WJES Wasit Journal of Engineering Sciences
VOLUME: (7), NO. : (1) 2019

The Effect of Information Technology on Fluidity of Contemporary Architectural Space

Shatha Abbas Hassan, Noor Ali Aljorani

College of engineering ,Architectural, University of Baghdad.
**Corresponding author Shatha_arch2010@yahoo.com , architectnr@yahoo.com
Submitted: 8/3/2018
Accepted: 12/6/2018

ABSTRACT: The increasing importance of the information revolution and terms such as 'speed', 'disorientation', and 'changing the concept of distance', has provided us with tools that had not been previously available. Technological developments are moving toward Fluidity, which was previously unknown and cannot be understood through modern tools. With acceleration of the rhythm in the age we live in and the clarity of the role of information technology in our lives, as also the ease of access to information, has helped us to overcome many difficulties. Technology in all its forms has had a clear impact on all areas of daily life, and it has a clear impact on human thought in general, and the architectural space in particular, where the architecture moves from narrow spaces and is limited to new spaces known as the 'breadth', and forms of unlimited and stability to spaces characterized with fluidity. The research problem (the lack of clarity of knowledge about the impact of vast information flow associated with the technology of the age in the occurrence of liquidity in contemporary architectural space) is presented here. The research aims at defining fluidity and clarifying the effect of information technology on the changing characteristics of architectural space from solidity to fluidity. The research follows the analytical approach in tracking the concept of fluidity in physics and sociology to define this concept and then to explain the effect of Information Technology (IT) to achieve the fluidity of contemporary architectural space, leading to an analysis of the Skidmore, Owings and Merrill (SOM) architectural model. The research concludes that information technology achieves fluidity through various tools (communication systems, computers, automation, and artificial intelligence). It has changed the characteristics of contemporary architectural space and made it behave like an organism, through using smart material.

Key words: *Information Technology, Fluidity, culture, Smart material, Architectural space*

تكنولوجيا المعلومات وأثرها في سيولة الفضاء المعماري المعاصر

شذى عباس حسن، نور عبد الامير الجوراني

الخلاصة:إن تزايد أهمية ثورة المعلومات وماجلبته من مفاهيم مثل السرعة speed،وعدم التوجيه disorientation ،وتغير مفهوم المسافة distance قدم لنا أدوات لم تكن متوفرة سابقاً، فالتطورات التكنولوجية أخذت تتجه بإتجاه السيولة fluidity التي لم تكن معروفة سابقاً بهذا الشكل ولايمكن فهمها الأ من خلال الأدوات الحديثة.ومع تسارع إيقاع العصر الذي نعيشه ووضوح دور تكنولوجيا المعلومات في حياتنا وسهولة الحصول على المعلومات ساعدتنا في التغلب على العديد من الصعوبات ، فالتكنولوجيا بكل صورها أثرت تأثيراً واضحاً في جميع مجالات الحياة اليومية حيث كان لها التأثير الواضح على الفكر الإنساني بشكل عام والفضاء المعماري بشكل خاص حيث إنتقلت العمارة من الفضاءات الضيقة والمحدودة الى فضاءات جديدة تُعرف بإتساعها وبأشكالها الغير المحدودة ، تمتاز بالسيولة ومن هنا ظهرت المشكلة البحثية(بعدم وضوح المعرفة في أثر التدفق المعلوماتي الهائل المصاحب لتكنولوجيا العصر في حدوث السيولة في الفضاء المعماري المعاصر) حيث يهدف البحث الى تعريف السيولة ، بالإضافة الى إيضاح أثر تكنولوجيا المعلومات في تحقيق سيولة الفضاء المعماري المعاصر ، وكيف ساهمت في تغيير خصائصه من الصلابة نحو السيولة.إذ اتبع البحث المنهج التحليلي في تتبع مفهوم اليسولة في الفيزياء وعلم الاجتماع وصولا الى تعريف هذا المفهوم ومن ثم بيان تاثير التكنولوجيا في تحقيق سيولة الفضاء المعماري المعاصر وصولا الى تحليل لبعض النماذج المعمارية المعاصرةوصل البحث الى إن تكنولوجيا المعلومات تُحقق السيولة من خلال الأدوات المستخدمة (أنظمة الإتصالات ،الحاسب الآلي ،التحريك الأوتوماتيكي والذكاء الإصطناعي)، وساهمت في تغير خصائص الفضا ء المعماري المعاصر وجعلته يسلك سلوك الكائن الحي من خلال إستخدامه للمواد الذكية.

الكلمات المفتاحية: *تكنولوجيا المعلومات ، سيولة ، ثقافة ، مواد ذكية، فضاء معماري*

1-INTRODUCTION:

Fluidity emerged as a result of the emergence of information technology (IT) and its modern tools that did not limit flow only to goods, but included information too. IT has contributed to all aspects of life, including architectural space, where architecture has moved from narrow and limited spaces to new spaces known for their expansion, with unlimited forms, and characterized by fluidity. To understand how IT has contributed to the fluidity of contemporary architectural space, it is necessary to know what information technology is?

