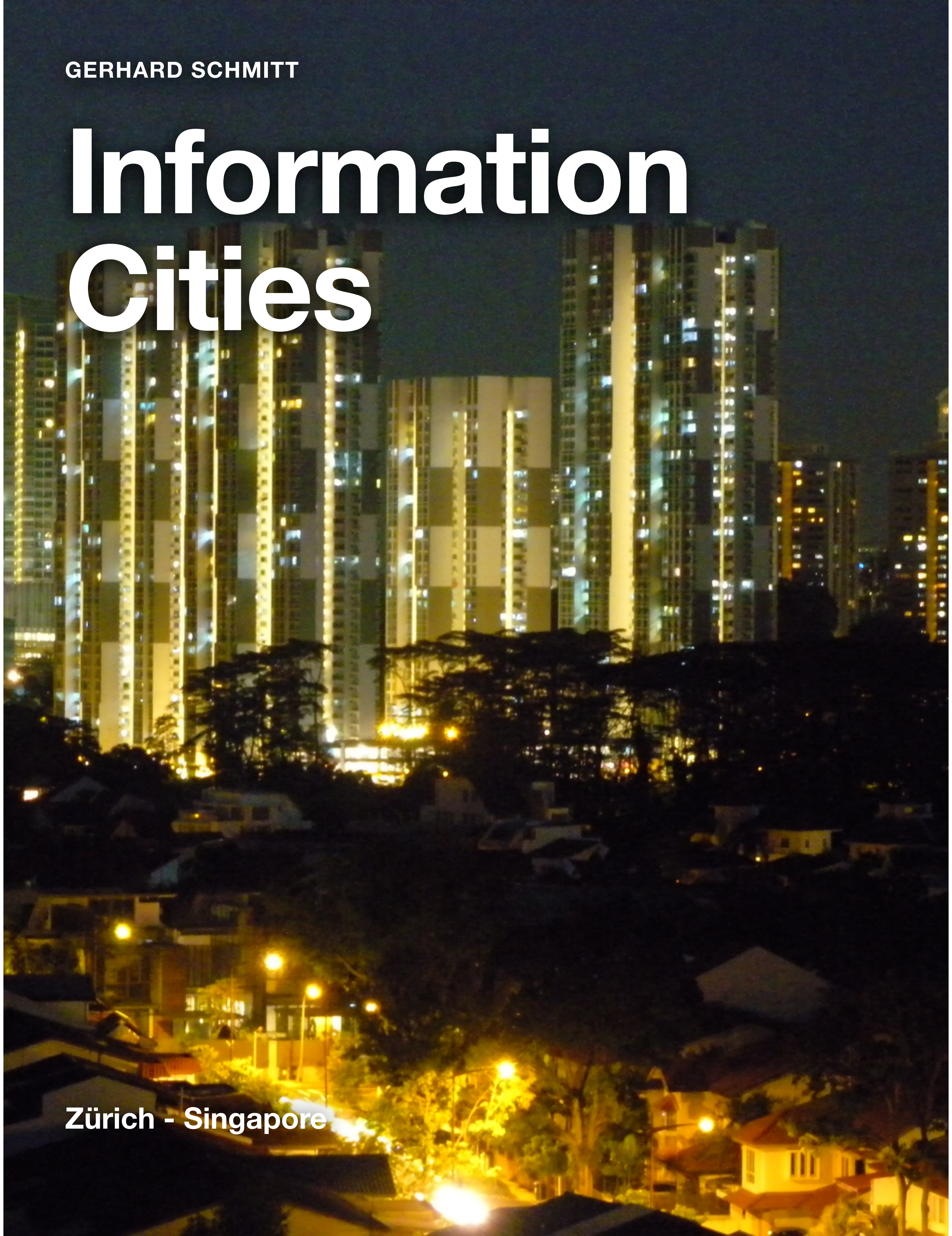
GERHARD SCHMITT

Information Cities



Zürich - Singapore

Future Cities Preface

Abstract

What is a city? What is an urban system? Do we understand these most complex man-made artefacts in their entirety? Do cities need skyscrapers? Are there cities without density or are there dense settlements without being a city? Some are liveable for most, others just for a few. As we enter the first urban century, we start to realise that today‘s cities are not sustainable, no matter from which side we look at them. In order to transform them towards livability, sustainability and resilience, better knowledge and the power to change are needed. Understanding the city and knowledge about the city should be the base for change. As we begin to see that cities are not neutral objects, but that people define the city, the citizen takes the central role in the definition of the future city.

With the regard to cities, the development in different parts of the world is moving in radically different directions. Cities in the tropics will grow strongly in the coming decades: overall, the number of new inhabitants will increase by 3 times the population of Europe today in the next 30 years. But who is planning those cities? To enable people to do so, it is necessary to develop new University programmes which in an integrated and holistic way transmit the knowledge to understand the city, to transform it, to plan it, to design it, to build it, to manage it and to constantly adapt it. The Future Cities Laboratory in Singapore and Zürich is conducting fundamental research into this area and also prepares concrete proposals to change existing urban structures towards higher sustainability.

A new understanding of the city: The Future Cities Laboratory

At the end of the 1st decade of the 21st century, networks of urbanised centres are the predominant framework of life in Europe, the United States, South America and Oceania. While in Africa and Asia a majority of the population still lives in the non-urbanised countryside, the urban population is growing much faster through higher birth rates and internal migration and will exceed the rural population by 2050. Thus, the urban framework of living will dominate the coming centuries. As a consequence, the urban theme has moved to the top of the agenda of elite universities, industries, and agencies. Governments such as the one of Singapore have made the future of the city, in particular the future of the liveable city, one of the national central themes.

