Design Morphology Group

Roel Daru, Senior Lecturer, Design Morphology
Eindhoven University of Technology
Faculty of Building and Architecture
Department of Architecture and Urban Planning

1. OBJECTIVES

- SCIENTIFIC: better understanding of the generation of built forms, their description, evolution, intentional and esthetic expression and experience, meaning and use,
- PRACTICAL: the development of tools for the generation of built forms and the heuristics for obtaining them.

2. INTERESTS

- Working more on the side of the production of forms than their reception, but with a definite interest in both,
- enhancing an explorative approach but making use of strict research methods, without losing sight of the hermeneutic tradition,
- redirecting efforts onto the pluralistic styles of designing as an alternative to pursuing an unifying model of the design process,
- developing and testing specific simple, focused and if possible generic tools adaptable to various design situations and modelling them to specific personal working styles, as an alternative to technologically 'heavy' tools.

3. ACTIVITIES

(Development of the field as reflected in the activities of the group)

PAST (1): form perception (geometric and arithmetic proportions)
PAST (2): form description and (re)presentation
- Symbolic (morphographic and morphometric descriptions).
- Analogic (spatial and stylistic conformations).
- Iconic (geometric and genetic descriptions).

PRESENT: form reception and generation
- Reception (analogic form and pattern recognition).
- Generion (styles of designing and 2D form generation in the sketch design phase, based on the symbolic, analogic and iconic principles of form description and (re)presentation).

FUTURE: form generation, reception and logics of prescriptive rules
- Generation (personality dependant tactics of designing and 3D form generation in the sketch design phase, also for group processes).
- Reception (analogic and iconic form and pattern recognition).
- Logics (non monotonic design thinking: abduction and adduction)

4. ISSUES

- Which aspects of the design process should be supported to stimulate effective design of high quality buildings?
- Is designing the same activity accross all domains of designing? (architecture, industrial design, mechanical engineering, graphics, etc.)
- Are design tools developed for one domain transferable to another?
- Are design tools adaptable to the individual personality, heuristics and working styles of designers?
- Is canned, pre-packaged design knowledge useful during the early phases of the design process or rather in other phases (i.e. evaluation)?
- What is design knowledge? (information, heuristics, attitudes, experience, imagery, etc.)
- Can we develop design tools which inspire designers enough to apply them in daily practice? Can certain design tools hamper the creativity of the designer?
- What is so special about using computers in the design process?
- Was Marshall MacLuhan right after all (the medium is the message/massage)?
- In the past decade, the end-users of buildings has been forgotten in favour of the expression of the designers' views translated in bold forms, isn't it time to get them back into focus?
- How can the designed characteristics be made measurable as a basis for objective comparison?