2-INFORMATION TECHNOLOGY(IT):

Information technology is of very great importance in all areas of life and can be defined as 'a set of scientific and practical applications, Hardware and Software, including computer, satellite, optical fiber, microfilm, and so on, which deals with information and assembly, by collection, storage, analysis, organization, generation, and retrieval, in a manner that is available and appropriate to the user' (Abdullah, 2003, p. 11). It can also be defined as 'a technology that combines computer, communication, and automatic control systems simultaneously' (Ali, 2003, p. 14).

3. FLUIDITY:

3-1 Fluidity in physics:

Fluidity is a characteristic of fluids. Fluids are defined as, 'substances that are able to flow' and these substances can be liquids or gases (voda, 2015, p.27). The British Encyclopedia states that a fluid is the opposite of a solid, characterized by its inability to maintain the cohesion of its components in the state of stillness, but changes its shape continuously, when exposed to stress and when exposed to the last flow and it is one of the characteristics of fluids (Bauman, 2016, p. 41). The fluids flow and have an association with the idea of movement (Ibid., 2016, p. 42). Chapoly Titouan emphasis that fluidity is metaphorically indicative of flexibility, intelligence, and ease of dealing with problem solving (Chapoly, 2012, p: 11).

We find fluidity against hardness and it is characterized by the ability of the material to flow and change its shape continuously and to respond to the force that affects it, that is, it expresses the flow and flexibility and ability to provide alternatives and it is linked to the idea of movement.

3-2 Al Saeed states that Bouman defines fluidity in sociology:

Bouman defines fluidity in sociology as the flexibility that stands in the face of the rigidity in all fields (Al-Saeed, 2016), in the sense of continuous dissolving and dissolving fixed and stable entities that derive their stability from within them (Bouman, 2016, p.20). The British Encyclopedia refers to the use of the concept of fluidity in sociology as the main metaphor that reflects the current stage of modern times (Ibid, 2016, p. 42). The fluidity of contemporary society seeks to disintegrate systems, the state of uncertainty, and the multiplicity of centers of action (Ibid., 2016, p. 33).

Here we find that fluidity is flexibility, a concept that reflects the nature of the current stage of society.

3-3 The concept of fluidity in architecture

Chapoly Titouan 2012 defined the concept of 'fluidity in architecture' as a concept that conflicts the terms and rules of architecture based on the terms, 'fixed' and 'solid'. It is a term that adopts a new knowledge that integrates architecture in complex and multiple relationships with other different disciplines, such as, society, science, and so on (Chapoly, 2012, p:4). Information and communication technology is essential to achieve this; it is a complex concept, rather than a mere expression of movement. It introduces new spatial practices, new building materials to build, and attempts to find a new way of thinking. It allows for the characterization of a fluid, interactive and mysterious space, with no traditional physical boundaries or orthogonal logic, but organic logic, a new practice in urban space and a change in lifestyle (Ibid, 2012, p. 5).

4-INFORMATION TECHNOLOGY AND FLUIDITY:

Fluidity has emerged with the emergence of information technology. The rise of the concept of speed and movement in addition to the changes in the culture of modern society, has changed many of our habits and symbols, The emergence of communication systems (the Internet) has made the flow no longer limited to goods alone, but to flow of information (Ibid, 2012, p.7). Harris states that the tools currently available were not available in 1900. These developments are moving towards fluidity, which was previously unknown, and cannot be understood safely through modern tools (Harris, 2000, p.2.). Modern tools provided by information technology include computers, communication systems, automatic movement and artificial intelligence (Ali, 2003, p. 12). Harris has emphasized that in the past ten years, space-time has changed because of the internet. It has enabled the immediate exchange of information and communications around the world (the fluidity of communications). As a result, our empirical understanding of space-time changes, distance and speed changes, pluralism and synchronization change. They have become fluid (Harris, 2000, p.2).

We find that technology has contributed to the achievement of fluidity through the tools used (computer, communication systems, artificial intelligence). These tools provide a flow of information, in addition to ambiguous borders.

Information technology has influenced the culture of society (Kandemir, 2016, p.1459) and because culture is closely linked to architecture, we will talk about the impact of information technology on culture and its reflection on architectural space and achieving its fluidity**.**

4-1 Information technology and culture:

Information technology is a tool to produce culture (Orabi, 2010, p. 10). Culture is defined as a way of life, the general traditions and beliefs of a certain group of people at a particular time. It takes into consideration all the circumstances (Hadid and Brahma, 2014, p. 264). Changes are fundamental in any living culture. We live in a world where fluid is becoming increasingly blurred in practices between local and global cultures. Every culture utilizes technology so that cultural activity can benefit from it. Any technological invention will affect our habits, causing a change in the manner in which we identify ourselves, and will bring changes and transformations in the culture to which we belong and the environment in which we live, innovate, and design. As a result of the increasing technological developments in the field of social interaction technology and digital communication, the methods of

communication between people, our habits, and our culture, and the needs of society have changed gradually (Kandemir, 2016, p.1458).

