THE REPUBLIC OF TURKEY

BAHCESEHIR UNIVERSITY

USING SIMS 4 BUILD MODE IN PRELIMINARY INTERIOR ARCHITECTURAL DESIGN

Master's Thesis

SELIN SOP

ISTANBUL, 2018

THE REPUBLIC OF TURKEY

BAHCESEHIR UNIVERSITY

GRADUATE SCHOOL OF SOCIAL SCIENCES

GAME DESIGN MASTER'S PROGRAM

USING SIMS 4 BUILD MODE IN PRELIMINARY

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Thesis Supervisor: Asst Prof Guven CATAK

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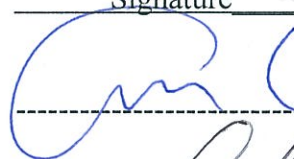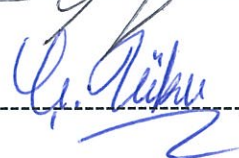Asst. Prof. Dr. Güven Çatak
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ABSTRACT

USING SIMS 4 BUILD MODE IN
PRELIMINARY INTERIOR ARCHITECTURAL DESIGN

Selin Sop

Game Design Master's Program
Thesis Supervisor: Asst Prof, Güven Çatak

May 2018, 37

The aim of this study is to determine if the best selling PC game The Sims 4 can be used as a tool for interior architectural design. The life simulation game comes with a highly detailed "build mode" where players can build & decorate their dream houses from scratch. Being fairly easy to learn and fast to use, the build mode of the game might prove to be an efficient alternative to popular interior design softwares such as Auto-cad, 3D Max and SketchUp; which are professional tools with high learning curves and long rendering times.

During the "preliminary design" stage of an interior architectural project, communication between the architect/designer and the customer is vital. The customer must be crystal clear about their expectations, and in return the architect must fully inform them about how much of these expectations might be brought to life, and how. Furthermore, this interaction must be made as fast as possible, leaving the line of communication open for future feedback and overhaul. The Sims 4 build mode might provide the essential tools for a fast paced drafting stage.

Keywords: Sims 4, Preliminary Interior Design, Architectural Design Tool, Playful Experience

ÖZET

SIMS 4 YAPI MODUNUN İÇ MİMARLIK AVAN PROJESİNDE KULLANIMI

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Oyun Tasarımı Master Programı
Tez Danışmanı Asst. Prof, Güven Çatak

Mayıs 2018, 37

Bu çalışmanın amacı, dünya çapında en çok satan bilgisayar oyunlarından biri olan Sims 4'ün iç mimarlık/tasarım avan proje aşamasında bir araç olarak kullanılabilirliğini araştırmaktır. Bir yaşam simülasyon oyunu olan Sims 4, beraberinde gelen oldukça detaylı bir "İnşaat Modu" sayesinde oyunculara hayallerindeki evi sıfırdan inşa edip dekore edebilme imkanı tanımaktadır. Öğrenmesi ve kullanması oldukça kolay ve hızlı olan bu inşaat modu; iç mimarlar/tasarımcılar tarafından yaygın şekilde kullanılan Autocad, 3D Max ve SketchUp gibi profesyonel, öğrenme eğrisi yüksek ve render alma süresi uzun yazılımlara pratik bir alternatif oluşturabilir.

İç Mimari "avan projesi" aşamasında, müşteri ile mimar/tasarımcı arasındaki iletişim hayati önem taşır. Müşteri beklentileri konusunda çok net olmalıdır; karşılığında da iç mimar bu beklentilerin ne ölçüde ve ne yöntemle gerçekleştirilebileceği konusunda müşteriyi kesin şekilde bilgilendirmelidir. İlaveten, bu etkileşim mümkün olduğunca hızlı şekilde yapılmalıdır. Sims 4'ün inşaat modu seri şekilde bu taslak sürecini gerçekleştirebilmek için gereken temel araçları mimarlara sağlama potansiyeli taşımaktadır.

Anahtar Kelimeler: Sims 4, İç Mimari Avan Projesi, Mimari Tasarım Araçları, Ortak Tasarım, Eğlenceli Deneyim

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Gamification and playful interaction applications spread over many different fields every passing day. Branches of design seem to benefit significantly from these exercises, as the participators find the opportunity expand their creative horizons in unconventional ways. Interior design and architecture, apart from being a professional field of study; has a lot of unprofessional enthusiasts. This fact is already being exploited by the gaming industry, and as a result there are many virtual home decoration games published in almost all platforms. These games provide little else then leisure. However, the possibility of gaining practical, even professional benefit from such games still lies unexplored. Virtual environment building games hold the potential of not just providing casual entertainment to enthusiasts, but aiding professional interior architects in their line of work as well.

During the early stages of an interior architectural project, the architect produces many drafts to outline the work flow, and to estimate the final look of the project. These drafts are commonly created with the aid of specific softwares, as hand drawing can be drastically time consuming and lack a certain technical depth. At further stages of planning the project, there are lots of things to consider; such as constraints, proportions, measurements; so using a professional tool that covers these elements is a must.

On the other hand, during the preliminary project stage, which is merely the process of sketching a rough draft for the purpose of showing to the client; the visualization might not need such realistic boundaries. The main point at this time is to understand the needs of the client and sketching it not for visualizing the project for yourself as the architect, but to get confirmation from the client. The architect would later again draft their work in a much more detailed manner, but this will not concern the client; as the client will not be interested in technical details, nor they will be equipped with the education to

understand them. The customer will be interested in how the project will look, how fast the work will be done, and how much money it would cost them.

1.1 AIM

In this study, we will explore the possibility of using a game, The Sims 4 as an alternative drafting tool for interior architectural design. It's possible to create realistic looking   environments in Sims 4, and achieve visuals somewhat similar to preliminary project sketches drawn/modeled in a conventional design software. To determine if Sims 4 can indeed be used as a tool, we will conduct case studies with interior architects; and get them to execute the preliminary project step for a presumed interior architectural design contract, with another test subject assuming the role of "client" present. By doing this, we will look into if/how much the game makes a positive impact on the process from the architects perspective. We will restrict our case study for "preliminary project" stage only; as the tools within the game will not be sufficient to fulfill the requirements of further, advanced planning.

1.2 SIGNIFICANCE

The results of this study might make a difference in the preliminary project step for interior architectural design in two ways. First of all, the conventional softwares used for sketching have long rendering times, and they require lots of plug-ins and assets especially when it comes to furnishing an interior. They also have much more detailed interfaces, and in some cases it lacks practicality. Sims 4, having a simple interface and many ready-to-place assets; can be used to produce a decent enough visual faster and easier. The conventional design softwares also require high-end systems to run, while Sims 4 can run on even mediocre laptops, still having good looking graphics. All of these contribute to a much practical approach; where the architect can simply grab a laptop,   visit the construction site or meet with the client without being restricted to his own office, and start creating virtual interiors right in front of them.

This execution would create a unique experience for the client as well, gamifying the design process and enabling the client to be more involved; as a detailed 3D sketch of the project would be shaped right in front of their eyes, and they will be able to give feedback from the very beginning without having to wait several days for the architect to do this draft on their own with conventional tools. As will be explained later, the client will also have the opportunity to download the virtual house and play-test it. Rather that is for   playing the simulation, or simply to make minor changes (such as using a different   wallpaper than the architect placed); that is completely up to them.

Finally, using a game for interior architecture is not a field that is saturated with a lot of widely known research. Our study would be encouraging to others who wish to discover new areas that can benefit by gamification.

2. THEORETICAL BACKGROUND

2.1 INTERIOR ARCHITECTURAL DESIGN

The Foundation for Interior Design Education and Research (FIDER) defines the professional practice of interior architectural with these following elements;

- Determination of client needs, goals and safety regulations.
- Evaluation of the findings, backed by theoretical knowledge of interior design.
- Production of preliminary design concepts which are aesthetic, suitable and functional.
- Development and presentation of advanced design proposals, within the guidelines of design communication.
- Preparation of professional construction documents specifying all interior detailing, ceiling and floor plans, lighting, materials, furnishings and the necessary equipment; applicable and accessible universally. (Foundation for Interior Design Education, 2018)

In this study, we will emphasize the importance of making the customer a vital part of the design process. With the advancement of technology and access to information; the modern and popular approach of all creative industries has shifted into the direction of getting the consumer/customer more involved. Interior architecture and design is no different. As Coleman states, "Design is becoming more open and democratic-architects and designers can no longer hope to avoid a genuine creative dialogue with powerful and articulate end users." (Coleman C., 2002, p 278)

2.1.1 Steps of Design

An interior architectural contract goes through five designing steps, as shown below. These steps are not necessarily linear, but rather intertwined with each other.