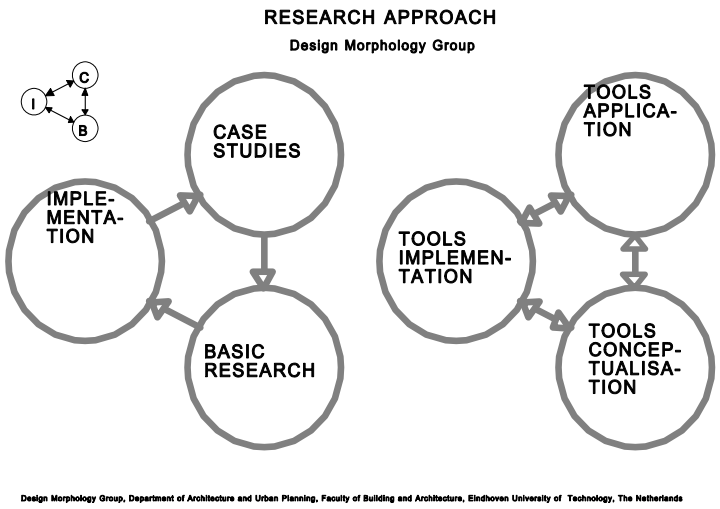

Figure 1: **Research Approach of the Design Morphology Group**

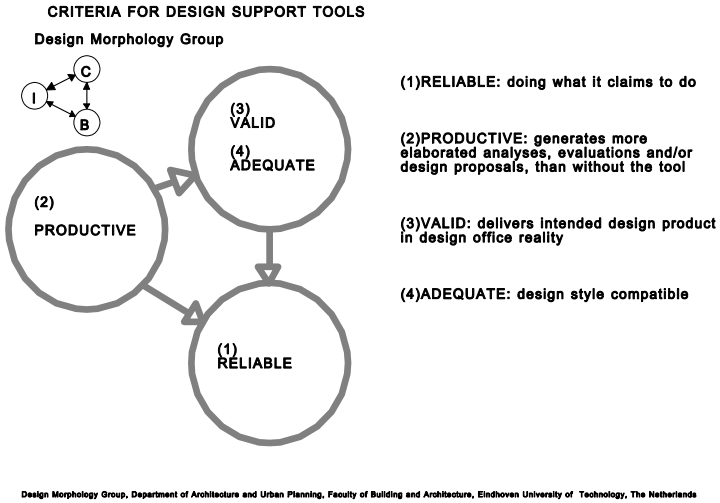

Figure 2: **Criteria for Design Support Tools**

5. **STAFF**

- Professor of Visual Arts and Architecture: Jean Leering
- Senior Lecturer Design Morphology: Roel Daru
- Lecturer Design Morphology: Tom Dubbelman
- Technical staff member: Ton de Caluwe
- PhD candidates and post-graduates (see research projects)

6. **INTERDISCIPLINARY COLLABORATION**

Many of the projects named hereafter have been the result of interdisciplinary collaboration, combining design background, psychological and computational knowledge within and without our institution, in particular with the universities of Delft, Nijmegen and Tilburg. Tools have been tested and assessed in practice.

7. **TYPICAL PhD RESEARCH PROJECTS**

(Published by 'Bouwstenen': the scientific press of the faculty)

Wim Adams, 1991: 'Supporting Decision Making Processes, a graphical and interactive analysis of multivariate data' (about datagraphics and the perception of proportions; the perception of the plastic-number series of Dom van der Laan empirically supported)

Anton van Bakel, 1995: 'Styles of Architectural Designing' (about identifying and assessing personal preferences in architectural working and product styles for didactical design management)

Martin Veenendaal, 1996: 'Datagraphical Heuristics' (as a logical follow-up of Wim Adams' research, is about the cognitive underpinning of the perceptual and predominantly heuristic aspects of pattern forming and recognition)

Philip Snijder, 1998: 'Sketcher' (about probing the support of conceptualisation by very fast automatic, but constrained sketching and exploration of the results by the designer, employing evolutionary programming techniques)

(P.M.) Piet Venemans, 1997: 'Prevention of Desorientation by Architectural Design' (about the influence of geometric and topological spatial structure for way finding and how this knowledge can applied in the design process).

8. **TYPICAL POST GRADUATE RESEARCH PROJECTS**

(Published by TUE IVO: Institute for Continuing Education)
Hugo de Haan, 1992: 'Electronic Sketching in the Design Process'
Phil Winteraeken-Bruls, 1992: 'RAP, GIOS and ROP in the Housing Process of the Governmental Building Agency'
Jianping Li, 1993: 'ROP and SPACE, comparison of the building layout programs with two case studies in architectural design'
Cristian Popescu, 1993: 'The Usability of ROP to Support Facility Space Planning'
Piet Venemans, 1994: 'Orientation Within Buildings: Towards a Designtool'
Joost Burger, 1994: 'Image Expectation in the Initial Phase of the Building Process'

9. **OTHER PUBLICATIONS 1991-1994**

Adams, W. and R. Daru (1994). Matchmaker, an instrument to match demand and supply of buildings and revealing discrepancies. Paper, *2nd Design and Decision Support Systems in Architecture & Urban Planning*, Vaals.
Adams, W. and S. van Kol (1991). Gebouw-indelingen met behulp van MiniCad+. *VCA-Mededelingen*, 8: 20-22.
Bakel, A.P.M. van (1991). Stylistic Description Instead of Methodological Presentation of Architectural Design. In: L. Beng Siong (ed.) *Proceedings of Second IES Information Technology Conference on Advances & Development in Information Automation*, Singapore: Institution of Engineers, 9-17.
Bakel, A.P.M. van (1992). Personality Assessment of Design Strategies. Paper *Design and Decision Support Systems in Architecture and Urban Planning*, Mierlo-Hout
Bakel, A.P.M. van (1993). A Creativity Supporting Data Bank. In: Patrick Holligan, *Proceedings of Proceedings of the 1st International Conference on Creativity and Cognition*, Loughborough.
Bakel, A.P.M. van (1994). Assessing Strategy Questionnaire For Architectural Styles of Designing (ASQ-FASD). Paper *2nd Design and Decision Support Systems in Architecture & Urban Planning*, Vaals.
Boxtel, P. van (1991). Ontwerpvarianten en hun beoordeling. *VCA-Mededelingen*, 7: 21-25.
Burger, J. (1994). Images for communication. Paper *Design Pleasure or Responsibility conference*, Helsinki

Daru, R. (1991). Beyond algorithms and visualisations. In: L. Beng Siong (ed.) *Proceedings of Second IES Information Technology Conference on Advances & Development in Information Automation*, Singapore, 133-140.