The urbanisation of the rapidly emerging countries of the 21st-century as a societal and as a scientific phenomenon needs fundamental research quickly. This is the main reason, why ETH Zürich has founded in 2010 the Future Cities Laboratory as an integrated and multidisciplinary design and research centre in

Singapore and Zürich. The Future Cities Laboratory is looking for realistic approaches, techniques and methods to increase the sustainability of cities. It integrates research results from fields of science which are crucial to know about by the next generation of city planners, city builders and city managers.

In order to better understand the city, theory, experiment, and simulation need to work hand-in-hand. *Theory* entails research on the reality, the planning, and the implementation of the city; *Experiment* includes the conduction of Design Research Studios with the city as a living laboratory; **Simulation** is needed to make the invisible visible and to test and to visualise future scenarios.

In the beginning of 2013, the Future Cities Laboratory in Singapore and Zürich works with 50 Ph.D. students, 20 Postdoctoral Researchers, 13 Principal Investigators, 35 Design Research Studio Master Students and 5 management persons from 31 nations, as well as with the academic partners of the National University of Singapore (NUS) and the Nanyang Technological University (NTU). Together, these researchers are beginning the development of a new city science by the combination of theory, experiment and simulation.

Building on the model of the urban metabolism, on the stocks and flows approach and on complex systems theory, the Future Cities Laboratory in addition explores experimental possibilities, such as pre-specific modelling and the quantum city. The research operates on 3 integrated scales: small – building and building technology; medium – quarter and city; and large – hinterland and territory. 10 research modules and 3 assistant professors work on the influential and decisive parameters water, material, energy, design, capital, landscape, density and information.

Context versus universality

throughout the entire book, there will be a distinction between universally accepted facts and context-based information and facts. Universally accepted facts and methods can be transported without causing confusion or damage between cultures, countries, and climates, they apply to all cities and urban systems. Context-based information and facts refer to a specific location in a specific climate and should be used with great care as a base for design decisions in other places. Cities and buildings are not context free objects and therefore should not be copied. The boundary between those two types is not rigid, and as our knowledge about cities increases, we will be able to expand both the set of universally accepted design support facts as well as the locally important information and knowledge. The universally applicable information is depicted by the global symbol.

New ways to plan the city

City planning means different things in different parts of the world. While the development in Europe and United States is stagnating, the cities north and south of the equator are expanding as rapidly as European and North American cities did 150 years ago. Yet in the meantime, the world‘s population has grown by a factor of 6, and the global networking amongst the urban centres has increased significantly. The interactions between cities are massive as compared to the development in Europe and North America in the 19th and 20th century. Asian centres such as Singapore have recognised and developed city planning as a crucial part of the development of the entire nation. The idea is to become the leading centre in Southeast Asia with the highest satisfaction of the inhabitants. **Lee Yi Shyan**, the Singaporean Minister of Trade and Industry asks in 2012: “How can we urbanise while maintaining harmony – socially, economically and environmentally? How do we balance short-term needs with long-term demands? How do we ensure that we can go on building cities, while retaining a healthy environment for our children and grandchildren?“

The Future Cities Laboratory looks at city planning from different perspectives. On the territorial scale, the architects and urban designers **Marc Angélil and Franz Oswald** conduct research on the symbiotic relation between cities and their regional and global Hinterland in Brazil and Ethiopia. Territorial Designer **Milica Topalovic** concentrates on the interconnections between Singapore and its Hinterland, which includes Malaysia and Indonesia, but which is global in reality. Also on a territorial scale, transportation planner **Kay Axhausen** simulates the effects of mobility and the increasing number of cars and other vehicles. In the neighbouring Jakarta and along the Ciliwung River, the landscape architect **Christoph Girot and Paolo Burlando**, a hydrologist, try to understand and plan for the territorial importance and the local functions of water as natural and development elements. The urban sociologist **Christian Schmid** works with comparative methods in the rapidly growing urban centres north and south of the equator to discover common phenomena and solutions for the densification of cities.

New ways to build the city

Cities seen as physical expressions of urban systems consist of people, buildings, infrastructure, and moving parts. The urban system extends above ground and below ground. Above ground, buildings are the objects that we associate with cities most. Every single building in a city contributes to its future success or failure with regard to sustainability, and therefore building physicist **Hans-Jürg Leibundgut and Arno Schlüter**, an architect, concentrate on **Low Exergy** housing and office buildings for the tropics. Architect and building technologist **Sacha Menz** compares housing typologies in Switzerland, Singapore, and China. To construct these buildings in the future with high precision and longer life cycles, **Fabio Gramazio and Matthias Kohler** teach their students to program robots for the automatic, non-standardised digital production of high-rises. Building scientist and preservation specialist **Uta Hassler** and her group focus in Singapore on material flows and the historic aspects of quarters originating from different times and development of the city. Expanding on this team, the urban planner and architect **Kees Christiaanse** leads a team that deals with the revitalisation of city quarters and is also exploring the new role of the airport as an integrated part of the new city. With the explicit goal of saving valuable resources and reducing CO2 output in the production of building materials, **Dirk Hebel** introduces regional material such as bamboo which in specific parts of the world could partially become under certain conditions a replacement for concrete in construction.

New ways to manage the city

Cities consist of more continuous parts and more dynamic parts. In the constant development between continuity and change it is necessary to build innovative methods and instruments for a dynamic city management. Already the master plans for a city and the resulting buildings should be seen through the eyes of the city life-cycle management, and the city administration has to be composed in a way that it can implement well-founded requests from the population. Rules and building regulations will play an important role in the future to manage the city. **Alex Lehnerer** is planning a centre for urban rules, that could formulate planning guidelines for the new city. As interaction environment for those who are participating in the building and the management of the city, as well as for the safe deposit of all information related to a city, the **Simulation Platform** of the Future Cities Laboratory with the Value Lab Asia represents the technical foundation. Information originates from data. This data stems from historical records, but increasingly from real-time and online sources, crowd sourcing and social media. Integrating them carefully in the Simulation Platform will lead to context sensitive knowledge databases for the management of future cities.