Table 2.1

Pre-Design	Customer brief, establish a budget, brainstorm for inspiration
Concept Design	Rough sketch (might even be hand drawn), first assessment of the project site & environment
Pre-Liminary Design	Scales, proportions refined; walls & corridors & windows and built-in furnite planned (such as cabinets)
Design Development	Selection of materials and textures, detailed planning for furniture and modifications
Construction Documents	Construction schedule, safety regulations, permit application

In this study, we will focus on the "Preliminary" design stage.

2.1.2 Preliminary Stage

Preliminary design is the process of visualizing the project in realistic, but flexible manner. Different than concept design, the scales and proportions of details are accurate; as well as the indication of main architectural elements (such as columns, walls, doors etc.), but it lacks the technical detail required for application, and it is highly stylized.

Figure 2.1
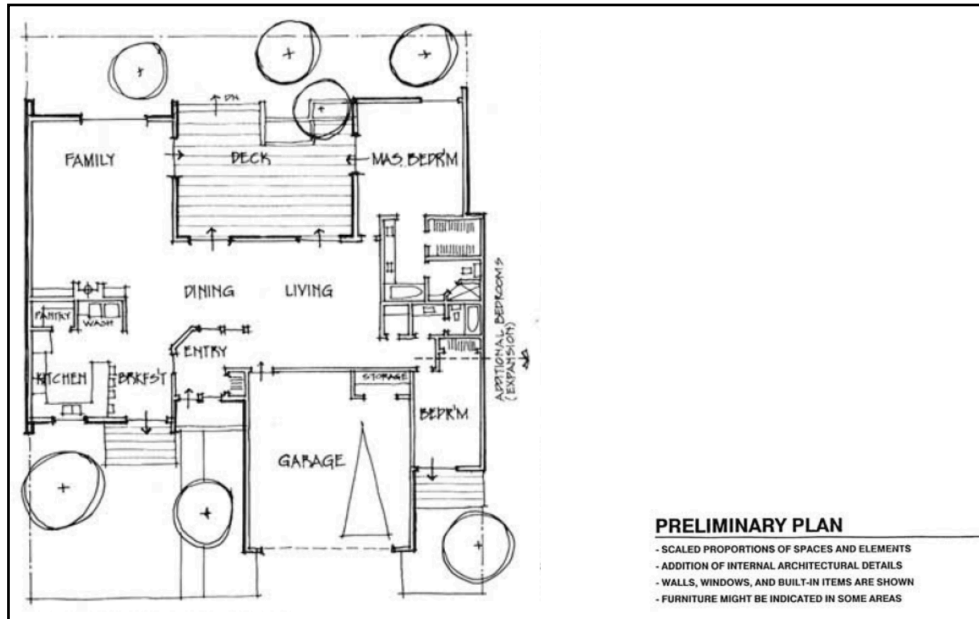
*Reference:* Kilmer R., Kilmer W. O., 2014, p 184

Preliminary design schematics lets the architect/designer to communicate with their clients, as a mean of visual common language, as this is the only way for the client to comprehend to outcome of the process.

An important thing to note, is that the architect avoids making solid decisions, as well as spending a lot of time shaping the details at this stage; as everything is subject to change with customer feedback. (Kilmer R., Kilmer, 2014, p 190)

2.1.3 CAD Software Used in Preliminary Stage

AutoCad is one of the most conventional CAD software used by the industry. It's known for its ability to produce extremely realistic looking visuals; as well as its high price, difficult learning curve and incompatibility with other software.

Figure 2.2
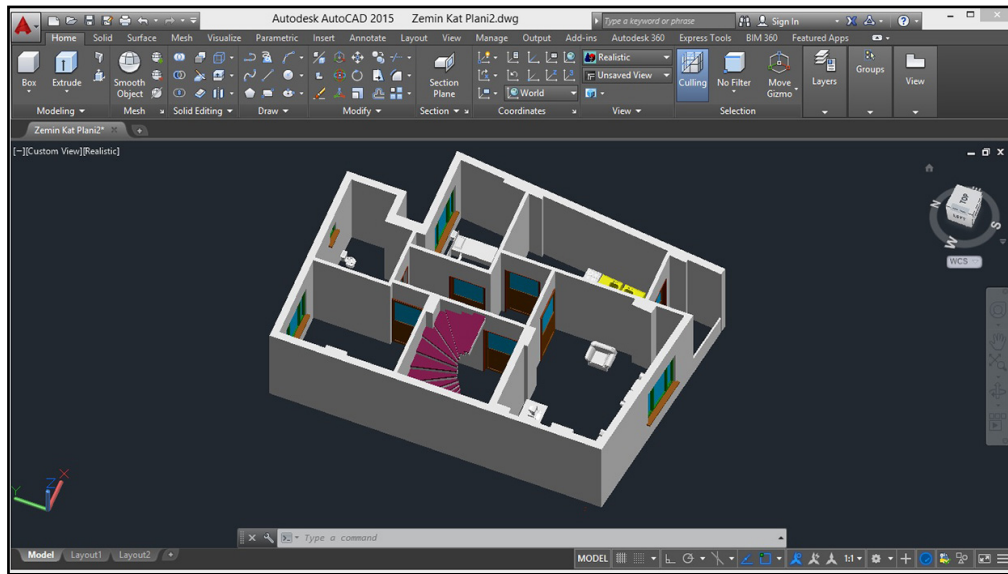
Reference: Sanal Öğretim. Material Kaplama Kütüphanesi, 2015

Figure 2.3
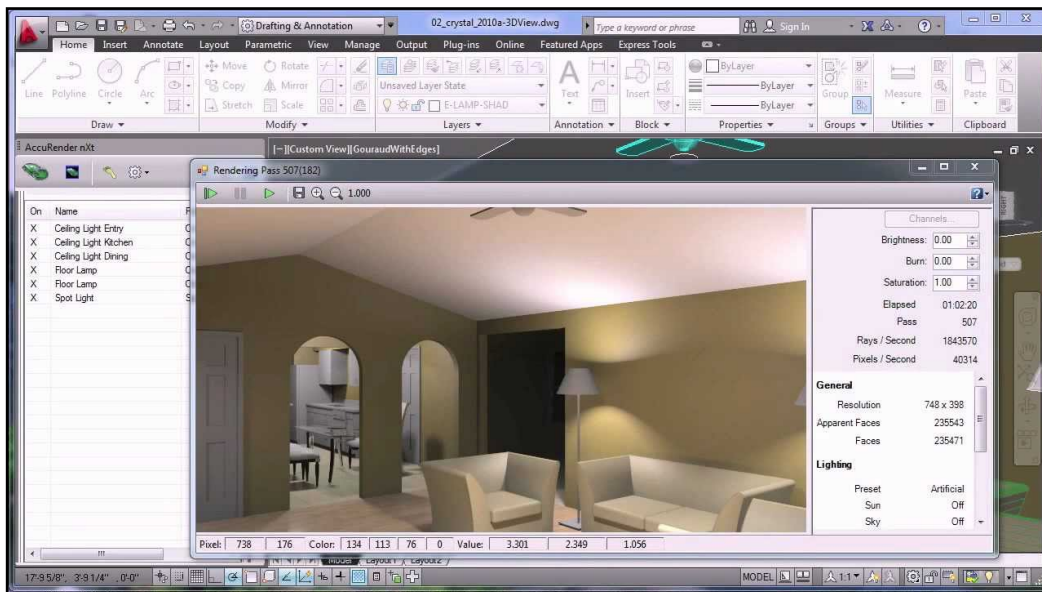
Reference: Azcodes. Autocad 3d Lighting Tutorial, 2016

SketchUp was developed much later than Autocad, and it's mostly prefered by the new generation of professionals. It is fairly easier to learn and use, has a vast asset library, and allows access to 3rd party plug-ins. Without additional plug-ins however, SketchUp

is not equipped to create high quality 3d visuals, and lacks controlled light sources; which is vital for realistic interior design renders.

