

CHAPTER 10.

SUMMARY AND CONCLUSIONS

During the investigation of design patterns and graphics, it became clear that this is not a new subject in architectural research. Many previous studies focused on these topics. The recent developments in computer and web-site technology, however, have shown many further development opportunities, which this study has shown.

Though this study was done using the format of Problem and Proposition, the subject of the study is not a scientific or mathematical one, in which the answers to the problem can only be right or wrong. Design Patterns and Graphics are part of the creative fields of the subject of *architecture as art* and the propositions are therefore quite subjective. The subjectivity of possibilities as to how a design tool should be made appropriate and the way it should be developed must be taken into account when answering the question: '*Were the propositions confirmed?*'

10.1 SUMMARY: FIRST ASPECT

In the twofold Problem, and related Sub-problems, *the first challenge* was to examine *how to develop an appropriate design tool*:

10.1.1 *Graphics* can be used to illustrate design in several ways:

- Exploratory thinking, inviting the user to participate.
- Pedestrian or aerial views can be utilised to highlight certain design aspects.
- Development of design can be shown in many different ways.
- Open-endedness can be achieved by principles shown without reference to style or architectural language.
- Design concepts and the way they were derived can be illustrated.
- Colour can be utilised to distinguish elements consistently, improving the graphic 'reading' of patterns.

Dynamic graphics are important in the sense of illustrating forms in the round and allowing the user freedom to see the form from all sides, thus obtaining better understanding of it. The proposition that graphics can be used effectively is confirmed by the examples of graphic illustration of design patterns.

10.1.2 *Computer Graphics*, as in CAD systems, are well developed in 2D and 3D and the study has shown:

- Vector lines in mathematical CAD systems have superior possibilities to bitmaps, in manipulating graphics,
- Shading, colour and freedom of view selection is available to illustrate the design patterns,

- Dynamic graphics can find its rightful place in computer graphics, giving the designer freedom to choose the view that he/she prefers.
- Animation, illustrating design development by exploding elements of a design, can easily be achieved by creating elements in layers.
- The inter-active possibilities of Computer Graphics will allow the designer choice of options, thus confirming proposition two.

There are, however, many other opportunities for further study on the subject of using computers in design - as the section describing current research at MIT has shown.

10.1.3 Is the computer the ideal instrument for storing and retrieving design data? This question was asked in the introduction. There are many examples of web-sites that function as data-bases, most of them operate with sophisticated storage and retrieval software.

The *Software and web sites* investigated have also demonstrated that the Internet has grown substantially in the past 10 years and that the possibilities of a web site and networking are infinite and open-ended. . The proposed web site example (Fig 6A) identified the following menus or web-pages:

- *Design Principles* linked to multiple patterns and constraints checklists,

- *Social Preferences* linked to multiple patterns, as well as other links,
- *Architectural Language* linked to multiple patterns and possibly to architect's practices.

Other web sites have been found during this research that are functioning in different ways as design-assisting tools, some linked to patterns and others to buildings and even modular design kits.

This confirms the third proposition of the first part of the problem and also shows truth in the assumption that the grouping and organising of patterns would be done differently by each person.

The problem of **how** to develop an appropriate design tool was answered in Graphics, Computer Graphics and Web Sites. The timing is ideal for this web-site to become a practical reality.

10.2. SUMMARY: SECOND ASPECT

The second aspect of the problem is *to find a way of implementing* the patterns in the design process :

10.2.1 The Design Process has been defined in various ways but *the creative stages* as defined by Lawson (1980) were found to be valuable in the context of developing a design pattern tool :

- *First insight* : formulation of the problem., subjects, such as Landscape Architecture, Urban design, Sustainable building design
- *Preparation*: conscious attempt at solution, choice of the study.
- *Incubation*: no conscious effort,
- *Illumination*: sudden emergence of idea,
- *Verification*: conscious development.

Post Modernism

A question was raised earlier in the study concerning the use of computers, namely: *Does the use of computers curb the creative flow in the design process?*

The nature of creative intuition may seem to question the use of a computer to assist in design. Computers, however, are in fact used more and more by architects. Inspiration from Internet/World Wide Web data-bases is common among many architects, which confirms this proposition.

However, constraints and information relevance must also be taken into account with any design project, and these are crucial to making the design relevant.

10.2.2 Design Principles: In the introduction a question was raised, which this study attempted to answer: *Can valid theories and principles as taught at universities be reconciled with the practical realisation of designs in practice?*

In answering this, design principles were shown to have many possibilities of being implemented in practice by the following suggested menus/web pages:

- Site,
- Form type,
- Composition of form,
- Space,
- Environment,
- Grid / modules,
- Indoor / outdoor.

These fields are linked to design patterns and to the relevant constraints checklists (the examples of patterns speak for themselves).