We find that communication systems contributed to the removal of the boundaries between what is local and what is global, and caused a change in the habits and needs of a society, the ways of communication between people, and an individual's perception of their environment.

Ozlem Kandemir states that the postmodern trend in contemporary culture is due to the changes and transformation of communication in many societies that has led to a cultural formation with new habits and new types of interactions on the physical and the virtual levels (Ibid, 2016, p. 1459). The historical sense and times change, we sit in the living room to watch events around the world; even though it is not the reality we live in, it is a representation of it. The images presented by the media are an inseparable part of our world (Musa, 2008, p. 38).

Contemporary culture has changed because of the communication systems that have provided a new type of interaction on the physical and virtual levels, in the sense of an ambiguous boundary between reality and unreality.

Technology has influenced the human perception of environment; the latter is influenced by our cultural experiences. We receive information from the environment around us from our senses, process it and organize it in a way that makes sense to us. The outputs and results convey everything that exists in our minds. Smartphones have changed how we sense things and the way we see environmental change. When the methods of receiving information was change (kandemir, 2016,p. 1459).

Communication systems have influenced man's perception of his environment because cognition depends on the individual's cultural experiences.

Information technology has been influenced by many concepts, including the concept of privacy. Digital devices provide a system of privacy that allows people to be open to others at times and closed at other times. Altman (1975) describes privacy as a selective control of self-access. Modern culture shows different levels of privacy as a dynamic process. When we define our site on social networking sites such as Facebook or any other application, we let ourselves be close to people (not very close), give them the right to comment, show them what to eat and what to drink, and so on. The new frameworks and standards have made people adjust and then set the movement in a series of behavioral mechanisms, to implement the desired level of rapid interaction, all of which has caused a change in cultures due to a variety of habits, rules, and concepts, where communication and openness changes the culture of the society we live in. Here, information technology has the potential to bring about societal change far superior to any previous technology (Ibid, 2016, p.1459).

Communication systems have caused a change in the concept of privacy and the culture of openness, closure, and communication.

In addition to the above, there is a concept of personal space, which is one of the important concepts used by people to regulate their privacy and accessibility to others, through movement close or after others, we make ourselves physically and socially, more or less access, though Hall (1966) mentioned four areas of spatial interaction: Intimate area, personal space area (place of daily interaction), social area (public places and non-personal communication), and public area (reception, people in a formal framework). Modern technologies have changed these concepts, where, through the Skype program, we can communicate with people when we are sitting in our house and we can make calls to other countries with different time zones (Ibid, 2016, p.1460).

Communication systems have caused a change in the concept of personal space, which includes easy access to others, through movement.

New technology has transformed our interaction with others and our environment in a profound manner. In schools and hospitals, we identify ourselves by verifying identities digitally. We therefore need to re-examine regional dimensions. In addition, the concept of territory is influenced by the concept of information technology. It is different, our property of space or any place is now not only physical, but also digital, as is our identity as mentioned above. It can be expressed without our body and we can experience our space without it being occupied (Ibid, 2016, p. 1460).

New technology has caused a change in interaction with others and with the environment through the use of communication systems. It has also changed the concept of spatial control of space, which has become digital in addition to physical.

Table 1 shows the impact of information technology on culture:

Table **1** The impact of technology on contemporary culture. source: Researcher culture. Source / Researcher

Technology has influenced culture in many ways:	
1.	Communication systems have caused a change in habits, community needs, methods of communication between people, and individual perception of the environment.
2.	-Contemporary culture has changed because of the communication systems that provide a new type of interaction on the material and virtual levels, in the sense of ambiguous boundaries between reality and representation, between the local and the world.
3.	-Communication systems have influenced man's perception of his environment because cognition depends on the individual's cultural experiences.
4.	-Communication systems have caused a change in the concept of privacy and the culture of openness, closure, and communication with others.
5.	-Communication systems have caused a change in the concept of personal space, which includes easy access to others through movement.
6.	-Contemporary technology causes a change in relationships (interaction with others and the environment) through the use of communication systems.
7.	-IT has changed the concept of spatial control in space, becoming digital in addition to physical.

Any change that affects culture, affects architecture, because architecture is a field that cannot be easily separated from culture.

In the next paragraph we will talk about the role of information technology in achieving fluidity in architecture, especially contemporary architectural space, and how it affects its properties.

