

3D Motion-Graphics: 21st Century Architectural Visualization Pedagogy in Nigeria

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Abstract

This article critically appraises the status of architectural animatronics (3D motion-graphics), and relates this clear-cut sphere to the general computer-graphics, particularly conformist picture-making techniques. It spots key fundamentals from conformist picture-making and shows how these fundamentals can improve computer-graphics for architectural interpretation. The process of identification of key fundamentals from conformist picture-making starts with a critical appraisal of the use of 3D motion-graphics in restricted architectural pedagogy and pragmatic analysis of a number of architectural-based documentary picture-making and past and present computer-graphics. The article concludes with specific recommendation relative to the phase at which the animation is produced. This postmodernist advancement (technology) can be best operated with the right dexterousness (gained from picture-making) and understanding of each phase that call for a different level of input and gives an impact to the viewers.

Keywords

Motion-Graphics, Architectural, Visualization, Practices

1. Introduction

This article proposes to critically review the repute of architectural motion-graphics, and relates this specific field to more general motion graphic-based versions, above all conformist picture-making techniques. It can improve animatronics (computer graphics) architectural visualization.

Motion graphics (animatronics) is one of a number of graphic totemic modus operand's in the building industry (especially the design field and realistic physiognomies) developed to store and exchange information representation model for clients and other concomitant professionals to understand the building or

places created. The hassle on architects to change from ideological drawings to moving-pictures arises as the medium itself provides a more understandable and influential communication process.

While postmodernist advancement (technology) in motion graphic-based representation has immeasurably improved, the status of architectural computer-graphics (motion graphics) remains the same. Some architects who have empowered a huge amount of capital in the most up-to-date recording art technology may craft even worst animation. There is diminutive concern to learn and decipher picture-making proficiencies and the promise of design animatronics, either in architectural pedagogy and scholarship or put into practice.

Discerning an excellent architectural picture-making knowledge is relatively difficult. As Grigor (1998); Albrecht (1987); Yue-Ling (2013) posit *“in many advanced countries especially in America and Europe, architecture is a big news. Conversely there aren't many picture-making about architecture, which is very uncanny”*. This talented field has only recently been tackled academically, one of the first conferences being a Symposium on Cinema and architecture held at Cambridge University in 1995, the proceedings of which have a moment ago been published (Penz & Thomas 2000; Beckman, 1995; Benjamin, 1994).

Cinematic and “video graphic” on architecture may be documentary and commercially produced to some advance countries akin to Swiss picture-making. Picture-making on architecture as cinematic for special interest groups (e.g., planners and architects); client’s own documentation (e.g., picture-making of construction progress), industrial purposes, commercial (newsreel) and independent production are categorizing (Janser, 2005; Georgiadis, 1994; Dear, 2003).

Hitherto, there is evidence that architects have been involved in motion graphic-based representation (particularly animation), and there is no statistics on the coverage to which this postmodernist advancement and “Cinema and Architecture” advantaged architects in the design pedagogy. Hence, this article introduces an appraisal of how architectural pedagogy currently employs animatronics-based as the authors conduct a short key informant interview (KII) with individual practice members of architectural index architectural firms in Nigeria. This includes epigrammatic description about the individual firm and how they utilize this technology in their design process, particularly by looking at which working phase the architects produced motion graphics. It also covers the architect’s wakefulness of picture-making and their opinion on the future of this specific field.

The need to understanding some picture-making techniques became critical as the tools to produce architectural animatronics became more easily reached and the unverified in manipulating motion sequences became more patent. Consequently, this article selects a number of architectural based picture-making, particularly documentaries and makes an empirical analysis of how architectural-related information (especially building) is motion-pictured professionally. Clarification is focused on the general synopsis, main content and cinematography.

The constraints of static visuals-based representation have led some architects to change to motion-graphic representations. As erudite architects clarified, *“since our knowledge of building comes from seeing isolated facades (the building as painting) or forms (the building as sculpture), only cinematic can deliver the essential spatial dimensions of space and volume”* This implies the importance of picture-making sequences as a medium to be developed in design process (Grigor, 1994, Qiong, 2017; Baylay, 1993).

Designing animatronics (3D motion graphics) are for a while even worse than the static visuals-based representations as architects lack an understanding of how the motion graphics techniques works. They have petite or no information about picture-making is formed to convey ideas. As Denis, Mikhail, Artyom, & Alexey (2017), Bridges (2000) articulated that, *“one of the things that architects can get carried away with is they assume they’ll utilize (the high-end production house) Industrial light and Magic. They don’t capture until they’ve tried (motion graphics) for the first time just what a task those people in actual fact face.”* Undeniably, there are certain trouble-free rules and principles which should be understood carefully before getting mixed up in any of the motion graphic representations.

Accordingly in order to gain an understanding of the 3D motion graphics, this article presents an appraisal of how architectural pedagogy currently utilizes animatronics.

2. Methodology

While there is authentication that architects have been involved in motion graphics representation (principally animatronics) there is no statistics on the extent to which this technology remuneration or is utilized by architects in design pedagogy.

Consequently, the entire practice members of firms of architects were contacted through telephone interview to determine if they were interested in participating in an appraisal. Out of fifty (index architect firms) practices contacted, only seventeen considered motion graphics as part of their design representation (Table 1). The authors then arranged to make contacts with these practices through phone-interview (key informant interview and questionnaires recorded review).

A squat interview was conduct at the (architects) practice lasting for between twenty minutes or more. The architects were requested general queries about their practice before continuing to more specific questions on the subject of the process of 3D motion graphics (pre-production, production and post-production). All of the architects were enormously supportive and interested in the topic of the article particularly the proposal to improve the animatronics-based architectural pedagogy.

2.1. Appraisal Questionnaires

Not all of these opinion polls were explicitly demanded, as they were by and

large rejoined in the general discussion at the start of the interview. These questionnaires (opinion polled) were configured to give a basis on which to analysis the statistics pull together in a logical manner. In reality, in some approach it helps out to identify when, why and how architects utilize animatronics and to what coverage this motion graphic-based representation was used.

2.2. Collective Information

- 1) At what phase do you start to use animatronics and why (e.g. pre-production/production/post-production).
- 2) How are they use?
- 3) What does the client use the animatronics for?
- 4) Animatronics is part of the architectural pedagogy (YES/NO e.g. client pay extra-inclusive or exclusive of the design).
- 5) In what way do you think that animatronics helps out (e.g., design process/accolade presentation/advertising purposes/triumph a project?)

2.2.1. Pre-Production Phase

- 1) Do you have any guideline to refer to before producing the animatronics (e.g. picture-making/documentary/TV graphics production).
- 2) Does the animatronics have storyboard?
- 3) How time-consuming does it acquire to produce the storyboard before it is finalized.
- 4) Is there any conformity of fee and content on the basis of storyboard YES/NO.?
- 5) Do the clients usually oblige a storyboard prior to making, the animatronics YES/NO.?
- 6) If YES, does the storyboard influence the animatronics project from the client?
- 7) What is your outlook in having a key guideline prior to producing animatronics?
- 8) Do you replicate that picture-making understanding or other related perceptive is essential to produce a good animatronics YES/NO and why?

2.2.2. Production Phase

- 1) Who does the animatronics?
- 2) Did you have any upbringing knowledge before producing animatronics (e.g. school of architecture/CAD courses/picture-making/video-graphic production)?
- 3) What type of software cum hardware is used to craft the animatronics (e.g. hardware/software: PC/Mac/SGI/Sun).
- 4) To what coverage do you go to produce the animatronics (Relying on firm CAD software available)?
- 5) How much dynamics would go into producing the animatronics (e.g. modeling with or without topological context/general exterior/general exterior and interior modeling/with selected and area/photo-realistic rendering)?

2.2.3. Post-Production Phases

- 1) Do you edit your animatronics?
- 2) Who in reality deals with the post-production part of motion graphic (editing) in-house/production-house?

