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VALUE-SENSITIVE DESIGN & MANAGEMENT OF BUILDINGS AND FACILITIES

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ABSTRACT

Architectural design may be defined as a synthesis of form, function, and technology, in a particular context, taking into account legal and financial preconditions. This book shows the need to also incorporate societal values. In the area of Corporate Real Estate Management (CREM) and Facilities Management (FM), a growing awareness comes to the fore, how buildings, facilities, and services can add value for clients, end-users, other stakeholders, and society as a whole. Adding value through well-thought design and management choices in the development of new buildings or interventions in buildings-in-use regards its contribution to the fulfilment of organisational objectives, end-user needs, interests of other stakeholders, and societal values. This chapter aims to connect both worlds by presenting findings from the CREM/FM field that may be incorporated in architectural design. It discusses twelve types of added value, possible conflicts and synergy between different values, and criteria for prioritisation. It also presents a step-by-step model to support value adding design and management processes. Incorporating societal values and values of clients and end-users is a prerequisite for socially responsible and user-centred design and management. Teaching students this way may help to provide a sustainable built environment that fits with people's needs and interests. The chapter ends with some suggestions on how to teach value-sensitive design and management of buildings and facilities.

**CORPORATE REAL ESTATE, FACILITIES, USER-CENTRED, SOCIETAL VALUES,
PRIORITIES**

1. INTRODUCTION

In common language, the concept of 'value' is usually associated with major beliefs that steer our behaviour and drive our everyday actions. Value is often used as part of the twin 'norms and values', like freedom of speech, civil rights, and equal treatment of people regardless of gender, age, education, sexual orientation, religion, and ethnic origin. According to Hofstede et al. (2010), on a national level cultural differences come to the fore regarding five main value dimensions: small versus large power distance, collectivism versus individualism, femininity versus masculinity, weak versus strong uncertainty avoidance, and long-term versus short-term orientation. For instance, a feminine culture is associated with being more cooperative and caring for the quality of life, whereas a masculine culture is associated with being more competitive and striving for success. Similar differences come to the fore in organisational cultures (Cameron & Quinn, 2006). In workplace design, for instance a high-power distance may result in a higher level of privacy, territoriality, extra square meters and a luxurious interior design for top managers, as an expression of their status and position in the organisation (Plijter et al., 2014). Organisations who adopt the concept of Corporate Social Responsibility will likely pay more attention to societal values such as sustainability and incorporate the triple P of People, Planet, and Profit or Prosperity.

Another common meaning of value is what something is worth. In economics, *financial value* is one of the key values. The economic theory of exchange value goes back to Rubin (1927), who attempted to explain the price of goods and services i.e., the amount of money that somebody is willing to pay for them. The market value of a building, for instance, depends on many tangible and intangible factors, such as its location, characteristics of the surroundings, the quality of the building (functional, architectural, technical), its uniqueness, government actions, the investment costs, and running costs to keep it up to date. However, a one-sided economic view may result in a cynical attitude as defined by the poet Oscar Wilde: someone who knows the price of everything but the value of nothing.

In the healthcare sector, value-based health care (VBHC) is defined as the ratio between the healing effects of medical processes on patients and the total costs to attain these health effects. As such, this concept links the aimed outcome to the required input. The VBH concept originates from the US and gets a growing interest, in particular since Michael Porter, a renowned professor at Harvard Business School, published the book *Redefining Health Care: Creating Value-Based Competition on Results* (Porter & Teisberg, 2006). VBHC connects human values to financial values, in order to keep health care affordable on a national and individual level and to provide health care that is both effective and efficient, and delivers value for money. Efficiency regards the relationship between the output from goods or services and the resources

to produce them – spending well. Effectiveness regards the relationship between the intended and actual results of public spending (outcomes) – spending wisely (National Audit Office, 2020).