Future cities

It is clear ready now, that the future city will not be designed and built based on hierarchies, formalisms, or mathematics, but will originate from a dynamic system you including global relations and the local force fields. This view of the future city is already reflected in the organisation of the Future Cities Laboratory, which closely networks on the one hand in-depth disciplinary research and on the other hand disciplines like design or sciences. Depending on the topic, the leadership of emerging synergy projects will rest with the research module that has the highest competence in this field of interest and might change throughout the project. The first example is the common work on the historic Rochor quarter in Singapore, where tradition and future are at stake. A second example is the Jakarta Ciliwung project, in which several research modules of the Future Cities Laboratory cooperate with the University of Jakarta on the concrete redevelopment of a Kampung in order to improve the situation of the slums in a sustainable way. A third example is the design and construction of the city of Nestown in Northern Ethiopia. All examples having common that research, development and implementation are closely working together in the rapidly growing regions around the equator with the common goal to achieve urban sustainability.

The cities of the future will differ from each other much more than those of the presence, because they emerge in a globally networked consciousness and with the knowledge of the importance of sustainability. They increasingly will take into account the participation of people as well as the climatic and economic context. This requires that the teaching of city planning and urban design needs to be revisited and renovated fundamentally, and must be adjusted to the degree of knowledge that has been created in city related research. To this end, the Future Cities Laboratory develops a new curriculum for those students in different parts of the world, who will lead the planning, construction, and the redevelopment and the management of future cities. The new curricula will influence education in the West but possibly even more the education in Asia and in Africa, because these curricula will hopefully end the discrepancy between the needs of cities in those continents and the solutions that were traditionally offered in the West.

At the beginning of the 21st century, the majority of the fastest-growing cities are in Asia and Africa. In the very near future, the majority of the population in the world will not only be housed in cities, but in Asian and African cities. As a result, the knowledge of the development of the cities is crucial for students worldwide. The patterns and recipes of the past will be replaced by new patterns and blueprints that are under development in the Future Cities Laboratory in Singapore and Zürich.If

Review Future Cities Preface.1 Urban population

How many people in Asia will need new living and working places in the coming 30 years?

- **A.** 500 million
- **B.** 2 billion
- **C.** 5 billion
- **D.** 1,5 billion

Check Answer

Chapter 1

Information Architecture

In the realm of the built environment, Information **ARCHITECTURE** visualises the information inherent in a building and thus makes the invisible visible. In the realm of the virtual, **INFORMATION** Architecture serves as a metaphor to structure the vast amount of data produced in modern society. We define **INFORMATION ARCHITECTURE** as the necessary framework to understand architecture, urban systems and territories in the knowledge society.

Section 1

Data, information, knowledge

INFORMATION ARCHITECTURE COMPONENTS

For physical architecture, we use physical materials. For information architecture, new types of material are needed. Data, information, and knowledge could be those materials. Abstract in nature, they need structure, space, and interfaces so that we can use them for design support purposes. Other disciplines, such as medicine, are constructing their body of knowledge with the same elements to come to a better understanding of the functioning of the human system.

Three important words

Data and information are often used interchangeable, but as they are at the core of information architecture, they deserve a special consideration. Wikipedia, for example, suggests that "**Data** is another word for information". We see data as the smallest entity of information and as a necessary foundation for building knowledge.

The transformation from data to information to knowledge is one of the most important activities in every society. End might appear that this activity applies only to the post-industrial societies, yet it was and is as important for the preindustrial and the industrial societies. With regard to the city as hubs for the collection, storage, and transformation of data into information, knowledge, and finally built architecture and other physical and intellectual structures, this activity is crucial. It requires the capacity to abstract, to order, to give structure, and to design. Therefore, the architectural curriculum is a good foundation for information architecture.

Since the middle of the 20th century, a development in computer science, with roots even more than 100 years before, laid the foundation to represent and work with data in a standardised format. This standardisation of data and information has had the most important impact on human society until today.

