



The Scenario House

Scenario Architecture

www.scenarioarchitecture.com

Project name: **The Scenario House**
Project location: **London, UK**
Project type: **Residential, renovation**
Year of completion: **2016**
Software used: **ARCHICAD**

BIM collaboration Case Study on a domestic renovation and extension project in London.

Scenario Architecture has started their second decade specializing in the high-end residential sector, focusing on creating homes that are beautiful, functional and ideally suited to each client.



Photo: Matt Clayton

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During the past decade, the practice has constantly adopted and optimized BIM processes, usually deployed on large projects by larger practices, to work smoothly and effectively within their small-medium-sized company, applied to typical residential projects.

The partners, Maya Carni and Ran Ankory, purchased a Victorian terraced house to completely renovate, expand and adapt it to the scenarios of their own family.

Working on the director's own house was an opportunity to fully utilize ARCHICAD, Scenario's BIM tool of choice, and test the extent to which a BIM collaboration can be effective when applied to a single residential renovation and expansion project.

According to Scenario, the term 'BIM' is often used simply as a buzz word, a new synonym for "cutting edge" or a way of saying "we are not behind on current trends"; unfortunately, sometimes without much practical implementation. Alternatively, the term is used to describe an ideal, futuristic, completely unified and possibly unattainable construction process.

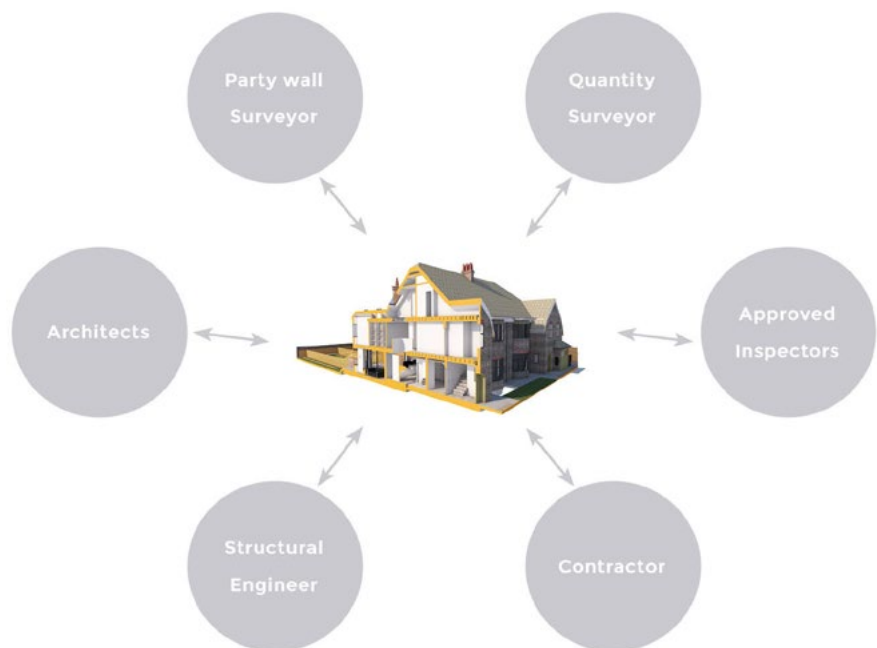
To make BIM useful and applicable for themselves, their collaborators and their clients, Scenario Architecture stayed as far away as possible from both definitions above, as well as from the whole BIM levels discussion, which as important as it may be, they find mostly irrelevant in practical terms, certainly for a practice on Scenario's scale.

For them, at least for now, a successful BIM collaboration simply means that, to the greatest extent possible, the entire project team works from a single, coordinated and frequently-updated 3D model from which all project data, drawings and specifications are obtained.

They begin each project by commissioning an accurate laser scan survey from which the output is point cloud data. Using the 2D CAD plans and elevations produced by the surveying company, they build from scratch a 3D BIM model of the existing situation within ARCHICAD. They use the point cloud data as a reference, overlaying it onto their model; they compare it to their model and make sure that it is accurate but also simple.

It is possible to convert the point cloud data directly into ARCHICAD, but they find that the models they get are too complex, so they prefer a rationalized model built from scratch, using the point cloud as a reference.

This existing model becomes the main BIM model that architects use throughout the project all the way to completion.



“Although the final documentation set consists mainly of standard 2D drawings, they are more accurate and coordinated and simply higher quality than what can ever be produced when working and thinking in 2D CAD.”

