Generative processes for revitalising historic towns or heritage districts

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Essentially this article advocates the adoption and use of dynamic generative processes for town and neighborhood development vs the use of static blueprints of 'master plans' that produce fabricated built environments. Instead, those that are the product of generative processes have attributes that can be described as dynamic complex adaptive environments that embody the virtues of complexity and sustainability. The article also discusses the components of a generative program and how they are utilised for revitalization projects that are located within historic towns or heritage areas. Two case studies – Albuquerque, New Mexico and Muharraq and Manama, Bahrain – are discussed to show how the principles of a generative program are applied. Over time, the results of such a program for revitalization will maintain the integrity, characteristics, and sense of place of the area by avoiding the static results that freezes the built environment and produces museums that are of interest to tourists rather than the people living there.[1]

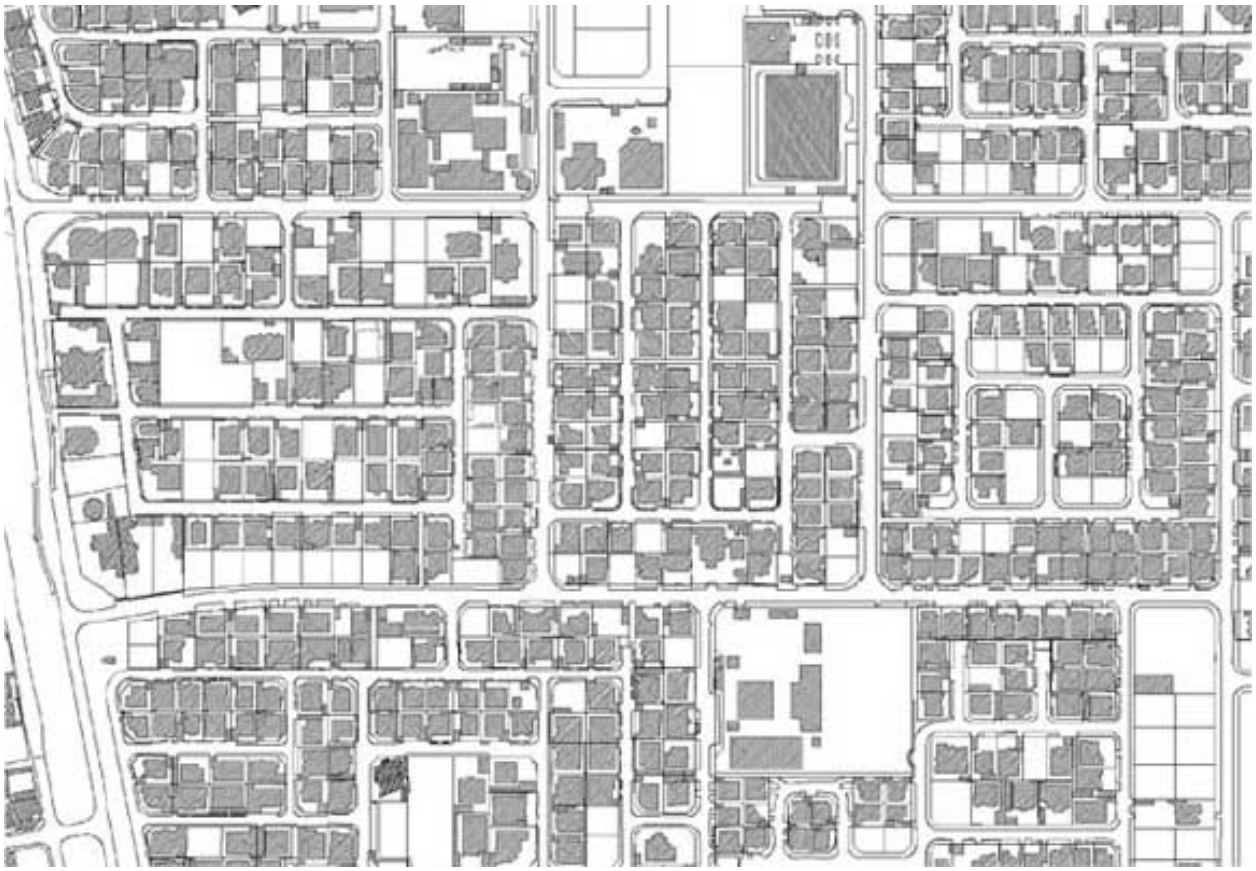
Introduction

What is a generative process? The goal of this short article is to clarify what it is, and by doing so shed light on how it is different from the common processes of development currently used in many parts of the world. Although the study addresses the context and problems of historic towns or heritage districts in cities, the insight gained is applicable to new development projects as well as it is valuable for formulating policies and appropriate codes for projects that incorporate generative processes in their implementation.

***Figure 1a**. (top) and **1b** (bottom) are from the city of Muharraq, Bahrain. The map above is a part of the traditional fabric resulting from a generative process. Located below is a partial map of a housing subdivision from the mid-1990s, a result of a 'master plan' blueprint. Both maps are dated 2005, from MoMAA, Bahrain.*

Two maps from Bahrain (Figures 1a and b) visualise the difference of the built environment that resulted from a generative process and a preplanned and designed one. The latter type is based on a static plan in the form of a blueprint, commonly known as a 'master plan' that describes what needs to be done and which generates a fabricated structure. Whereas a generative program is one that creates built environments that are guided by a step-by-step procedure within a reasonable time frame. In essence a generative process tells us what to *do*, what*actions* to take to build or revitalise buildings, rather than detailed drawings that tells us what the *end*-result is supposed to be.

