Information Architecture

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Architecture and Information Architecture.

Architecture: Architecture is the design of meaningful spatial environments. It is created by transforming the existing social, cultural and technological world through theoretical and technical skills.

Information Architecture: There now exists an identical realm situated in an entirely new context: computer simulation. Information architecture is a meaningful spatial environment. It is created by transforming existing social, cultural and technological computer data through theoretical and technical skills.

Defined Realities.

Reality: The physical material world that is perceived through the senses is reality. The built environment is one aspect of the real world.

Virtual Reality: Virtual reality is a computer-generated spatial simulation of reality, that is, it is an inhabitable alternate environment created entirely within computers. This virtual reality could be a simulation of reality, created to perceptually mimic the real world such that, to the body's senses, there is no distinguishable difference between the real and the virtual; or it could be an alternate reality, created as an entirely new environment, with its own rules, laws and logic; which need not correlate with reality's laws, such as physics, social-dynamics or politics.

Simulation of Reality: Virtual reality is currently being considered as a potential tool for the design and construction of the built environment, that is, the traditional realm of architecture. This is the use of virtual reality as a simulation of reality, an environment to design and evaluate simulacra of buildings and environments before they are created, or perhaps recreated in a different context.

Alternate Reality: However, the principal of virtual reality contains a much greater potential for a new future of architecture: information architecture. There is a rapidly expanding world of information that is accessible only through the computer. All transactions of daily life are potential candidates for computerisation. The breakpoint for the computerisation of a task occurs when it becomes easier to examine and transform the informational aspects of a real world task in a computerised environment. As computer technology continuously evolves, more real world transactions are transformed into computer data and the corresponding databases grow at exponential rates. As databases increase in breadth and depth they begin to achieve a density where they form a detailed computer reconstruction of daily life. Also, the computerized transactions are no longer recording a recent past, rather the time between the real event and the computer record has reduced to the point where the two are simultaneous, thus implying that the record and event no longer separate. The computer record and real event are one - the record is proof of reality. This is the realm of the alternate reality. It exists as a complement to the real physical environment: it is an information environment in which already many of the transactions of daily life occur and shall continue to grow in size and complexity, necessitating a continuous evolution of structures to maintain its comprehensibility. The transformation of data into these
comprehension structures in this information environment is information architecture. The product of information architecture is simulated spatial environments.

Design Meaning and Information.

The design of simulated spatial environments in information reality requires a shift in paradigms from the real to the alternate. The transformation of information into the real to create material architecture is a difficult task, since data is intangible. Data does have its origins in the real world though:

For example, witness the increasing "virtualization" of money. Once, only physical money embodied in precious metals could be transacted through a limited set of banks: this transformed, first through direct representations as paper money, then into cards acting as signs for a limit of money, and now most monetary transactions can be completed without any cash present. Thus the contemporary architect, when considering the role of electronic information and data communication, is in a dilemma trying to define what a bank is, when it is only a node in a communication network, just like video outlet or convenience store.

In the physical world, if data is considered as ethereal electrical impulses, it is difficult to attribute meaning. On the surface of an information reality, if data is considered as mere numbers, the data still has no meaning. However, considering data in its informational form it contains potential meaning with inherent qualities such as differences, hierarchies, patterns, and form.

Consider an income tax data base: it contains a mass of information that can be extracted in a variety of ways dependent upon how the user might want to use it, for example, calculating the average incomes per region, auditing individual forms for tax evasion, or testing potential revisions to the tax structure.

Deriving meaning from within data presents a beginning from which a physical architecture or information architecture can derive.

Design Methodology and Information.

Data has little value until its inherent qualities are made apparent. That is, data must be transformed into information. For small databases this consists of retrieving the pertinent file or record of data and displaying it as useful information for the user. As databases become larger, the permutations of possibilities for accessing and transforming the data into information increases exponentially. Current systems emphasize achieving a specific goal and may be plausible for browsing but generally are not useful for making comparisons and connections between a multitude of diverse and unrelated data. Also, the means of retrieving and visualizing the data are primitive and difficult to use.