Ran Ankory,
Managing Director, Founder

To make the setup for each project fast and easy and to minimize unnecessary work, they developed a rather sophisticated ARCHICAD template with presets, model views, layer combinations and graphic overrides optimized for their typical projects in terms of project size and complexity. They tested and perfected the best translators to export and import IFC models, the main format they use to communicate with other consultants who are not using ARCHICAD.

The same model is used from the initial existing building elements, through planning tender and construction, all the way to “as built drawings” accurately reflecting the results.

Scenario Architecture sometimes collaborates with both structural engineers and building services engineers who use ARCHICAD as their tool of choice. In this case, no translation is needed, which is ideal for fast and seamless collaboration.

Some consultants use different BIM or even non-BIM 3D applications, which require translations and reformatting, and some (mainly contractors, planners and approved inspectors) still simply enjoy the higher quality standard 2D outputs from our BIM models, and the clear 3D illustrations architects create for them. The drawing sets Scenario Architecture produces all the way from initial design sketches to the finest detail construction packages are done in ARCHICAD and developed mainly in 3D. This means that although the final documentation set consists mainly of standard 2D drawings, they are more accurate and coordinated and simply higher quality than what can ever be produced when working and thinking in 2D CAD.

The ability built into ARCHICAD to examine the model by cutting through it top to bottom and side to side means that the model can be more detailed, resulting in clarity and accuracy of the 2D output produced from it. Quantity surveyors, contractors and sub-contractors often comment on this without even being aware that the architects used BIM and ARCHICAD to produce the packages; they simply mention that the drawings are very clear, readable and accurate.

The way that all annotations correlate between the drawings was also mentioned time and again as helpful.