2.3. In House Production

- 1) Why do you prefer in-house production (e.g. cut the overall cost/convenience)?

2.4. Production House

- 1) Why do send out to the production house to produce animatronics?
- 2) Are you satisfied with the end product?
- 3) How many discussions are required prior to getting the end product?
- 4) How time-consuming do they expend to complete the animatronics?
- 5) In what format do you present the animatronics (e.g. on screen only/video-graphic/cinematic/QTVR/multimedia/VR?
- 6) Do the clients have any disbelief in understanding the animatronics (e.g. work-through fast/crude rendering and modeling/rendering material/the selected format?

3. Appraised Results

While workstation technology has developed expansively in motion graphics, computer-aided design (CAD) and other motion-based representations for the last twenty years, this appraisal shows that animatronics is at a tranquil not a common representation choice in architectural pedagogy as shown in **Figure 1**.

In reality, fifty practices firms in Nigeria give attention to static visual-based representatioal and 3Dmotionns (modeling). There is one firm that totally uses manual presentation. Sixteen firms craft 2D-dimensional drawings and perspective of which four of them include a minimal 3D-dimensional modeling. The immeasurable of the architectural firm combine their static visual-based presentation with 2D-dimension graphics representation (see **Figure 1**).

3.1. Supportive Information

This phase epitomizes temporarily the individual firms that use animatronics

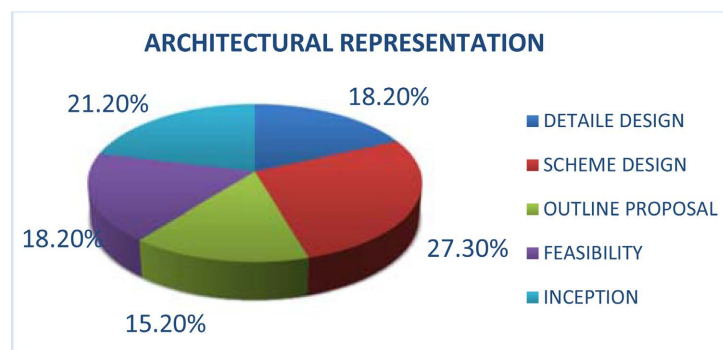


Figure 1. Use of computer unit representation fifty firms’.

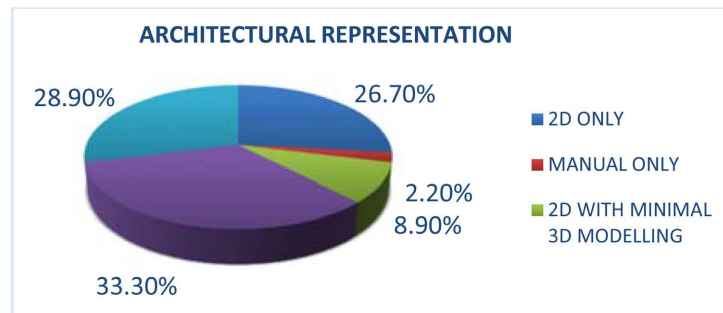


Figure 2. At what phase do you start animatronics?

Table 1. Supportive information of individual firms' architectural pedagogy.

	FIRM	NO. OF ARCHITECTS\STAFF
1	ATO Architectural limited	15
2	Advocacy Architects	11
3	AECREN Limited	9
4	AEX Design Services	10
5	Abodes Architecture	6
6	ACE Global View Consultants	8
7	Archon Nigeria Limited	10
8	Architectural Building Consultant	12
9	BAECOU Design Associates	15
10	BENSON Partners	10
11	Brain Gram Design Partners	12
12	Composite Architecture Limited	10
13	DAA Architects	12
14	DAD Koncepts Association	15
15	Design Group Nigeria Limited	15
16	EbiskeTochukwu Architects	15
17	James Cubits Architecture	15

(**Table 1**) and how they utilize motion graphics and incorporate this technology in their design process (**Table 2**), particularly by momentarily looking at which working phase the architects produce motion graphics. It also covers the architect's opinion on the future of this explicit field, and whether motion graphics was an integral part of the service architects provide to the client.

Question 1: At what phase did the practice use animatronics?

Motion graphics are used at different phases in design process (particularly concentrated on office, residential and public building design (**Table 2**)). This appraisal shows that most architects produce motion graphics in the briefing (investiture and feasibility) and sketch plans (outline proposals and scheme

Table 2. Motion graphics produced by architectural pedagogy.

	FIRM	RES	PB	REP	OFF	IND	EDU	COM	SIA	LF	TOTAL
1	ATO Architectural limited	6	3	6	4					1	17
2	Advocacy Architects	4	1	3	2						17
3	AECREN Limited			2	2			1			5
4	AEX Design Services	3	3	1	2						9
5	Abodes Architecture	4	1		1						6
6	ACE Global View Consultants	5	2								7
7	Archon Nigeria Limited	4		3	1						8
8	Architectural Building consultant	4		4	2						10
9	BAECOU Design Associates	6	3	2	2						13
10	BENSON Partners	5	2		3						10
11	Brain Gram Design Partners	4	4		1						9
12	Composite Architecture Limited	5	3	2							10
13	DAA Architects	6	2	2							10
14	DAD Concepts Association	5	5	2							12
15	Design Group Nigeria Limited	8	3	1		1				1	14
16	EbiskeTochukwu Architects	6	4	2						2	14
17	James Cubits Architecture	7	3	2	2					2	16

KEY: RE = Residential; PB = Public Building; RET = Retail; OFF = Office; IND = industrial; EDU = Educational; COM = Commercial; SIA = Sit Impact Analysis; LEI = Leisure.

design phases. However, six firms include motion as a detail design representation (Figure 2).

Question 2: Why prefer the phases?

There are quite a few motivations why architects institute a specific phase to use animatronics in the design process. Widespread, most of the selected phases were used to guarantee that consultations will understand the design through the media which they are familiar with a motion-based representation. This is due to the verity that almost all of the architects that were key informant interviewed (KII) averted that most their consultations (particularly the client, public but also engineers and contractors) cannot understand architectural drawings, especially 2D-dimensional representations.

As a result, one of the key motivations that most architects concentrate on the early phases of design is to guarantee that all of the concomitant parties understand the proposals. As Lawrence (1993); Kellner (1998); Bury (1997); Robertson (2000) articulates, *“It is imperative for the architects to pin down from the very beginning phase what sequence will be presented and to obtain tenet between both parties (the architects and clients) to avoid any major re-modeling or changes of design which obviously require a vast amount of time and money”*.

This key *raison d'être* on the whole includes building representation, design communication and visualization. Apart from these, the animatronics is at explicit phase by architects as required by the clients and to make an impact on them as part of the design development and submission (**Figure 3**).

3.2. Building Representation

The design is represented in the form of animatronics as budding platform to facilitate the bystander to see and understand the building easily before it is built. For paradigm, Archons and Benson Partners (ABP) use their building representation to provoke the planner in getting the design approved. In fact, one of the motion-graphic sequences is purposely made to analysis the visuality impact based on a few “driving mode” walk-through on the proposal site to outline the potentials and challenges (e.g. the main route and prospective building appearance from certain distance) before starting any design.

3.3. Design Communication

The ultimate approval of architectural design typically depends on client (including the public). All the way through the design process, an architect always faces unremitting building amendments. Clients that are incapable to visualize and decipher their building representations are prone to make incorrect decisions. The appraisal shows that a good number of the architects agreed that motion-graphic-based representation is a powerful media spheres to attract clients in getting projects and help out make faster decisions. The design process is made easier and kept on schedule. Thus, six out of thirteen practices prefer 3Dmotion-graphics in the design phase to allow good verdict making from the participants by having a quality communication proposal.