Figure 2.4
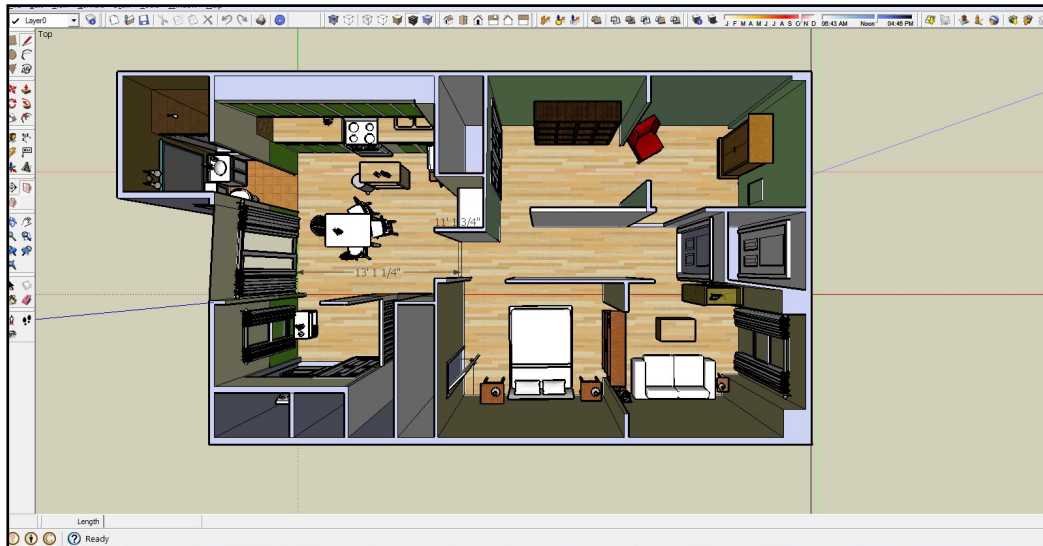
Reference: PennWic. Sketch Up Software, 2014

Figure 2.5
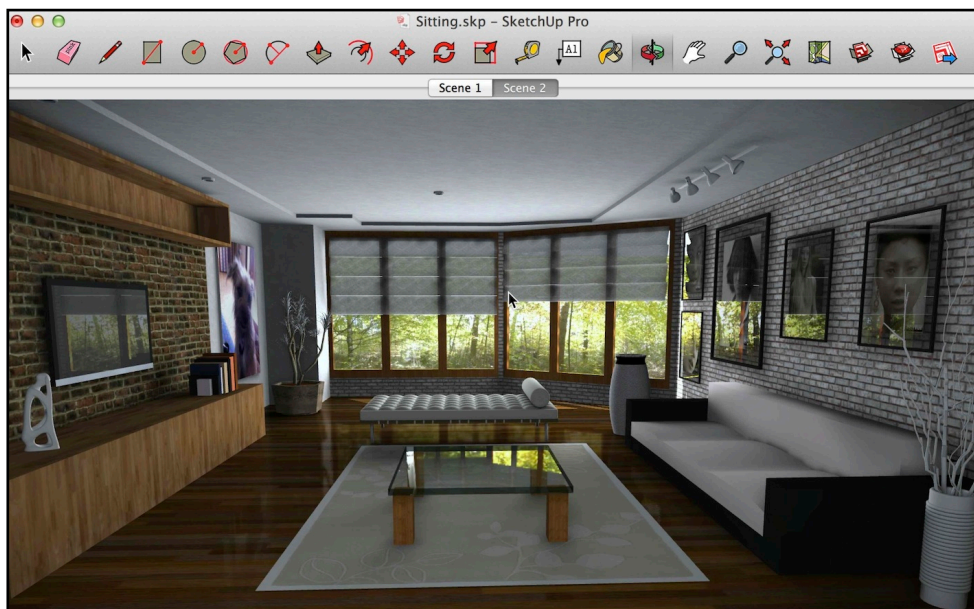
Reference: Light-Up Co. Sketchup: Light Up Tips and Techniques

3Ds Max is also widely used for producing 3D assets and visuals. It's more of a 3D modeling and animation software, so it has a lot of tools completely irrelevant to interior architecture design; therefore it has a complicated interface. It requires an in-depth knowledge of the program regarding which functions can be used for interior architectural design. In addition, it is slow and expensive like the other softwares.

Figure 2.6
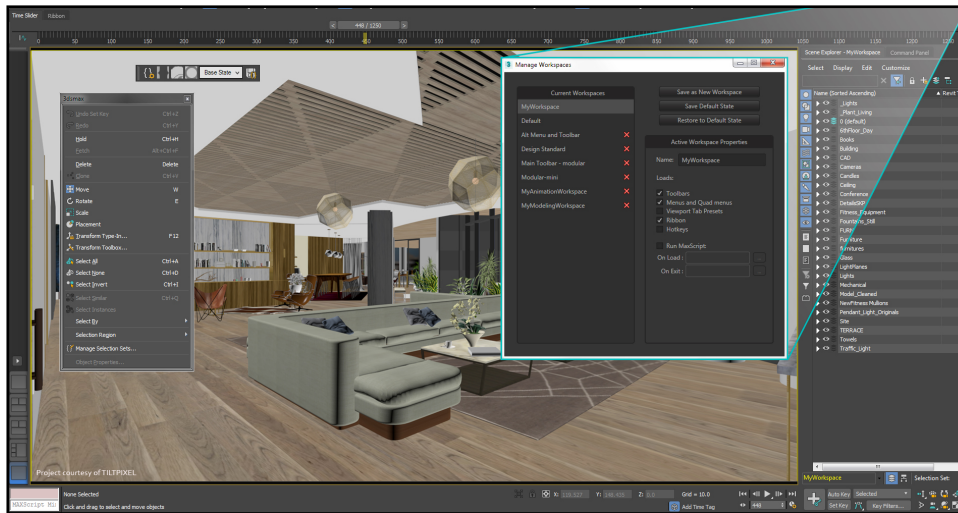
Reference: 3DArchitettura. What's New in 3ds Max, 2018

Figure 2.7
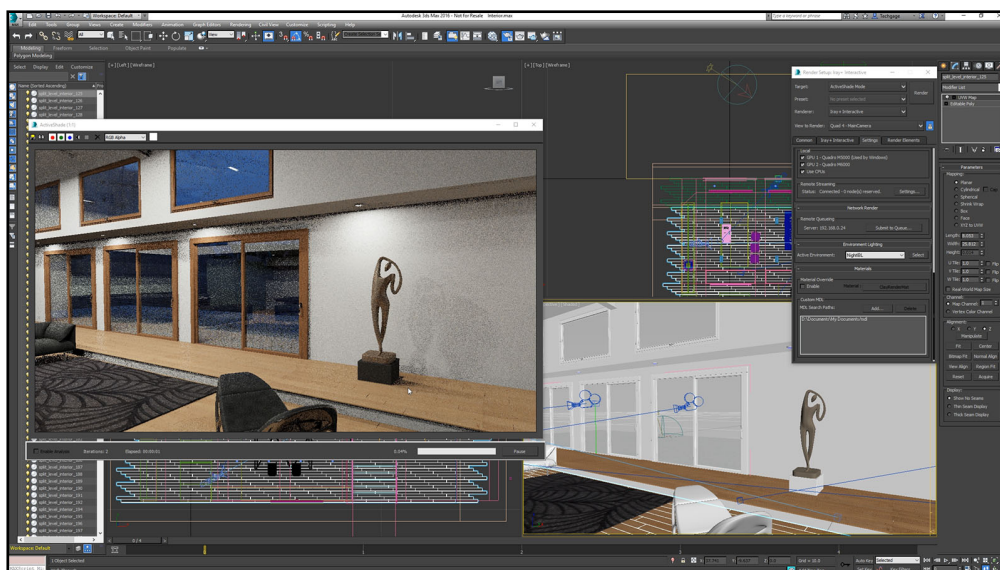
Reference: Techgage. Iray-Interactive in Autodesks 3ds Max, 2015

Revit is a highly detailed software for architects, engineers, contractors and designers. It supports a modeling workflow that enables people from different disciplines to collaborate simultaneously. Revit is higly flexible, and widely used for its ability to create unified models that contain real-life data.