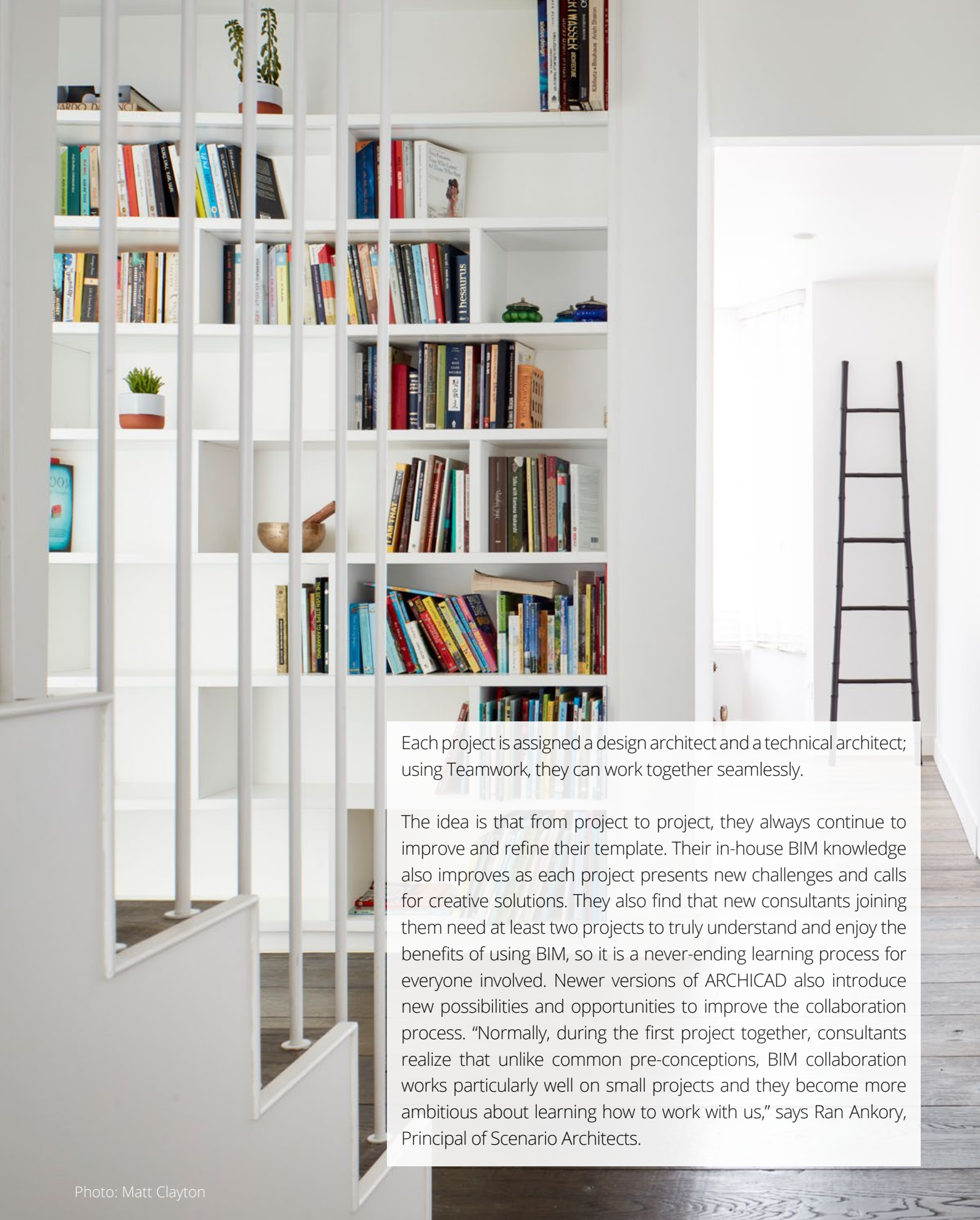


Photo: Matt Clayton



Far from ideal or perfect, this down-to-earth approach by architects simply works well in practice as it enables them to use BIM as an ever-evolving process. They look at the big picture; if one of the consultants is using SketchUp and sends SketchUp models to the architects for coordination, Scenario Architecture does not consider this a problem or something that hampers the BIM collaboration and its core principles. The ideal scenario is, of course, that all parties use the open IFC file format. However, the key point is that architects develop their main model in BIM and communicate and resolve issues in 3D; uniformity of formats and platforms are secondary for them.

Another aspect of down-to-earth approach to BIM is that their experience shows that the internal BIM collaboration within their practice is as important as the collaboration with other consultants. They create all projects using ARCHICAD Teamwork, to work on the same design project simultaneously, which means that different team members can work on the same model in parallel without clashes.

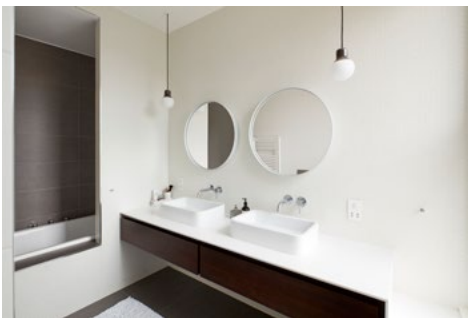


Each project is assigned a design architect and a technical architect; using Teamwork, they can work together seamlessly.

The idea is that from project to project, they always continue to improve and refine their template. Their in-house BIM knowledge also improves as each project presents new challenges and calls for creative solutions. They also find that new consultants joining them need at least two projects to truly understand and enjoy the benefits of using BIM, so it is a never-ending learning process for everyone involved. Newer versions of ARCHICAD also introduce new possibilities and opportunities to improve the collaboration process. "Normally, during the first project together, consultants realize that unlike common pre-conceptions, BIM collaboration works particularly well on small projects and they become more ambitious about learning how to work with us," says Ran Ankory, Principal of Scenario Architects.

Photo: Matt Clayton

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According to Ankory, the benefits for everyone involved in the project, including clients and contractors, are the following:

- 1.** Early stage discussions are very easy and clear when sitting with any 3rd party and exploring the model together; it helps clients, planners, engineers, surveyors, sustainability consultants and other stakeholders to understand the design intent, the challenges and test solutions easily in workshop-style meetings. Sitting in front of the ARCHICAD model together and modifying it in real-time (even in planning meetings with the local council) works well.
- 2.** Using quick renders, 3D cutouts and the 3D document function in ARCHICAD, they communicate the early stage designs with suppliers and sub-contractors in a fast and efficient manner.
- 3.** Using the combination of Twinmotion and ARCHICAD, they produce high-quality and fast real-time visualizations that help everyone involved understand the design intent.
- 4.** The scheduling tools help them to maintain coordinated and up-to-date information about sanitaryware, lighting, electrical, windows, doors and finishes with less room for mistakes and misunderstandings.
- 5.** Their tender and construction documents are clearer, resolving as many of the technical details as possible in 3D, which forces them to think about every junction.

This approach allows to use each project as a new testing ground to push the boundaries and increase the overall efficiency of the process. They find that working from start to finish on the same platform in 3D, which is also able to produce for them all the required documentation, is a dramatic 35% more efficient than the standard 2D CAD process.

