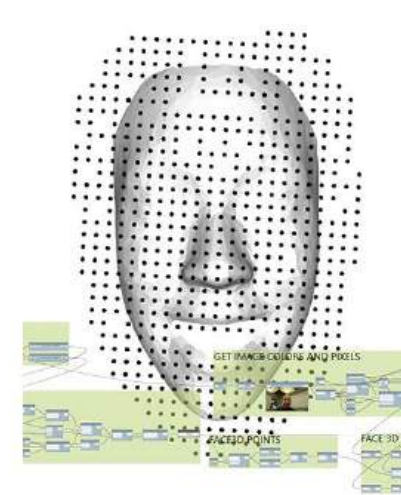
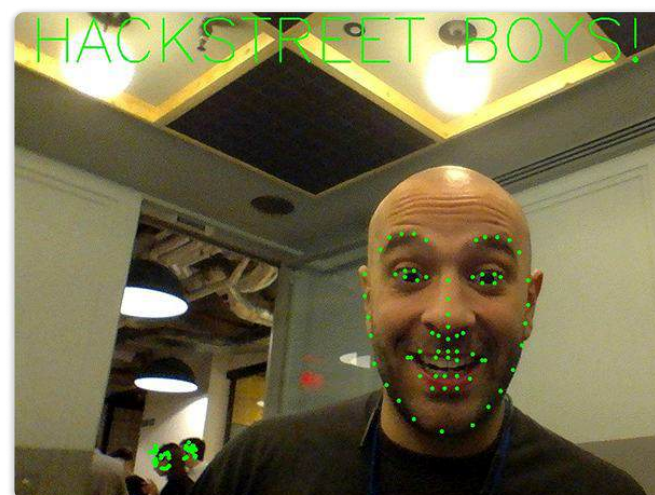
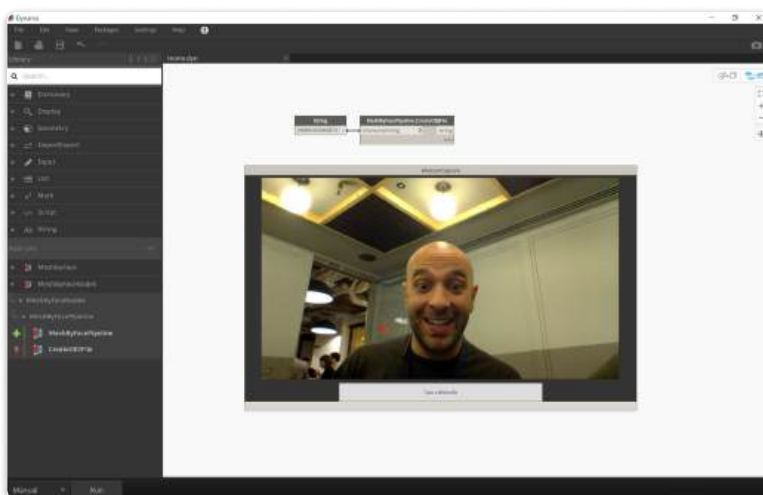
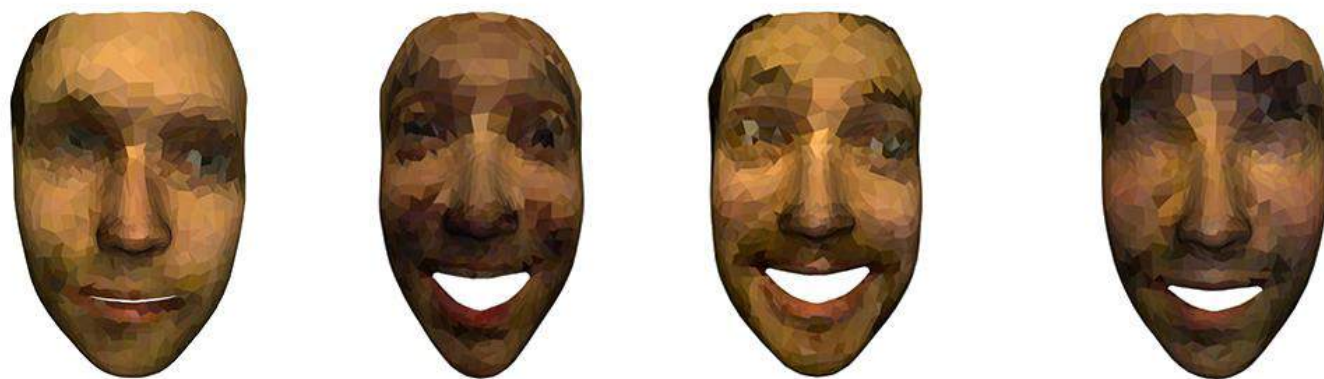
Our idea for the hackathon was to build something technologically ambitious, but also to have as much fun as possible while doing so. Assisted by Luke and Keith from the Dynamo development team, we were able to turn Dynamo into a selfie machine, which we dubbed Mesh.ByFace.

Our final node package included a node with a live webcam feed inside, letting a user take a selfie within Dynamo.

Implementing an open-source 3DMM technique (using PyTorch), we were able to generate a mesh representation of a user's face.

Overall we came in third place - but we won a special prize for being the most fun team at the event. #BIMSelfie.

My other solo hackathon project, Regular, is outlined on the previous page.





VIDEO GAMES DESIGN

USA & Canada, private work

2005-2008

Even as a teenager, I was always getting involved in creative projects. One of the most exciting hobbies I found was in developing online Flash games, purely for the fun of it.

I worked closely with my brother, who would write all ActionScript code, while I would handle creative vision, produce all graphics and animations. We found an audience, and were lucky enough to start selling our games to several American and Canadian gaming companies. What had started out as a hobby had quickly turned into a small business - one in which we had full creative control.

During these 3 years, we made around 20 Flash Games and - through trial and error - I gradually picked up the rudimentary principles of graphic design, animation and UI/UX design. I see gaming as the pinnacle of UX, since it is purely for its own joy and entertainment value.

There were many variables to keep on top of: graphical brilliance had to be met with speed (on old computers with slow Internet connections) and accuracy to give users fair game mechanics.

The challenges were always different: sometimes we would build multi-player games with leaderboards, other times we would be simulating antigravity, creating robot players to play against or building an upgrades system into our game.

Although we were young, I was greatly excited by the potential technology had to impact people. By devoting my time and effort I was able to change the days of the millions of people who played our games.

I am still excited by this potential today, and I want to build tools and platforms which can reach out to people and make a difference by bringing joy and excitement into their day.