4-2 Information Technology and Architecture:

Information technology is one of the most important factors forming the architecture of the twenty-first century (Orabi, 2010, p. 28). Harris states that the use of computers in design by architects in the last ten years has helped bring life to the fluidity discourse in architecture, She adds that the common feature of architecture today lies in the concept of fluidity, where architecture has reflected this position through flexibility and movement during time and space and has shown that fluidity is centered around the concept of dynamics (movement) (Harris, 2002, p.4). As a result of cognitive growth and digital technological advances, some architectural concepts have changed. In addition technology has influenced the level of formation, function, construction, structure, and architectural space (Khalil, 2011, p. 164). In the field of architectural space, the emergence of non-physical spaces such as cyberspace, hyperspace, and hybrid space, combine physical and cyberspace. Previously, architects who designed physical spaces are now beginning to design spaces that are dominated by a set of rules and emerging laws, which are more freer than traditional spaces and provide them with new intellectual fields (Orabi, 2010, p. 98).

Information technology has contributed to the fluidity of the architectural space and made it virtual in addition to physical, which has led to the emergence of new types of spaces like cyberspace, hyperspace, and hybrid space that combine the physical and virtual. Moreover, the architectural space adopts new laws and rules different from the previous fixed rules.

In the era of new technology, the field of architectural design submits to many rules other than the rules that accompanied the industrial revolution (Abdullah, 2011, p. 182). Orabi states that modern technology has provided the possibility of ease of external formation through gaining many architectural formations and streamlining them using modern programs, which have high flexibility in changing form, proportions, and colors, in addition to ease of internal formation (the flow from the inside to outside of digital buildings) (Orabi, 2010, p. 98).

Information technology has contributed to the achievement of fluidity through its impact on relations between form and space, providing new rules for architectural formation, different from the prior. It provides ease of external and internal formation (at the level of the relationship between inside and outside).

On the functional level, the new technology has provided high flexibility in space use through the possibility of gathering multiple functions at the same time, such as, housing, work, study, entertainment, financial services, administrative services, and the like, or by canceling some jobs or some spaces in traditional buildings or the removal of an entire building as a result of the nullification of its function in society (Ibid, 2010, p. 99)

Information technology has achieved fluidity through its impact on the use of space, providing high flexibility of space use through its multiplicity of functions. It has transformed the architectural space into a medium for transfer of information, which will be reflected in the user's needs, and its components have become electronic, for example, the electronic wall (e-floor), electronic ceiling, electronic windows (Abdullah, 2011, p. 181).

On the level of the fluidity of building materials, the most significant in the present information technology, in the field of building materials, are the smart materials and these materials are based on the principle taken from the nature of human biology. There are two characteristics that distinguish human life and mind, the latter has been exploited to work on a new quality of building materials called "Smart material". Muscles and nerves are distributed throughout the human body in a manner that enables them to respond to external variables automatically. Smart materials follow the same principle (Orabi, 2010, p. 100).

Saeed states that there are a range of characteristics that distinguish smart materials from traditional materials. They are, the ability to sense energy, the ability to change and transform in order to fit the surrounding conditions, ease of replacement and switching, light weight and power of possibility, and the ability to work through an electronic system, that is, control of these materials remotely (Saeed, 2003, p.33). The use of technology in the production of new materials has made architecture shift from working within the fixed limits of materials to dynamic materials. These materials have had an impact on the architectural space by transforming their fixed elements into dynamic, interactive concepts, which change and renew themselves, based on the environmental conditions and the various uses of the user (Kandemir, 2016, p.1460).

These materials have given a new dimension to architecture and thus to the contemporary architectural space, and transformed it into a living organism, by allowing it to form systems of sensation, with sensation of the surrounding environment. They have transformed the fixed elements into interacting elements, which interact with the user and the environment.

Titouan Chapoly states that fluidity requires a structure that is constantly growing and one that adapts to the context, and that, the architect cannot achieve with traditional design methods; he needs new tools (Chapoly, 2012, p.19). Information technology has produced new tools that enable it to achieve new structural ideas with the help of a computer, with its ability for computation of shapes and configurations, and it has also helped in the possibility of production and manufacture, in addition to its contribution to the solution of structural difficulties, where it needs programs and technology to help avoid errors and achieve accuracy (Abdullah, 2011,P. 182).

The work of Santiago Calatrava, the Kuwait Pavilion in Seville, Spain, is an example of the fluidity of structure, a building with a dynamic structure of the roof that reflects the organic forms of palm fronds moving to reflect day and night weather changes (Harris, 2000, p.15), as seen in Figure **1** .