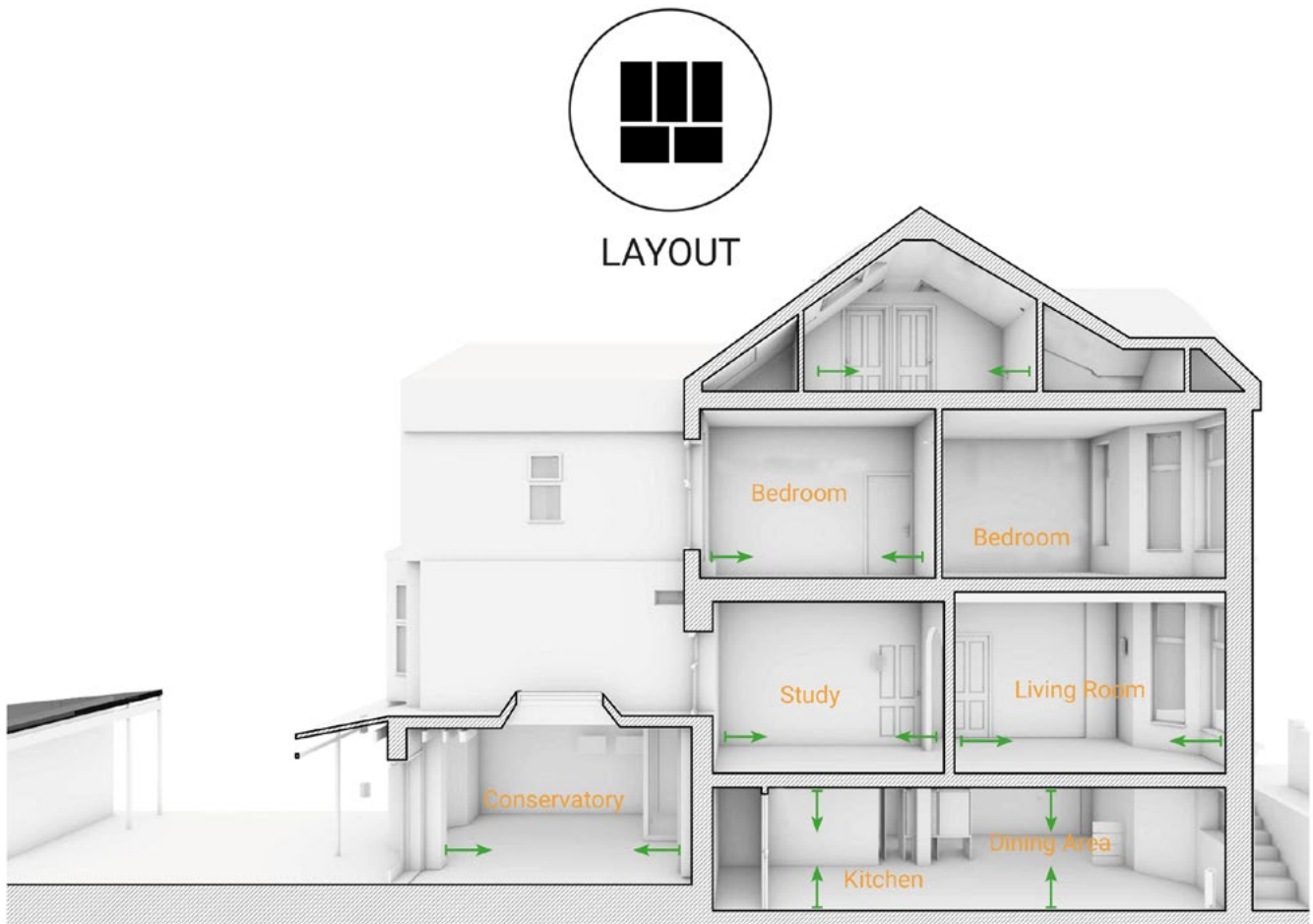
Using traditional 2D CAD, even small changes to the concept when it is fully developed and the project is onsite, can take weeks to coordinate and resolve; a chain reaction is likely (architectural design changes effect structural design, which in turn effect mechanical and electrical design and again architectural elements). They find that coordinating such changes in 3D within ARCHICAD is fast and efficient and saves the clients' time and money.

The internal BIM collaboration described above using Teamwork also contributes greatly to Scenario Architecture's efficiency, and on small projects maybe to a greater degree than the external collaboration with 3rd parties.