Historic towns in many parts of the world were initially built following a generative process.[2] When confronted with the task of revitalizing such historic towns today we must create the conditions that will allow a generative process to function and thrive.[3]



Generative system and its components

I will put forward the essential components of a generative system. This is adapted from my insight of how traditional towns emerged from such a system and from my experience in designing programs for revitalizing historic towns. It is therefore an amalgamation from both sources.

Figure 2*. A view of a street from the island of Paros, Greece. The* ***Sabat*** *belongs to the house on the right because the left side is supported by columns independent of the structure on the left. Photo by Constantin Papas from the early 1950s. Click on image to enlarge*

A generative program must be composed of the following components:

I – Meta-principles comprised of ethical/legal norms that is derived from the history and value system of the society for which such a program is proposed.

To provide a concrete example of such principles I will use those that were predominant in Islamic societies. Similar principles were also predominant in non-Islamic societies around the Mediterranean. The following seven meta-principles are a part of ethical norms:

(i) Good intentions are the basis for sound decisions.

(ii) The basis for action is the freedom to act within one's property, constrained by the ethical norm of 'Beauty without Arrogance', and by avoiding creating harm as stipulated in the following norms.

(iii) Harm to others and oneself should be avoided, and if two damages should occur then, and only if necessary, accept the lesser of the two.[4]

(iv) Respect the rights of older established conditions on the ground including existing buildings, and by extension accepting the idea of interdependence and cooperation between neighbors.

(v) Respect the privacy of others, particularly avoiding the creation of direct visual corridors into private domains. In addition, in traditional Greek societies, avoid blocking the views of harbors and the sea.

(vi) Do not debase the social and economic integrity of adjacent properties by changes or the use of one's property that would create such harm.

(vii) Local customary practices must be respected and followed, although with the passage of time changes to those customs might be necessary.[5]

Figure 3*. A street scene in the Albaicin quarter, Granada, Spain. The* ***Fina*** *is fully utilised in the structures by projections from the upper levels and by its use by the people without obstructing the public-right-of-way. The result is a dynamic built and social environment. Photo by Arthur Erickson from the early 1960s.*

II – Private and public rights are fairly and equitably exercised.

In a generative bottom-up system most of the decisions affecting the built environment are made by the people living in their neighborhoods. Rights that affect those decisions have to be clearly articulated and understood by the public.

They are:

1. Right for abutting an adjacent neighbor, and the right of servitude and access. This will depend on the specific configurations of the site and buildings.
2. Privacy rights – their protection and maintenance.
3. Rights of original and earlier usage. This means that subsequent decisions and acts have to take into account existing conditions.[6]
4. Rights for the full utilization of one's property that include the right to increase useable areas such as building a *Sabat* (room bridging the right-of-way without creating obstructions to traffic, as the example in Figure 2), or increasing the height of a building within stipulated restrictions if those exist for a specific locality or site.
5. Right for using a part or all of one's property for generating income, provided such use does not create damage to the neighborhood.
6. Right of pre-emption of an adjacent property. This right provides the first option for purchasing an adjacent property by the neighbors.

7. Right of *Waqf* property. The *Waqf* is an Islamic institution that allows owners of property to endow their property and the income it generates for charitable purposes.
8. Right of inheritance by taking into consideration the impact it might have on division of a property.

THIS BIRD'S EYE VIEW SHOWS THAT BUILDING HEIGHTS RANGED BETWEEN ONE, TWO, AND OCCASSIONALLY A PARTIAL THIRD LEVEL WAS ADDED. THE LOCATION OF THIS AREA OF MUHARRAQ IS SHOWN ON THE MAP BELOW.
Drawing by John Yarwood, 1980s.

Figure 4. Heights of Buildings. *Background: In traditional Arab-Islamic cities, we notice that the heights of buildings tend to be uniform. The reasons for this are: 1. Roof terraces are potential locations for people to overlook the private domains of adjacent neighbors. Thus the custom (Urf) was not to build appreciably higher than adjacent buildings. 2. Owing to limitations of traditional construction methods and building materials, constructing a building higher than two or three stories was discouraged and in some cases was impractical. This was also the case in the heritage areas of Muharraq and Manama. With the availability of modern building materials and technologies, it is now possible to build very high buildings. Such open-ended freedom will destroy the heritage characteristics of both towns.*
Implementation: 1. In both Muharraq and Manama it is necessary to undertake a study to establish the average height of traditional buildings in the area. That average can be established as a benchmark for building heights. Certain exceptions might be allowed on a case by case basis. For example, if the average height of a two story building and its terrace parapet is 3.5m + 3.5m + 1.5m + 1 m (for the floor thicknesses) = 9.5 m, then for exceptional cases a 10 or 15% additional height might be allowed. That will make the building height between 10.5 and 11 m. 2. It should be noted that the height of a building should be the

primary measure and not the number of floors, as those can vary between 2.5 and 3.5m or higher. Thus the average allowable height of buildings may allow within their dimension up to three floors: 3 floors @ 2.5 m/floor = 7.5m + 1.5m for the terrace parapet + 1.5 for the floor thicknesses = 10.5 m, which is within the average range for buildings with an allowable 10% increase in height.