Figure 2.8
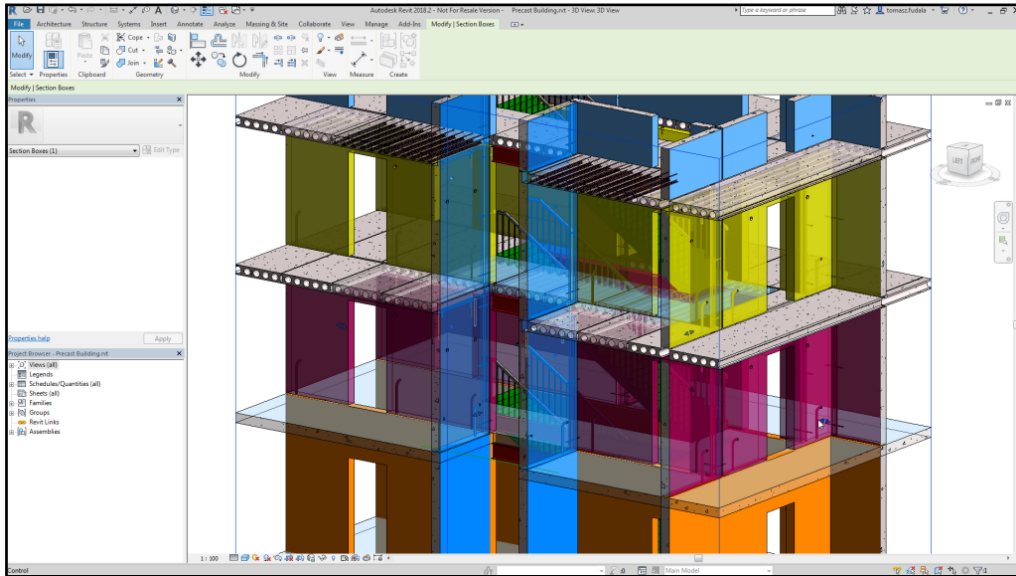
Reference: Autodesk Revit Blog: Here's to the Small Stuff

Figure 2.9
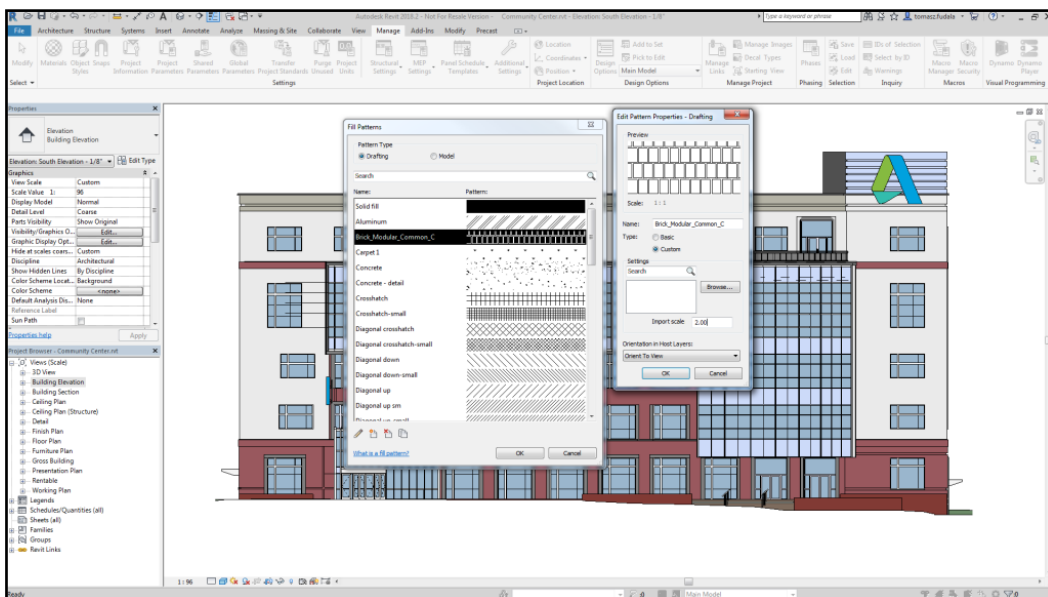
Reference: Autodesk Revit Blog: Here's to the Small Stuff

2.2 THE SIMS 4

2.2.1 History of Sims Games

The Sims is a life simulation game first published by Maxis in 2000. The original creator of the game Will Wright; who had already developed numerous simulation games in the past; had the idea of making a virtual doll house after losing his own house in a firestorm. (Taylor T., 2011) The franchise continued to this day, and its counted amongst the most successful computer games ever made; having sold near 200 million copies worldwide. (Rhinewald S., McElrath-Hart, N., 2016)

The developing company Maxis reintegrated with the publisher Electronic Arts in 2006, and since that day the franchise has been published officially under the name of EA. The latest title "Sims 4" was released in late 2014 and as of day continues to grow with four expansion packs, six game packs and fourteen stuff packs released so far.

Sims 4 was built on an unique engine which Electronic Arts decided not to name or share with the community. It was specifically designed and advertised as "system friendly", able to run on lower end machines and especially laptops (Makuch E., 2013); much different than its predecessor "Sims 3" which received a lot of lash back from the community for requiring high system specs. Being the most up-to-date title of the franchise, addition to its ability to run smooth on laptops make Sims 4 the most suitable for our study.

2.2.2 Sims 4 Build Mode

Sims titles, staying loyal to the idea of creating a "doll house" to play with, always came with a separate in-game mode called the "Build Mode". Sims 4 is no different, with the exception of merging the "Buy Mode"; a separate mode present in previous

titles which was for furnishing and decorating purposes only, within the build mode itself.

Figure 2.10

Reference: Holden A. Review: The Sims 4, 2014

As seen in the figure above, the build mode can be accessed by clicking the tools icon on the interface, located at the upper right corner of the game screen. This causes the game to go into pause mode, and the interface changes. There are a total of four main sections on the build mode interface, three of them being our main concern.

Figure 2.11

Build Mode Interface:
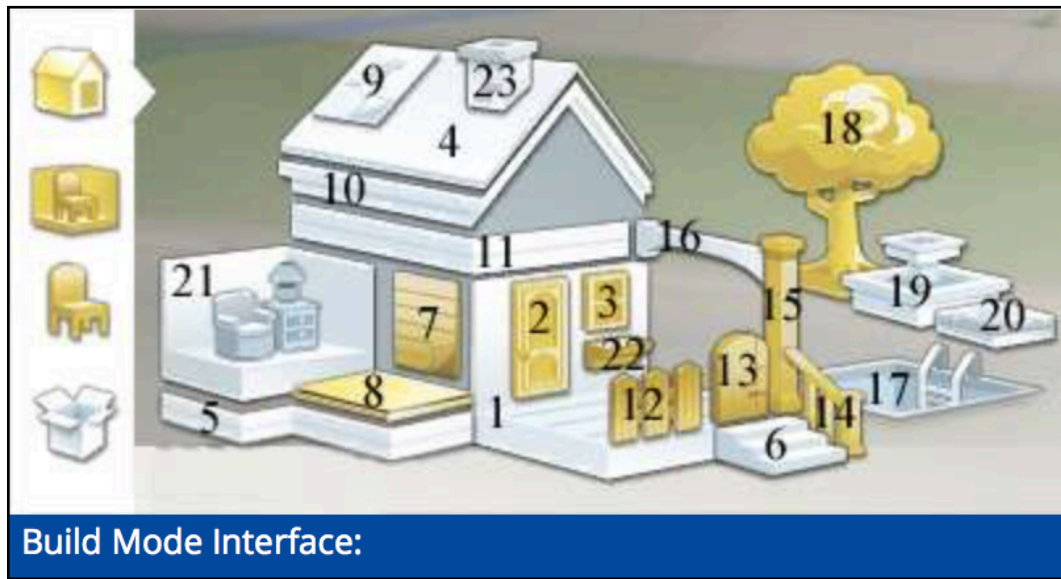
Reference: Blackburn N. The Sims Building Basics

Table 2.2

1. Walls and empty rooms	7. Wall patterns	14. Gates	19. Fountains
2. Doors	8. Floor patterns	14. Stair railings	20. Terrain paint
3. Windows	9. Roof patterns	15. Columns	21. Styled rooms
4. Roofs	10. Roof trims	16. Spandrels	22. Wall sculptures
5. Foundations	11. Friezes and exterior trims	17. Pools	23. Roof sculptures
6. Stairs	12. Fences	18. Outdoor plants	

As seen in the figure and table above, there are tools for everything one can need when modeling a house. If we were to imagine a preliminary process; the architect/designer can build a replica of the planned interior within this build mode either manually with the tools in the third section, or place one of the pre-made rooms in the second section and make the necessary size adjustments to match the planned interior. The tools in

third section can be used to basically everything one can think of during this process; floor tile, wallpaper, windows, doors, columns etc.

