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## CHAPTER 2 Introduction

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### [1.] Methodology and structure of research

When defining my research question I raised six propositions to summarise my interest. These observations lead to my central research question. In the following section I will explain my structure and methodology before listing an annotated bibliography.

What kind of methodology and structure would serve to find an answer to my research question, and what are the implications of the question itself?

For my research, architecture should here be seen as a defined 3D zone in the form of a media façade added on to existing, or as yet unbuilt, buildings in which spatial presentations will occur. Architecture would be dematerialized and electronic media, normally ephemeral, would become more palpable in space.

Existing media façades are constrained to be a 2D screen and cannot be a defined 3D zone. Therefore the first task should be finding a possibility to develop existing media façades further.

My contribution to the field of knowledge will concentrate on this precise zone, which I posit as being that part of the building, which helps to define the space external to it and is therefore intimately part of the architecture. The second task would be applying the developed 3D zone in the form of a media façade to an existing or as yet unbuilt buildings.

In the six propositions listed in the previous chapter, which led me to my central research question, I talked about media content. Consequently the next task was to consider media content in my research and test the developed and applied system by supplying media content. Here are two options of dealing with media content. The research question does not ask for media content as a form of art or communication but whether, with the use of media content, the zone could be in constant flux. For me, one task in generating and regenerating the zone through media content, would be to design the media content myself. Because one media content option would limit the possibility for fully testing the system, a second option of media content should be the fourth task. Thus, I will work as a curator for different media content by offering a

series of software “applets”.<sup>i</sup> Again these software “applets” are neither a form of communication or art; their function is further testing my researched system.

Summarizing the methodology of my research – a system will developed as an evolution of media façades into a 3D zone. This system will be applied in an architectural context and will then be tested by two different media content options: a media option which I design and different media contents in the form of software ‘applets’.

To structure this methodology I am reporting my research in two volumes, Volume One outlines the theoretical research. Volume Two outlines my project work to test the proposals put forward in Volume One.

Volume One commences with four chapters. Chapter 1, as already discussed, is a background chapter. Chapter 2 serves as an introduction to the methodology and structure of my research and is an annotated literature review reinforcing the boundaries set in the methodology. In order to answer the first task raised in the methodology, the development of existing media façades, in Chapter 3 my research will look at the history of media and architecture in order to gain an understanding of media façades. Chapter 4 concludes with an evolution of research and project work, a discussion of my contribution to the field of enquiry and a reflection on my project work.

Thus, in Chapter 3 I include precedents for media and architecture in my research and analyse what could be learned from these first examples of media façades.

I will also analyse the development of different technologies in order to provide an understanding of existing media façades and the shift of the technology of media façades – whether the shift of technology leads to a shift in the appearance of buildings clad with media façades.

To gain an overview of contemporary examples of media façades, looking at new building types that specify embedding media architecture will identify what kind of technologies could be developed further to answer the first task of developing a media façade system.

So far my research has looked into media façade technology and how media façades are applied to a building, two fields important for me to answer the first and

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<sup>i</sup> For my research an applet is a software component that runs in the context of another program, mainly a Rhino script that runs in Rhino™. It performs a narrow function in generating a light point surface movement that has no independent use.

second task raised in my methodology. I will also continue with research into media façade content.

At this point I discuss the characteristics of media façades and the different forms of media content used to gain information for tasks three and four raised in my methodology when talking about testing my system with the use of different forms of media content.

The investigation until this point leads to a theoretical concept of what a media system could potentially look like, I propose a system that is an evolution of existing media façades and which allows the display of media content as spatial and dynamic. Due to its ability to be both spatial and dynamic I will call my proposed system in *spatial dynamic media system* to establish a constant term when talking about my researched system.

I compare this *spatial dynamic media system* with work by others in order to, at least partially, fill the gaps in this field with regard to its relevance to architecture. Chapter 3 concludes by discussing the significance of the *spatial dynamic media system* for architecture and outlines the characteristics of the system.

Lastly, the theoretical framework concludes with Chapter 4, which looks at the evolution of tasks raised in the methodology that defined the research and which project work could have been achieved and which could not. At this point my contribution to the field of enquiry will be discussed. Reflections will be made about the overall project, and the positive outcomes and the limitations will be discussed.

With Volume One providing a theoretical framework for my research, the hypothesis of the *spatial dynamic media system* as an evolution of existing media façades is then tested by a series of four projects works in Volume Two. I have undertaken these four projects to answer the four tasks raised in the methodology. The background knowledge necessary to undertake the four projects has been gained in my theoretical framework

In the second volume this knowledge will be applied in a series of tests which are embedded in the project work and will help in developing the *spatial dynamic media system*.

As mentioned in my methodology, when talking about which tasks are necessary to answer the research question, two Projects are dedicated to the design of a technology that fulfils the requirements of the research question and applies this system to an architectural context. The third and the fourth projects discuss media content. In project three, the media content is provided by the author and in project four the author functions as the curator of various media content scenarios through providing a toolset composed of different codes used to influence the generation of form.

Therefore I have developed as a first step a prototype system which, with the use of a 3D light-point matrix, alters space. The tests undertaken to develop such a prototype are described in *Project 1: Realisation of system in regards to an industrial design product*. The prototype system has then been applied in an architectural context, in *Project 2: Applying system* to answer if the prototype can fulfill its function as a media façade to become an architectural component. These two projects are dedicated to the design of a technology that fulfils the technical requirements of the research question. Projects three and four are a test series dealing with the question of media content. In the following the system was tested by applying ‘designed’ media content to it in *Project 3: Effect and use – providing media content*. Lastly, in *Project 4: Effect and use – working as curator for different media contents*, I have experimented with writing software ‘applets’ for a third party to adapt to their own input for display purposes. Technology to actually display media content onto media facades exists, but they must be adapted from a 2D surface into a 3D zone, in order to allow the media content to be spatial and the space to be dynamic.