Public rights relate to transportation, infrastructure, and certain public facilities. The public authorities have to implement and maintain them.

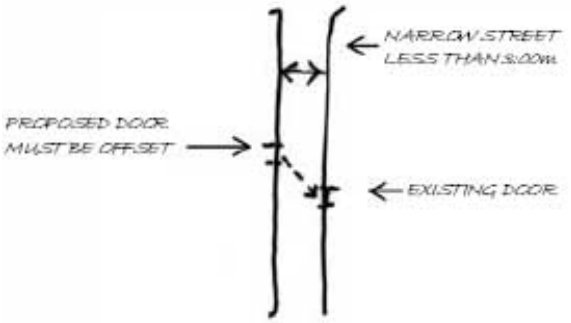
III – Private and public responsibilities are properly allocated and implemented.

Historically, the responsibilities of private citizens and institutions in generative systems that were clearly evident in societies and cultures located around the Mediterranean basin were:

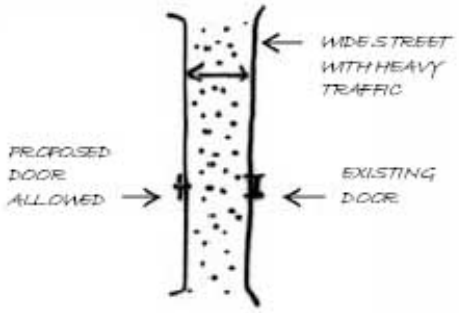
1. Utilizing the exterior *Fina* when needed and the responsibility for keeping it clean. (The *Fina* is a longitudinal space along the exterior wall of buildings about one meter wide. It has many useful purposes as the example in Figure 3 shows).[7]
2. Informing the public authorities of any danger to the public realm from within private properties so that corrective action is taken. A typical example is the leaning wall that might pose a danger to passersby on the street.
3. Each individual and family is responsible to maintain peace and tranquility with their surrounding neighbors.

Responsibilities of public authorities were:

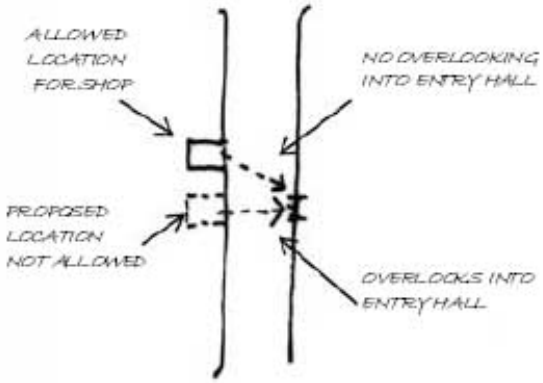
1. Protecting the rights of the public.
2. Building and maintaining public streets and sewer lines, water and electricity distribution and maintenance, garbage collection, and ensuring that the public realm – streets and open spaces – are always kept safe.
3. Protecting the integrity of local customs that are related to change and growth in the built environment.
4. Resolving equitably problems and disputes that may arise between property owners, particularly between adjacent neighbors.