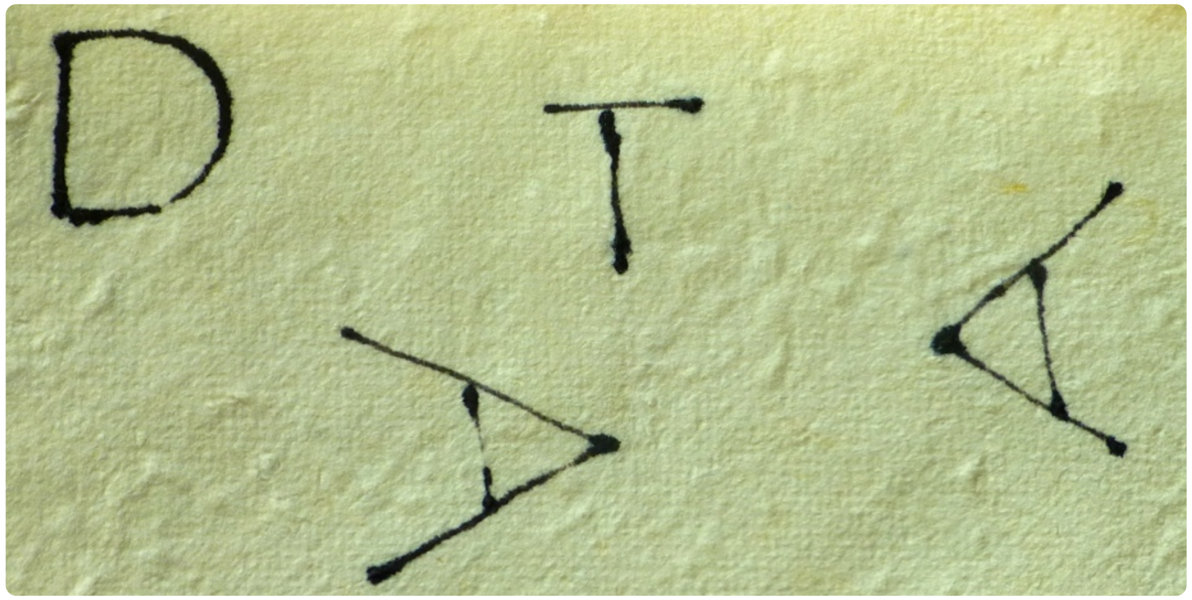
Data

The Romans used the word **datum** to express „that is given“. In the context of the city, we refer to **data** as the smallest entities of information, as values given to objects, expressions, functions or properties. Examples for data are numbers, colors or other simple descriptions. To better describe objects, expressions, functions or properties we need data and connections or relations - we call the result information. Important to remember: Data do not completely describe objects, expressions, functions or properties, but they are an indispensable ingredient.

Information

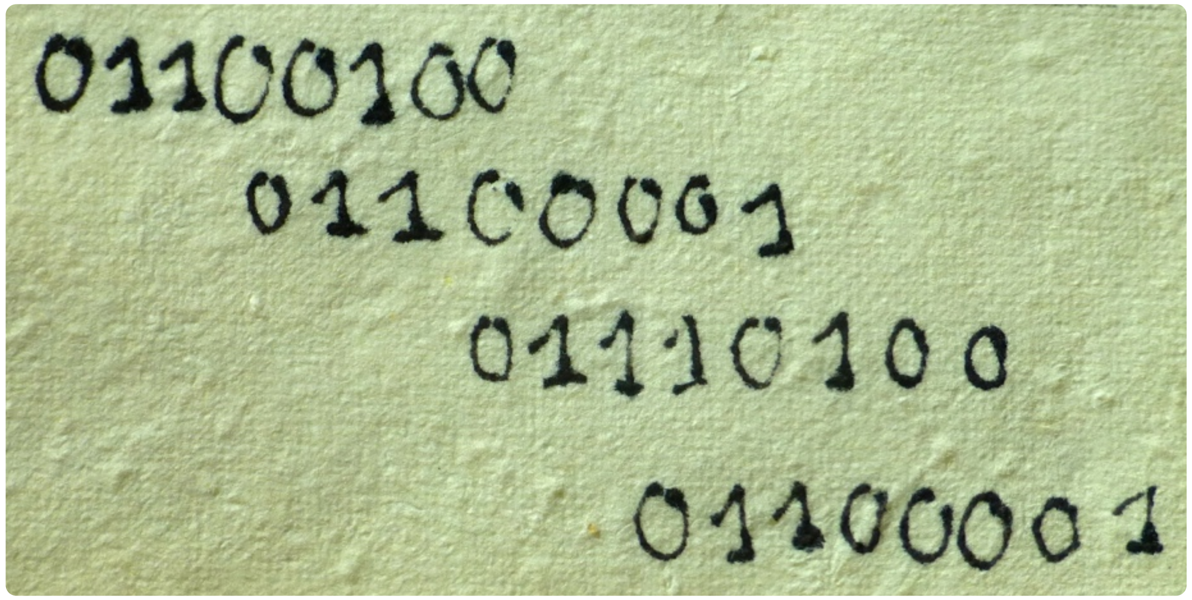
Information sets data in relation to each other, it consists of data and connections. The word has also Latin roots: informatio. There was the stone age, the bronze age, the iron age, or the nuclear age. We consider information as a virtual material, and one of the most important ones for the information age and for the information society. Important to remember: Information does not completely describe society, but it is an important abstraction.