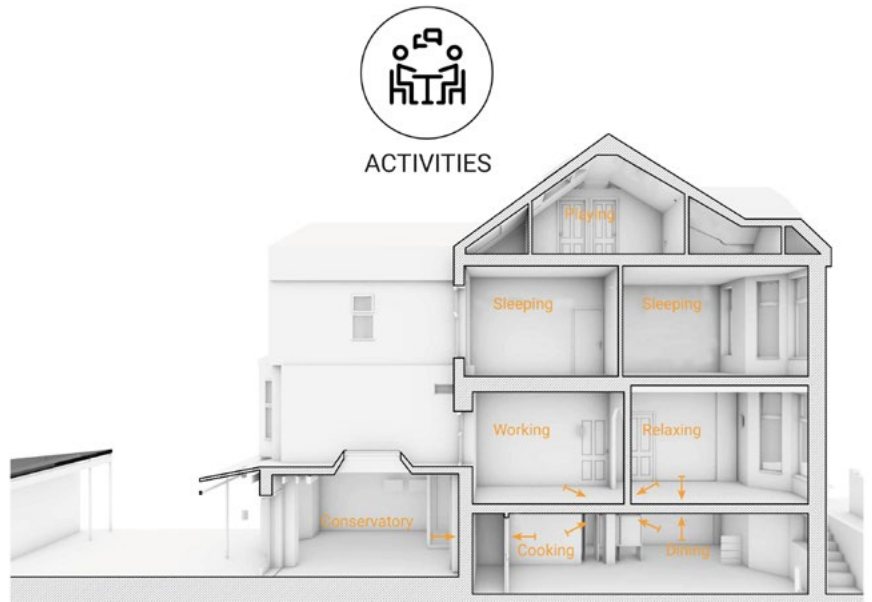
Design Challenges

The main design challenge presented by the Scenario House project was to physically and visually connect the front part of the house with the basement below, while producing an open plan encompassing living, dining and kitchen.

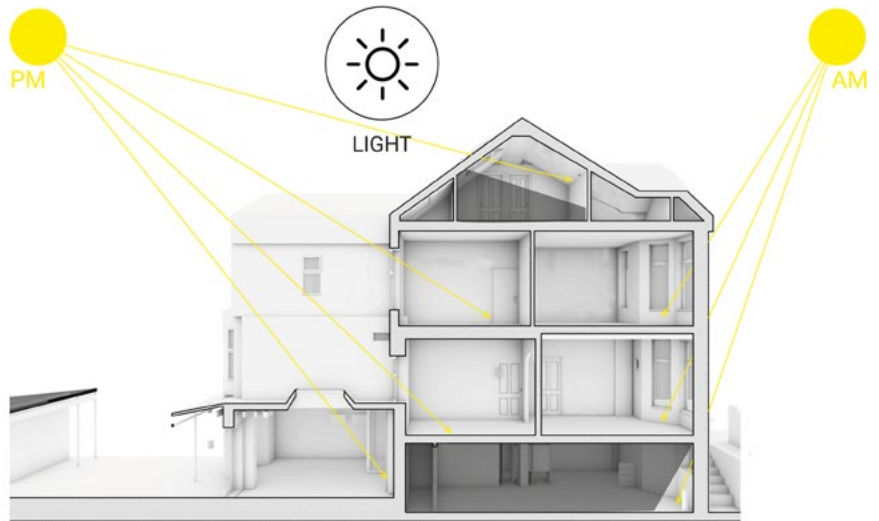
This challenge was brought to ARCHICAD in the form of an accurate BIM model of the existing building, local context and correct orientation. It was then solved fully within the 3D environment by creating a split-level double reception connected to the kitchen and garden beyond via an angled and glazed roof light and a 'floating' library feature that leads up to the bedroom floors.



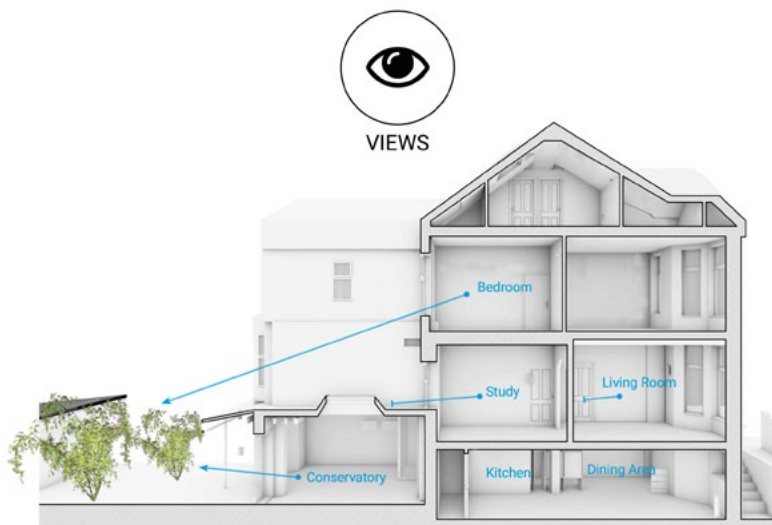
The internal spaces were cramped and the living areas had low ceiling heights; the only direct connection to the garden, the conservatory, was used mainly as a storage space.