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[2.]  
Literature review

[2.1]  
Introduction

This annotated bibliography defines and reinforces the boundaries of my research methodology and structure. It is not only limited to books, articles or papers read throughout my research, but also covers how personal experience has informed the research. Furthermore the relative value of the internet, books and papers is discussed, what I have learnt from what source and why, in certain cases, one medium has been more useful than another. In this annotated bibliography, I highlight the sources used in my research. Some crucial research most relevant to my research undertaken in university laboratories around the world currently remains unpublished in formal sources such as books or journals. In many cases the internet provides a platform where results can be publicised if not published, in a formal scientific manner. Some of the important resources used in my research are therefore from the internet.

<http://futurefeeder.com/> and <http://www.mediaarchitecture.org> amongst others have been especially helpful.

The research question, based on the four tasks set by the methodology, is divided into foci and each focus is addressed by a number of existing publications or books. This creates a structure to my research and highlights each particular field for its respective contribution and merit. Defining my research question, six propositions are driving my core research-question and form the structure of my research. Concentrating and positioning the research in the field of media and architecture, the focal point considers the further development of current media facades; this being the role of my research as a part-architectural discussion and the area to which I seek to contribute by developing a media façade system which evolves the 2D screen into a spatial representation system.

In recalling the central research-question:

*When weaving architecture and electronically applied and managed imagery together, are their respective properties successfully interchanged to the extent that they mutually create a new architectural*

*zone, one that is in constant flux, generated and regenerated through ever changing content?*

Two separate issues arise which must be addressed in detail prior to developing the research and experimenting through project work. Firstly, I need to develop background knowledge in technological resources. Secondly, I need to gain a similar knowledge in media content of media facades through literature review. The necessity of gaining background knowledge in both technology and media content is addressed in two parts of the research question. The question around technology addresses how a *[...weaving together (of) architecture and electronically applied and managed imagery...]* can be achieved. For media content, how this apparatus or system can then define *[...a new architectural zone in constant flux, generated and regenerated through content that never stands still]* is then discussed. Thus questions of media content and what media content will be displayed are also raised.

My research starts with the historical context of media and architecture and the questions provoked by this history when analysing three specific buildings with embedded media facades. I discuss the history of media facades, with a focus on the technological changes over time, specifically the technology used in media facades. Within this discussion, my background knowledge and experience in working with media and architecture enriches the research and has been the starting point for some of the key references.

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**[1.2]**  
Principle resources  
for VOLUME ONE –  
Theoretical framework

**[1.2.1]**  
Technical  
presentence

A study of the history of media facades has helped my research construct a background in the development of this technologically oriented approach to facades. This investigation gave me an understanding of the historical precedents in incorporate media in architecture, how and when media in architecture has been incorporated into buildings. The focus is on the very early years and I cite a few relevant examples here. It will not be a complete history of media and architecture, but, interestingly, I have not been able to find an existing published history of media and architecture combined, focusing on the embedding of media in architecture. The examples and, the literature

discussing the examples, I have selected shows that systems, which have been outlined, in the past could be built today, to demonstrate that the system envisaged at present could be built in the future. These selected examples look at the early stages of the combination of media and architecture and the kind of problems and constraints these projects faced when focusing on the technology. I am aware that other examples exist but Luigi Puglisi's book *Hyperarchitecture - Spaces in the Electronic Age*<sup>1</sup> is starting point for research in the history of media and architecture. According to Puglisi, the Centre Pompidou it is held to be the precursor of media and architecture. Its original designed state which included large screens on the facades, has been altered to a metaphorical level due to cost constraints and technical limitations during the construction. Kenneth Powell, in *Architecture of the future: Richard Rogers*<sup>2</sup> speaks of the Centre Pompidou and the background to its design. Other examples are examined briefly, such as the architectural representation in the movie *Blade Runner* which has been discussed in essays such as Alex Burn's *Will Androids dream of electric sheep?*<sup>3</sup> and Eric Alliez and Michel Feher's *Notes on the sophisticated city*<sup>4</sup>, which discusses the still unbuilt media screens showing in this movie. This section of my review of buildings showing media in architecture concludes with Toyo Ito's book *Toyo Ito: 1970-2001*<sup>5</sup> and Toyo Ito and Andrea Maffei talking about Ito's Tower of Wind in Yokohama, Japan in the book *Toyo Ito : works, projects, writings*.<sup>6</sup> The literature about the above mentioned projects reveal that certain facades, for example those in *Blade Runner*, had already been conceived, twenty years but could only be built today thanks to technologies such as LED screens. Without setting out to do so, in order to gain an understanding of the field the background, research has made apparent a cohesive, but hitherto untracked, history of media facades in architecture. The question raised from the reviewed literature is: What new kind of media façade development could be envisaged today and what could be the first steps towards developing such a system?

The literature, read up to this point, has demonstrated that achievements made since the beginnings of media facades are mainly based on technical developments. I have also considered mobile phones and their screens when defining my research question. When looking back at the difference between state of the technology of these phones in the mid-nineties and at present, one can understand the evolution of screen technology and

the potential for further development. Thus my research looks at which shifts in appearance of media facades has been made through which particular shifts of technology. This overview of current technologies investigated fluorescent tubes, LEDs and large display screens, explained by their history and their function.<sup>i</sup>

Fluorescent tubes, LEDs and large display screens were subjects discussed in my training course as an electrician and, when working with media components during my time in the architect's office, prior to my postgraduate experience. In addition, specific information on a certain product or electronic component, where detailed information has been necessary for the research, has been sourced from the manufacturer directly. Thus my research covered the history and function of fluorescent tubes, LEDs and large display screens.

I outline shift of technology through a brief explanation centered upon two locations which, in their physical development and visual appearance, demonstrate a shift of the appearance locations physical through a shift in technology.