3.4. Visualization

Architectural picture-making more often than not look intangible or ambiguous for non-architecturally based professionals and lay populace. An architect's construal of a building might be unlike from what the audience will profess. With 3Dmotion-graphics representation there is the latent to bring together the design thinking of the architect and other parties consistently from the beginning

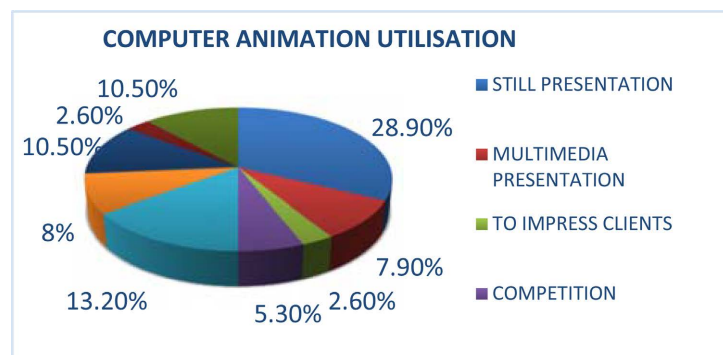


Figure 3. Why do you prefer this phase?

to the final phase through good quality “visuality” and acousticity. Indeed, design awareness becomes more explicit when the participant is represented in a well-told visual story; milieu music allows browsing through the animatronics.

On all of Design Group Nigeria Limited (DGN) newsworthy projects the clients were first shown a preliminary “or” pilot testing motion-graphics. For paradigm, in the new double tracing Railway Station (Lagos-Nigeria) project, a few potential sequences would establish a certain point-view shots to make possible the clients to see from the exit point what the adjacent look like (building landmarks) in relation to the proposed building.

3.5. Patrons Requirement

Some patrons distinctively require the architects to craft a motion-graphic at a specific phase mainly for funding and public information. Most of the patrons (contractors) prefer the early phases due to the fact that funding often takes a certain period of time to secure.

On the other hand, The Benson Partnership (BP) created motion-graphic sequences of a classy trade hub as keep-posted design information for the public to view and knowledge the new classy trade hub. The motion-graphic representation was required by client after seeing the first trade hub 3D motion-graphic proposal developed by the contractor’s in-house production. The interactive sequences allow the viewers to view as well as key in information such as walk-through, shopping standing together with the sound effect, view the trade hub from any of the chosen perspective and fly-through using the keyboard and joy-stick.

3.6. To Make an Impact on the Client

Although most of the firms consented that 3Dmotion-grapic representation make an impact on their viewers, only two exclusively used it for this motivation in the design phase. The early on phase representation is in essence used to get public curiosity and present the design information.

DAA Architects prefers the later design phase as more information can be included to give better impression to the client. This is due to the fact that the overall design and space planning is completed and texture can be plotted out to the building façade as well as a suggestion of light arrangement. As [Thomas, \(1993\)](#); [Rhodes \(2010\)](#) posit that, *“animatronics representation plays a major role as an impressive finished product and anything that extra ordinary will help in the design.”*

Dispiritingly, only one architect senses that their clients are not impressed by technology (3Dmotion graphic representation) perhaps because of negligible rendering (without any photo-realistic) and unsophisticated sequence. As Current Design Studios (CDS) enlightens, *“the client may wonder why the architects squander their money on investing in animatronics. What they want is actually something that shows the building working for them”*.

3.7. Design Development

The streams of the interviewed architects granted that animatronics that were created in the earlier phase do not provide a key improvement in the design development. This is mainly since these representations only provide an enhanced visualization (i.e. mass form) to the clients who often cannot understand 2D-dimensional drawing.

Nonetheless, if the animatronics (3D motion graphics) is produced at a later phase, helps the architects to develop their design. With far-reaching detail of the material, color, light, shadow, reflection and camera trajectory, a lot of quality decisions can be outlined critically as the animatronics gives almost a complete building representation. A chat, from Ebisike Tochukwu (ETA) Architects declared that, *“decision can justifiable swift as the animatronics on input deals with material selection in photo-realistic rendering which physical models cannot.”*

Consultant Collaboration Partnership (CCP) built-up a form of animatronics sequence viewing sun path to identify the natural lighting upshot quality in the design. This information helps them to suggest a few façade alternatives and energy conservation strategies to the clients particularly to make full use of natural lighting.

Correspondingly, Compo Consultant Partnership (CCP), a few seconds motion-graphic sequence helped them to win a housing competition project although the firm had to pay the animatronics fee (i.e. free service to the client). Nonetheless, 3Dmotiongraphics representation does not indispensable ensure a triumphant result to win a competition. This occurred to The Abodes Architects (AA), when one of their industrial design projects did not win a competition yet it was presented in the form of a motion-graphics sequence.

Question 3: How are animatronics used?

This appraisal reveals that the way the animatronics is activated relates to the phases selected by the architects. On the other hand, 3D motion graphics may be anticipated as part of the whole design representation together with static visual images and multimedia (Figure 4).

The focal point used to create the 3D motion graphics sequences is typically other CAD data (Figure 5). The architects essentially transfer and exchange files before extruding the building information into a 3D-dimensional model. Only

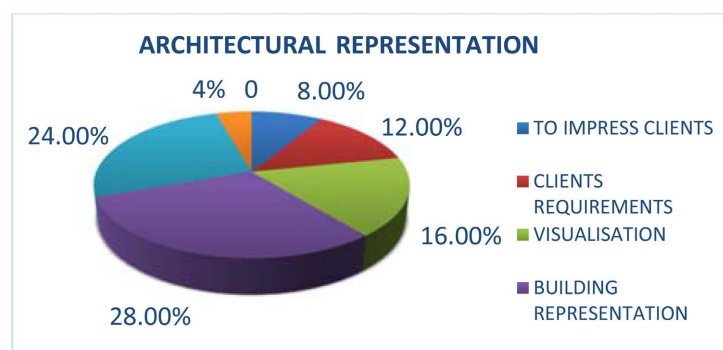


Figure 4. How are the animatronics used?

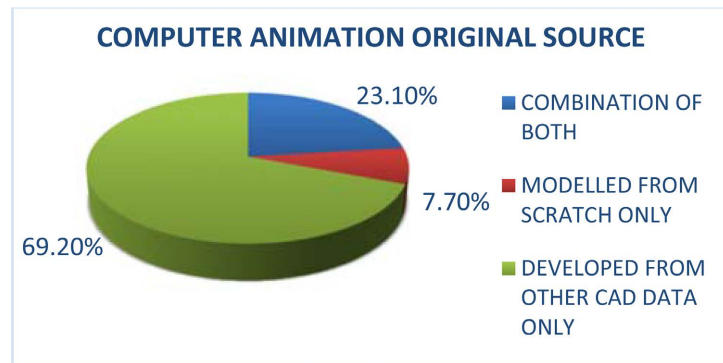


Figure 5. Is the animatronics being developed from CAD data?

one firm (James Cubits Architects) configures all of the other animatronics from scratch since it makes the overall motion graphic process easier and faster without any missing Polygram as often occurs in data exchange file.

Three out of seventeen architectural practices combine both animatronics tasks due to the fact that the mainstream architects receive individual information from other parties with diverse software's. To begin with, they create the derivation building model and draft. Subsequently, the architects manipulate the camera path and other rendering features to form a chain of motion graphics sequences.

3.8. Static-Visual Presentation

Contrasts to other usage, animatronics silent dominate the bulk of the practices static-visual representations. A bouquet of the architects create a few important shots from the animatronics sequences to be included as part the architectural documentation such as building reports, paper-based presentation and brochures. On the other hand, architectural firms update their practice brochures with the present animatronics projects in static colors; in fact, most of their clients request larger format static computer images for public exhibitions. Only one firm (ACEE Global View Architects) does not distinguish the point having many static images as the initial initiative was to convince and communicate design motion-based representation.