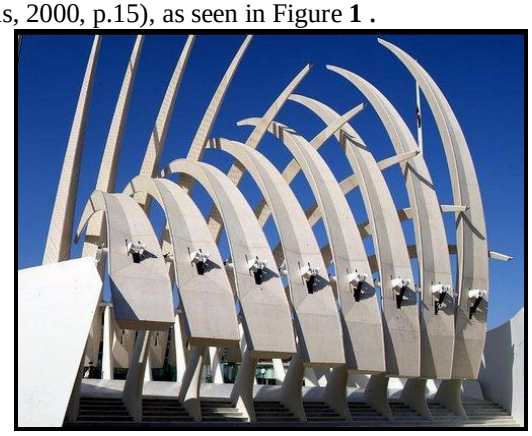

Figure **1** the Kuwait Pavilion in Seville, Spain, by Santiago Calatrava.source: (http://www.bmasf.com)

According to Yolande Harris there are two kinds of fluidity: The movement within space and its understanding and interaction with it and the external fluidity of the structural structure liquidity and its interaction with the environment. If the internal and external fluidity combined together create an interactive living environment, it can reflect the potential of the tools available in the twenty-first century. Architecture does not need to be a shell isolated from the space in which people move; it can be a living environment that reflects the organic and natural world without working against it (Harris, 2000, p.15). Fluidity, when available in space, makes it behave like an organism.

Table 2 shows the impact of information technology on achieving fluidity in contemporary architectural space, and its characteristics:

fluidity	Characteristics of contemporary architectural space
1-Materia	Information technology provides intelligent materials that give a new dimension to architecture and thus to the modern architectural space, and transforms it into a living organism, by enabling it to form systems of sensation of the surrounding environment. It transforms its fixed elements into interacting ones, with the user and environment, such as nanotechnology and biotechnology.
2-Form	-Information technology has influenced the form of the architectural space and made it, in addition to the physical, virtual, which has led to the emergence of new types of spaces, such as, cyberspace, hyperspace, and hybrid space, which combine the physical and virtual. The architectural space relies on new laws and rules that differ from the previous fixed rules. -The fluidity of information technology has affected the form, providing new rules of architectural form, different from the previous, providing an ease of external and internal formation.
3-Structure	Information technology has influenced the structural system through the use of computers in the calculation of shapes and configurations, in addition to the possibility of producing and manufacturing shapes, solving structural difficulties, and providing a growing structure that is constantly adaptive to the context.
4-Space relation	Information technology has affected the space relations, providing an ease of internal formation (at the level of the relationship between the inside and outside).
5-Elements of space	Information technology has influenced the elements of space and made them electronic, such as, e-wall, e-floor, e-ceiling, e-windows.
6-Movement	Information technology depends on the language of motion such as user movement and structural structure movement.
7-Use and interaction	Information technology has influenced the use of space, providing a high flexibility of space use through the multiplicity of functions it contains. In addition it has created a space that interacts with the user.
8-Perception and reception	Information technology has led to a change in the individual's perception of his environment. When the individual and his/her ways of receiving information change, the perception changes

We will analyze the following example based on Table 2:

fluidity	Characteristics of contemporary architectural space
1-Materia	Information technology provided intelligent materials that gave a new dimension to architecture and thus to modern architectural space, and

	transformed it into the living organism by enabling it to form systems of sensation of the surrounding environment and transformed its fixed elements into interacting with the user and environment, such as nanotechnology and biotechnology.
2-Form	-Information technology has influenced the form of the architectural space and made it in addition to the physical virtual, which led to the emergence of new types of it. Cyberspace, the hyperspace, the hybrid space that combines the physical and the virtual. The architectural space relies on new laws and rules that differ from the previous fixed rules. -The fluidity of information technology has affected the form, providing new rules of architectural form different from the previous, providing the ease of external and internal formation.

Project Name: Fresh Water expo H2O.Figure 2
Name of architect: Spuybroek Lars and Kas Osterhuies Kas Oosterhuies,
Place of project: Netherlands
Date : 1997

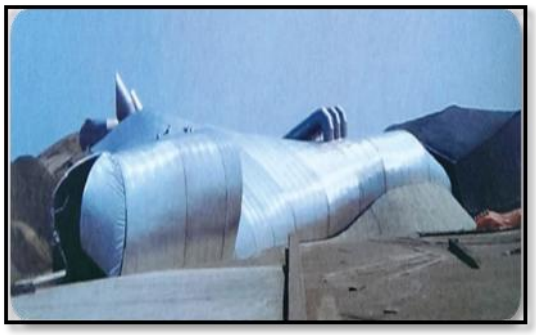

Figure 2 H2o Water expo Source: (voda, 2015, p.231)

The H2O is a fully interactive museum designed with the use of information technology, where the classic exhibition space is transformed into a space for the event. The visitor is immersed in an atmosphere of disturbance in which space, time, vertical, and horizontal concepts disappear (voda, 2015, p.231) as in the Figure (2). It has two halves, one half of salt water and the other half of fresh water, the aim is to create an environment around the main idea of water. It is designed to respond to the movement of visitors' actions with a complex pattern of water flow, sound, and image. It involves the participation of more than the competence of composers and artwork and technology experts (Harries, 2000, p.14). This project was meant to be a fluidity internal space, where visitors were allowed to flow freely, similar to water molecules. The space was designed to allow visitors to interact with the exhibits, for the purpose of education and recreation.