These two locations within varying culturally-driven areas are – Times Square, New York (Western) and Shibuya crossing, Tokyo (Eastern). I have visited both locations more than once over a period of 2-3 years and observed a shift in technology. The shift in technology has been investigated by a literature review and an analysis of changes at Times Square, New York. This analysis is assisted by Christine M. Boyer's book *Cyber Cities: Visual Perception in the Age of Electronic Communication*<sup>7</sup> and *The Double Erasure of Times Square*, in: *The unknown City First*<sup>8</sup> when she discusses Times Square. Further insights are provided by J. Hoberman's *42<sup>nd</sup> Street*<sup>9</sup>, Herbert Muschamp's *The Alchemy Needed to rethink Times Square*<sup>10</sup>, Robert A. M Stern's *42<sup>nd</sup> Street Now! A Plan for the Interim Development of 42<sup>nd</sup> Street*<sup>11</sup> and Anthony Townsend's *Digitally mediated urban space: New lessons for design*<sup>12</sup>. Anthony Townsend's book is also usefully to document another example of that shift, Shibuya Crossing in Tokyo. The history and cultural complexity of this location in Japan is explained in Roman Cybriwsky, *Tokyo - The Shogun's City at the Twenty-first Century*<sup>13</sup> and articles in the *Architectural Design Profile No 99 – Japanese*

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<sup>i</sup> I do not discuss and include projection into the discussion of my research, due to being essentially an old technology, which projects onto a form and therefore can not be altered into a 3D form by itself

*Architecture II*<sup>14</sup> guest edited by Andreas Papadakes. The literature about both locations reveals that shifts in the buildings' appearances are caused by shifts in technology, but offers additional the question: what kind of technical development would be required to push this 'shift of appearance' further?

Times Square and Shibuya are an assembly of different forms of media facades across different buildings. For a deeper understanding of the kind of technological categories that exist, a classification is made based on concepts outlined in the paper *Wandelbare (mediale) Gebaeundefassaden*<sup>15</sup> by Alexander Wahl, published online at the Bauhaus University Weimar in 2002. Alexander Wahl's concepts have been tested through a collection of different projects with different kinds of facades in my research. The selected examples were included, for the same reasons as those examples discussed in my analysis of the history of media facades. The focus of the research is not to provide an overview of existing media facades but rather to indicate a spatial development of media facades. My research moves beyond different projects. It is a hypothetical development of existing technologies to explain how media content can be a method of altering space. Nevertheless, three of the seven categories described by Alexander Wahl in *Wandelbare (mediale) Gebaeundefassaden* are discussed through built examples to further explain the technology. Wahl's seven categories also assist in narrowing down the research focus in regards which technology could be used for further development. The seven categories are according to Wahl:

- Projection façades, where a façade is used as a projection screen, with the projector on another building.
- Back projection façades, with a projector behind a translucent projection surface.
- Window raster animation uses existing window grids or fenestration on buildings and each window functions as one pixel. Low resolution messages or early computer game atmospheres are possible.
- Passive media façades is primarily a transparent façade, where the communication is created through different visible layers behind and the users/people in the building.

- Display façades, having a mainly LED medium displaying items on the façade. The façade functions as a big screen and available systems are produced by several companies such as Barco, SmartSlab, Versatile, etc.
- Illuminated façades, where neon tubes are dimmable and allow the display of low resolution black and white moving images.
- Mechanical façades have mechanical driven elements that change the appearance of the façade.

I describe the last three types of media façades in the above list in greater detail: firstly display facades, secondly illuminated facades and thirdly mechanical façades. Why these three types of media façade? A detailed study of resources of all seven types of media façade has shown that only Wahl's last three categories for media facades, the ones I want to discuss further, have potential to be developed toward the aims of my research. Research on display facades also references the product information homepages of different display façade manufacturers. Examples of such product information are discussed including the Mercedes-Benz booth of the Automobile Salon Geneva 2004. Analysis of illuminated facades using fluorescent tubes as a medium is found in *A friendly alien: ein Kunsthhaus für Graz: Peter Cook/Colin Fournier architects (A friendly alien: a museum for Graz: Peter Cook/Colin Fournier architects)*<sup>16</sup> written by architects Peter Cook and Colin Fournier/Spacelab. *A friendly alien* explains the Kunsthhaus Graz, Austria, a recently built project where the circular 'kitchen fluoro' has been used. For the Kunsthhaus project, the Berlin based firm *realities:united* explored a concept that they titled "BIX", short for Big Pixel, and published this concept and results of the project on their homepage.

In his book *Twentieth Century Architecture: A Visual History*<sup>17</sup> Dennis Sharp wrote about the mechanical façade of the *Institut du Monde Arabe* in Paris by Jean Nouvel. Jean Nouvel himself described the project in *Architecture and Design 1976- 1995 a lecture in Italy*<sup>18</sup>, and in Oliver Boissière's *Jean Nouvel*<sup>19</sup> the project is further explained. A project description of the Roger Smith Hotel project, which wraps a street corner in New York, promotes direct interaction between an awning made up of kinetic metal bars and the pedestrians on the street below, was found on the MIT (Massachusetts Institute of Technology) homepage in the Kinetic Design Group, within the Department of Architecture. This project was chosen to investigate what, if any,

insights can be gained for my research in the field of kinetic architecture as a form dynamic space. Due to using a different medium, pneumatic or hydraulic, my research and kinetic architecture do not overlap to an extent that kinetic architecture will play a role in my research. The review of the resources of all three different types of media façade has shown further that illuminated façades also do not accord to the aims of my researched system. Development and technical possibilities of fluorescent tubes are not as versatile as display façades based on LED technology.