Daru, R. (1991). Facility Planning : nieuwe stijl. In: B. M. Polak and M. R. Beheshti (eds.), *Systematisch ontwerpen*. Delft: TU Delft, Faculteit der Civiele Techniek. 223-248.

Daru, R. (1991). On-Orthodoxe Facility Planningstechnieken. *VCA-Mededelingen* , 7: 8-15.

Daru, R. (1991). Orthodoxe en On-Orthodoxe Facility Planning. Eindhoven: Jaarvergadering NEFMA.

Daru, R. (1991). Sketch as sketch can. In: G. E. Pittioni (ed.) *Proceedings of ECAADE*, München.

Daru, R. (1991). Space Planning. Delft: TNO.

Daru, R. (1991). Workshop Facility Planning. *VCA-Mededelingen* , 7: 6-7.

Daru, R. (1992). Morfologisch concept. In: *Lustrumboek, Faculteit Bouwkunde TUE*. Eindhoven:

Daru, R. (1992). The Performance of Design Support Tools. Paper, *Design and Decision Support Systems in Architecture and Urban Planning*, Mierlo-Hout.

Daru, R. (1992). Space Planning by graphic intervention: a new tool in practice. In: *Proceedings of CIB W 70 Symposium Innovations in Management, Maintenance & Modernisation of Buildings*, Rotterdam: 1-10.

Daru, R. and M. Daru (1992). Personal working styles in the CAAD studio. In: *Proceedings of ECAADE 92 "Caad instruction. The New Teaching of an architect?"*, Barcelona, 451-471.

Daru, R. and A. P. M. van Bakel (1993). CAADidactics: An Instrument for Tuning CAAD Systems to Student Styles. In: G. T. A. Smeltzer (ed.) *Proceedings of Education in Computer Aided Architectural Design ECAADE Conference 1993*, Eindhoven University of Technology.

Daru, R. and P.J. Venemans, (1994). Future Developments: integrating a diversity of approaches of architectural design tools. Collection of Paper , Design Morphology Group, *2nd Design and Decision Support Systems in Architecture & Urban Planning*, Vaals.

Daru, R. and P. Snijder (1994). Sketch-Trigger: Towards a Specification for a Form Generator and Design Analysis Toolbox for Architectural Sketching. Paper *2nd Design and Decision Support Systems in Architecture & Urban Planning*, Vaals.

Daru, R. and P. Winteraeken-Bruls (1991). Indeling plattegrond met nieuw systeem. *Misset Bouwkosten Signaal* 2, 5: 10-12.

Gerrits, W.V.A. (1991). Data and Information Processing: A Graphic-Heuristic Approach. In: L. Beng Siong (ed.) *Proceedings of Second IES Information Technology Conference on Advances & Development in Information Automation*, Singapore, 83-91.

Gerrits, W.V.A. (1991). Succes in zoek-technieken. *VCA-Mededelingen*, 7: 26-28.

Snijder, H.P. and C. van Leeuwen (1994). A Minimal Architecture for detecting Object Location and Motion. *Pattern Recognition* 27, 11: 1463-1473.

Snijder, H.P.S., M. Veenendaal, W. Adams and R. Daru. (1994). *The Use of Genetic Algorithms in Graphical Data Analysis.* Faculty of Architecture, Building and Planning Eindhoven University of Technology (submitted).

Snijder, H.P.S., (1994). The Use of Genetic Algorithms in Spatial Optimisation Problems. Paper, *2nd Design and Decision Support Systems in Architecture & Urban Planning*, Vaals.

Veenendaal, M.H. (1994). Subjective Orderliness versus Mathematically defined Order in Graphical Data Matrices. Paper, *2nd Design and Decision Support Systems in Architecture & Urban Planning*, Vaals.

Venemans, P.J., R. Daru and A.F. van Wagenberg (1993). Buildings and Wayfinding: a framework for guidelines. In: R. M. Feldman, G. Hardie and D. G. Saile (eds.), *Proceedings of 24th Annual Conference of the Environmental Design Research Association (EDRA24)*, Chicago: 233-240.

Venemans, P.J., R. Daru and A.F. van Wagenberg (1994). Orientation in and around large buildings: guidelines and architects. Paper, *2nd Design and Decision Support Systems in Architecture & Urban Planning*, Vaals.

Venemans, P.J. (1994). Wayfinding and Orientation, Sign systems and Buildings. In Zwaga, H.J.G., Boersema, T.& Hoonhout, H.C.M. (eds.). Procceedings *Public Graphics: Visual Information for Everyday Use*, Lunteren, 26-30 september, pp. 21.1-12

Winteraeken-Bruls, P. (1991). De relatie tussen organisatie en ruimtestructuur, inpassingstechnieken. *VCA mededelingen*, 7: 16-19.