It allows for different types of movement of models and events, it is different from other traditional exhibitions where visitors move from one display to another, observing them and continue this movement. This project focuses on the movement of the visitor, which is seen within the liquid through information technology, with the use of interactive sensors (Spuybroek, 2004: 18), as in Figure **3**. Material Level**:** The project uses intelligent materials that allow interaction with the visitor. At the level of form: The form of the museum is a pure expression of formal continuity. It is believed that this geometry is a tube made up of a number of missing ellipses, distorted by a series of "repetitive transformations" according to the location data, such as "wind direction, sand dunes, and flow of visitors." The ends of the buildings consist of two incomplete segments, one on the vertical axis and the other on the horizontal axis. The change in the shape of the ellipse affects not only the exterior, but also the interior. The building consists of a physical and virtual form; sensors have been used to create a fluid and interactive surface. Formal and spatial continuity leads to unexpected social effects. Flow creates stress and intensifies sensations within the body. This density generates greater potential for spontaneity and unexpected movement (Spuybroek, 2004: 18). At the system level, it has been designed with the help of a computer, using the CAD program. On the level of space relations, it deals with the interaction of the building with the visitor and the interaction of the building with the environment. At the level of the element of space**,** there is curvature in the ceiling, walls, and floors. There is no horizontal or vertical section (Voda, 2015, p.231), as shown in Figure **4**. At the movement level, the project uses motion language such as integration, bending, and twisting, allowing for different models of movement (Spuybroek, 2004, p.39). At the level of use and interaction**,** it provides high flexibility of use, allowing for different types of events. At the level of interaction, it is a fully interactive building. Depending on the generated sensors by information technology, which increasing uncertainty, so Spuybroek uses the term "liquid architecture" of its designer, and Markus Novak try liquidate all that is solid and crystalline in architecture (Spuybroek, 1998, p. 50).Here the water implicitly suggests blue to engage the visitor in an interactive manner. Interaction is carried out by groups of sensors that produce simulations of waves, lights, and sounds, complementing water expressions that combine different situations: ice, steam, and cold or boiling water. The interactive idea of the museum is based on the interaction with the environment, where interaction is done using a computer (voda, 2015, p.231). At the level of **perception,** events within space arise through the interaction between the visitor and the building, which led Spuybroek to believe that perception is the essence of architecture, the uncertainty of the walls and floors continues uninterrupted, similar to the space of the perverse function of Claude Parent, which evokes balance in the audience through multiple ripples of the earth and the introduction of physical discomfort. According to Spuybroek, the architect of the H2O, the visitor's adaptation to the irregular geometry of the building is so significant that "the visitor navigates similarly to water" (Spuybroek, 2004, p.18). Understanding the space becomes difficult physically and mentally, because of the absence of windows opening outward. The visitor becomes immersed in a new, unknown, and isolated space. The visitor is introduced into a simple world, the orientation disappears and the perception focuses on a topological rather than a geometric space. In this scenario, the visitor follows a predetermined time, involving moments, a non-dimensional interactive sequence, the sensors are not placed at equal distances and do not cause the same feelings and emotions. For this reason, the overall atmosphere of the project is turbulent and confusing (Ibid, 2015, p.235).

The result is the fluidity inside the building, which has the flexibility to respond to human movement. The water EXPO evokes fluid characteristics through formality, spatial continuity, and interaction. The behavior of the building, in its dynamic nature and its internal evolution in real time, resembles the behavior of an organism. The wall is integrated with the roof of the wall with a dynamic system. The building achieves the interaction of users with each other, and the users with the environment. The environment from which the visitor adapts to a changing environment, constantly reflects the fluidity. This is achieved in full by the tools provided by IT.

The example for this is the museum in Graz, Austria, 2003, by Peter Cook and Colin Fournier. The computer was used to achieve fluidity as the building absorbs energy through the solar panels on the roof of the building, which acquire energy as an organism, Figure 6.

The digital house by Hariri and Harieri architects in the United States of America consists of a metal structure encased with LCD screens for multimedia applications. The internal space is flexible and accommodates multiple users. In this example, technology has been used in every part of the house for the user's service and well-being, Figure 7

5-CONCLUSIONS:

1. Fluidity is closely related to information technology. It is considered as an IT tool.
2. Fluidity against hardness is characterized by the ability of the material to flow and change its shape by continuing to respond to the force that affects it, that is, express its flexibility and ability to provide alternatives. Moreover, it is linked to the idea of movement.
3. Fluidity is flexibility, a concept that reflects the nature of the current stage of society.
4. Information technology has achieved fluidity through the tools used (communication systems, computer, automation, and artificial intelligence).

5. IT has influenced culture in many ways:

- Contemporary culture has changed because of the communication systems that have provided a new type of interaction at the physical and virtual level, in the sense of-unclear boundaries between reality and representation.
- Communication systems have caused a change in the concept of privacy and the culture of openness, closure, and communication with others has changed, and it has caused a change in the concept of personal space, which includes easy access to others through movement.