The material I have researched and cited thus far encompasses the brief technological history of media facades and the improvement of facades due to technological developments. Media facades have been classified and separated into seven different categories by Alexander Wahl, and, to this point, my research discusses the physical characteristics of these facades. Having considered the predominant technical aspects, the collected characteristics and information is used to investigate their influence on issues of visual media content. The following pages discuss the characteristics of media content on media facades, where four groups of characteristics will be elucidated. These characteristics start with a return to the beginning of media facades where again Luigi Puglisi explains the characteristics of Centre Pompidou in his book *Hyperarchitecture - Spaces in the Electronic Age*<sup>20</sup>. Next focus is on the technical enhancements which are listed by Anthony Townsend's article *Digitally mediated urban space: New lessons for design*<sup>21</sup>. Further the research looks into Toyo Ito's argument of the characterisation of architecture in the electronic age in his essays *Architecture in the Electronic Age is Figuration of Vortex of Information*<sup>22</sup> and *A Garden of Microchips – The Architectural Image of the Microelectronic Age*<sup>23</sup>, and also at informational and electronic spaces through Paola Gregory's book *New Scapes, Territories of Complexity*<sup>24</sup> and Pierre Lévy's *Becoming virtual; Reality in the Digital Age*.<sup>25</sup> Essentially, this technical precedents chapter discusses the characteristics of media contents, shows the development of media facades and describes how they to be came classified as separate categories. The question arising from the study of these resources is: if media facades current technology has transformed architecture and space no more then as a purely carrier of signs, how can space reassert itself as a main issue when applied to such facades?

After discussing the technical aspect of media facades up to this point, the literature review's second phase discusses the role of the media content of media facades. Here, firstly a distinction has to be made. The discussion of media content and research into media content looks into different approaches to generate media content but not as a form of communication. Communication is a field too wide to include in my scope of my research. Books about media including core works by Marshall McLuhan, Jean Baudrillard, Roland Barthes, Rafaeli Sheizaf<sup>i</sup> were used as background material in order especially to gain an understanding of the field rather than platform it as part of my research. I have for this reason avoided using the word 'communication' in order to avoid any impression that the research will take that direction. This consideration has influenced the design of projects at the later stage. My research also does not attempt to 'communicate' with the environment; my interest is more in the spatial representation of information and the influence media content has on the appearance of the façade or, when developing one's own system, how such media content could be used as a generator for a dynamic space.

Joachim Sauter's article *Das vierte Format; Die Fassade als mediale Haut der Architektur (The fourth format; The façade as a medial skin of architecture)*<sup>26</sup> lists four different conditions for the utilisation of a media facade. Autoactive, the first of the four conditions, is presented by two projects published by *blinkenlight.de* on their homepage. Reactive conditions are mechanical facades such as that by Jean Nouvel at the *Institut du Monde Arabe* in Paris. The *Institut du Monde Arabe* in Paris has been discussed above and therefore the books references to this building will not be listed a second time. While interactive content is discussed in a later chapter, a participative content is for Sauter, projects such as Project Blinkenlight, which was created by the German Chaos Computer Club in 2001 as a celebration of its 20th birthday, where a light installation in the *Haus des Lehrers* building at the Alexanderplatz in Berlin transformed its front into a giant monochrome low-resolution computer screen. The installation is illustrated on *blinkenlight.de*.<sup>ii</sup> Following from this view of the type of media contents that exist for media facades, my research uses the three forms of media

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<sup>i</sup> The books have been listed in Chapter 6 References

<sup>ii</sup> Project Blinkenlights was created by the German Chaos Computer Club in 2001 as a celebration of its 20th birthday. A light installation in the Haus des Lehrers building at the Alexanderplatz in Berlin transformed its front into a giant monochrome low-resolution computer screen.

content: pre-recorded content, live content and interactive content evaluated from the characteristics of media facades. Times Square is a location that has a high concentration of pre-recorded content, which can be analysed with Townsend's *Digitally mediated urban space: New lessons for design*<sup>27</sup> and the *Zoning Resolution of the City of New York* published online. I have compared the mainly commercial pre-recorded content displayed in Times Square is compared with Deborah Snoonian's article *Digital Practice*<sup>28</sup>. Here she refers to the *Kunsthhaus Graz*, where the representation of pre-recorded content has been shifted to non commercial motivations. An example for live content is the real-time broadcasting of sports events, amongst others but Townsend lists in his book another example of live news in Times Square: the Reuters Sign presenting live news. Arjen Mulder talks about interactivity in his article *The object of interactivity*<sup>29</sup> published in *NOX / machining architecture*<sup>30</sup> by Lars Spuybroek as well as Sheizaf Rafaeli and John Newhagen in *Why communication researchers should study the internet: A dialogue*<sup>31</sup> and Terry Flew in *New media: and introduction*.<sup>32</sup> Lev Manovich discusses in his book *The Language of New Media*<sup>33</sup> the role of the screen and claims that we have not "left the era of the screen".<sup>34</sup> This quote by Manovich summarises the outcome of the literature review of media content and has been the key driver for my research: going beyond a 2D display. So if a "screen is still a screen"<sup>35</sup> to quote Manovich, what kind of a system would allow content to be more than just a generator of what happens in the "window into another space"<sup>36</sup> but be a generator of space itself?

The books listed in the annotated bibliography, up to this stage were highlighted in order to investigate the technological background of media facades on the one hand and the visual content aspect of media facades on the other hand. The literature review added four questions to the central research-question prompted by the investigations in history, technology and content of media facades. To seek answers for the new questions my research had raised at this stage, the following literature and projects have been used to answer my questions.