The proposition is confirmed, but further study or investigation of the compilation and use of the menus and especially constraints checklists may be necessary.

10.2.3 Another question that was asked early in the study was: *Should patterns as developed by ordinary people be reintroduced into the design process?* These *social preferences* were shown to be implemented in a web-site menu by patterns related to:

- Elements : Streets, gates, water features, intersections,
- Building types: Restaurants, homes, shops/markets, streets, etc.
- Events: Work, play, networking, etc.
- City elements: Monuments, colonnades, arcades, etc.

The proposition is valid but the aspects of links to other subjects, such as Landscape Architecture, Urban design, Sustainable building design should be studied further (see also 10.4). This is beyond the scope of this study.

10.2.4 *Architectural Language* in movements of the 20th century has been shown to express definite ideologies in the major movements:

- Modernism,
- Post Modernism
- New Modernism

The aspect of style or architectural language may be controversial but architectural design cannot be studied fully without investigating and illustrating the patterns found therein. The issue of copyright and ownership of ideas, will have to be further investigated.

The problem of finding a **way** to introduce patterns in practice was addressed by the analysis of the design process, the patterns of design principles, social preferences and architectural language.

10.3 CONCLUSIONS AND RECOMMENDATIONS:

This study has contributed to the subject of design patterns illustrated by graphics in the following ways:

10.3.1 It has shown that the computer and web-sites / software programmes *can be utilized as design tools*, though the way of

implementing it will always be subjective.

10.3.2 Designers are individuals and each has his / her own preferred design method that is often difficult to define. However, open-endedness can be achieved by web page formats and links. (Further investigation may show that the format of such a tool might differ slightly or even quite radically from what was proposed.)

10.3.3 The interactive possibilities of CAD-systems make them ideal vehicles for exploring design patterns and having freedom to all possible views.

10.3.4 The opportunities available to create a design tool today, were shown by examining the possibilities of web-sites and the Internet.

Creative intuition in the design process need not be limited by the use of computers: a web-site with design patterns will probably be well-frequented by architects.

A database of design patterns would take some time to develop. It could be created initially by sketches (bitmap-images) and later developed to 3D CAD-images. The patterns created on CAD have shown that there are endless possibilities.

To illustrate patterns of architectural language and social preferences, photographs may be used. For this, the aspect of author's copyright and consent will have to be addressed. If used on a web-site, these patterns illustrated will probably have to be public-domain (users will have free

access). Links can also be formed to the architectural practices that designed the building.

A web-site could be created and patterns added on a regular basis. The data-base should be able to grow and expand. Sponsorships from CAD software companies could be pursued, as venture capital may be needed to get the web-site developed. Software companies can also become business partners (see Preliminary Cost Plan, Appendix D).

Advertising could provide some funding. The patterns should also be portrayed in CAD format, possibly on compact disk and could become part of a software package together with CAD programme upgrades. Pattern contributions from users can be invited, and user-group interaction should help to refine the format.

Links to the web site will become important, as well as the advertising and circulation of a web address. Links to sites frequented by architects should be established, such as architect's institutes (across the globe).

10.4 FURTHER STUDIES AND RESEARCH:

To analyse design patterns and computer graphics thoroughly, further investigation by the author and others may be needed. Other possibilities are:

10.4.1 The subject of *design patterns created with CAD-systems*, could be the topic of further PhD-level studies locally or at other institutions, such as The Design Technology Department at M.I.T. (see Chapter 4, section 4.8).

10.4.2 The subject of *utilizing the computer to design* could also be a topic for further studies, analysing the design process further, specifically with regards to harnessing the potential of the computer.

10.4.3 A *research institute investigating architectural design patterns* could be created with support from a local university or technikon (technical college). This could be linked with many other relevant disciplines:

- *Web-site development and data-base retrieval* should be investigated, possibly by a *department of information technology* at a local university or possibly an IT-college.
- Other research centres of *Computer Graphics*, can be linked, such as M.I.T. (Design Technology) and Harvard University (The Martin Centre). These centres are on the forefront of developments in this field.
- The aspect of *Social Preferences* having links to other subjects, such as *Landscape Architecture, Urban design, Sustainable building design* should be investigated further. It

could open opportunities for research by others in these fields.

- Alexander, R. 1964. *Networked with other universities and colleges can be achieved by conducting workshops with students, focussing on design patterns and developing alternatives.*

Such workshops may also present opportunities for discovering new patterns. These can be held at schools of architecture and could also assist students in establishing their preferred design method.

Because design patterns are universal they can be used by architects or students in any country. An accessible tool, being a web-site or graphic manual (or both), could greatly assist designers.

It is believed that the present study will have made some valuable suggestions in the development and realisation of a database of design patterns in architectural practice. ■