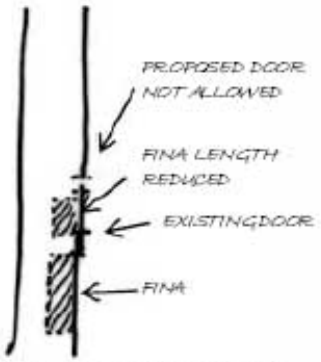
1.1 LOCATION OF PROPOSED DOOR ON NARROW STREETS LESS THAN 3.00m WIDE



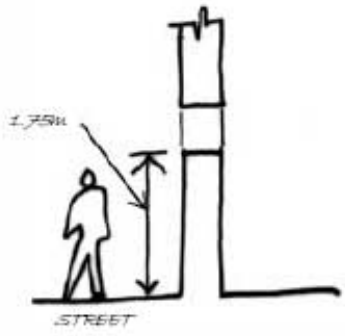
1.1 LOCATION OF PROPOSED DOOR ON A WIDE/HEAVY TRAFFIC STREET



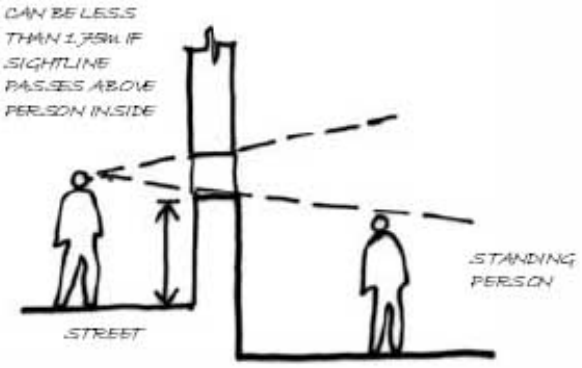
1.1 LOCATION OF PROPOSED SHOP RELATIVE TO EXISTING DOOR ON OTHER SIDE OF STREET



1.2 LOCATION OF PROPOSED DOOR ADJACENT TO A NEIGHBOR'S DOOR IS NOT ALLOWED IF IT REDUCES THE LENGTH OF FINA

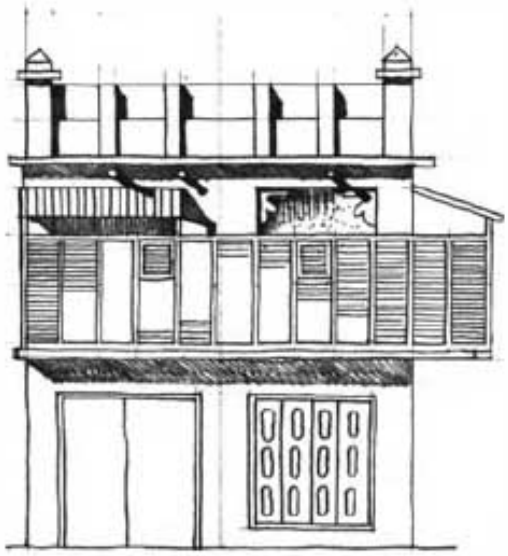


LEVELS OF STREET AND INTERIOR APPROX. SAME



INTERIOR LEVEL LOWER THAN STREET

2.1 - DETERMINE HEIGHT OF WINDOW SILL FROM THE EXTERIOR OF THE HOUSE AND FROM THE STREET.



2.2 - BUILDING IN SHEIKH ISA ROAD IN MUHARRAQ SHOWING USE OF MASHRABIYA WRAPPING AROUND TWO SIDES OF BUILDINGD.
DRAWING BY JOHN YARWOOD, 1980s.

2.2 - AN EXAMPLE FROM MANAMA. ALSO SHOWING THE CHAMFERED CORNER AT THE JUNCTION OF TWO STREETS, 2006.

Figure 5. Location of exterior doors and windows. *Background: As a general rule doors and windows facing the public-right-of-way were traditionally viewed as either 'old' or 'recent', as a result of the sequence of building events. Older doors and windows have a priority over more recent ones in terms of their right to continue as they are. This is related to the Ethical/Legal norm 4 '... to respect the rights of older established buildings'. In other words, the 'recent' door or window has to adjust to the conditions of the 'older' ones. It is difficult to determine accurately which buildings were built before others in the traditional fabric of Muharraq or Manama; however, the principle can still be followed today. For example, if an owner of a house which is in a very bad state decides to tear it down and re-build it, he should respect the existing conditions of adjacent and opposite buildings in locating the exterior door(s) and window(s) of his proposed new building.*
Implementation: 1 – The following rules should be followed for any changes to door locations: 1.1 – A door must not be located exactly opposite another door. It should be offset from it adequately to discourage looking into the entry hall of the opposite house. However, this stipulation might be relaxed if the street between opposite buildings is wider than usual and has a higher pedestrian activity than other streets in the vicinity. A door must not be located opposite a shop, or vice versa. They should be offset from each other so that direct overlooking will not be possible from the shop into the entry hall of the opposite house. However, this stipulation might be relaxed if the street between opposite buildings is wider than usual and has a higher pedestrian activity than other streets in the vicinity. 1.2 – On the same side of a street, a door must not be located adjacent to an existing neighbor's door without his consent. This is to avoid disrupting the Fina space on both sides of an existing

door, in the event that such a Fina space was used by the neighbor. Examples for such uses include space for flower pots, unloading groceries, and temporary or emergency parking if cars are allowed in that area. 2 – The following rules should be followed for any changes to window locations: 2.1 – The height of a window sill on the ground level for residential buildings, facing a street or a public area, is determined from the exterior, that is, from the street. It should be approximately 1.75m from the surface of the street or public area. This dimension is above eye level of an average man. It can be less if the sightline from the window into the interior would pass above head level of a standing person(s) inside. This condition would occur when the interior floor level is appreciably lower than the outside street level. Therefore as a general rule, ground level windows on exterior walls facing streets should be designed for the purposes of ventilation and light. Measures for security should also be kept in mind for the design of such windows. 2.2 – Windows on upper levels (ie first and second floors that are above the ground level) facing streets or other public areas have no restriction on their size and sill height above the street. However, their location should be influenced by existing windows on the other side of the street. The proper thing to do is to offset, that is, set them aside, but this is not as critical as the case with doors discussed above, because exterior windows were traditionally covered by a wooden lattice to prevent visual penetration. This treatment is commonly termed Mashrabiya, and its use should be encouraged. The specific design should be influenced by traditional models found in Muharraq and Manama. 3 – Location of windows facing the interior courtyard or garden: 3.1 – There are no restrictions for the location and size of ground level windows that face a courtyard or garden. Any constraints will be due to other design requirements. 3.2 – Upper level windows, whether or not they face an interior courtyard or garden, must not be located so they would provide direct visual penetration of an adjacent neighbor's courtyard or garden.

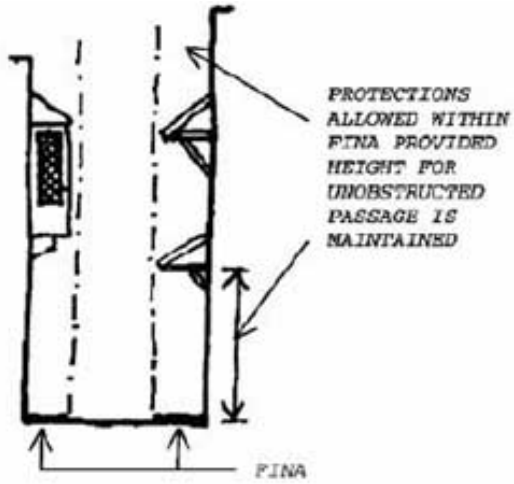
IV – Control and Management.