3.9. Media-Sphere Presentation

Two architectural practices slot in their animatronics sequences as part of the integrative building representation. 3D motion graphics sequences were organized into a CD-ROM (Compact Disc Read Memory) for client to view interactively with elements (e.g. buttons) to link with other information triangulation such as (textuality, visuality and acousticity).

In one of Advocacy's Architects topical commercial projects, one of their architects' elective a media-sphere production for the Shopping Complex. A few sequences passing through various buildings and topography setting (e.g. derelict area, housings and street with dim lighting) were included in the CD-ROM

to show and draw public attentiveness of how crime can suggest itself and be prevented.

Question 4: What Does the Client Use the Animatronics For?

In all-purpose the majority clients require the architects to develop animatronics for them to present their project to other parties. According to DAA, developers often require computer-graphics to be tendered alongside with their design. They hit-upon that animatronics is an effective marketing stratagem to catch public attention to invest in and buy their properties. In DGN Architects, the clients had the knowledge in the visualization design through 3D motion graphics and required The Partnership to develop animatronics throughout the design process.

Five architectural firms clarified that their clients use the animatronics to get funding. For paradigm, BGD architects clients use animatronics as a “public relation” (PR) to present to their project to the trustee, planner and local council.

The synopsis of how the clients use animatronics is shown in **Figure 6**.

Question 5: What Ways do the Architects think that Animatronics Helps?

This appraisal demonstrates that there is a clear relationship linking the way that architects think about animatronics (**Figure 7**) and why they select a convinced phase. Most of them agree that animatronics expertise vastly helps to impress the audience. This correlated with the motion-based medium and the idea

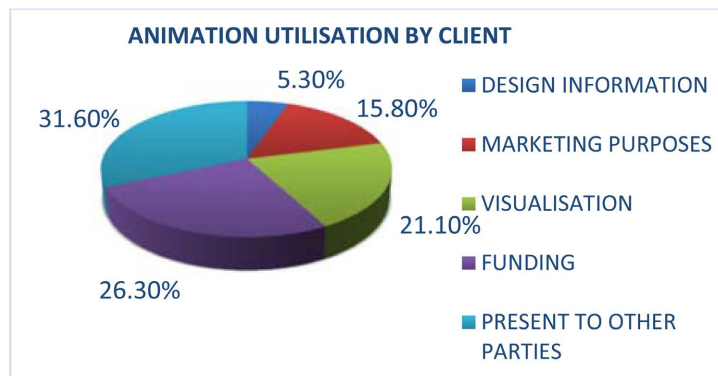


Figure 6. What does the client use the animatronics for?

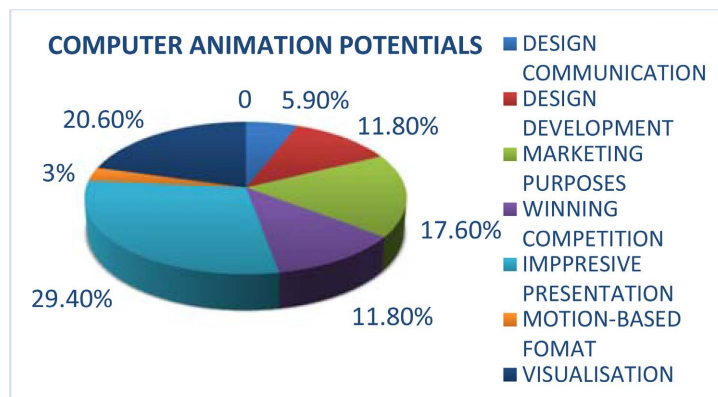


Figure 7. What way do you think that animatronics helps.

to reveal 3D motion graphics representations when explaining design with viewers who are not familiar with drawings.

For the client, this “eye-catching” technology (3D motion graphics) augments the prospect to promote, sell or even win competitions. In the architect’s point of view, the high quality rendering and selection of key shots make the design process easier as the client understands the design and knows what they require (e.g. form amendments and material selection) through visualization.

Question 6: How Might Animatronics in the Field of Architecture Develop?

While most educates/firms have diverse judgments on how architectural 3D motion graphics may develop, there are a few key similarities that architects concur with. These judgments are in essence divided into two main categories which are the present and the future of motion graphics in the field of architecture.

This appraisal shows that almost all architects recount to present situations before indicative of any idea in the future development of computer graphics-based architectural animatronics. For paradigm, in terms of the motion graphics faculty and quality, many firms noticed that the present motion-based technology for architects is still slow in the developing countries particularly in Nigeria it entails a lot of input even to develop a simple modeling and motion graphic sequence (see **Figure 8**).

Currently, CAD platform are still not developed to take advantage of the rendering power for large files that are often faced in building motion graphics. Thus, architects have to delete a batch of building features and contemplate on simple makeshift modeling. The end product becomes even worse in interactive simulation. This makes a number of architects from Design Group Nigeria (DGN) limited doubt the point of giving the interactive choice in the makeshift environment for client to experience in the virtual environment.

3D motion graphics representations calls for a greater amount of information input before individual images can be manipulated although in reality the design does not have that level of detail in early phase of design. If the architects unresolved ‘design to explain and can discourage the client’ on what the architects are doing on design. That is why the ATO Architects proposes concentrating architectural motion graphics at the design or advanced design phase to ensure

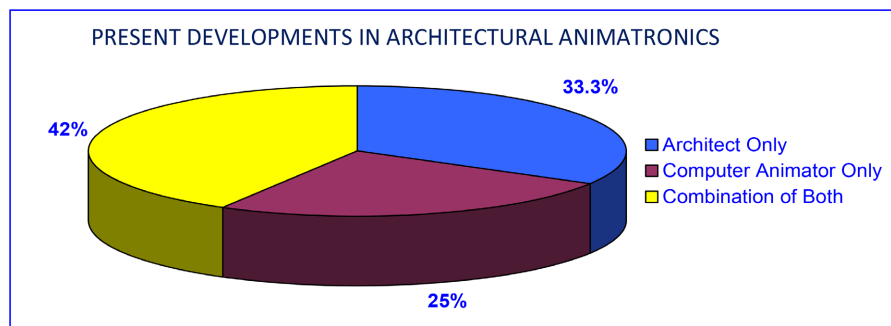


Figure 8. Architects opinion in present animatronics.

the building) better.

A further *raison d'être* that concerns many architects is the cost and time obsessive. Discounted software and hardware still prolong the production time. The price tag and time period become even greater when the numbers of animators in firm is large or too small. For paradigm, one key reason that James Cubits Architects have to freeze up 3D motion graphic representation in their design process is due to the fact that only one of forty-eight architects and technicians are in charge of the motion-based production. According to BESON Partnership (BP), *“animatronics in the field of architecture is still a back end application since it is not a common representation practice”* The impenetrability in finding discounted hardware and software and expertise to model fast three-dimensional animatronics makes many architects contemplate on a large project that cover the intensive toil production.

In this appraisal, five architects concur that in future 3D motion graphics will be more than a presentation tool (Figure 9). In fact, this motion graphic representation will develop better as a design platform for the designer to make the full use of this postmodernist advancement (technology). Building manipulation should become easier and more efficient particularly with fast rendering power and production processes. 3Demotion graphics that associates with interactive representation will be widespread in architectural practices for the audience and architects to instantaneously change the building material, colures and objects mainly to visualize the impact in the virtual surrounding.