Gallery 1.1 Examples for data



Letters of the alphabet as data. Ink on paper, Johanna Schmitt, January 27, 2013

Gallery 1.2 Examples for information

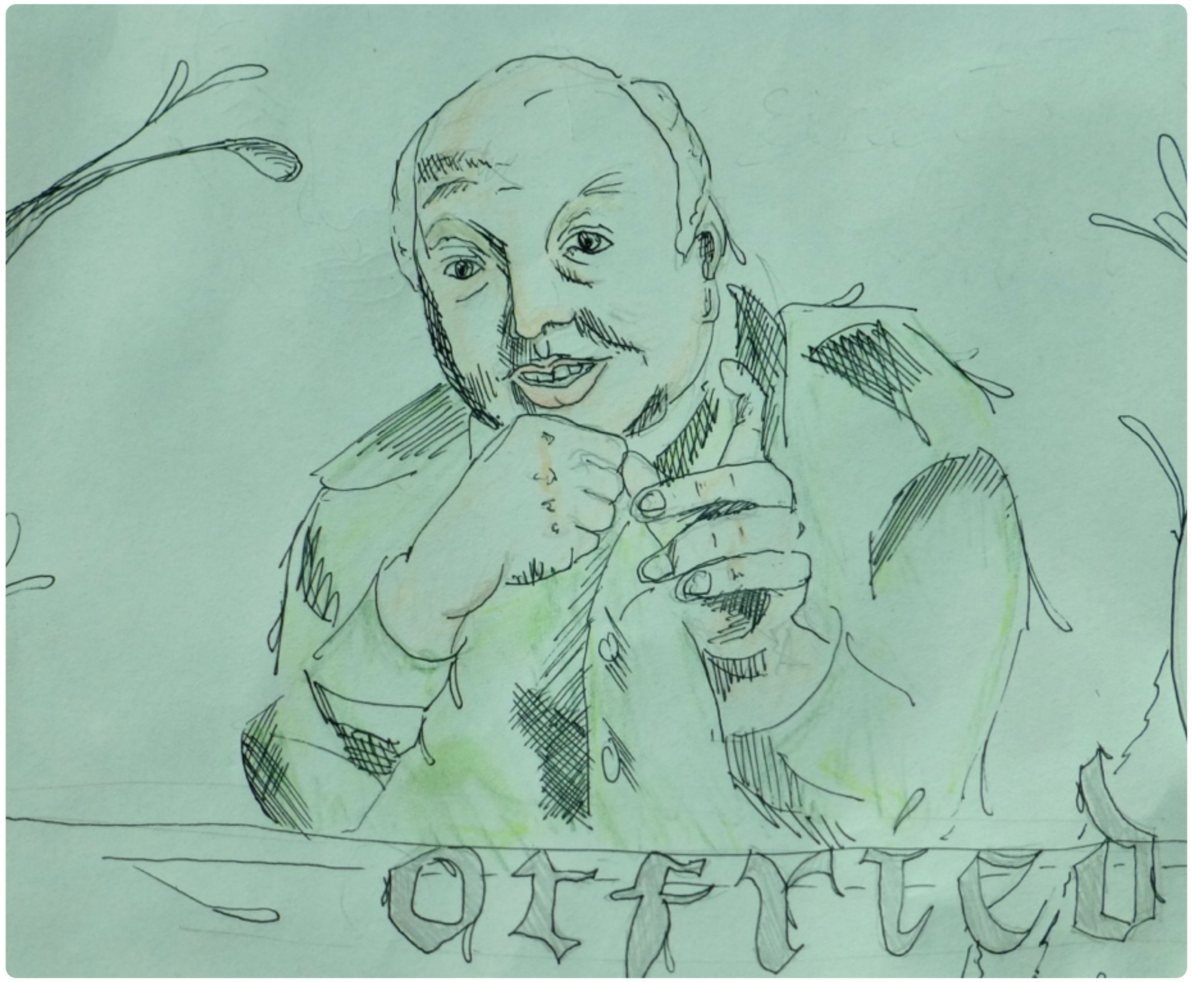


Binary code of the word «data». Ink on paper, Johanna Schmitt, January 27, 2013

Knowledge

Knowledge is a result of connecting data and information. It is not entirely clear how data and information are combined in the cognitive process into knowledge, but in any case domain knowledge and domain independent knowledge build on data and information.

Gallery 1.3 Containers of knowledge



The knowledge of the writer Otfried Preußler, author of the book Krabat. Pen on paper, Johanna Schmitt, January 20, 2013

Silke Lang interacting with information and data in the “red hell“ of the Department of architecture, ETH Zürich.Is equipped with 16 video cameras to capture the knowledge worker‘s position towards and interaction with the data displayed. Photo: Chair of Computed Aided Architectural Design, 1999.

Section 2

Information ARCHITECTURE

DEFINITION

Information ARCHITECTURE stands for making the invisible visible in the form of digital information extracted from and applied to physical architecture to better understand and design physical architecture.

Information is a central property of architecture, as it is defined by data and their relation and at the same time is a crucial ingredient to build and maintain architectural knowledge. We can think of information as the building blocks of future architecture. Looking at such a building block, we can decompose it into its facts (data) and into the relations connecting the different facts. Looking at knowledge, we can decompose into information and into the relations connecting the different sets of information. But it is much more difficult to reverse this process.

Information ARCHITECTURE describes the information IN architecture.

Architecture and information

Far too often, we take built architecture for granted. We are satisfied by looking at the surface of a building, of a city, or of a landscape. For those who want to merely enjoy and experience architecture, this may suffice. But for those who want to design buildings, urban quarters or territorial structures, this is not enough. We need information to understand and design architecture, and as we shall see later, we need the architectural metaphor to understand and design information. But what is information? And what is the relation between data, information, and knowledge?

Think of a simple brick wall: in the distant past, it was sufficient to know about the bricks ability to protect and to bear loads. In the information age, the brick wall can tell us an entire story: the origins of its materials, the process of their transportation to the production site, the production of the bricks and the mortar, the transportation to the building site, the construction process, the position of each brick in three-dimensional space, the thermal properties of the wall, its colour, its acoustic properties, its health related qualification, and many other invisible, yet existing properties. In fact, the wall tells us an entire history about its life-cycle. If we know all these properties and also how to handle them, it should be possible in the future to design and build new architecture, which fulfils its specifications much better than today.

Data in ARCHITECTURE

All scientists need data, and all architects need data. Often, we see the value of data only then when we have no access to them. As history is an important aspect of architecture, historic data of valuable and the precondition for many design decisions. Future data–which by definition cannot exist–come from architectural simulation and design exploration.

Information in ARCHITECTURE

Looking at architecture, we see the obvious. But there is more invisible information in architecture than meets the eye.Think, for example, of the past, present, or future temperature of the room; the weight of the wall resting on a floor; the age of the wooden beams in the ceiling; the hidden pipes and cables behind the plaster; the acoustic properties of materials surrounding you; the cost per square metre or per cubic metre of the space you look at; or the CO_2 embedded in the material and the energy needed to heat and cool the space.

Gallery 1.4 Data in ARCHITECTURE

What do these numbers mean? This data might be important, but make no sense without knowing the context. Science Park 2, Singapore, April 1, 2011. Photo: Kevin Lim

Gallery 1.5 Information in ARCHITECTURE

Old or new? Original or reconstructed? We need historical information to decide. In the vicinity of Riyadh, January 28, 2010. Photo: Gerhard Schmitt

Knowledge in ARCHITECTURE

Combining information, experience and insights can lead to architectural knowledge. This knowledge is necessary to design new buildings that fulfil certain properties; and it is necessary to understand the function and meaning of buildings in the first place. Knowledge is associated with people, in this case with architects. Knowledge increases with the experience of architects in their practical and theoretical work.