It is important to establish a system of control and management that will be guided by the metaprinciples and that would ensure private and public rights are fairly and equitably exercised, and that responsibilities are properly followed by private and public parties. Such a system of control and management should be based locally and must have legitimacy to the people living in the area or who will live there in the near future. One effective method that was predominant in many traditional societies was the system of neighborhood representatives, that is, one person is elected or selected/identified by the majority residents of a neighborhood to represent them at a council of representatives. If a council system were not used, then each representative would have direct access to the ruling authority. In some traditional Greek communities a council of elders was responsible for the day-to-day affairs of a community including matters that related to building activities.

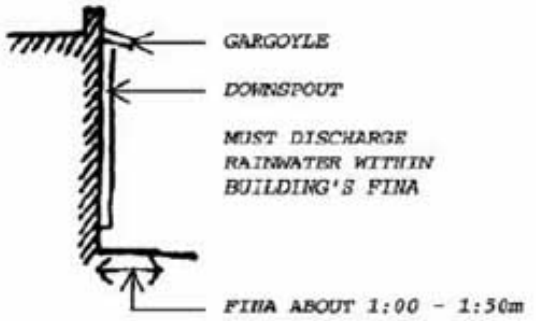
That was all that was needed in traditional societies to correctly control and manage the built environment. However, with changes that occurred in many societies since the first half of the 20th century plus the introduction of the municipal system in countries that traditionally did not have them, an intermediary became necessary. This role can take the form of the Office of Arbitrator and his/her technical and secretarial assistants. It can be a small office or a large one depending on the size of the community that it serves. Ideally a council of

neighborhood representatives should select the Arbitrator. His/her primary responsibility would be to liaise between neighborhoods and the municipal central authorities. This is necessary to maintain a healthy generative process controlled by the people, that is, keeping it a bottom-up system. The Arbitrator will also be responsible for ensuring that all parts of a generative program function properly, and that the rights and responsibilities of private and public parties are respected and followed.

Plan of clister of houses, showing location of interior and exterior fina.



Concept of fina extends vertically



Downspouts are preferred to gargoyles

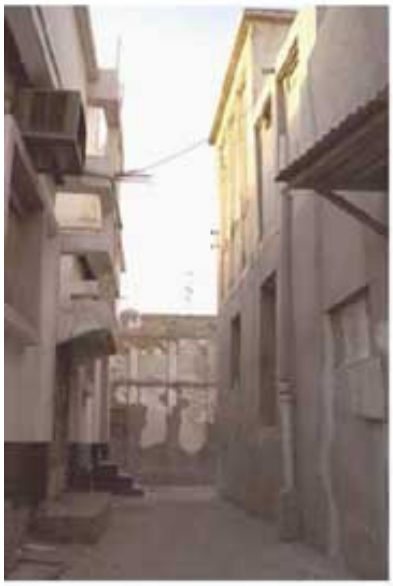
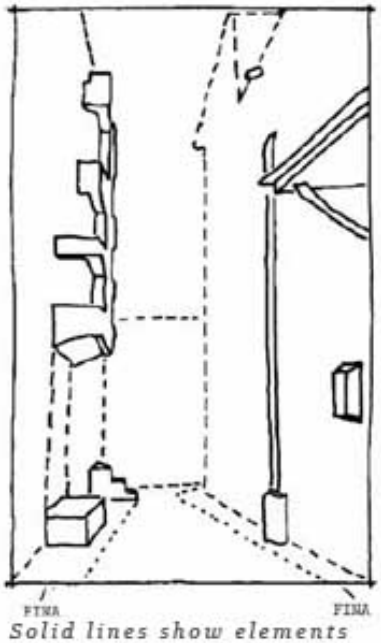


Photo of a street in Muharraq, June 2005.



Solid lines show elements allowed within the fina.

A street in Manama, 2006, that shows the continuous use of the fina, with steps and plants within it.

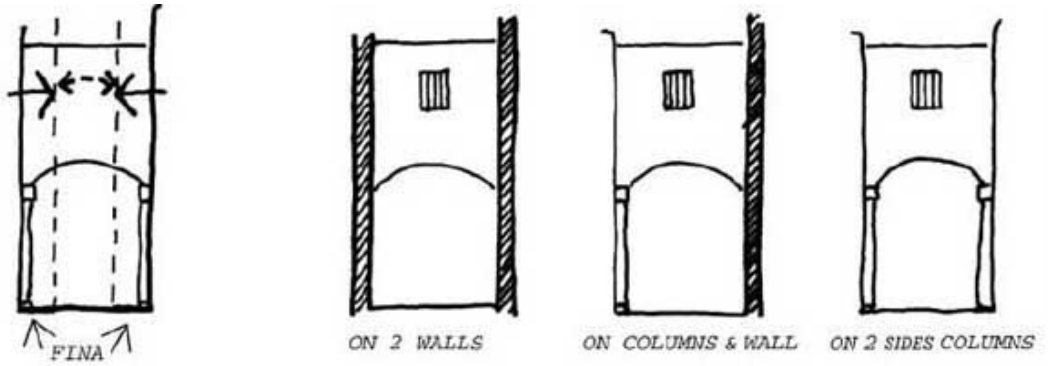
Figure 6. Rules for the utilization of the Fina on the ground and vertically.*Background: The Fina is an Arabic term that refers to two types of spaces. The internal courtyard of a building is named Fina in some parts of the Arab world. It also is synonymous with the term Harim which refers to an invisible space about 1:00 to 1:50m wide alongside all exterior walls of a building that is not attached to other walls, and primarily alongside streets and access paths. It extends vertically alongside the walls of the building. The owner or tenant of the building has certain rights and responsibilities associated with the Fina. He has the right to use it for temporary purposes provided such use will not impede the traffic in the street, and he has the responsibility to keep his part of the Fina always clean and safe from any obstructions. The Fina extended vertically allows high-level projections in the form of balconies, enclosed bay windows, and rooms bridging the public-right-of-way which are called Sabat.*