Before discussing the sources further used in defining the enquiry to the field in my theoretical framework, I want to list the four questions raised from the literature review. The four questions thus are:

- The question that the historical background of media facades asks, what new kind of media façade development could be envisaged at present and what could be the first steps towards developing such a system?
- When investigating the technology of existing media facades by the means of two locations, Times Square New York and Shibuya Crossing Tokyo, it appears that shifts in the media façade appearance of buildings are caused by shifts in technology of media facades, so what kind of technical development would be expected to push this "shift of media façade appearance" further?
- A question which rose when researching the technology is that, at present, technology of media facades has reduced architecture and space as a merely the carriers of a sign, how can space reassert itself as the main issue when designing media facades?
- Existing technology does not currently extend the screen to being more than simply a "*window into another space*"<sup>37</sup> to quote Manovich, what kind of a system would allow content to be more than just a mirror of what is happening within the "*window into another space*"<sup>38</sup> and rather, be a generator of space itself?

These questions complement the central research-question and together form the foundation questions that helped me to define clearly the field of my research. The literature review has helped me so far to gain background knowledge which I apply in the Project Work in volume Two. What the books, papers, articles and journals, amongst others, have not done is help in actually developing existing media façades. All resources have discussed existing systems, sites or application but have failed to consider in how media façades could be further developed. Literature reviews in the following pages will address the issue of future technologies and incipient and be focused on gaining knowledge in how media façades can be evolved.

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[1.2.2]  
Media content  
presence

When reflecting on media and the characteristics of media, the possible qualities of the information delivered by new technologies and materials taken from the research done by Paola Gregory in *New Scapes, Territories of Complexity*<sup>39</sup> where, in her opinion, buildings and therefore the material that covers them function as ‘urban transmitters’ are considered. Antonio Saggio states in the introduction of Gregory’s book that ‘other materials could be possible in order to define space, and that these materials will reflect the scientific and philosophical concepts of their own time.’<sup>i</sup> Saggio suggests that the development of media facades envisaged at present could rely up on a material which has not been used yet to define space. These thoughts will be used as a starting point while still keeping in mind the materials and technics researched in the section on technology

So, to define a material which has not been used yet to define space, two premises have been investigated: firstly, how are forms received and can forms be delivered with means other than physical, and secondly how can images produced on a 2D screen be abstracted into a 3D method?

Le Corbusier’s book *Vers une architecture*<sup>40</sup> originally published in 1923 states how forms could be perceived, but this definition of ‘Architecture [as] the masterly, correct and magnificent play of volumes brought together in light’ is attacked by the German expressionist Paul Scheerbart in *Edison, der vergessene Pionier*<sup>41</sup> edited by Reyner Banham. Scheerbart twists the Le Corbusier quote so that buildings at night time become light in forms and not forms in light. This statement, that it is possible to define space with light or light points is demonstrated through different examples in architecture and other contemporary events. The first event is taken from recent history, conspicuously during the accidental blackout in New York in August 2003.<sup>ii</sup> Architectural examples where light has been used to define space are the ”light

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<sup>i</sup> Antonio Saggio in the Introduction of Gregory, Paola – *New Scapes, Territories of Complexity*; 2003 Birkhaeuser – publisher for architecture, Basel; The IT Revolution Series, Page 5

<sup>ii</sup> The event has been amongst others publicised by CNN on their homepage, for further information please refer to: <http://www.cnn.com/2003/US/08/15/power.outage/>

cathedrals” (Lichterdom) designed by Albert Speer for the annual *Reichsparteitag* (NS party conference) in Nuremberg in 1934, described in Frederic Spotts’ book *Hitler and the power of aesthetics*.<sup>42</sup>

Lastly I want to look at different ways architects or urban planners have made use of light. Here Las Vegas is selected as an example of a location where light has been used to a great extent, and therefore we can see if indeed light has been used to define space. This research will use Robert Venturi’s analysis of the architecture of Las Vegas in his book *Learning from Las Vegas*<sup>43</sup>, where he also focused on the use of light in architecture.

Light, therefore, can be considered as a medium to define space and offers a possible way for further developing existing media facades. Light, and, to be more precise, light-points, are already generating the images on media facade systems such as LED facades and other similar techniques. Understanding how a picture is first created on a screen and then this 2D arrangement of pixels is altered to a 3D matrix of light points or pixels, permits the advancements of the technical development of existing systems. This pushes a shift in appearance further towards a point where space could again become the main consideration when applying media facades. Space can be altered when the media content changes and the light points in turn react to the change in media content. The reaction of the light points will result in a change of the appearance of a surface and therefore a change of space. In such cases a media façades could then be considered as a spatial dynamic media system which would move if media content was applied and media content, therefore, becomes a generator of space itself.

The literature review has given examples to show space can be defined by other materials. Thus a statement of Antonio Saggio<sup>i</sup> has been helpful in regard to defining space with light points. The phenomenon of defining space with light points has been demonstrated further. The analysis of Robert Venturi’s book *Learning from Las Vegas*<sup>44</sup> did not offer any insights to my research field, but has been included into the research as an example of a well-known location with a high use of illuminated signs and how the signs reflect towards space.

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<sup>i</sup> Antonio Saggio states in the introduction of Gregory’s book (Introduction of Gregory, Paola – New Scapes, Territories of Complexity; 2003 Birkhaeuser – publisher for architecture, Basel; The IT Revolution Series, Page 5) that ‘other’ materials are possible in order to define space, and that these materials reflect the scientific and philosophical concepts of their own time.