After outlining the replica, the architect/designer would want to go to the first section of the interface, which is a whole different game mode on its own: Furniture. A huge variety of decorations and utilities can be browsed here. The items can be listed under context, or their related type of rooms. For example, if one would want to browse the types of kitchen counters; the items can be found under "Kitchen" (related room) category as well as the "Surfaces" (context) category. That being said, its equally easy for the users to decorate the room replica they just created.

Any time during the creation of the planned interior, its possible to change the point of view. Ideally, building and furnishing would be done easier with a zoomed out camera, close to an isometric angle. Also the walls, upper floors etc. can be made transparent or solid anytime during the game. Afterwards, a zoomed in, up-close angle with the walls and floors toggled on as solid would give the most realistic preview, arguably similar to the ones captured with other design softwares.

Figure 2.12

Reference: Ayathebook. Sims 4 Living Room Ideas, 2018

2.2.3 Gallery and Content Creators

For a rather significant amount of Sims players, the build mode is the real game itself alone. (LeTourneau T., 2006) These players prefer to immerse themselves with the creative process of building / decorating lots rather than actually playing the life simulation aspect of the Sims games. This has been a common situation observed since the very first Sims game, and gained popularity as the game series evolved. As Sims 4 being the latest title, plus having more in-depth building tools compared to its predecessors; its no suprise more and more players join the ranks of content creators every passing day. With the increased usage of Youtube and later Twitch over the years, some of these content creators have gained immense popularity; and continue to gain more followers and fans as they stream their process of building/decorating Sims 4 lots live on the internet.

Figure 2.13

Reference: Deligracy. Kimiko's Japanese Home, 2018

These creations gather mainly under the roof of the game's "Gallery" section; which can be accessed from the official game website, as well as within the game if the player is logged in to the game servers. Millions of custom created, ready-to-download-and-play lots can be found in the gallery; and players can narrow down their search using many filters such as lot type and size, vacancy (decorated or empty), in-game cash value etc. Downloading from the Sims 4 Gallery is and always has been completely free.

Figure 2.14
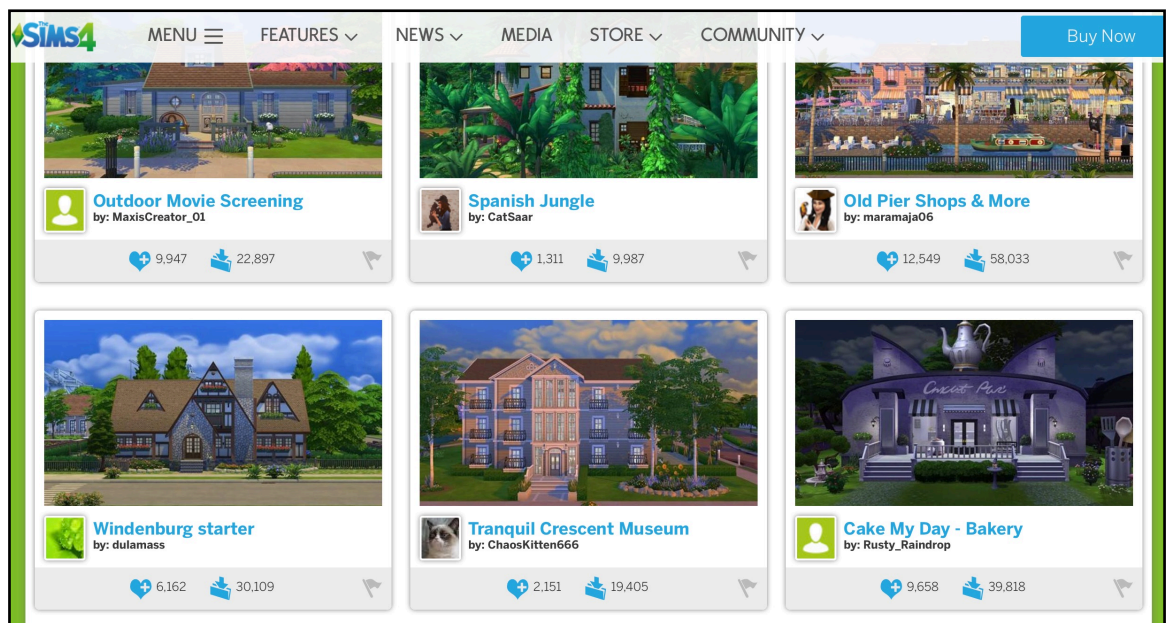
Reference: Electronic Arts Inc. The Sims 4 Gallery

In summary its fairly easy for someone who is not familiar with the game to access this shared platform and find what they are looking for, download it and play test it by themselves.

2.3 RELATED WORKS

The Sims games has been the focus of many academic studies in the past. Most of these studies are either about the narrative aspect of the game, or about analyzing the game within sociological norms. There is a one study conducted in Essex University (UK), using a modified version of Sims with their custom built simulator, in terms of analyzing the sustainability of intelligent buildings. (Davies M., Callaghan V., Shen L., 2007) They were able to prove that the computer game softwares can be beneficial for creating such systems.

Usage of games and playful interactions for design inspirations started to be seen often. The Swedish home furnishing company IKEA had made investments in both VR and Augmented Reality. The company first released a virtual kitchen decorating app for Steam platform on April 2016.

The users were able to tour around a virtual kitchen, and furnish it with IKEA products. Afterwards, on September 2017 an augmented reality app was released for IOS and later Android. The app received mixed feedback, however it was still very innovative and ground breaking being the first of its kind.

Figure 2.15

Reference: Shayon S. IKEA Tests Interactive VR Kitchen Experience, 2016

Figure 2.16
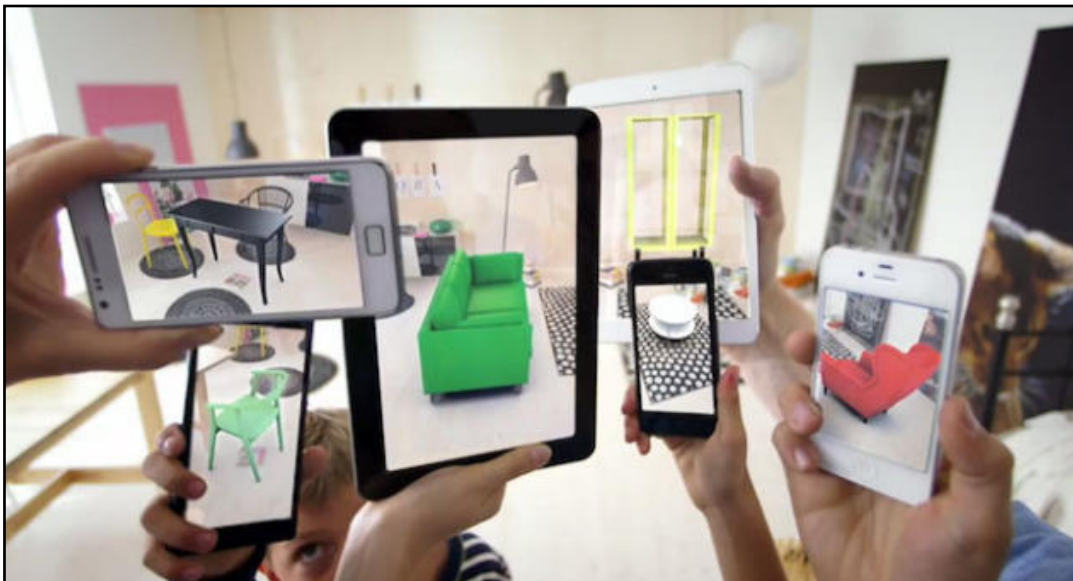
Reference: Dasey D. IKEA Augmented Reality App: Try Before You Buy, 2017

3. METHOD

3.1 QUALITATIVE RESEARCH METHODS

To test the usability of Sims 4 build mode for preliminary design purposes, we will conduct the following qualitative research methods;

- The designer/architect will work on a case study, using Sims 4 build mode to draft a project. The subjects will be professional architects working in the industry. They will have a time limitation of one and a half hour to work on the program

- Both semi structured interview and questionnaire methods will be used to collect data from our participants, depending on their availibility and the location of where the case studies will be conducted. There will be three different sets of questions, markes as Q1, Q2 and Q3. Q1 will be conducted before each participant starts the case study, and it will help us gather information about which architectural CAD softwares they use, the reasons behind their preference in using them, and strong/weak aspects of these programs from their personal point of view. Second part of the questionnaire, Q2, is to assess their opinion of the Sims 4 build mode and what they like/dislike about it. Finally, during Q3, each participant will give their final verdict on rather or not they would want to use Sims 4 build mode for their preliminary design projects.