Implementation: In the past, before the era of municipal government, the historic sectors of Muharraq and Manama fully utilised the Fina as in other Arab-Islamic cities. Therefore: 1 – The Fina should be recognised as a generative principle. 2 – As it is evident in the attached photo from a street in Muharraq, projections at the upper level were allowed as well as steps to front doors within the space of the Fina. This practice should be encouraged to continue so that the traditional character of the built form within streets will continue. 3 – Although the municipal system took over the responsibility of cleaning streets, it never manages to keep them always clean. Therefore, owners or tenants of buildings are responsible to: (i) clean the Fina adjacent to the exterior walls of their building at least once/week. (ii) Placing any kind of item within the Fina that will impede access in the street is not allowed, except for dire necessity and only for a few hours. (iii) If the public-right-of-way is determined to be wide enough for vehicular access (depending on the location in the town) and particularly if wide

enough for emergency vehicular access, then it is allowed to use the Fina for planting vines and flowers, and to locate a Sabil – which is a privately donated and maintained drinking fountain for public use. (iv) Any projections from the upper floor(s) of a building are allowed provided its base is at least 4.60m higher than the street level. The height may be lower if that part of the street is determined not to allow emergency vehicles to go through. The width of the projection must not exceed the width of the Fina, keeping in consideration the nature of use of the Fina on the other side of the street. One set of steps to the front door are allowed for each building. (v) The treatment of downspouts and gargoyles for rainwater evacuation onto streets should observe the following rules: v.1 – Downspouts are preferred to gargoyles, because they do not cause splashing. v.2 – When gargoyles are used they should project from the roof of a one-story structure and pour within the width of the Fina of the building from which it originates. It is preferable to build the spout at a 45 degree angle from the surface of the wall so that rainwater will fall within the Fina and thus avoid splashing the wall of the opposite neighbor, particularly in narrow streets. v.3 – Gargoyles are not allowed from structures of more than one story.

V – Rules and codes.

Another important component of a generative system are the necessary rules and codes that can be followed during the process of growth and change and for resolving unforeseen conflicts between neighbors. It is preferable that such a system of rules and codes is compatible with the ethical/legal norms, the rights and responsibilities of private and public parties, and should also be linked in content to traditional local customs that are still viable socially and technically. They should also be proscriptive in nature and their intention clear, that is, what is to be achieved must be understood by everybody involved in the generative process. They are to be open for interpretation in response to the peculiarities of each location and condition. Prescriptive codes that do not allow localised interpretation must be discouraged unless they are absolutely necessary. For examples of such codes developed recently for the Bahrain project discussed below, see Figures 4, 5, 6, and 7.

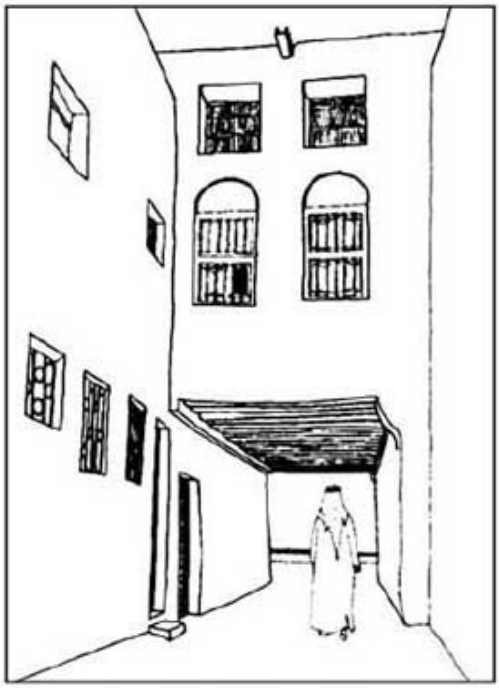


The sabat conept is related to utilising the air space of the fina on both sides.

Alternative support systems for a sabat

Sketches taken from the book Arabic-Islamic Cities: Building & Planning Principles, *London 1986, by Besim Hakim.*

VIEW OF A SABAT IN TUNIS.



A SABAT IN HOFUF, SAUDI ARABIA. PALM TREE TRUNKS ARE USED FOR THE MAIN STRUCTURE FOR SUPPORT.

EXAMPLES OF TWO SABATS: ON THE LEFT FROM TUNIS, ON THE RIGHT FROM HOFUF IN EASTERN SAUDI ARABIA. ALTHOUGH THE CONCEPT IS THE SAME, THE CHARACTER AND SENSE OF PLACE IS RELATED TO THE CONTEXT.
Both sketches are from the article by B. Hakim titled: "The Urf and its role in diversifying the architecture of traditional Islamic cities". Journal of Architectural and Planning Research, 11:2, 1994, pp. 108-127.