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**[1.2.3]**  
Resources work  
done by others

The literature review into the history, the technology and the media content of media facades has brought the research to where the development of the dichotomy between 3D static form and 2D dynamic image could be overcome. This proposal of a media façade system now finds its position within my architectural discourse. A collection of five projects has been selected in order to frame my research and its ambitions. These projects are underscored by the listed key texts, chosen to identify a gap in the discussion of architecture, when focusing on aspects described in my research questions. The selection of projects was determined by two factors: either following a similar trajectory as my research or else I could see possibilities in further developing certain thoughts or concepts presented by their creators. Within the researched field of media and architecture, its technology and discussion of content, I investigate the possibility of filling a gap that exists in architectural discourse, when shifting from an autoplasmic to alloplasmic mode of operation. By ‘autoplasmic’ and ‘alloplasmic’ I refer to an article published by Mark Goulthorpe<sup>i</sup> where he defines ‘autoplasmic’ as a ‘self-determined operative strategy’, and ‘alloplasmic’ as a ‘reciprocal environment modification’.<sup>ii</sup> The fabric I am talking about is the 3D light-point matrix. The driving force to alter the fabric to make it alloplasmic could be the injection of content into my research system, of developing existing media facades which will allow the zone to be generated and regenerated. I want to list the five projects thus are:

- The Source by Greyworld, London, England, 2004
- Aegis Hyposurface by Mark Goulthorpe and other researcher, Birmingham, England, 1999.

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<sup>i</sup> I am referring here to the article *Goulthorpe, Mark - Aegis Hypo-surface: Autoplasmic to Alloplasmic*; *Architectural Design Hypersurface Architecture II* Vol. 69 9-10, Chichester: Academy Editions, 1999

<sup>ii</sup> Mark Goulthorpe used these two terms ‘autoplasmic’ and ‘alloplasmic’ in an article discussing the Aegis Hyposurface, drawing these terms from Ferenczi’s analyses of trauma. For this research these terms are borrowed to explain the shift from a determinate, static space to an indeterminate, interactive space.

- Blur Building by Diller + Scofidio<sup>i</sup>, Yverdon-les-Bains, Switzerland, 2002
- D-Tower by Lars Spuybroek + Q.S. Serafijn, Doetinchem in the Netherlands, 2003.
- Hypersurface Architecture by projects from Lars Spuybroek / NOX and Kas Oosterhuis Associates with Ilona Lénárd, Neetje Jans in the Netherlands, 1994 – 1997.

The first of five projects, a project whose existence is publicised on the homepage<sup>ii</sup> of the designers is The Source by Greyworld. Most information for this artwork installed in the London Stock Exchange was found on various homepages such as *InteractiveArchitecture.com*<sup>45</sup> or *Futurefeeder.com*<sup>46</sup>.

Aegis Hyposurface, is discussed in publications by Mark Goulthorpe in *Aegis Hyposurface Autoplastic to Alloplastic*<sup>47</sup> and Mark Burry in *Between Surface and Substance*<sup>48</sup> as well as a joint paper by both authors, *Aegis Hyposurface ©: The Bordering of University and Practice*.<sup>49</sup>

Blur Building by Diller+Scofidio, is extensively discussed in the book *Blur – The making of nothing*<sup>50</sup> by Elizabeth Diller and also in a brief introduction by Laurie Anderson in *Scanning: the aberrant architectures of Diller+Scofidio*.<sup>51</sup>

This project which changes its form by a digital injection is followed by a project that alters its colours as a result of an internet survey - The D-Tower by NOX / Lars Spuybroek + Q.S. Serafijn. It is discussed in Spuybroek's *NOX: machining architecture*<sup>52</sup> and specifically in articles written by Brian Massumi and Arjen Mulder in the same book. Brian Massumi again discusses the D-Tower in the interview *Transforming Digital Architecture from Virtual to Neuro*<sup>53</sup> with Thomas Markussen & Thomas Birch, aka bleep.dk.

Finally for the fifth project, two related projects will represent Hypersurface Architecture. Lars Spuybroek / NOX is mentioned a second time with his project Fresh Water Pavilion, and furthermore the Salt Water Pavilion designed by Kas Oosterhuis Associates with Ilona Lénárd is discussed. Discussion of both projects is published in the AD Architectural Design magazine *Hypersurface architecture I*,<sup>54</sup> amongst other journals.

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<sup>i</sup> Now Diller Scofidio + Renfro

<sup>ii</sup> Please refer to: [http://www.greyworld.org/#the\\_source\\_/i1](http://www.greyworld.org/#the_source_/i1)

The literature reviewed has shown that all work done by others creates an alloplastic mode of operation, either through an alteration of form or an alteration of image. The analysis of the above discussed resources revealed that none of the analysed projects by others seek an alteration of space through *both* form and image, a combination, in fact, not seen in any example presented when discussing the historic, technological and content background of media in architecture. This gap I will be addressed by creating an alloplastic mode of operation through an amalgam of form and image.

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#### [1.2.4] Resources to discuss possible significance

Until this point I have not included literature which would help to discuss a framework of the significance of such a system operation in an alloplastic mode for architectural discourse. Hitherto books, papers, articles, journal and others have helped me to define a framework of a media façade system based on a 3D matrix of light-points. This 3D matrix of light-points could define a zone which could be generated and regenerated when exposed to an alloplastic mode of operation. The following literature has helped me to define the particularities of a zone generated by a 3D light-point matrix.

Paola Gregory in *New Scapes, Territories of Complexity*<sup>55</sup> discusses the role of surface as an architectural interface. For her the surface should promote interactivity, connectivity, multi-mediality, and virtuality, creating new dialogic and multisensorial dimensions that extend the very cognitive and perceptive field of architecture. The *spatial dynamic media system* extends space in the same direction. The literature reviewed in this section discusses qualities of the *spatial dynamic media system*, which differ from presently existing media facades.