All public activities were disconnected from each other and from the outdoors and isolated into separate rooms.



Not much light entered the spaces that were used the most, which were all located on the lower ground floor.



Only a few spaces, designated for temporary activities benefit from a view of the garden.

“We always believed that accurate and realistic 3D representation of any concept we worked on is a key element in our ability to have a meaningful and productive discussion with our clients who are normally not used to reading plans, sections and elevations.”

Ran Ankory,
Managing Director, Founder

Resolving the brief using ARCHICAD

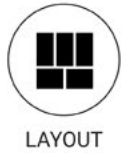
ARCHICAD successfully simulates the actual physical building and integrates information for all elements of the design. Views, plans and sections are created automatically and updated with every change to the model.

“We always believed that accurate and realistic 3D representation of any concept we worked on is a key element in our ability to have a meaningful and productive discussion with our clients who are normally not used to reading plans, sections and elevations. Our process is unusually collaborative and interactive, which means that more than most architects, we invite our clients under the hood, into the core of the design process,” says Ran Ankory.

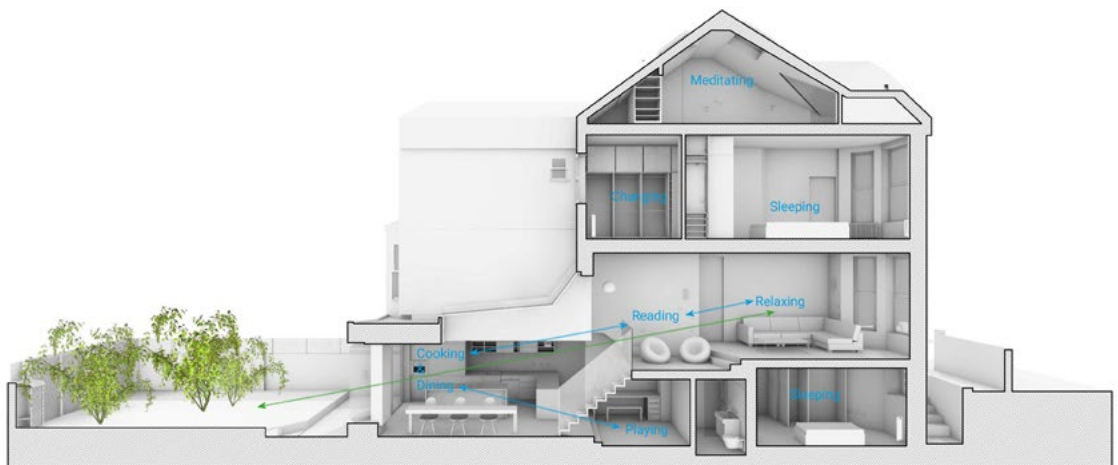
This is challenging, as most of clients are confused by the complexity of traditional 2D plans and find it difficult to move from 2D to 3D. They bridge the gap by using the actual ARCHICAD model, often connected to Twinmotion, as well as quick ARCHICAD renders and 3D documents; their clients seem to interact very well with the 3D data presented to them. They also export BIMx models for clients to explore on their phone or iPad.

Working within a virtual yet accurate representation of reality naturally increases the level of complexity in the design geometry, which architects can easily deal with. In this project it helped them to come up with and design a split-level, open, double reception, connected to the kitchen and garden level by an angled, glazed roof extension and a ‘floating’ library feature leading up to the bedroom floors.