Gallery 1.6 Knowledge in ARCHITECTURE

The Architect Franz Oswald in Singapore as Leader of the Future Cities Laboratory on September 8, 2011. Photo Gerhard Schmitt

Data, information, knowledge, architecture

The design of architecture is built on knowledge, knowledge is built on information, and information is derived from data. Yet there is no straight and automatic way from data to information to knowledge to architecture. The structures, frameworks, hierarchies, ontologies and mechanisms that relate those entities are most interesting for research. One of these structures we refer to as models. Models in architecture, urban design and territorial planning are an abstraction of the real object with its functions and behaviours. Models are also the base for simulation, an activity and abstraction that includes the important parameter of time.

Information ARCHITECTURE uses simulation for more than creating images or artefacts based on geometric constraints, rules, or cases. Rather, non–geometric factors such as light, energy, structure, behaviour or systems knowledge become available for integrated direct modeling. Information Architecture helps to formalise and generalise design principles.

Few design principles in architecture, urban systems or territorial planning are context-free. Those are the ones based on known constraints, such as gravity, temperature ranges, or material properties. Most other design considerations depend on the context.

Modeling in ARCHITECTURE

When we think of architectural models, physical models of proposed designs or existing buildings come to mind. Yet in the context of information ARCHITECTURE, **modeling** builds on abstractions of physical architecture that explicitly show the connections between the parts and the whole. This normally involves simplification and formalization. To simulate a building's cooling demand, for example, we apply a formalised physics model to a specific, yet simplified geometric model.

Simulation in ARCHITECTURE

Simulation in Architecture requires the existence of a model, representing the most important characteristics of the proposed solution. In the past, the words «model» and «simulation» were often used interchangeably in architecture, i.e., an architectural model was seen as a design scenario for a given time in the future. Increasingly, the factor time and with it the dynamic aspects of design proposals become important parts of simulation in architecture.

Gallery 1.7 Modeling in Architecture

Physical models of buildings in Singapore. URA Gallery, August 25, 2010. Photo: Gerhard Schmitt

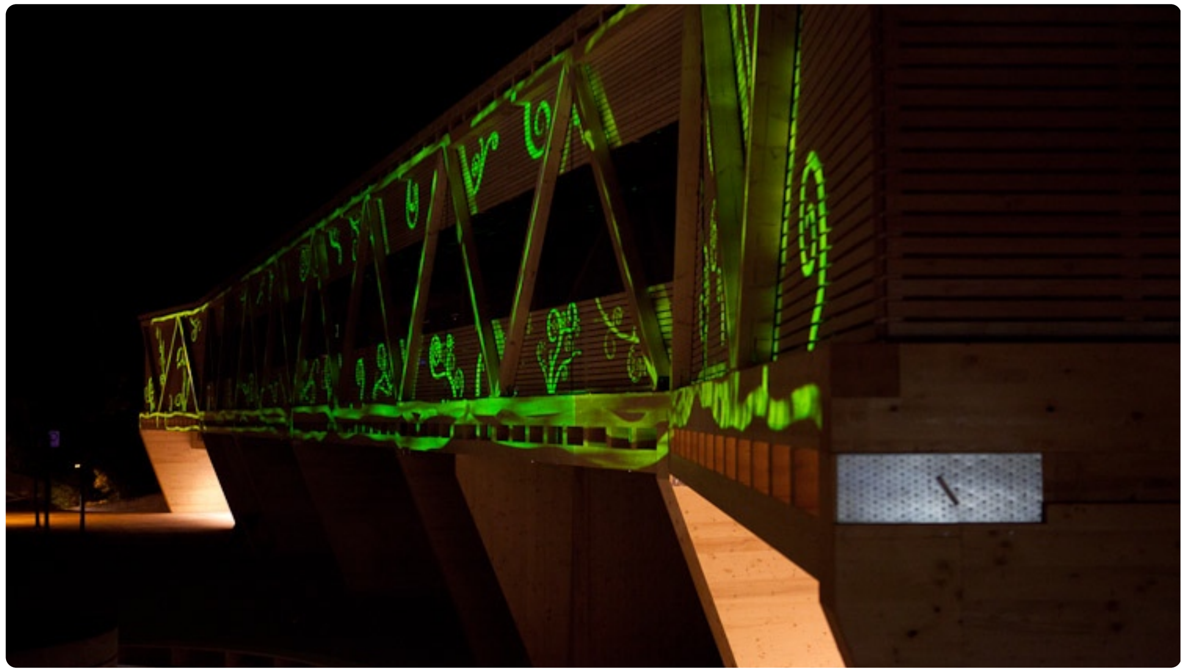
Gallery 1.8 Simulation in Architecture

Simulation of future buildings and land use in the Value Lab Zürich. Antje Kunze and Jan Halatsch, 2009. Photo: Chair of Information Architecture