Figure 7. Rules for building a Sabat. Background: *The possibility of bridging the public-right-of-way is an extension of the concept of the Fina. It is an element that allows the*

creation of additional space attached to a building. The tradition of building Sabats was not a part of the local Urf (customs) in Muharraq and Manama. However, it is widely used in most traditional Arab-Islamic cities. It is an effective method for creating additional space and its use provides shade for pedestrians in the street and can be an excellent cover for front doors of buildings if they are built above them.

Implementation: 1 – Sabats are allowed to be built when one or more of the following conditions arise: 1.1 – When opposite buildings on both sides of the street are owned by the same person or family. 1.2 – When a house is small in area and whose height is within the maximum limit allowed, and the owner can demonstrate that some or all of his requirements for additional space can only be met by building a Sabat. 2 – The design and structural requirements of Sabats are: 2.1 – Ideally a Sabat should be supported on both sides structurally independent of the walls of the buildings on opposite sides of the street. This allows change of ownership easily. The supports have to be built in such a manner that they touch the walls of the building, so that no space, however small, is not taken from the right-of-way. 2.2 – The support of one side of the Sabat can be on the building whose owner wishes to build it. The other side has to be supported by columns built adjacent to the wall of the opposite neighbor provided careful design is made to ensure no damage occurs to the wall or its foundation. 2.3 – The technical aspects of the support has to be determined on a case by case basis with the aid of a qualified structural engineer who will ensure that no damages will occur to the walls that are adjacent to the supports.

Highlights of two cases:

Old Town Albuquerque, New Mexico, and the historic districts of Muharraq and Manama, Bahrain

The earlier case developed for the city of Albuquerque, New Mexico in 1983[8] was essentially based on two tools of a generative program: the appraisal process, and planning principles and guidelines that are to be used as necessary in specific parts of old town after a careful assessment and appraisal is made of a specific site and its surroundings. In other words, the generative program was designed for changes in the built fabric of an existing historic area that traces its history and its founding to 1706. The planning principles and guidelines were developed to ensure that results from change would maintain the character and sense of place of the historic district. To ensure authenticity the Spanish Laws of the Indies, that date back to 1573 comprising 148 rules and codes, were carefully consulted. These laws influenced the physical parameters of old town at the time of its founding.

The other part of the generative program that was proposed is the Coordination Process between the city authorities and residents/users of the area. In the case of Old Town Albuquerque it was made up of three components: (i) certificate of appropriateness, (ii) city investment in public improvement projects due to the large amount of land owned by the city in the area, and (iii) user participation for projects initiated by the private sector. A number of steps for implementation were suggested as a part of the generative program that was specifically worked out for this project.

The case of the historic districts of Muharraq and Manama, Bahrain was developed in early 2006.[9] The generative program for this project, as it should be for every project, was developed from a careful understanding of the history and traditional processes of the two historic

districts.[10] Although the case of old Muharraq and Manamahas similarities to other towns in the greater Islamic world, they also have certain unique attributes.[11] The generative program, which I developed for revitalization of these historic districts, was designed to ensure that the changes that will occur would maintain the character and sense of place of each district. This is a similar goal that was established for the Old Town Albuquerque project described above. The general approach that I have used is similar to the outline of a generative program explained above in this article. It remains to be seen if the centralised authorities of Bahrain will adopt a generative program that is based on a bottom-up decision-making structure. In other words, are the authorities willing to revert to a system similar to the one that created those historic districts in the first place? If they do, then it will demonstrate serious intention to revitalise those areas following a generative program.

Conclusions and the future of generative processes

In the past generative processes were the norm in most cultures, that is they were the type of processes that shaped the morphology and form of what we currently refer to as 'vernacular architecture'. They were very different from current 'modern' processes that have spread to many parts of the world.[12] It is difficult to imagine that generative processes will make a comeback soon. However, they can at least be used for revitalizing historic towns and heritage districts within cities. This will ensure that authenticity will be maintained when revitalization is undertaken by a generative process that is derived from the uniqueness of a particular site and a thorough understanding of its history. Such an approach can embrace the use of modern materials and technologies were necessary or appropriate. It will also encourage residents of such places to maintain, improve, or renew their buildings, knowing that these activities will ensure the continuity of the general character and sense of place of their neighborhoods.

To summarise, the following are the attributes that must be present in a generative process:

1. Agreed upon ethical meta-principles, derived from a locality's history and customs, must be articulated. They have to be respected and followed by the residents.
2. Private and public rights and responsibilities must be clearly assigned so that all actors and parties making decisions know what is expected from them, either as individuals or as public entities.
3. Control and management: this must be worked out and established based on a locality's history and customs as it relates to the function of the traditional generative process, including the interface between residents and the various public authorities.
4. Traditional rules and codes must be identified and refined, revised if necessary, to be compatible with contemporary building materials, technology, and infrastructure requirements including transportation. New rules and codes might also have to be devised to ensure maintaining the character and sense of place of the historic area or district.

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1. The work on the Bahrain project, during January and February 2006, was undertaken with the collaboration of all employees of the Research and Development Department and its director, Dr. Falah al-Kubaisy, of the Bahraini Ministry of Municipalities and Agricultural Affairs (MoMAA) and all the consultants for the project who were present during that period. It was my pleasure to work with all of them. I would also like to acknowledge the assistance

of Dr John Yarwood, from the UK, for providing me with valuable information from the work he did for Muharraq during the mid-1980s.