At present, there are sectors of the computer industry focused on user interface methods for accessing databases, such as natural language querying techniques and statistical analyses. Most of this research is very tightly focused attempting to extend the existing paradigms through the creation of new techniques. These new techniques will have limited application until they are assimilated and integrated into the information environment.

In The Visual Display of Quantitative Information, and Envisioning Information, Edward Tufte illustrates that the graphical representation of information has the ability to organize vast amounts of data and empowers the user of the information to contrast, compare and choose. As Tufte points out, visual processing is powerful but visual memory is weak. The transformation of data into concentrated visual representations that are clear portrayals of complexity gives visual access to the subtle and the difficult.

The transformation of data into a spatial representation demands compromises. While it may be possible to imagine a construct that contains within it all the base data, the extrapolation of the implicit connections and patterns is the result of a subjective
interpretation, and thus it will be impossible to embody all the potential permutations. Therefore, the information construct presents a limited view of the data, or more precisely, information is designed. Just as good architecture presents a specific conception of the world through the thoughtful design of the building, good virtual architecture will present data as information in a highly tailored design.

It is at the junction of the techniques (tools) and the data (object) and the interface (spatial environment) wherein lies the potential for architectural creativity to create information architecture.

Computer information environments require the application of creative design processes. Architectural design is particularly well suited for numerous reasons. Architecture is familiar with producing spatial objects in a larger context. Architecture is familiar with both empirical and critical evaluation. Most importantly, architecture already produces abstract visualizations of spatial meaning through models, writings and drawings. There already exists in architecture the realm of information architecture and transformation methodologies, (for example, the works of Lebbeus Woods or Peter Eisenman)

A Design Example in Information Reality.

The transformation of data into meaningful form in space will occur through many processes. This is a design exercise that explores two potential processes: spatial compression and ionization, and applies them to the situation of spatializing documents.

Spatial Compression: Spatial compression transforms data into multivariate perceivable space utilizing qualities such as texture, sound, color, form, time, etc., as the perceivable dimensions of this space. This is a direct correlation between the data and some spatial/environmental variable - each piece of data is transformed from its usual representation into some other distinct spatial representation that is identifiable.

An example; consider text documents, such as business letters, newspapers and novels.

Type is not a dense representation of letters or words. The computer representation of one character of text is usually seven or eight bits (a group of seven or eight ones and zeros) that can uniquely identify uppercase and lowercase letters as well as numbers and some particular punctuation codes. Text could be represented instead by a singular dot of variable color, where the color directly corresponds to the letter it represents. Thus, with about forty distinct colors, the entire alphabet could be compressed. That would mean that the word processor that this document is typed on could display approximately 35 pages of text as colored dots as opposed to half of page of type.

The first page of this chapter transformed into a pointilistic composition. Seurat as story and picture.

A trade-off has occurred. Although the basic form of the page can be retained, font sizes and styles would be lost in this representation. However, the ability to see the entire document (and potentially read and edit the document) implies that the capacity to work with a document in this manner might yield insight into document's overall form and structure.

The tradeoffs can also be mediated through other dimensions: the font style could be represented by texture perhaps, and the font size could be represented by the height of the dot. Ultimately, the best design solution is dependent on how the information is to be used - therefore, the conversion of type to colored dots has the
high yield of providing an overview of the structure and form of the document; at this resolution font size and style could be considered unimportant.

This compression is mediated through connotative representations, which is to say that different states of a variable are used to evoke certain qualities from the original data (for example, the color red might be indicative of heat, action or verbs; or a fold in a surface might be indicative of a branch in a procedure or introduction of a subplt). This makes the new form of the information more legible by keying into the connotations that the user is already familiar with (a good example is a map that portrays the depth of water by using light green to denote shallow water and dark blue to denote deep water).

Continuing with the above example, colors representing letters and numbers should be specifically defined, for example numbers might be shades of grey (numbers are dull therefore not colored) while vowels might be fully saturated hues (the dominant sound of the syllable) and consonants of similar sound (i.e. a, x & s, or h, d & p) might be based on the same hue. This would make the letters more readily identifiable and allow for some error when scanning the letters and still get a close reading.