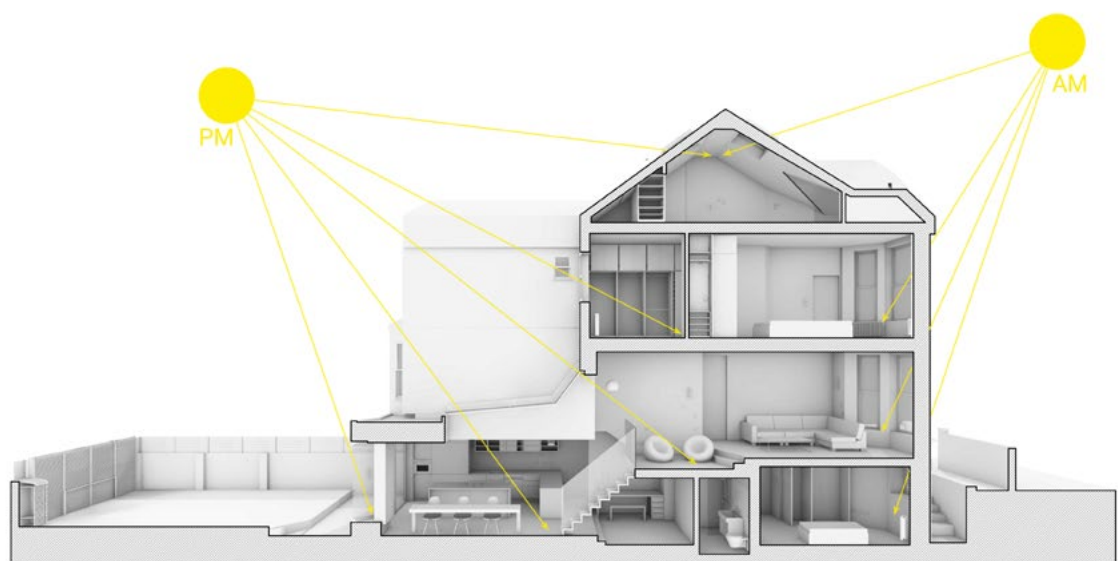




A split-level reception was introduced, with living, kitchen and dining distributed along it and into the rear extension.



Activities and views were carefully considered in relation to each other and to the garden.



The angled, glazed sunroofs allow the sun to bright up all main spaces from both available directions.

Optional solutions were continually tested to utilize every square inch of the house and fulfil the brief. These included, for example, use of “left over” spaces under the stairs, under the eaves, in hallways and limited height areas.

These spaces are often overlooked in traditional 2D design and are much easier to spot and resolve in the realistic 3D environment ARCHICAD provides.

For example, one such space was the relatively low ceiling height resulting from lowering the reception area above. This presented an opportunity for a fun and practical kids’ area. A storage unit under the stairs complete with a pull-out table and bench invites the kids to spend time playing, doing their homework and artwork in a designated but connected part of the home.



BIM collaboration

In terms of BIM collaboration, early concept models were exchanged with the project's structural engineers (Solid Geometry, <http://www.solid-geometry.com>), who in turn implemented rough 3D representations of their proposed structural solutions.

Scenario Architecture normally use IFC format for file exchange, and sometimes FBX, OBJ or DWG, depending on what others use. It's a trial and error process and over the years they found and kept the best settings for export and import to all main platforms as pre-sets. In this project, the structural engineers used SketchUp but they created a great level of detail, showing everything down to the nuts and bolts. The architects exchanged files with them using IFC and found workshops a very useful way to collaborate; e-mails with quick screenshots and annotations were also used.

According to Scenario, "pure" BIM collaboration, i.e. sharing the same file format and maximizing the benefits is obviously what they ultimately aspire to achieve, but their approach is to use what they can when they can and continue to improve the process and get more people on board. This type of fast and clear iterative process entirely within the BIM model became their preferred method to seamlessly integrate structural and architectural aspects of the project.

In terms of building services, due to the relatively simple systems implemented, M&E engineers were not appointed, and Scenario's technical team produced all the information needed in-house. The concept was challenging, as they relocated all bathrooms and toilets, some to the completely opposite side of the house. They had to model the pipe work of incoming and outgoing services and drainage to make sure that sufficient slopes could be maintained and that their slim walls and floors could indeed accommodate all the services without intruding into the space. Scenario Architecture did this using MEP modeler; they used this opportunity to test for themselves ARCHICAD's MEP modeler, which proved very helpful in plotting a mechanical and electrical design and resolving clashes with the architectural and structural designs. Although they did not have MEP engineers on this project, due to the challenges mentioned above, they decided to model some of the pipe work using the MEP modeler; this helped them refine the design and communicate the intentions to the contractor and his plumbers and electricians.



Real-time Visualizations & Virtual Reality

As a practice, Scenario always seeks to make full use of the latest technologies to help them design and also communicate effectively their designs to clients, planners and contractors. Two such technologies that they believe have the potential to completely revolutionize their design process in the long-term are real-time realistic visualizations and Virtual Reality. Real-time realistic visualization means a decent quality rendered model in which they can navigate in real time without having to render fly throughs or static views. They use Twinmotion for this and it seems to work very well so far.