Projection in ARCHITECTURE

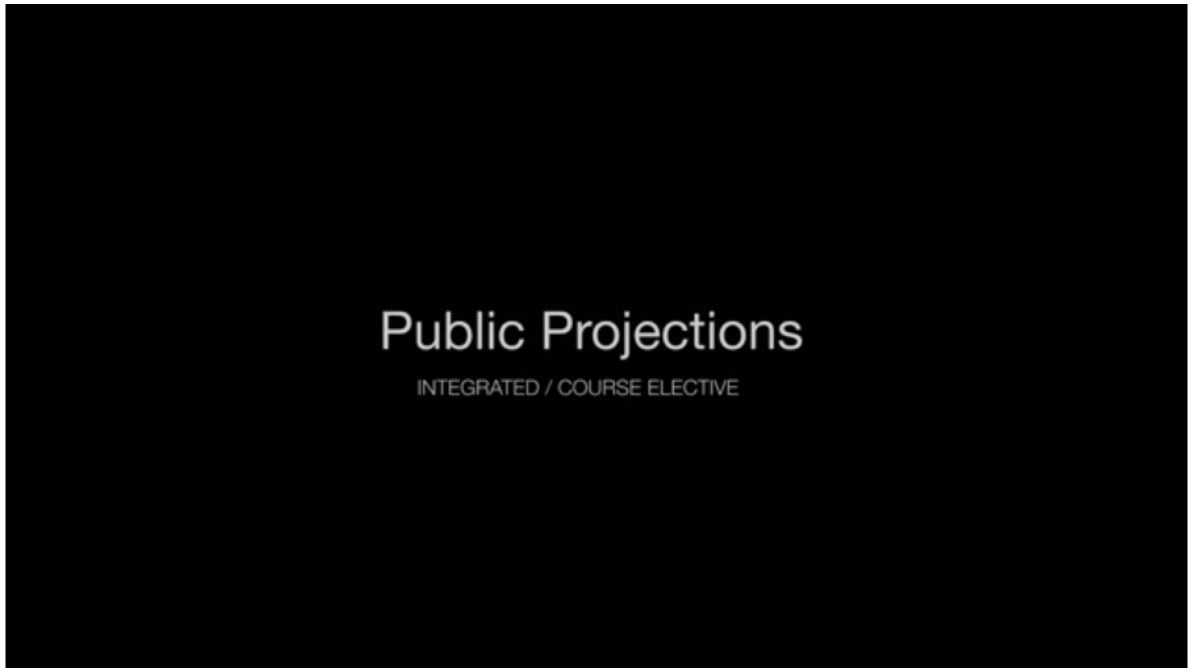
Projections are a special type of information ARCHITECTURE. They either project images that have nothing to do with the content of the projection area. Or – more interesting – they project abstractions of information of functions or events that occur behind, in, or in front of the projection surface. This way, facades can become large information displays. The chair of information architecture has established a tradition of projection exercises with Christian Schneider. He started with projecting complex adaptive code generated geometries onto facades, respecting the particular qualities of each facade in terms of openings and proportions. He then began using infrared cameras to detect people and heat emitting objects as they were moving in front of the building, resulting in dynamic changes in the projections.This was a convincing example for making the invisible – in this case sources of heat – visible. Lukas Treyer extended the experimental exercises towards dynamic design projected on more complex geometry. Students learned programming and at the same time gained experience in visualising information in previously unthinkable ways.

Gallery 1.9 Projection in Architecture



Architectural projection by Lukas Treyer on the facade of a parking garage. Stadtfest Baden, Switzerland, November 2012. Photo: Lukas Treyer, iA, ETH Zürich

Movie 1.1 Projection in architecture

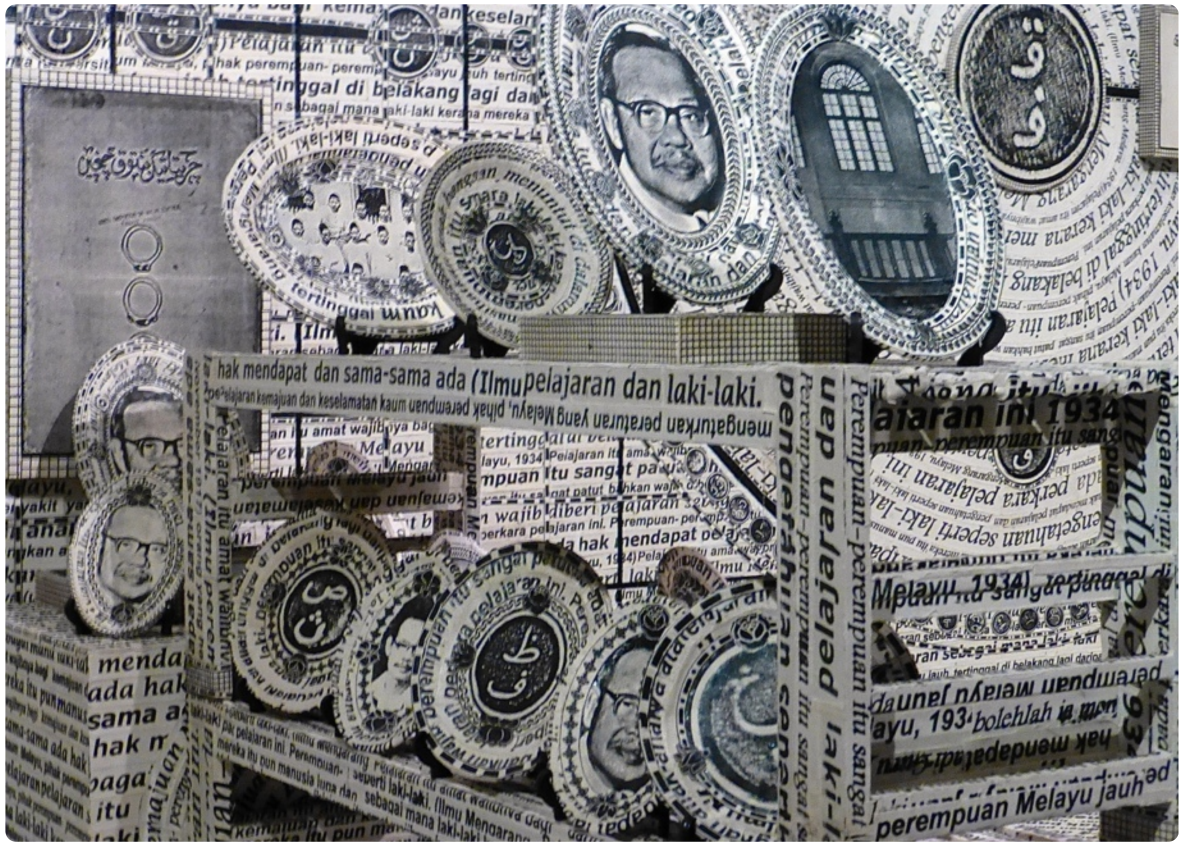


Video of the architectural projection by Lukas Treyer for the Stadtfest Baden, Switzerland, November 2012. Video Lukas Treyer, iA, ETH Zürich

Art Information ARCHITECTURE

In art, architectural spaces and furniture can be used as information carriers. Most of the time spaces are used as an empty shell in the background, to allow art to be perceived separately. Information can also be displayed from furniture and other surfaces, giving the impression of interaction between the viewer or user of the space and the art installation.