In order to get a blossoming result, three architectural firms proposition that architects need to focus on 3D motion graphics as a specialism either as an in-house or separate business. According to architects from ATO' Architects Limited, *“a good 3D motion graphics cannot be achieved unless the architects choose motion graphics as a specialty since it is not a continuous task that many architects do as they often forget the process of developing the sequence.”*

Currently, three architectural firms had a split unite specializing in motion graphics and modeling. Design Group Nigeria Limited (DGN) and James Cubits Architects (JCA) have started this motion graphics service in-house as they

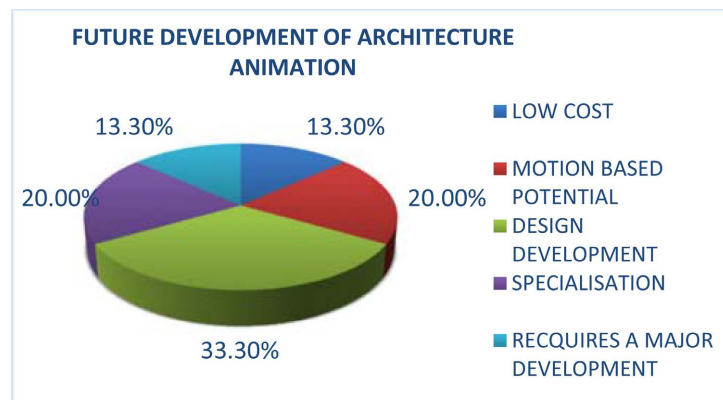


Figure 9. Architects opinion in the future based 3D motion graphics.

found that it has the potential market particularly in the construction business. The alleged that having a split unite will buff up the 3D motion graphics proficiency better as the architects can chew over on the process, modus operandi and other motion-based knowledge. On the other hand, Architectural and Building Consultants (ABC) have untouched partially into focusing on computer modeling, computer graphics and interactive business.

3.9.1. Pre-Production

Traditionalist picture-making recommends storyboards to be the paramount support in ascertaining key cinematic features and troposphere before commencement of any real virtual shooting. As Kawin (1992), Wang (2017), Otobo & Palnam (2021) posits, *“to sketch something out beforehand can be just as important to the picture-making as it is a painter”* In many cases, shooting cannot proceed until all key features are finalized onto storyboards. Thus, this reports how architects start to craft their 3Dmotion-graphics by critically decoding the step-up process and requirements from the commencement of the production.

Question: 1. Do the Architects have any Guidelines before Producing Animatronics?

Not any of the appraised architectural practices swanks any guideline or orientation (predominantly picture-making or any other motion-based representation perceptive) before preparatory point of view and repeatedly settled to produce their computer graphics. Most building sequences were manipulated based on the designers with the client.

Question: 2 Does the animatronics have any storyboard?

The appraisal confirms that only three out of the thirteen firms deem storyboard in the making of architectural animatronics (3D motion graphics). Pragmatically, only one firm (i.e., James Cubits Architecture) in actual fact put forward storyboard as their key preliminary clue to client before starting to develop the 3D motion-graphics. DGN architects seldom sketch more than a few key shots just for the internal production orientations and as a means to guarantee they include those shorts in the computer graphics sequences.

Question: 3 Does picture-making understanding benefit architectural animatronics?

All of the architects that consent on having a key guideline deem that picture-making understanding is crucial due to the fact the cinematic principles can be found in picture-making. In fact, nine out of eleven firms have similar opinion on this matter as shown in **Figure 10**. Concomitantly to a (chitchat) from (ETA) architects *“there is a certain background for the architects to know and understand for viewer’s perception particularly the contact”*.

Nonetheless, many architects feel that in-depth knowledge should be circumvented simply because the endeavor (JCA and time splurge in real architectural practice is minimal and noticeably does not relate architectural motion graphics. What is best for the architects are in essence to understand and apply those key principles.

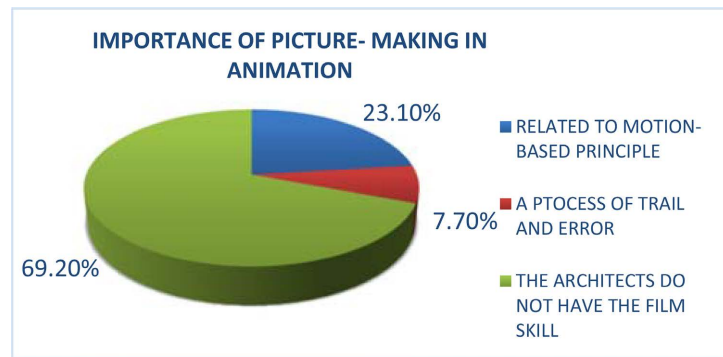


Figure 10. Why picture-making or another related architectural-knowledge is important to a good animatronics.

In this appraisal, only some architects accept as true that relying on just architectural knowledge is not enough to ensure a good motion graphics. James Cubits Architects (JCA) posits, *“There are a lot of proficiencies in picture-making that architects don’t have. What’s really happen in the practice is that most motion graphics development is in the process of trying and error to get the best shots”* Hence, having the picture-making principles will ensure a good result as the architects proffer to the people who are expert in the motion-based misapprehended (Pie Chart, 10).

3.9.2. Production

3D motion graphics (animatronics) production is in essence the stage when the virtual shooting begins. Architects will set up by means of modeling and maneuvering building to form the sequence. Thus, this section finds out the process involved by seeming at the number of graphic-animators involved and their troposphere applicability-task of computer graphics. Considering the procedural aspects, it also reports the number of computer unit, type of hardware and software used in the production. Most importantly, the blueprint is to critically tartan to what coverage they and other staff utilizes computer graphics above all the application of the packages and the representation detail.

Question: 4 Who Does the Animatronics?

In this appraisal 3D motion graphics is typically produce by architects and service bureau. The majority architectural firms allocate at least two to three architects’ animators and occasionally bring together graphic animators (service bureau) to generate 3D motion graphics (see **Figure 11** & **Figure 12**). Four firms set up only one animator and three have more than four animators.

Most of the animations (motion-graphics) skills were developed from or subsequent to architectural schools and as a personal interest. None of the architect’s animators have any video graphic; picture-making or motion-based skills (see **Figure 13**). Only few architects have knowledgeable in animations between ten to fifteen years. But most of the firms produce animation for the last seven years. In fact, ACE architects only had two months experience.

Three firms include CAD training for architects anecdotal from in-house and

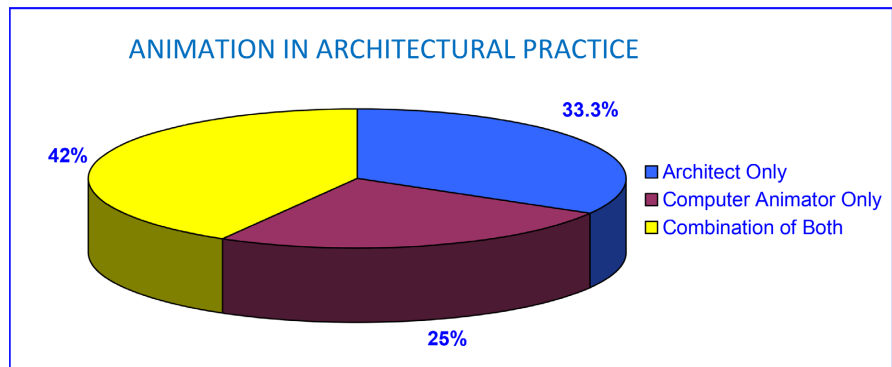


Figure 11. Who does the animatronics?

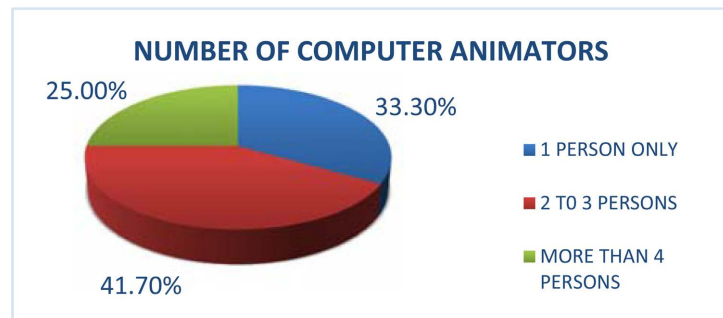


Figure 12. How many are in the production of animatronics?