If the techniques are available to recognize certain implicit patterns and conditions in the data, then that additional information can be transformed into space as well. Many powerful techniques are evolving, such as statistical data analysis for large arrays of numerical data; edge detection in photo-imaging; dictionaries, thesauruses and grammar checking in word processing.

Another extension of the above example would be the transformation of the text from its inherent form (linear text written left to right across a rectangular field) into other forms. Using the tools currently available in word processing, it would be possible to work with syllables (hypenization dictionary) phonetics (phonetic dictionary), words (spelling dictionary), and sentences (grammar checker). With these, the structure of a word may begin to be highly altered. For example, if each syllable were constructed as a stack of transparent dots, the view from any oblique angle would reveal each dot/letter in the syllable, while if viewed from above only a singular dot of a sum of color would be visible. If the colors were well designed, the sum of these colors could represent phonetic syllables. This would make learning the sound combinations of letters much easier as different letter patterns would resolve into the same sound patterns (f & ph, sch & sk, x & ks, etc.).

Continuing with the text example, statistical analysis could be used to derive some understanding of the larger structure, for example, in a novel, the characters could be determined and their parts within the story. The story could be reconstructed as free lines in space following paths of characters and the junctions where the characters interact. Note that this is a drastic alteration on the entire form of the book, disrupting the singular linear narrative; but would transform a book into a network of a number of interrelated stories allowing a wide variety of readings.

![Pages of literature transform into a spatial roller coaster.](image)

The use of spatial compression alone as a technique would result in dense spaces of complex interweaving patterns similar to
perian rugs or gothic tracery. This achieves a certain fulfillment of virtual architecture. Note that it is not something that could be fully automated; perhaps it might be automated in the case of spatializing business letters, but in the case of spatializing the works of Shakespeare, Baudrillard or even student essays, it is an environment to be designed. For example, the spaces created out of Shakespeare's tragedies, one would expect some sort of foreboding commanding form; it might somehow generate through automatic processes, but certainly could be shaped much better by focusing on the implicit information specifically embodied in the work and attuning it to its space.

This is only one potential virtual architecture methodology.

Iconification.

Iconification is the derivation and creation of icons - condensed signs of fixed representation with broad connotations. Certain patterns recur in most large samples of data (as well as the real world, i.e. religions, politics, traffic signs, etc.) and that can be condensed into abbreviations that stand for the larger pattern. If this symbol creation is in the form of a two dimensional image then it is a graphic icon (in the computer sense) (real world examples are corporate logos and traffic signs). This can be further elaborated to three dimensional spatial symbols: churches are cruciform, living rooms are cubic volumes, and financial institutions are towers (although, in all of these cases they are signs that are variants based upon a type; rather than pure icons that are mutable but not changeable).

Using the text example, certain recurrent patterns could be recognized and symbolized. The sender's address on all the documents on a personal computer are the same and could be transformed: a letterhead would be a simple extraction and reorganization of the layout, while a logo would supplement or replace the text with an image recognisable as standing for the underlying concept (in this case the sender's name and address). Thus, once the person occupying the space is familiar with the symbol and its meaning, it can be reused in all instances of its occurrence within that space (all the towers in a financial district, for example).

Real signs vs abstracted signs: Furthermore, while symbols transform an abstract idea or object into some tangible sign; it is possible to recreate the objects within the computer as virtually real. That is, objects may be represented as they are rather than as an abstract sign. It would be possible to refer to a tree as a spatial object with a trunk, branches and green leaves rather than the four letters t-r-e-e.

Within a novel, there are particular characters, events, places and transactions which recur and all could be represented as spatial objects. Physical descriptions could be replaced by the virtual reconstruction of that description into a spatial object. Thus a description of the setting for a Shakespearean play could actually be a spatial representation of that setting, or a character could achieve spatial definition given the character traits and description throughout the novel and other contextual information which the virtual designer might provide as well. This is not to imply that the text will be reconstructed as a full length feature film, but rather might evolve into some sort of cinematographic space that the reader could enter and explore.

The creation of these spaces might be based on some sort of text pattern recognition interpreted through a knowledge base into the rules (perhaps similar to pattern languages described by Christopher Alexander) that form the basis for shape grammars to create the space. In this manner the design tool for the creation of symbol spaces could learn how to construct similar spaces over time as its knowledge base grows.