2. This extract is taken from the author's original manuscript. The definitive published version of this extract may be found at www.palgrave-journals.com/udi. Hakim, Besim, "Generative processes for revitalizing historic towns or heritage districts", in Urban Design International 12: 87-99; Palgrave Macmillan, London 2007 (ref doi:10.1057/palgrave.udi.9000194). Reproduced with permission of Palgrave Macmillan.

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NOTES

[1] To my knowledge this approach was not considered or discussed until the early years of this decade. Amos Rapoport confirmed this – by saying '...and this is a form of preservation that has not yet really been considered or investigated' – in his article 'A framework for studying vernacular design', Journal of Architectural and Planning Research, vol. 16, no. 1, 1999, pp. 52–64. Christopher Alexander in his recent four-volume book *The Nature of Order*, 2002–2005, discussed a similar approach in volume 2, chapter 6, titled 'Generated Structure'. He has also published in volumes 2 and 3 of this book built and unbuilt projects which he was involved in that are based on various aspects of this approach.

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[2] For the analysis and findings of how this occurred in towns around the Mediterranean basin since antiquity including areas under Byzantine control or influence and later as a part of the Islamic world. See publications by this author, some of which are available on:www.charrettecenter.net/Hakim and his article in Urban Design International (2008)13, 21-40.

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[3] The analogy is very clearly described by Lewis Wolpert in his book *The Triumph of the Embryo*, 1991, page 17 under the sub-heading – A Developmental Programme:'If the cells in the embryo 'know' where and when to change shape, contract, or move, then it begins to be possible to envisage a program for the development of form'. And 'We can think of this pattern of cell activities as being part of the embryo's developmental program. It is a program that contains the instructions for making the shapes. A key feature of a generative program is that it can be made up of quite simple instructions, yet generate very complex forms'. From the same author in his *Principles of Development*, 1997, page 21:'All the information for embryonic development is contained within a fertilised egg. So how is this information interpreted to give rise to an embryo? One possibility is that the structure of the organism is somehow encoded as a descriptive program in the genome, which contains a program of instructions for making the organism – a generative program. Consider origami, the art of paper folding. By folding a piece of paper in various directions, it is quite easy to make a paper hat or a bird from a single sheet. To describe in any detail the final form of the paper with the complex relationships between its parts is really very difficult, and not of much help in explaining how to achieve it. Much more useful and easier to formulate are instructions on how to fold the paper. The reason for this is that simple instructions about folding have complex spatial consequences. In development, gene action similarly sets in motion a sequence of events that can bring about profound changes in the embryo. One can thus think of the genetic information in the fertilised egg as equivalent to the folding instructions in origami: both contain a generative program for making a particular structure'.

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[4] The Golden Rule of reciprocity is very ancient. A number of websites, available on the internet, discuss it. Socrates, Greek philosopher from the 5th century BCE, wrote: 'Do not do to others that which would anger you if others did it to you'.
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[5] Refer to the reference cited in note 11 below.
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[6] Refer to the discussion in note 12 below.
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[7] For a detailed description of the *Fina* and how it is to be used, and the rights and responsibilities of the residents to their *Fina*, see my *Arabic-Islamic Cities: Building and Planning Principles*, London, 1986, pp. 27–31.
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[8] *Historic Old Town: Albuquerque, New Mexico – A Procedure for Guiding Change and Development Based on Patterns/Guidelines and Continuous Appraisal*. For the Department of Community and Economic Development, City of Albuquerque, NM. Besim S. Hakim, Consultant, March 1983. Sixty-one page technical report plus appendices. Available at:www.charrettecenter.net/Hakim.
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[9] This project was undertaken by the United Nations Development Program and the Bahraini Ministry of Municipalities and Agricultural Affairs, titled: *Capacity Building for Enhancement of Urban Governance*. I developed the Control, Management and Coding aspects of a generative program. My report was completed at the end of February 2006.
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[10] When developing a generative program for a specific site, it is imperative to do so based on the locality's history and customary practices that formed that built environment in the first place. Thus, such a generative program becomes unique to that particular project.
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[11] For a detailed study of how customary laws and practices in each locality within the Islamic world achieved distinct architectural and urban form qualities, see my study: 'The "Urf" and its role in diversifying the architecture of traditional Islamic cities', Journal of Architectural and Planning Research, vol. 11, no. 2, Summer 1994, pp. 108–127.
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[12] For example the temporal priority issue is very different from current practice. If someone has built something, then the person who comes later must legally pay attention to what is there and respond to it. This process is akin to weaving, that is, the next act always responds to the previous act and completes it. Compared to current law, in most US cities, that provides each person the same rights, regardless of the temporal sequence. Thus each project, and each lot, becomes an isolated island, with no significant relation to the whole, and is unable, for the same reason, to intensify the context in which it is located. A fundamental principle that was explicit in traditional generative processes is that a new construction shall not do harm to its surroundings. This is in reverse to the current approach of zoning law that is followed in most US cities, which implicitly accepts that each case is different, by applying strict geometrical regulations blindly. Another important practice in traditional generative processes is negotiating decisions that may cause harm to the surroundings and the means to avoid them.
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