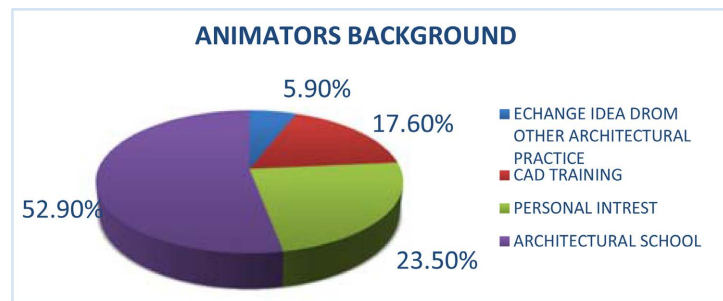


Figure 13. Did you have any knowledge before producing animatronics.

external training center. For paradigm, in order to hearten and build up the animation reputation, Advocacy Visionary Limited sponsors their staff to attend a short- and long-term CAD course. For the short course, apart from free software upgrading, the customer service package proffers the architects to attend intensive “Micro station training”.

Alternatively, Archon Nigeria Limited (ANL) develops their animator’s skills by exchanging ideas from other architectural allied practices. The animators on average get their information from other architects inform of final distribution formats (e.g. video graph and CD-ROM) as reference of before developing animatronics.

Animatronics Packages

Architects employ an ample assortment of computer packages to develop CAD drawings and animatronics. On the other hand, in this appraisal, approx-

imately all architects rely on the CAD software to create their motion graphics as shown in **Figure 14**. The majority of the rendered animatronics sequences are sent out in the form of cartridge to the production house to be reassigned onto video-graph with simple title and background sound.

Animatronics platform in the practices concentrate on PC-based packages. Authentically, only four firms use Mac hardware as shown in **Figure 15**. The assortment of working platform is based on the architect’s predilections and familiarities on the software and hardware to develop the animatronics (**Figure 15**). For the PC-based, many architects develop two-dimensional and three-dimensional images in AutoCAD. All of the images are repeatedly maneuvered and rendered in 3D Studio Max. Three of the most top architectural firms (i.e. Design Group Nigeria Limited, ATO Architects Limited and James Cubits Architects) proffer a cross-working platform due to the fact that architects repeatedly get various files from other building professionals such as engineers and surveyors before they can develop architectural animatronics.

As **Penz & Thomas (2009)**; **Dear (2003)** make clear, “chop and slice” instantaneously 3D model to see plan and section rather than view 3D model and 2D drawings discretely like other CAD packages. “*In Micro-station what you see in Mac will appear precisely the same as on PC screen. Most outstandingly it allows the architects with Mac-based working platform develop their basic modeling by using software such as Mini-CAD, Arch-CAD and Arch-ton. Sophisticated modeling, rendering (e.g. texture mapping, ray tracing and lighting) and animatronics (e.g. creating camera path and object movement) is build up by architects in Beacon Design Associate (BDA), Distinct Nigeria Limited (DNL) and Brain*

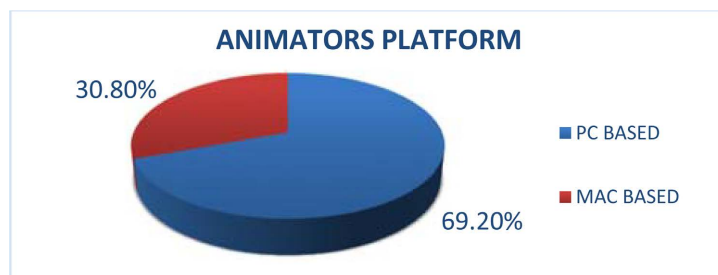


Figure 14. Computer platform used to create the architectural animatronics.

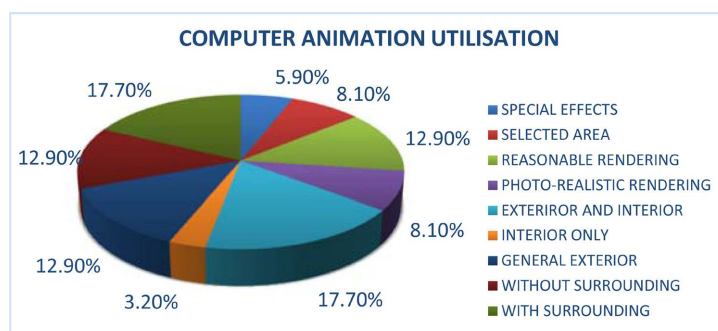


Figure 15. How detail would you go in production of animatronics?

Gram Design (BGD) Practice.

Intriguingly, architects that had PC proficiency found that Mac platform was more user-friendly primarily the process to develop the computer graphic which was faster and easier. What's more, most of the appraised architects rely on the in-house CAD facilities to produce architectural animation (see **Figure 15**) building model is developed based on the software availability and plug-in combination which enable architects to explore simple special effects. Some architects keep this way due the fact that topical software's with reasonable price does meet the design needs. Many CAD packages are difficult and complicated to learn (**Figure 16**).

If a special representation is requisite; architects on average hire a special service bureau to organize their architectural footage. In most cases, editing is just developed by putting together few moving sequences and static images with background sound and title compliment.

There are pocket-sized firms that consider developing an enhanced storyline by combining the animatronics sequences and images with voice-over and other "real" on-site shooting. In one of the high-rise proposals in Nigeria, Architectural and Building Consultants Limited (ABCL) developed an all-embracing detailed of the animatronics by showing the client how the building develops in stages throughout day and night time. Accordingly, the architect's annotation was very good and the client understood the construction process through the visual and representation which is often ignored in many architectural computer graphics.

3.9.3. Post-Production

Ever-increasing demand from clients has changed architects' consciousness of the need to improve their design presentation. This has led to an emergent use of both interactive and non-interactive recording art. On the other hand, when it comes to final distribution, many architectural representations lose the consultation interest and perceptible. One of the motivations for this challenge is a lack of acquaintance of post-production. Design material or information is not being primed with situate to post-production, instead, many architects simply create a few beautiful moving or static visuals.

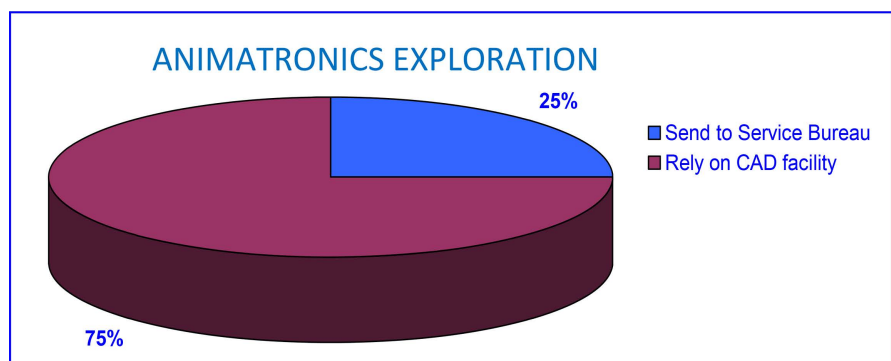


Figure 16. What extent do you go to produce animatronics?

Post-production is the phase where all the sequences are put together to form a well-told story. Thus, with a clear understanding of the storyline designers can then initiate to prepare a series or selection of video graphic recording. Hence, in order to get the best improvement in architectural animatronics and awareness of the importance of post-production, this section reports the architect's application on post-production particularly editing animated sequences. At the sometime, it categorizes where this process is developed, the cost and the final distribution format.

In general, the majority of the animatronics developed in architectural practices were not edited but by service bureau. Only three architectural firms alleged to edit the architectural sequences. This is due to the fact that a lot of them depend only on CAD hardware and software accessibility in their firm which obviously does not provide any editing facilities.

A number of architects grasp post-production as transmitting the computer images onto video graph or other format with few titles and background sound. Composite Architects Limited (CAL) feels that editing process is meant for architects to develop instead the post-production experts should handle it.