3.1.1 Q1 Questions

1. Which CAD softwares do you use to draft & present your preliminary design projects?
2. What are the key factors for you to prefer using a CAD software? Please answer regarding the listed bullet points; Technical properties / Learning Curve / Popularity / Interface / Susceptibility for Revisions.

3. What are the pros of the CAD softwares you are currently using?

4. What are cons of the CAD softwares you are currently using?

3.1.2 Q2 Questions

1. How was your overall experience with the Sims 4 Build Mode?

2. What were the positive aspects of the Sims 4 Build Mode?

3. What were the weak aspects of the Sims 4 Build Mode?

4. Were there any properties you came across the Sims 4 Build Mode that you wish were present in the architectural CAD softwares you frequently use?

3.1.3 Q3 Questions

1. Would you use Sims 4 build mode for your preliminary design projects from now on?

2. If there were improvements made to the game which addressed your complaints, would you use it for preliminary design projects?

3. If there was a new CAD software developed, which included the positive aspects of Sims 4 Build Mode, would you want to use it?

3.2 QUALITATIVE ANALYSIS METHODS

To analyze the data collected, we will first use a deductive approach to determine similarities, patterns and differences in participants' answers. Everything said by each participant will be transcripted individually. After this, we will take an inductive approach to determine relations and connections between the context of their answers. Each part of the questionnaire will be visualized with mind maps, showing these relations and connections, and how often each key concept was mentioned by the participants (the number will be shown between brackets on the nodes of the mind map).

3.3 PARTICIPANTS

We have 9 participants who are all professionals with architectural education backgrounds, with varying years of experience in the industry.

Participant A: D. Erer, Senior Architect. 30+ years. Partner of a major architectural project company for many years.

Participant B: S. Sökmen, Senior Architect. 25+ years of experience. Worked abroad for many years as a freelancer architect.

Participant C: S. Deren, Architect. 9 years of experience. Working for an architectural project office, currently on the renovation of a popular Istanbul night club.

Participant D: I. Deren, Architect. 9 years of experience. Currently working as a freelancer interior architect.

Participant E: M. Kıtırcı, Architect. Around 8 years of experience. Working for an architectural project office.

Participant F: Y. Oğuzoğlu, Architect. 10 years of experience. Working for an international architectural project & real estate company since her graduation.

Participant G: G. Ergazi, Senior Architect. 18 years of experience. Worked for several different architectural project companies. Currently working as a freelancer.

Participant H: B. Çetin, Senior Architect. 18 years of experience. Working for an architectural project office.

Participant I: Z. Masalcı, Junior Architect. 5 years of experience. Working for an architectural project office.

4. RESULTS

4.1 SEMI STRUCTURED INTERVIEW AND QUESTIONNAIRE

4.1.1 Results for Q1

1. Which CAD softwares do you use to draft & present your preliminary design projects?
2. What are the key factors for you to prefer using a CAD software? Please answer regarding the listed bullet points; Technical properties / Learning Curve / Popularity in the Industry / Interface / Susceptibility for Revisions.
3. What are the pros of the CAD softwares you are currently using?
4. What are cons of the CAD softwares you are currently using?

Table 4.1

	Question 1	Question 2	Question 3	Question 4
A	• Autocad • Revit	• Tech properties • Learning curve	• Fast results • Suscepibility for revisions	Autocad: No solid visualization regarding the end result of the project
B	• Autocad • 3Ds Max	• Tech properties • Learning curve • Suscepibility for revisions • Popularity in the industry	• Familiarity • Easy to find people to work with who also are using the program	• Autocad: You have to draw everything • I have to hire a 3rd party because for me 3Ds Max is not easy to use

C	• Autocad • Revit • 3Ds Max	• Popularity in the industry • Susceptibility for revisions	• Revit: It enables interdisciplinary coordination and feedback • 3Ds Max: It's good for creating circular forms and realistic visuals	• Revit has some technical issues regarding map sheet gaps and converting to dwg format • 3Ds Max is not at all flexible for revisions, it depends on 3rd parties for assets, has really long render times and you can't see the result before the render ends
D	• Autocad • Revit • Sketch Up	• Susceptibility for revisions • Interface	• Autocad: Easy to learn and use because of it works with the basic technical drawing principles. • SketchUp: Easy to use/edit/ see the effects of the editing in 3d.	Autocad is lacking basic 'building block' elements and its time consuming to draw even the simplest thing from scratch every time
E	• Autocad • Revit • Sketch Up	• Popularity in the industry • Learning curve	Revit: Interdisciplinary coordination SketchUp: Flexible and fast for revisions	Especially with the rising rates, all of these programs are really expensive, if you are a newly graduate.
F	• Autocad • Revit • Sketch Up	• Technical properties • Interface	Autocad: used by everyone SketchUp: easy to use and has a user friendly interface	• SketchUp: depends too much on 3rd party such as Lumion • Autocad is not good on its own as an architectural design tool

G	• Autocad • Revit • Sketch Up • ArchiCad	• Technical properties • Popularity in the industry • Interface	• Revit & ArchiCad are BIM based (worlwide open database, enabling sharing of any kind of information and feedback) • SketchUp: Easy to use, flexible. Can transfer 3d data to BIM based Cads	• Autocad: Has no visual tools and hard to learn & use, depends on other softwares • Revit & ArchiCad require at least 60 hours of basic training and they are expensive softwares
H	• Autocad • 3Ds Max • Revit	• Technical properties • Popularity in the industry • Interface • Susceptibility for revisions	• Autocad: Can be used for multi purposes because of its basic principles • Revit: Interdisciplinary coordination	• Autocad: not really a architectural design software • Revit: Lacks flexibility during preliminary design, its mostly for later stages • 3Ds Max: Hard to use, cannot see result until the last step and its slow
I	• Autocad • 3Ds Max • Unreal Engine	• Technical properties • Popularity in the industry • Susceptibility for revisions	• Autocad: Fast 2d design, export • 3Ds Max: Efficient 3d design, realistic visuals and animations	• Autocad: Really weak in 3d design, even with plug-ins • 3Ds Max: Setting a scene and rendering takes a lot of time

4.1.2 Results for Q2

1. How was your overall experience with the Sims 4 Build Mode?

2. What were the positive aspects of the Sims 4 Build Mode?

3. What were the weak aspects of the Sims 4 Build Mode?

4. Were there any properties you came across the Sims 4 Build Mode that you wish were present in the architectural CAD softwares you frequently use?

Table 4.2

	Question 1	Question 2	Question 3	Question 4
A	I think especially interior designers could benefit from such a program, as it focuses on design rather than technicality. It can also be used by real estate offices, replacing the "model house" application. Customers can see how a replica of the residence might look like when its furnished.	Easy to make revisions. Seeing the entire process in 3d makes planning ahead easier. Fun to work with, something different than using a regular architectural CAD software.	• Lack of measurement units • Library needs more assets • Can't modify modular furniture • The limitation of placing objects on grids	• Real time 3d rendering • Built-in asset library • Mobility
B	It was a fun experience. It feels sufficient enough for preliminary design and presentation. It's possible to design with a client present using this program because they will be able to understand what is going on from the visuals.	Tools to create walls, rooms etc are really practical. Being able to see the creation of the project in 3d is extremely helpful. Creating visuals for presentation is easy.	• Lack of measurement units • Library needs more assets • Can't modify modular furniture	• Easy to use interface • Cheap price • Visual references to library assets