Both technologies are normally used in the context of architecture purely as top-end visualization tools, to communicate finished designs to clients. As impressive as such immersive presentations may be, they always felt that creating a highly time-consuming and expensive, polished presentation, typically of one or two spaces is not much more than a gimmick.



Rendering



Photography

Scenario's approach to the implementation of these technologies is similar to their approach to BIM as a whole -- they are constantly looking for applicable, practical uses, which can be incorporated into their process effectively. The seamless integration of Twinmotion with ARCHICAD provides such an opportunity.

They started to experiment with Twinmotion and soon found that the ability to use the live connection to their ARCHICAD models makes all the difference. Without having to constantly import, export and deal with translation issues, they can relatively quickly create convincing, semi-realistic real-time models that their clients love exploring with them, as it gives them readily available yet unprecedented access to a realistic representation of the project.

A rather unexpected use of this technology was that they intuitively started to use it themselves as a valuable design tool. It helps them to quickly consider the look, feel and light conditions of different general layout options in the initial design stage and compare various material finishes during the detail design stage.

Rendering



Photography



In addition to real-time rendering and in fact, even earlier, they started to experiment with simple Virtual Reality applications as a way to take visualizations to another level. Much like the realistic fly-throughs mentioned earlier, Virtual Reality is normally used to create expensive and highly-polished presentations, which they always found to have limited value.

Scenario Architecture always believed that even at a relatively low resolution, a real-time VR experience that does not require time-consuming and expensive setup can be an amazing way to explore even early volumetric design and most certainly concepts at the detail design stage.

The ability to export VR-enabled ARCHICAD models to BIMx provided them with the perfect platform to easily and quickly start experimenting with potential integration of Virtual Reality into their design process. They soon found that although basic in terms of texture quality, resolution and lighting, the abilities to produce these VR representations of the design on the fly is invaluable.

They soon started to offer their clients complementary **BIMx with Stereoscopic view mode using Google Cardboards** and links to download the application and model, slide their smart phones in, and begin to explore the model.



“Twinmotion connected to the ARCHICAD model is exactly what we were looking for.

The setup is relatively easy; refreshing the Twinmotion model will quickly update it to reflect changes in the ARCHICAD model and, most importantly, we can play with the Twinmotion model itself to consider different material options, textures and realistic daylight conditions.”

Ran Ankory,
Managing Director, Founder

This simple and real-time approach allows clients to see exactly how the design develops, check how the proposed scheme will fit within the existing physical space, and most importantly, effectively provide their comments.

Another interesting application of VR that they just started to experiment with is to better explain the concept to contractors and their team members. Although the Scenario think that the day that most small or even large-scale contractors fully integrate BIM into their own workflows is probably still very far off, they have already started the process.

Contractors can start using the BIMx model to better understand the project in 3D on their iPad and when architects have a cloud server setup also communicate with them using messaging and annotations. If they want, they can also use a full ARCHICAD licensed seat to help them with measurements, quantities and planning their work more efficiently. Scenario finds that even small contractors enjoy and appreciate the ability to explore BIMx models on their tablets or smartphones, and often use it during site meetings to explain their thoughts or proposed solutions and answer questions.

Scenario Architecture was looking for a feasible real-time rendering solution, as single rendered views and even rendered fly-through animations are still extremely limited; they show a segment of the concept in great detail but are not interactive design and communication tools.

Scenario Architecture recently started to extend their work to VR as well, and the feedback thus far has been extremely positive.



About Scenario Architecture

More than just a name for a practice, Scenario Architecture represents a unique way of thinking, approaching and creating buildings. Their team is constantly working to find new ways to convert requirements, limitations and dreams into homes to live in and interact with.

Their architecture is unique because it is unencumbered by style or preconception; it emerges spontaneously from a methodical, analytic design process.

By engaging their clients in an inclusive and interactive process, they meticulously develop a high definition and illuminating brief. This is then examined in relation to all relevant restrictions, including sustainability, planning, structural and regulatory considerations. Careful accommodation of these, often contradictory, variables, is their definition of design and the only driving force that shapes their work.

About GRAPHISOFT

GRAPHISOFT® ignited the BIM revolution in 1984 with ARCHICAD®, the industry first BIM software for architects. GRAPHISOFT continues to lead the industry with innovative solutions such as its revolutionary BIMcloud®, the world's first real-time BIM collaboration environment; BIMx®, the world's leading mobile app for lightweight access to BIM for non-professionals. GRAPHISOFT is part of the Nemetschek Group.

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