The *spatial dynamic media system* follows the tradition of a bas relief, which can be seen in the pediments of classical temples discussed by E.H. Gombrich in *The Story of Art*<sup>56</sup> but made from a different material. The intangible material of the *spatial dynamic media system* allows space to be defined by what Massumi calls an ‘event’ in *Transforming Digital Architecture from Virtual to Neuro*<sup>57</sup> by feeding data captured from sensors into the surface. Sensors and the classification of sensors are discussed by Michelle Addington and Daniel Schodek in *Smart Materials and Technologies*<sup>58</sup>,

setting a frame for which sensors can be used as a source of input. The anomaly of surfaces generated by these sensor inputs are discussed, after defining the notion of space, using Paul Virilio in an interview with John Armitage in *From Modernism to Hypermodernism and Beyond*<sup>59</sup> and in a foreword of Antonio Saggio in Paola Gregory's *New Scapes, Territories of Complexity*.<sup>60</sup> The *spatial dynamic media system* offers three characteristics for surfaces: multilayered surface, decay function and privileged perspective.

- Multilayered surface is the possibility of over layering a number of surfaces onto one façade by simultaneously displaying more than one surface on the façade as a 3D object and creating an extra spatial depth.
- Decay function means achieving a "decay function" of the light surface by writing a script that puts a decay factor on each light point. The light point won't be switched simply on and off - it will be decayed to create an after-effect of the façade that just existed
- Privileged perspective talks about an anamorphic effect, an anamorphic image is a distorted image that only looks right when viewed from a specific angle or with the use of a device.

The options of surfaces such as multilayered surface, decay function and privileged perspective are explored with key references including *An introduction of Metaphysics*<sup>61</sup> by Henri Bergson, *The Charter of Zurich Eisenman De Kerckhove Saggio*<sup>62</sup> by Furio Barzon and works by Hans Holbein the Younger or Georges Rousses.

Discussion of movement and speed in architecture are explored through the Hessian Cockpit project in Utrecht, 2005 by Kaas Oosterhuis, and an interview of Brian Massumi in *Transforming Digital Architecture from Virtual to Neuro*<sup>63</sup>, and the book proposal of Lev Manovich for *Info-aesthetics*.<sup>64</sup> The section ends with a discussion of the shift of the design process to a design in real-time and what kind of parallels can be drawn from a parametric modelling environment as explained by Mark Burry in *Paramorph*.<sup>65</sup>

Chapter 4 briefly touches on a conclusion to my research. The system offers the possibility of designing a new architecture of information. The idea of a spatial

representation of information has been discussed by Lev Manovich in a number of papers, principally *Information and Form*<sup>66</sup> at the Ars Electronica 2000 Exhibition and *Post-media Aesthetics*<sup>67</sup>, and the discussion of form and information will be part of Manovich's proposed book *Info-Aesthetics*<sup>68</sup>, currently outlined as a book proposal on his homepage<sup>i</sup>.

After finishing the theoretical component of my research, the focus diverts to the Project Work in Chapter 5 and discussing the type of resources used to gain information about developing a system.

Giving a critical review to my annotated bibliography by summarising the value of the researched material I want to express following thoughts:

- Media façade products such as fluorescent tubes, display screens and LEDs: Literature about their physical specifications and capabilities is available and research towards gaining background knowledge of these products is easily achieved. When the aforementioned products are embedded into architecture and these products are published in articles, journals and others the main concentration of the article is mainly focused on the building and its visual affect. A technological background discussion of these façades is generally omitted. If this background is discussed it is only in publications which explicitly discuss one project as a monograph. Examples for this trend are review books such as, *Blur – The making of nothing*<sup>69</sup> by Elizabeth Diller or *A friendly alien: ein Kunsthhaus für Graz: Peter Cook/Colin Fournier architects (A friendly alien: a museum for Graz: Peter Cook/Colin Fournier architects)*<sup>70</sup> written by architects Peter Cook and Colin Fournier/Spacelab to mention two.
- Whereas theoretical literature, like the interview with Brian Massumi in *Transforming Digital Architecture from Virtual to Neuro*<sup>71</sup>, and Paola Gregory's *New Scapes, Territories of Complexity*<sup>72</sup> had value in achieving an understanding of theoretical background of my research, made on contribution to answering technical questions.

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<sup>i</sup> I am referring to: [www.manovich.net](http://www.manovich.net)

- Many buildings with media façades have been published in various journals or articles but, as mentioned previously, there is no cohesive published history of media and architecture.

At this point I will not go any further when talking about the resources for the theoretical framework. Further information can be located in the References in Chapter 6 at the end of the work. In Chapter 6 other books, papers and journals are acknowledged and while these resources have influenced the research they are not directly quoted in my research.

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**[1.3]**  
**Overview resources for**  
**VOLUME TWO – Project work**

With Volume One providing a theoretical framework for my research, the hypothesis is then tested by a series of four projects in Volume Two. I have undertaken these four projects to develop my research hypothesis, and demonstrate how this knowledge can be applied through a series of tests embedded in the projects in developing systems. I discuss how the projects were conducted, a point which is important for the selection of resources in the project work.

The four projects start with a test to assess the possibility of designing space with light; a proposition made in the theoretical framework. Based on this first test, further projects with their embedded test series, will be based on testings to improve and find evidence towards a final product. Here most knowledge is gained from the results of the undertaken tests. This test series led the research through the following methodology. A research question A which has occurred in a test will be answered by a series of following tests. The question A can be answered, but at the same time it could cause a question B which then has to be addressed in the next tests and so on.

As explained previously in my methodology, the first two projects are dedicated to the design of a technology that fulfils the requirements of the research question and applies this system to an architectural context. The third and the fourth projects discuss media content. In project three, the media content is provided by the author and in project

four the author functions as the curator of various media content scenarios through providing a toolset composed of different codes used to influence the generation of form.

Based on this methodology, the first selection of resources is in the field of electronics and electronic engineering. Having gained a theoretical background of different media components such as fluorescent tubes, LEDs and large display screens when researching the theoretical framework, now the focus is on the specific electronic components of mainly LED technology.

As mentioned earlier, in February 1995 I completed a three and a half year training course as an electrician and I worked for a further year afterwards as an electrician.

Why is this history important to my research?