C	It's practical. You save a lot of time and can focus on details much faster.	Being able to quickly compare textures, materials in 3d view.	• Lack of measurement units • Can't select multiple objects • Visuals not hyperrealistic	• Ease of creating animations and visuals • Mobility
D	It was a positive experience to see design and 3d visualization progress at the same time.	Altering organization of the environment easily.	• Lack of measurement units • Can't modify modular furniture	• Ease of choosing between different textures / materials • Flexibility for revision
E	It was a fun experience. I can imagine doing this with a client present, making decisions together.	Seeing your entire progress in 3d from the very beginning.	• Lack of measurement units • Library needs more options for materials/ textures	• Ability to switch between day/night lighting • Easy to use interface
F	It felt practical. It might be used during the first inspection visit of a project enviroment.	It runs really fast on a laptop, therefore its really mobile. Lighting and visuals are realistic enough for preliminary stage.	• Lack of measurement units • Can't select multiple objects	• Real time 3d rendering • Mobility

G	I felt familiar to the game as I played it before. Tools were easy to use, but felt insufficient.	Interface is very user-friendly. You can find what you are looking for with ease.	• Lack of measurement units • Can't modify modular furniture • Can't export design to actual CAD softwares	• Ability to switch between day/night lighting • Easy to use interface • Cheap price
H	I had difficulty planning ahead due to lack of measurement units. Having a lot of ready-to-place basic elements saved me a lot of time.	Simulating different materials/ textures and observing the environment in different lighting. Visuals are efficient enough for the client to have an understanding of the project design.	• Lack of measurement units • No true 2d top view option. Closest angle to 2d topview still feels orthographic	• Easy to use interface
I	It was overall a very positive experience. I had some difficulty with camera controls, but that won't be a issue if once I get used to it. The construction tools for walls, floors etc were very practical.	A lot of practical tools, especially for building and modifying walls and rooms. Useful shortcuts, such as being able to tile/ untile the entire floor plan with a single button. The ability to see your progress entirely on 3d.	• Lack of measurement units • Limited assets in library • The limitation of placing objects on grids	• Ability to switch between day/night lighting • Built-in asset library • Real time 3d rendering

4.1.3 Results for Q3

1. Would you use Sims 4 build mode for your preliminary design projects from now on?
2. If there were improvements made to the game which addressed your complaints,
3. would you use it for preliminary design projects?If there was a new CAD software developed, which included the positive aspects of Sims 4 Build Mode, would you want to use it?

Table 4.3

	Q 1	Q 2	Q 3
A D. Erer	Only for presentation	I wouldn't, but I would make my employees use it.	Yes
B S. Sökmen	Yes, especially for interior design projects	Yes	Yes
C S. Deren	Only for interior design purposes	Yes	Yes
D I. Deren	Only for presentation	Yes	Yes
E M. Kıtırcı	Yes	Yes	Yes
F Y. Oğuzoğlu	Only during initial inspection visits	Yes	Yes
G G. Ergazi	Only in case of emergency	Yes	Yes
H B. Çetin	Only for interior design purposes	Yes	Yes
I Z. Masalcı	Yes	Yes	Yes

5. DISCUSSION

5.1 ANALYSIS

5.1.1 Analysis for Q1

Figure 5.1
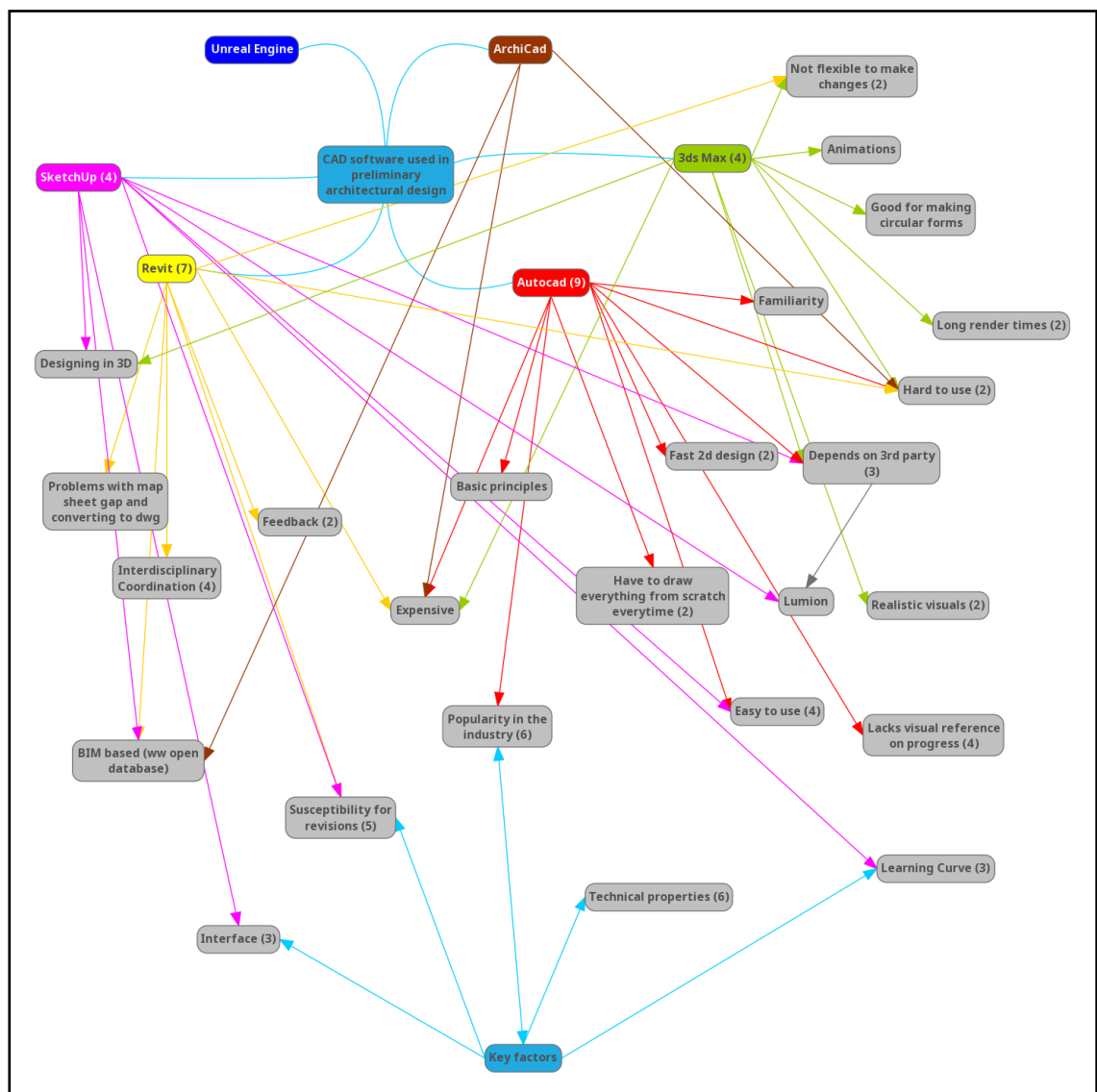
9 out of 9 participants use Autocad, making the most commonly used CAD software among our participants. It's followed by Revit (7/9), 3ds Max and SketchUp (both 4/9), and finally Unreal Engine and ArchiCad (both 1/9).

The key factors that designate our participants' choice of CAD software are; technical properties (6/9), popularity in the industry (also 6/9), susceptibility for revisions (5/9), interface (3/9) and learning curve (3/9). Other side factors that our participants value are interdisciplinary coordination (4 out of 9 people stated they use Revit especially for this reason) and realistic visuals (2 out of 9 people complimented 3ds Max for enabling this factor).

The results confirm that neither of these CAD softwares can be considered flawless, and stand alone sufficient to fulfill the architects' needs during preliminary design. Most common complaints were lack of visual reference of progress for Autocad (4/9), their dependence of 3rd party programs (3/9) for both Autocad and SketchUp, long render times (2/9) and unflexibility for making changes (2/9) on 3ds Max.

5.1.2 Analysis for Q2

Figure 5.2

In Q2, when asked our participants to comment on the positive and negative aspects of Sims 4 build mode. All case study subjects said they had an overall positive experience when they were trying out Sims 4 build mode. 2 out of 9 participants stated they were already familiar with it as they played the Sims 4 before.

Two participants mentioned the software can be used by people from other lines of work. One participant stated that interior designers, not necessarily with architectural

education background might benefit from the program a lot more than a regular architect would, as the software focuses on design and not technicalities. Real estate offices were also mentioned, as they could use the game to showcase replicas of the residences they have in their portfolios instead of making table-top models. Two participants stated that the game looks very convenient to make presentations of their design to the customers.