6. Fluidity in architecture has been achieved through the use of tools provided by information technology.
7. Information technology has influenced culture, and as space is a cultural product formed by man, technology has been affected by the contemporary architectural space and become characterized by fluidity through Information technology has influenced:

- The material: Smart material.
- The form of the architectural space and made it in addition to being physical, virtual as well, which has led to the emergence of new forms. Cyberspace, hyperspace, and hybrid space combine the physical and the virtual. The architectural space relies on new laws and rules that differ from the previous fixed rules, and it has affected the form, providing new rules of architectural form different from the previous, providing ease of external and internal formation.
- the structural system through the use of computers in the calculation of shapes and configurations, in addition to the possibility of producing and manufacturing shapes, solving structural difficulties and providing a growing structure that is constantly adaptive to the context.
- The space relations, providing ease of internal formation (at the level of the relationship between inside and outside).
- The elements of space and made them electronic, such as, e-wall, e-floor, e-ceiling, e- windows.
- Movement: Information technology depends on the language of motion such as user movement and structural structure movement.
- The use of space, it provides a high flexibility of space use through the multiplicity of functions it contains, in addition to creating a space that interacts with the user.
- Perception: Information technology has led to a change in the individual's perception of his environment. When an individual's manner of receiving information changes, the perception changes.

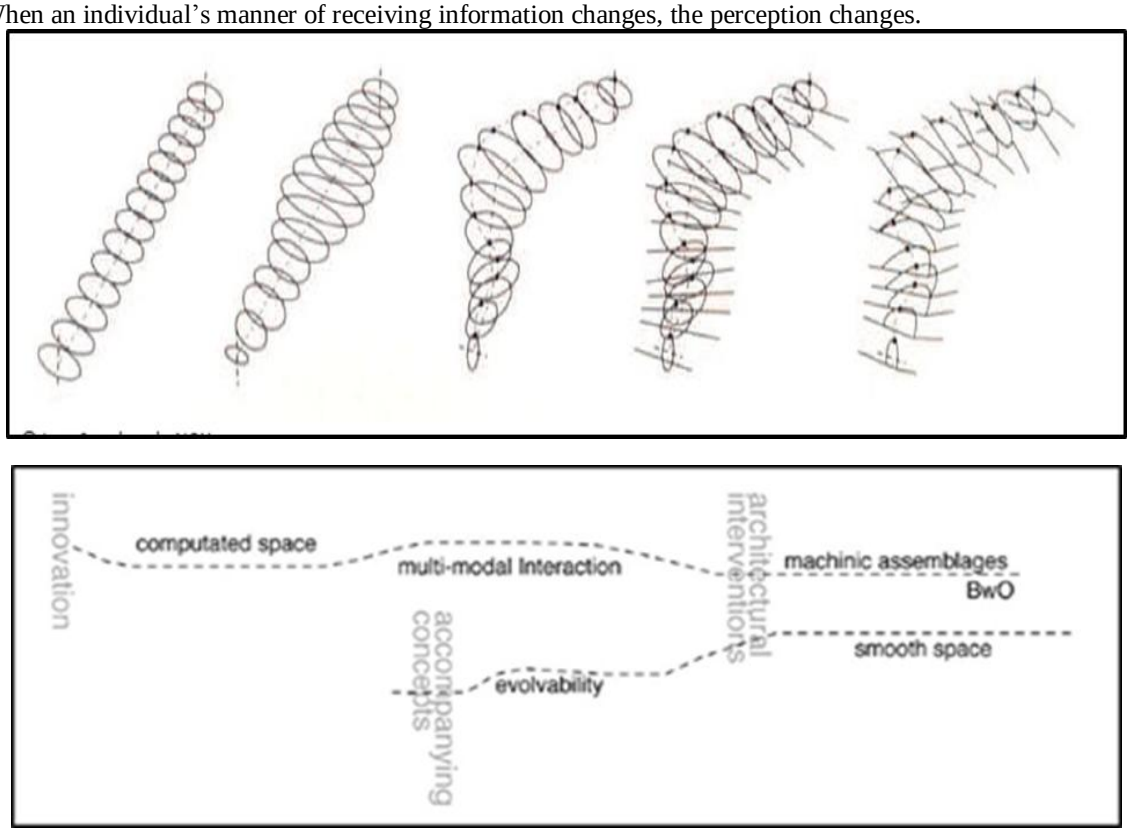

Figure **3** The sensing structures in the H2O water basin Source: (Görgül, 2015, p.171)

Figure 4 The shape of the H2O water pavilion. Source: (Spuybroek, 2004, p.19).