In indenture with many architects' animatronics in the field of architecture should be developed by architects particularly the production and editing. Some architectural firms had bad understanding when sending out few of their architectural information to be developed by the production house.

In-house animatronics Development

This appraisal shows that only three firms send out all of their animations to production house to be developed from scratch. Ten of the practices are dependent on service bureau to edit their animated sequence on which of them basically uses the production house facilities to transmit computer images onto video graph only without editing.

The *raison d'être* for this is to trim down the overall cost since many clients are not enthusiastic to pay extra for the service provided by the bureaus. Six firms agree that developing animatronics in-house speed up production as all information is at hand. Any changes and re-modeling can be dealt with instantly without having to give a longer development period. As DAA Architects cogitates, "*any firm that doesn't integrate animatronics or other modeling representation in their design falls behind*".

Reasons for many architects choosing to develop animation in-house are summarized in **Figure 17** & **Figure 18**.

Generally, the production phase dictates the overall motion-based development period. In fact, architects only dissipate one to three days for editing. Most animatronics is completed within one to four weeks (i.e. inception and feasibility). As Hyde (2003); Greenberg (2006); Judith (1995) clarifies, "*the clients can't anticipate them to put a lot of information especially material selection because the designer themselves are still in the process of developing design ideas*".

On the other hand, the architects typically require more than four weeks when

animatronics is involved with voice-over real shooting comparison, unique effects (e.g. “fog” effects) and high end photo-realistic rendering (see **Figure 19**).

Production House Service

There are numerous noteworthy reasons why most architects prefer to send their animatronics (particularly editing) to production house or service bureau for them to develop (**Figure 20**). Regularly, many firms are not fully equipped with the high-end production or post-production facilities or have as much as necessary expertise in Nigeria. Apart from longer time to spend in this motion-based representation, three practices say that the setting up especially for post-production is expensive.

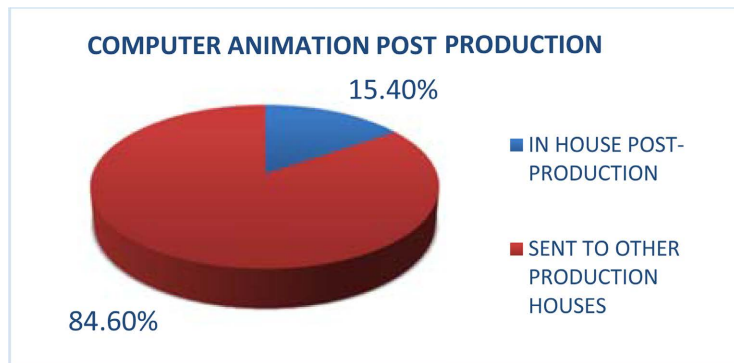


Figure 17. Who deals with the post-production animatronics?

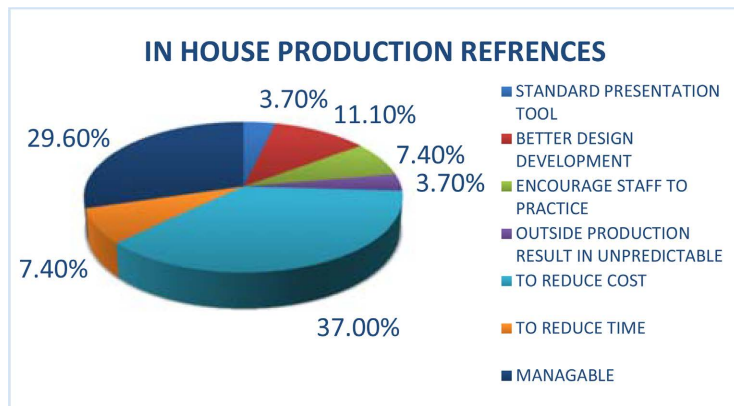


Figure 18. Who deals with in house production references?

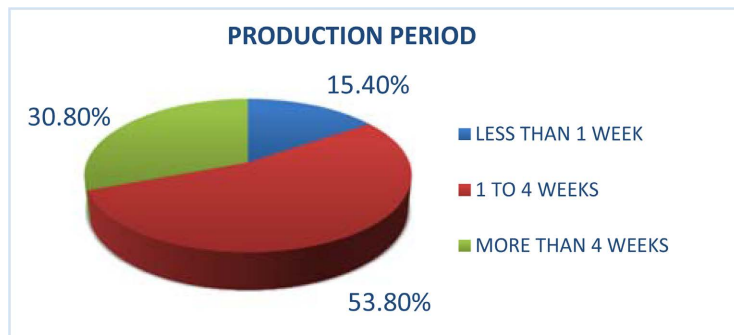


Figure 19. How long to complete an animatronics?

Current Design Studios (CDS) will sign-up for a number of hours a recording-studio to record the voice-over to include in their animatronics. They sense that this method is more economical and easier since the present service is still cheap and the architects depend on the sound experts.

To begin with, all the interviewed architects were pleased with the product developed by the service bureau. This is due to the fact that most of the animatronics sequence last for less than three minutes. As from AEX Design Services (ADS) spells out, *“there is nothing much the editor can do about the post-production because the given raw material (i.e. architectural sequences) is minimal for editing”*.

In most circumstances, architects need to trim down and remodel animated objects because the file is too large for the production house to develop. Hence, the firms that depend totally on the production house service need to plan ahead in the building planner so that the animators can spend enough time to develop the animatronics without requiring any extra charges for overtime and immediate production.

Concomitant to consultation, architects as a rule meet one or two times with service bureau during the development process (see **Figure 21**). Three firms allot three to five meetings. Distinct Nigerian Limited (DNL) architects meet up to six times with the production house on a few of the project animations to ensure that all the important sequences are highlighted. Only one firm let their develop

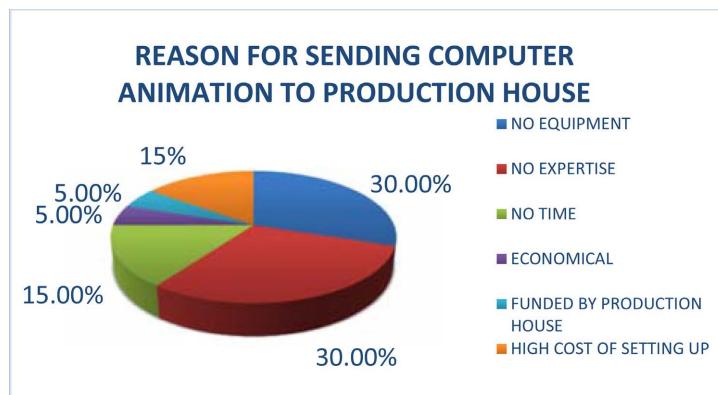


Figure 20. Why employ the production house for animatronics?

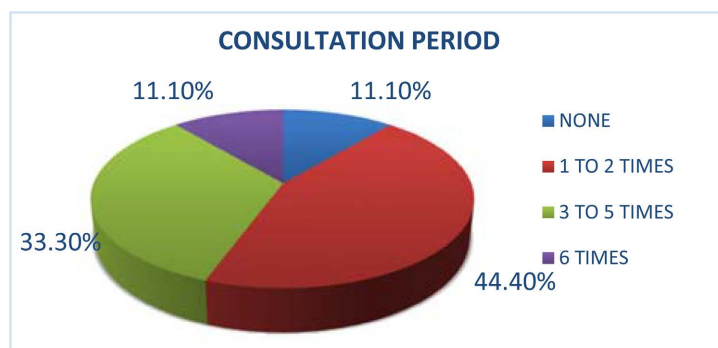


Figure 21. How many consultations before the end product?

animatronics.