In my research I discuss electronic components such as LEDs<sup>i</sup>, SMD LEDs<sup>ii</sup> and I have designed electrical circuits as part of my project work. I refer to different electronic technologies and their history, mainly from internet sources such as the LED display system Barco MiPix 20 or SmartSlab, amongst others. Through my previous training as an electrician, I am able to judge the viability of information on the internet as an information source adding to the books, papers or journals. Significantly, much of the information listed in my research includes cutting edge technologies which are only appearing on the internet now, and are not yet in books and journals. Many technologies used in the research have detailed explanations extracted from the manufacturers' homepages, describing the products and aspects of how the product can be used and their relative advantages. Certain inventions and particular technologies are not published in books or online due to intellectual property and related commercial imperatives, but, by keeping the research at a user level regarding these products, I have avoided any discussion on how these products have been developed or the kind of technological invention or innovation included in the product.

I have used my experience as an electrician in the Project Chapter 5: Project 1. Most of the references are taken from general books that provide a source for the information I present. This information remained on a level of common knowledge suitable for the

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<sup>i</sup> A LED (Light-emitting diode) is a semiconductor device that emits narrow-spectrum light when electrically biased. I will explain LEDs further in Volume Two Project work: Project 1

<sup>ii</sup> Surface mount devise (SMD) is a method for constructing electronic circuits in which the components (SMC or Surface Mounted Components) are mounted directly onto the surface of printed circuit boards (PCBs).

purpose of this section, where the focus is on the design of an LED based system but not on the development of LED technology as such, through books such as *The arts of electronics*<sup>73</sup> by Paul Horowitz and Winfield Hill or the book used during my training course written by Stephan Gossner, *Grundlagen der Elektronik – Halbleiter, Bauelemente und Schaltungen*.<sup>74</sup> Specific information on a certain product or electronic component, where detailed information has been necessary for the research, has been sourced from the manufacturer directly.

Achieving a prototype as the result of Project 1, the work of Project 2 includes mainly design based work. The prototype built as a result of 6 tests done in Project 1 is then applied to a building to test its functionality. Questions were asked how it could be attached to a wall. Experiments were made with different resolutions and looking at the approximate cost for the system. The cost calculation has been based on current costs for LED screens<sup>i</sup> produced by an Italian manufacturer *Altoona* and the spreadsheet of Altoona of the costs for their products.

The motivation of the design of a media content in Project 3 was to provide evidence of statements which are essential parts of the design concept. The media content designed for a conference paper<sup>ii</sup> had the media content displayed on the façade focused on the “*expression of cultural diversity*”.<sup>75</sup> The term of “cultural diversity” should be altered to reflect common characteristics of humans. Rather than focusing on the common grounds of humans, to focus instead on expressing the diversity, diversity of cultural background which will be overlapped by common grounds such, as facial expressions. Facial expressions are a common ground of humans, even those from different cultural backgrounds. The interest of the movement of the face caused by expressing different emotions led to a short study of movement as relative, discussed by Henri Bergson in *An Introduction to Metaphysics*<sup>76</sup>. Here my research uncovered evidence of the proposition in William F. Allman’s *The Stone Age present, how evolution has shaped modern life – from sex, violence, and language to emotions, morals, and communities*<sup>77</sup> where the author assessed that facial expressions are a common ground

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<sup>i</sup> Based on a datasheet dated October 2004, for further information refer to the company homepage: <http://www.altoona.it/>

<sup>ii</sup> The paper has been written for the UNESCO Digital Arts Award 2005 which encourage artists to reflect on the theme of Urbanity and Creative Media

of humans and its importance for the evolution of the human species. These human expressions could be then translated into architectural expressions and therefore humans could create despite their cultural diversity an object informed by their common characteristics. It allows the beholder to find themselves reflected in the building, leading to a negation of the design idea of the façade and therefore the author/architect vanishing behind his/her work - the beholder in fact becomes the person in charge of designing the “*temporal events-within form*”,<sup>78</sup> an expression used by Stephen Perrella in an article in *AD Architecture and Science*<sup>79</sup> edited by Giuseppa di Cristina. This designed media content is applied in different fields such as a conference paper, competitions and an art installation to test the media content and as well as the designed system in other applications. Project 3 could therefore be seen as a linking project where results gained in Project 1 and 2 are further tested and basic understandings for developments of media content studies are made.

One of the basic outcomes gained from Project 3 was the importance of providing software or codes in order for others to engage with the system, to assist by providing media content and an actual way of feeding input into the system. The discussion of media content is, therefore, structured via two approaches. The one approach, as detailed in Project 3, is by designing media content and the other approach, described in Project 4, is by working as a curator for different media content.

Why this second approach? Here my research concentrates on two topics.

- Testing the system on its ability to use data from different sources without being constrained by a discussion of the meaning of media content and its cultural and philosophical explanation. Writing a code for displaying information in the form of an Excel data sheet offers a tool for feeding information of all kind such as sensors. Others can debate the media content as it is beyond the scope of my current research.
- Writing code also offers the possibility of proving some of the propositions made in relation to the significance of the system for architecture. Among my propositions in the theoretical framework has been the task to create an amalgam of form and image, a multilayered surface or a decay function. Even though these propositions are on a

cultural and philosophical level and not fully discussed, my research in Project 4 locates to set itself as a foundation for ways these studies can be continued. Writing a code, on the one hand, suggested that these ideas and proposition can be realized, and, on the other hand, offers myself or other researchers a tool for future studies.

The project work did not require research into background resources. Items from my interest in developing these projects have been studied in the theoretical framework, such as technological input of LED screens. In general my research in the project work is informed by the resources of my previous experiences when working in architecture and as an electrician and designing media facades.

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**Research questions layout: *spatial dynamic media system* - Amalgam of form and image to deliver a content-driven zone in real-time through use of a 3D light-point matrix**