The combination of these spatially based icons creates a rudimentary pictographic language that is highly accessible and easily adaptable. A spatial language is not fixed by the boundaries of language although it is limited to a culture's
conception of space. The concept of baseball is much more easily communicated by watching an example rather than attempting to verbally describe it. Similarly, in a simulated spatial environment it could be easier to communicate by chaining together mutually understood spatial symbols to express a thought (architects build models and make drawings to communicate buildings). The combination of the spatial icons of Hamlet with dagger and Polonius behind curtain is enough to convey the manner of Polonius’s murder by Hamlet, although the reader would not gain the benefit of the actual words and emotion of the scene. However, questions could be proposed by rearranging the icons to form other phrases, such as Hamlet with dagger behind curtain behind Polonius, would suggest a different scenario.

Fragments of a hieroglyphic pidgin
dialog.

Thus symbol derivation is another potential virtual architecture. It is possible to imagine a cinematographic simulacrum of the space, wherein highly specialized and different spaces would be juxtaposed in a non-Euclidean space along the path of the narrative. Note that this is another designed environment: the design of the understandable symbols is critical to the comprehension of these spaces.

Composite Simulated Space.

Combinations of transformation processes would allow the information spaces to be read in multiple ways and would allow the different methods to reinforce each other. Clusters of icons phrases overlaid against spatial compression structures would create a pictographic key to an information space.

Once again, Hamlet: Each act occurs in a room, the basic shape and characteristics are derived from the description of the setting, and the shape of the room is modified by the tone of each paragraph. Each line of verse becomes an object - references to previous events are connected through doors while foreshadowing occurs through windows revealing picturesque views of upcoming scenes. Colored threads wander through rooms and doors providing a network - visual vectors of the narrative; and, if examined closely, reveals the text, (approaching the object and its corresponding thread could cause the words on the thread to become audible). One could move along the prescribed narrative with the story complemented by its spatial recreation, or one could follow an other path through it and derive a different understanding of Hamlet.

A more generic example: one could imagine business letters reconstructed. Each letter is a room, the subject of the letter is the commanding object, a logo and a geographic image of its destination is in an out tray. Windows and doors show connections to related pieces of information. The walls of the room are imprinted with the text of the letter, shown as color at a low resolution or a text when approached.

Evaluation.

A critical evaluation of the above ideas is dependent upon how closely those ideas can be presented and understood compared to their intended form (which is why architects make drawings of architecture instead of text alone and why virtual reality is important to real architecture). The proposition that representation of type by color would be affected by the designer’s choice of color and would benefit from the study of color theory, color perception, and user evaluation. (The examples generated
by the author were only somewhat readable.) The evaluation is also dependent upon the criteria established to be important to the project; for example, if the information base is to be accessible by people of different languages an iconification scheme would be better than character based spatial compression: however, if the objective is a structural analysis of a document then iconification information is not pertinent.

This design exercise demonstrates that the design of an information space can occur within the scope of architecture. It is feasible that architects could become information architects, and architectural theory could be enhanced by exploring the design of information space in conjunction with real architectural space.

Simulated space exists (in a very primitive form in the cyberspaces of today) and will continue to evolve. Architecture (today) is perhaps the closest profession to virtual architecture: As the role of architecture is to embody meaning extracted from the world around us in a spatial environment, then the role of virtual architecture is to create a simulated spatial environment embodying meaning extracted from the information space around it.

Simulated space is an interface into a dynamic information environment. The design of simulated space is the design of encoded processes for the reinterpretation of the world through data.

References.


Footnote.
1 This exercise was initially a reaction to a quote from J.G. Ballard: "You can already tell the difference between a novel that is written on a word processor and a novel written on a conventional typewriter. You'll notice this particularly in commercial fiction - what you have is excellent paragraph by paragraph editing, grammar, structure and all the rest of it, but very loose overall chapter by chapter construction, and this is because you can't flip through 100 pages on a word processor as you can with a pile of typescript. So the detailed structure is tight and elegant but the overall structure is weak." (Re/Search: J. G. Ballard, Re/Search Publications, San Francisco CA, 1984 p16)