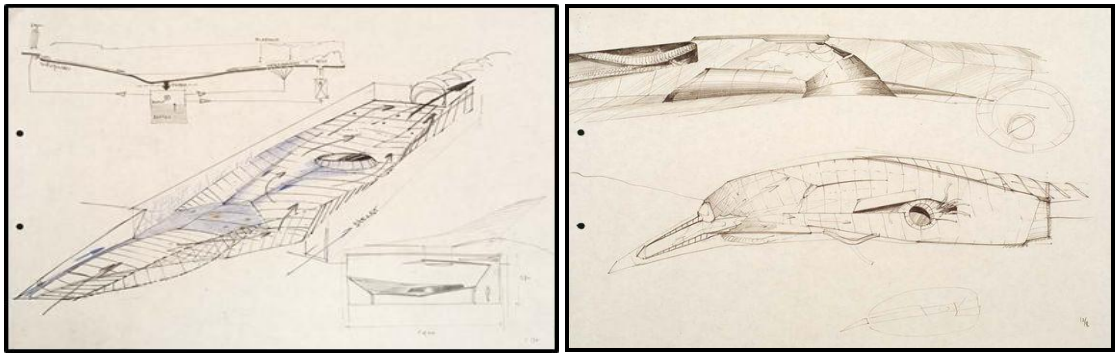

Figure 5 The space continuity in H_2O pavilion. Source:http://www.frac-centre.fr

Figure 6 The Museum of modern art in Graz,Austeria .
.Source: https://www.pinterest.com

Figure 7 The digital house by Hariri and Hariri architects..Source:

References:

-Arab References:

1- Al-Saeed, Yousra Wagih.2016. "The Term of Contemporary Liquidity and its Implications at Zigmont Baumann".Foundation of mominoun without borders for studies and researcher, Morocco,Rabat, December.

2- Baumann,Zigmont.2016."Liquid Modernity," translated by Hjah Abu Habr, First Edition, Arab Network for Research and Publishing, Beirut.

3- Hadid, Yoseph,and Brahma Nasira.2014. "Modern Communication Technology and the Cultural Privacy of the Algerian Urban Family", Journal of Human and Social Sciences, no. 17, December.

4- Musa ,Zahra Mohammed.2008."Information Technology and Internal Space", Unpublished Master Thesis submitted to the Faculty of Engineering, Department of Architecture, University of Technology, Baghdad.

5- Orabi, Engi Fawzi Ahmed.2010."Contemporary Trends in Architecture: In Light of Digital Architecture", Master Thesis published to the Faculty of Engineering, Department of Architecture, Cairo University, Giza.

6- Saeed, Salah Essam.2003. "Evolution in the Use of Building Materials and its Impact on Architectural Thought in Contemporary Architecture", Master Thesis, Introduction to the Faculty of Engineering, Department of Architecture, Assiut University.

7- Abdullah ,Mohammed Anwar.2003. "Urban Planning in the Information Technology Period", Master Thesis, Faculty of Engineering, Cairo University.

8- Khalil ,Mohamed Hassan.2010."The Influence of Information Technology on the Development of Architectural Thought", published Master Thesis to the Faculty of Engineering, Al-Azhar University.

9- Ali,Nabil.2003."The Challenges of the Information Age", Cairo: Al Ain Publishing House.

-English References:

1. Chapoly,T.,2012." FLUIDITÉ EN ARCHITECTUR CONTEMPORAINE: espaces ambigus et interactifs".Master thesis at EPFL (Swiss Federal Institute of technology),Switzerland.
2. Görgül, E., 2015."Augmented Spatial Mediators of Late 20th Century and their Impact on the Realization Process of the Smooth Space in Architectural Discourse: Fresh Water Expo Pavilion Case." Estudios de Filosofía ,No.13,Pp: 155-172.
3. Harris,Y., 2000. From Moving Image to Moving Architecture: A discussion of the space-time" phenomenon of the twentieth century, with particular reference to architecture, moving image and music.Cambridge, England.puplished by http://yolandeharris.net
4. Harris,Y.,2002. Architecture and motion:Ideas on Fluidity in sound,image and space.Proceedings of Symposium on Systems Research in the Arts,Baden,Germany.
5. Kandemir, O., 2016. Effects of Contemporary Information Technologies on Culture and Architectural Space. Procedia engineering,No. 161, pp.1458-1461.
6. SPUYBROEK, L.," NOX: machining architecture", London: Thames and Hudson,2004.
7. SPUYBROEK, L. ,1998."Motor Geometry", In: Architectural Design: Hypersurface Architecture.No. 5-6, p. 48- 55.
8. Spuybroek, L. and Kas O. ,1992-2012."Hypersurfaces (1998)." The Digital Turn in Architecture: 108-123.
9. Voda, I.I., 2015. La fluidité architecturale: histoire et actualité du concept (Doctoral dissertation, Université Grenoble Alpes).

-Internet:

- http://www.bmasf.com
- http://www.frac-centre.fr
- https://www.pinterest.com
- http://www.haririandhariri.com