Gallery 1.10 Art information space



The shaping of cultural memory by historical texts. Zulkifli Yusoff, collage embossed dye printed on canvas, 2011. Exhibition in the Singapore Art Museum. Photo: Gerhard Schmitt, February 11, 2013.

Curricula in ARCHITECTURE

Architectural education is about integrating data, information and knowledge with the ability to design and to arrive at buildable, affordable, and sustainable architecture. The same applies to urban design education and territorial planning education. Each architectural curriculum represents the present view of the institution in charge of what it considers to be necessary for the education of architects, urban designers and planners. Over the years, courses covering topics from other disciplines and sciences are added to and dropped from the curriculum, with the ultimate goal to improve the final product, be it architecture, urban design or territorial planning. Every addition of a new topic and every elimination of an existing topic cause heated discussions in faculties and among students. Yet as the total time for education is limited, and as the body of knowledge of architecture is growing exponentially, this process is necessary and unavoidable. Rather than merely dropping and adding courses, it is worth looking at a higher level of abstraction to find out if some topics could be combined into one, and if there is an underlying structure, grammar and language to these topics. Data, information, and knowledge might be a first step in this direction.

Section 3

INFORMATION Architecture

DEFINITION

INFORMATION Architecture describes metaphors and principles of physical architecture applied to digital data and information to create an architecture of information, using information as raw material.

INFORMATION architecture describes the architecture OF information.

In computer science and related fields, **information architecture** describes the organisation and the labelling of websites, online communities, and intranets. We see in that the potential to do much more. The key to these possibilities is the understanding of the architectural metaphor.

The architectural metaphor is an abstraction that is used in various fields. Think of words such as computer architecture, financial architecture, security architecture, or political architecture. In each case, the word architecture is meant to describe a structure and order, and not the physical construct. These expressions and descriptions use the abstract power of architecture and apply it to other fields.

Richard Saul Wurman is the person who originally used the term information architecture. As an architect and graphic designer he clearly broad architectural concepts into the world of information with the intention to make it better understandable for everybody. He also invented the Technology, Entertainment and Design (**TED**) conferences.

INFORMATION architecture is very powerful in placing emphasis on certain information by using the architectural metaphor. It is, at the same time, also a dangerous instrument as it might lead to overlooking other, less structural prominent pieces of information that might be essential, but go unnoticed.

Section 4

INFORMATION ARCHITECTURE

DEFINITION

INFORMATION ARCHITECTURE describes objects and buildings that are both expressions of information and at the same time use the architectural metaphor or the architectural object itself to bring structure and order into information.

INFORMATION ARCHITECTURE is architecture built for data and information gathering, storage, display, access, and experience.

A good example for this type of information architecture is the **Jantar Mantar** in New Delhi. The structures are not only architecturally attractive, but serve a specific scientific purpose. They are a perfect merger off form and function. Although construction started in 1724, they still form an impressive information architecture park in the centre of the capital.

Certain cathedrals and temples could also be considered INFORMATION ARCHITECTURE. The condition would be that the physical architecture rationally supports and enhances the information to be conveyed. This applies particularly to the use of orientation and windows to guarantee particular lighting effects at given times of the year. Sound enhancing interior space quality, achieved by geometry, surfaces and material, enable the transmission of sound information to the listeners with emotional effects in mind. Text integrated in the wall, on the floor, or on the ceiling, as well as sculptures conveying messages, are additional pointers. As such, the precalculated effect of light, sound, written, painted and sculptural information is a indication for INFORMATION ARCHITECTURE.

In general, buildings that successfully convey messages (intended, not by accident) and were designed for this purpose, can be considered as INFORMATION ARCHITECTURE. Examples are light towers, old bank buildings, hospitals, skyscrapers or Apple stores.

Example Atacama telescopes

INFORMATION ARCHITECTURE is probably the easiest way to explain the relation between information and architecture in a practical sense. There are structures with the only purpose to collect data. Those could be telescopes in Atacama desert, displaying fixed and dynamic parts. The fixed parts are the outer shells of the building, the dynamic parts follow the instructions given by scientists around the world.

Example libraries

Libraries have the purpose to store, protect, display, and give access to data and information, mostly in printed form.They have developed over centuries in all cultures and form, if successful, communal and social centres in urban systems. Their status and media content is changing constantly in society, especially in the digital society, yet the inexplicable connection between architecture and information remains.

Gallery 1.11 INFORMATION ARCHITECTURE

A place to store and access information. Library in the Collegium Maius, Krakow. Photo: Gerhard Schmitt, December 9, 2008.

Example stores

It appears unusual that digital companies need physical stores. Yet it has become a successful business model to build attractive stores selling digital and information technology equipment directly to consumers in prominent locations in the city. The desire of clients to explore the product together with well-trained personnel makes those stories commercially most successful.

Gallery 1.12 INFORMATION ARCHITECTURE

Store that sells digital instruments for accessing digital information. Apple Store in Sydney. Photo: Gerhard Schmitt,October 24, 2012.

Example churches

Churches are good examples for information architecture. The structure is optimised for light and sound impact to support both contemplation and festive celebrations. Strong symmetries and spatial hierarchies in plan and spatial realisation suggest analogies to the organisation of the church. Walls and windows are additional places to display data and information – or leave free space for projections.

Gallery 1.13 INFORMATION ARCHITECTURE

The Catholic Cathedral in Ho Chi Minh City, Vietnam. Photo: Eva Schmitt, December 25, 2012.