Assessed to in-house production, time depleted by the service bureau to complete the animation is less since the work to be done is just rendering and simple editing. In fact, three out of eleven firms were requisite by the production house to develop their large animation projects between four to six weeks predominantly when the sequences include interactive presentation and exceptional effects. See **Figure 22**.

Final Distribution

Most animatronics were presented to the clients in the form of on screen and “video graphic” presentation. Eight (architectural) practices prefer an interactive format particularly CD-ROM and QuickTime Virtual Reality (QTVR). The overall cost is cheaper than “video graph” since the animated sequence on the whole required a minimal resolution (half screen quality). For a large audience, some of them present this information via computer projection.

On the other hand, in order to get a more bendy movement through building interactively, a few firms suggest the clients to explore using interactive technology. For paradigm, in one of DGN (architects) residential designs, they have the consultation as taking around the exterior and the interior of the building virtually. On the other hand, Advocacy Visionary Limited (AVL) forms a Digital Video graphic Interactive (DVI) to get a better resolution quality to visualize the proposal building interactivity. See **Figure 23**.

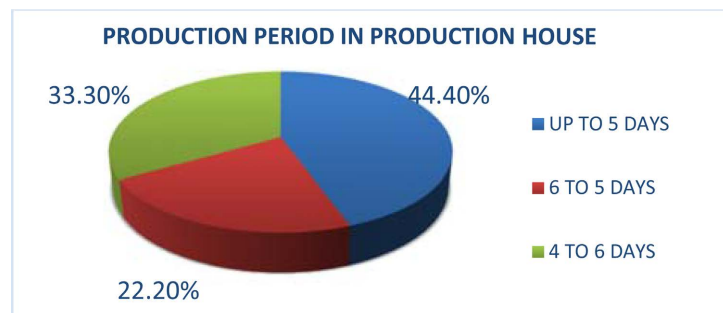


Figure 22. How long do they spend to complete the animatronics.

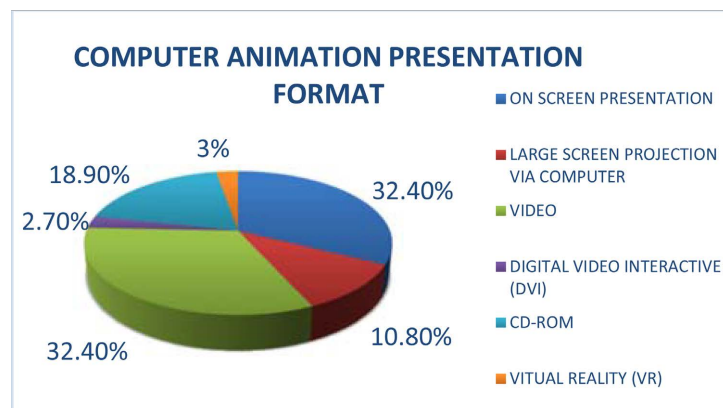


Figure 23. In what format do you present the animatronics?

The annotation that the architects received from their client on the animated sequence presentation across-the-board was good. Apart from catching the viewers' attention with this "eye transmittable" postmodernist (advanced) technology, most animatronics reveal the three-dimensional effect which allows for better design communication as viewers are familiar with the 3D motion graphic representation (television and movies).

4. Summary

In general, computer graphics were developed by architects at different phases particularly in the consultation and sketching plan phases for building representation, design communication and visualization. It is exclusively selected in the early design phase (simple modeling) to guarantee that all design challenges and impending can be justifiable earlier (especially with clients who are not familiar with drawing). On the other hand, animatronics that were developed in the sketch plan and later phases allow a positive feedback and decision from the viewers (client) as the animation input deals with a quite extensive detail.

Most of the animatronics were crafted based on the architect's point of view without any storyboard (picture-making basis) due to the fact that they only last for few minutes. However, the vast majority of the architects agree that there is a need to have a key guideline (particularly picture-making principle) for future architectural animation as an aid to get a good storyline and to aid keeping within time and resources constraints.

In the appraisal, one *raison d'être* why animatronics application in the field of architecture is minimum is that most architects developed their proficiency as a personal interest (often from edification and further supervision) although there is evidence of CAD training and exchanging ideas through (graphic moving picture bureaus) firms. Conversely, the range of CAD application for architectural ideas are increasing and developing alongside with the postmodernist advancement.

Virtually, all architects have inclination for in-house production to ensure the subject is well-presented (within architect's control). The motion-based production vastly depends on the CAD packages and services (often do not support editing) available at each firm. Many architects craft animatronics with a realistic rendering showing the general exterior and context in the form of on-screen and video graphic presentation. Scale references (e.g. human, trees and cars) were often added later as a computer-still. Photo-realistic rendering is applied on the later design phase as more design information and decisions were developed.

Above all, many architects have the same opinion that animatronics should be used as a bet to get a better design (clients were offered with the medium that are familiar which can reveal the three-dimensional effect). Nonetheless, in order to get the best of it, they offer animation should be focused as a sphere or big business.

5. Conclusion

In most status, architecture is problematic to explicate without leaving anything

to the imagination. The development of design ideas makes extensive use of drawings, perspectives, sketches and models as a way of communicating with a wide range of participants.

3D motion graphics could provide an effective means of communication if the designers were more aware of the techniques involved: in fact, from the appraisal voted for on architectural practices in Nigeria only one firm was trying to take a step forward in improving their animatronics by swap over ideas with other practices.

In practice, the use of architectural animation is quite unscientific. Sequences may come from the designer's point of view as stipulation or what they want the viewer to see. On the other hand, the appraisal revealed that many choices are often based on clients' preferences, and their consciousness of film and movies. Most importantly, the representation form is influenced by the individual design phase.

Hence, the computer-based animation in the field of architecture is more than just a manipulation of design images or building models using a few different paths, transmitted onto video-graph with background acoustic to form a well-told story. In fact, before the architects craft any motion-based representation, they must first figure out the design phase (as well as their participants) at which they develop the animatronics as it were proven to give a different level of input requisite and impact to the viewers.

In view of the fact that architectural animatronics is part of motion-based communication medium, architects be required to critically tartan the present recording art, particularly picture-making and television productions which in many cases displays winning result to communicate information. Certain cinematic standards and features that dominate the humanoid experience and perception when watching the sequence should be taken into account when producing the architectural motion-graphics.

Production House Service

There are several important reasons why most architects prefer to send their animatronics (particularly editing) to a production house or service bureau for them to develop (see **Figure 23**). Usually, many firms are not fully operational with high end production or post-production conveniences or have enough skill. Apart from longer time to use up in this motion-based representation, three practices say that the setting up especially for post-production is expensive.

Consultant Collaborative Partnership (CCP) (architects) will employ for a recording studio to record the voice-over to include in the animatronics. They feel that this modus operandi is more economical and easier science is still cheap and the architects depend on the sound experts.

To begin with, all the interviewed architects were contented with the product developed by the service bureau. This is due to the fact that most of the animatronics series last for less than three minutes. As Archon Nigeria architects make clear, *“there is nothing much the editor can do about the post-production be-*

cause the given raw material (architectural sequence) is minimal for editing”. On the other hand, the architect’s foremost disquiet is to ensure that the animatronics is in their control.

In most junctures, architects need to reduce and re-model the animated objects because the file is too large for the production house to develop. Consequently, the firms that depend utterly on the production house service need to plan ahead in the building planner so that the animatronics can spend adequate time to develop the animation without necessitating any extra charges for overtime and immediate production.

Concomitant to consultation, architects more often than not meet with the service bureau during the development process (see **Figure 22**). Three firms allot three to five meetings. AEX Design Services (architects) meet up to six times with the production house on few of their large projects animatronics just to ensure that all of the important sequences are highlighted. Only one firm let the animators develop their animatronics.

Put side by side to in house production, time spent by the service bureau to complete the animatronics is less since the work to be done is just rendering and trouble-free editing, particularly when the sequences include interactive presentation and special effects (see **Figure 23**).

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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