The most common positive remarks made about the Sims 4 build mode are listed below;

- Ability to see the entire work flow in 3d (5/9)
- Real-time 3d rendering/no need to wait for render to see results (4/9)
- Easy to learn & use interface (4/9)
- Ability to switch between day/night lighting (4/9)
- The fact that the software is fun to use (3/9)
- Its practicality (3/9)
- Built-in asset library (2/9)
- Ability to create decent looking animations & visuals for presentation (2/9)
- Quick tools to create walls & rooms (2/9)
- Its flexibility to make changes (2/9)
- Ability to compare materials & textures (2/9)
- The possibility for co-op designing a concept with a customer (2/9)
- Cheap price (2/9)
- Its mobility, as Sims 4 can run on low end systems and laptops very fast; making it possible for the architect to use it on a laptop during an initial inspection of a project site (2/9)

Furthermore, individual participants complimented the useful shortcuts, ready-to-place assets for quick planning, and the existence of visual references to library assets which makes it extremely easy to find a specific object or tool.

As for the negative remarks the Sims 4 build mode received, there was one factor mentioned unanimously by all participants; the lack of proper measurement units present in the game. 9 out of 9 participants stated that the lack of measurement units made it extremely difficult for them to work with the program. In Sims 4 build mode, the environment is divided into grids. Although there is no official say regarding the exact size of these grids, looking at the size ratio of several objects give us an estimation of 1 grid being equal to 0,7*0,7 m2. This is in no way official or definite. As for heights, no means of measurement exist. Not even grids. The objects that require height simply come in three different sizes, and there is no way to measure anything except comparing it with the size of other objects. 9 out of 9 case study subjects claimed this was a huge downside of the program, and the main reason why it needs some update if it was to be recognized by the industry as a legitimate tool for creating preliminary design projects.

Other common complaints were;

• The inability to modify size & length of modular furniture pieces such as kitchen & bathroom counters, built-in closets, doors and windows. (4/9)
• Limited choices of model, material and texture of decoration objects present in the library. (4/9)
• The grid system preventing placement of objects outside of grids.
• The inability to select multiple objects to move.

Other negative comments made about the program were individual to each participant. One of them said the visuals exported from the program for presentation purposes were not hyper-realistic as they prefer. One participant had a little trouble with camera controls during their first 10 minutes using the software, although they also stated this was not a significant downside. The lack of an exact 2d top down view and the inability to export designs in formats compatible with other CAD softwares were also individually mentioned.

5.1.3 Analysis for Q3

Figure 5.3
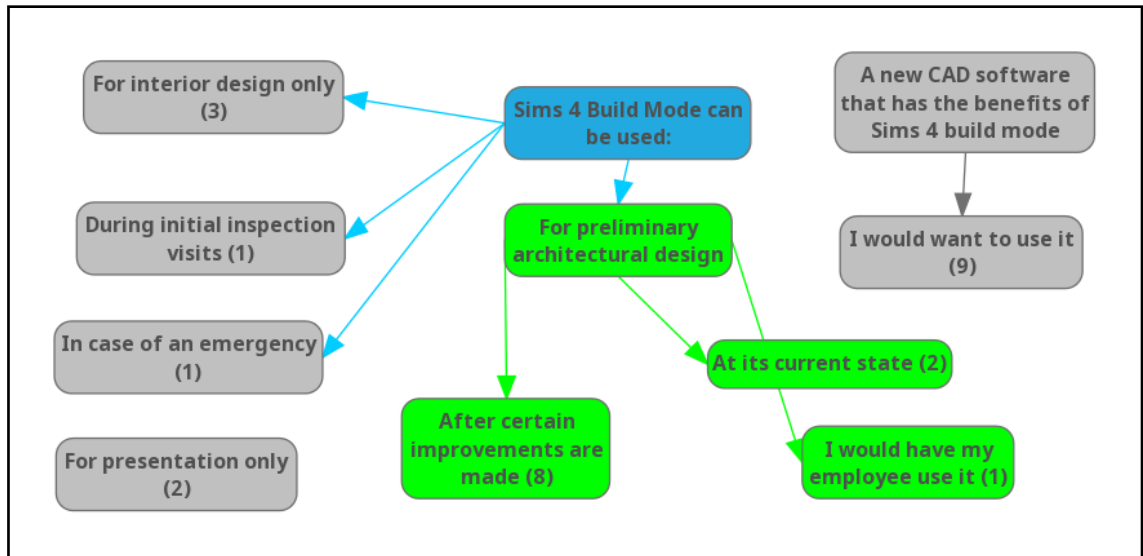
Finally, at the end of case study, the participants were asked to give a final verdict to determine if they believe Sims 4 build mode might be beneficial for preliminary architectural design. When they were asked if they would ever use Sims 4 build mode (in its current state, with its current flaws present), nobody gave a negative response. 2 out of 9 people straightforwardly replied "Yes.", while the others chose to limit their usage for more specific purposes; such as "Only for interior design." (3/9) or "Only for presentation." (2/9). To the question of rather or not they would choose to use an updated/modded version Sims 4 build mode; where their concerns regarding measurement units and lack of assets (and others) were addressed and corrected; 8 out of 9 participants replied "Yes." The remaining participant explained that she would not use the program personally, but would give the task of using it to one of her junior employees in her firm. To the last question of whether or not they would be interested in trying a new architectural CAD software containing the elements they liked about the Sims 4 build mode; again the answer was an unanimous "Yes.". (9/9)

Looking at the results and interpreting them in detail, we can say with confidence that these professionals saw a potential in Sims 4 build mode, and confirmed that it can be beneficial for their work. Their feedback showed us that even in its flawed state, Sims 4 build mode can be used for preliminary architectural design, however for limited purposes only; and that its potential would increase even more if certain flaws were corrected.

5.2 IMPROVING SIMS 4 BUILD MODE

Let's take a look at how we can make certain improvements to Sims 4 build mode, to increase its potential for being prefered by architects as a recognized software for preliminary design.

5.2.1 Enriching the Library with Custom Content

The Sims community, starting from the very first game, had been extremely active about creating and adding custom content to the game. Apart from tools like Photoshop, Maya, 3Ds Max etc; the custom content creators of the Sims community usually use these tools;

• **Sims 4 Studio**; a modding software developed by a player that enables making textures, recoloring, meshing etc.

• **Blender**; an open source software for creating 3d models.

Both of these programs have detailed tutorials. Even if the architect is not interested in using such a program to create their own material, they can simply browse Sims custom content websites such as **The Sims Resource** and have access to extra textures, materials and object models that the library was originally lacking. It is possible to add limitless custom content to the game's built-in library.

5.2.2 Modding the Game for Additional References

Writing a simple script to add measurement units, by defining each grid as the equivalent of one meter square; and defining an additional vertical grid system to determine height in a similar fashion, would fix the problem the case study architects were addressing. Adding visual representation of unit measurement to the game is a simple task.

There is already visual references regarding how much building something would cost in the game. This feature could be further enchanced by giving the architect the option to personally define the cost of each texture/material used; so while they are building within the game they will be able to determine the cost of the project more realisticly.

Developing an update for the game, with the content explained above; would make the process more beneficial for the architect as they also agreed during the semi structured interviews.

6. CONCLUSION

The main purpose of this study was to test to usability of Sims 4 build mode as an alternative to computer aided design softwares for making preliminary design schematics. We first went through the essential steps of architectural design, narrowing our focus on the preliminary stage as that was the process we wanted to base our study on. Briefly exploring three popular computer aided design softwares (Autocad, SketchUp and 3ds Max), we summarized each software's advantages/disadvantages in terms of time, effort and resource.

Later we looked into the Sims games franchise and especially Sims 4 and its build mode. Noting how detailed the build mode is, supported by the fact that many users play the game just for the build mode itself; we discussed in what ways the games build mode might provide benefit for architectural design projects.

We conducted nine case studies with nine professional architects, giving them the task of building an industrial themed penthouse within a time limit of one and a half hours using the Sims 4 build mode. Simultaneously, we conducted a semi structured interview with our participants, asking them questions before, during and after the case study. After collecting and analyzing the responses from our participants, we saw a common pattern for both positive and and negative criticism of the game. Regarding the supporting feedback from our case study participants, we finally came to the conclusion that it is possible to use the Sims 4 build mode as a beneficial tool for preliminary architectural design projects, though mostly for limited purposes in its current state. The game holds potential, yet also have a lot of room for improvement; as our participants agreed they would find more use for it if certain alterations were made. In the last part of our discussion, we talked about what these improvements might be, and how they might be made.

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