1.1. FOCUS AND OUTLINE OF THIS CHAPTER

This chapter also explores both sides of value, i.e., output and outcome parameters and the costs and risks of the input i.e., design and management choices that aim to support distinct values. Whereas value-sensitive design focuses on societal values at large from a public perspective, the current chapter focuses on adding value from the perspective of clients, end-users, and other stakeholders. As such, this chapter invites the reader to consider value creation from a wider perspective. The next section briefly summarises the extension of architectural quality with value-sensitive design. The following sections present which lessons can be learned from the field of corporate real estate and facilities management. Based on an extensive review of the literature, input from experts, and interviews with practitioners, this part of the chapter sheds light on twelve value parameters. These values are interrelated and can be conflicting or support each other. Furthermore, a Value Adding Management process model is presented that follows the well-known four steps of Plan-Do-Check-Act. These steps are quite comparable to analysis-synthesis-simulation-evaluation and decision, which is more common in design processes. The chapter ends with some concluding remarks and suggestions how to teach value-sensitive design and management of buildings and facilities.

2. VALUE-SENSITIVE DESIGN

In his ten books *De Architectura*, Vitruvius, a Roman military architect and engineer who lived more than 2,000 years ago, describes three qualities of architecture: *firmitas*, *venustas*, and *utilitas*, i.e., solidity, beauty, and usefulness. Solidity refers to the construction and technical aspects. Beauty refers to aesthetic concerns and meaning. Usefulness regards whether a building is appropriate to its function and functional needs are met. Functional quality or *utility value* includes inter alia reachability, parking facilities, universal access, efficiency, adaptability, safety, support of spatial orientation, privacy, territoriality and social contact, health and well-being, and sustainability (van der Voordt, 2009). Nowadays, it is also emphasised that architecture is embedded in a social, cultural, economic, and political context, and subject to specified conditions such as time, money and regulations (van der Voordt & van Wegen, 2005).

Papers that discuss many other design quality indicators are, for instance, Markus (2003); Thomson et al. (2003); Prasad (2004); Adamson (2004); Eley (2004); Volker et al. (2008); Haron et al. (2013); Eilouti (2019), and Khajehpour and Rasooli (2020). Most of these publications also discuss tools to assess designs in the design phase and the quality of buildings-in-use. More recently, Khajehpour and Rasooli (2020) explored different theories of dimensions and components of quality in public open spaces. The data-collection included an extensive literature review, a Delphi approach in which 20 experts were interviewed in three rounds, and a survey among lay people that visited four courtyards, with a simple question: 'which courtyard do you prefer mostly, and why?' The paper classifies the main dimensions of design quality into functional, visual and morphological, experiential and perceptual, social, and ecological, each with a number of components.

Although quality and value are not the same, both concepts are closely related. Actually, quality is one of the shared values that most people strive for in their lives and represents the nominator in the ratio between outcome and input. The British English dictionary defines quality as 1) a distinguishing characteristic, property, or attribute, which can be described objectively, and 2) a degree of excellence, a more subjective judgement, like in the expression 'Beauty is in the eye of the beholder'. Although most publications on design quality don't mention the term value at all, the discussed qualities may also be perceived as values i.e., characteristics that are highly valued by designers and users.

Incorporation of societal values is explicitly mentioned in the literature on value-sensitive design. The main focus is on addressing *human values* throughout the design process (Friedman et al., 2002; 2017). Value is defined here as what is important to people in their lives, ethics, and morality. Value-sensitive design asks designers to be transparent about explicitly supported project values and their own individual values i.e., designer values (Friedman et al., 2017). Van de Poel and Royakkers (2011: 72) state that values should be distinguished from preferences or interests of people, and define values as 'lasting convictions or matters that people feel should be strived for, in general and not just for themselves, to be able to lead a good life or realize a good society.'

Van den Hoven et al. (2015) discuss how value-sensitive design is or could be applied in different domains, ranging from architecture to agricultural biotechnology, healthcare technology, economics, engineering, and more. In *The Politics of Things*, van den Hoven (2009) considers the use of technology to express moral values, for example, a car that will not start if the driver is drunk. Another example are mobile phones that turn out to affect traffic safety (van de Poel, 2021), which resulted in a feature to stop the mobile phone automatically when the owner starts driving. Here, safety and protecting people against unsafe and illegal behaviour are underlying values in technological design. A study by Burmeister et al. (2011) identified four key moral values: equality, freedom, respect, and trust. This study is based on a 30-month ethnographic

investigation of Australia's largest online community of seniors, 11 months of observing social interactions within this community, and in-depth, semi-structured interviews with 30 participants. The findings are in line with earlier studies that also identified equality and respect (as human dignity). In the *Handbook of Ethics, Values, and Technological Design* (van den Hoven et al., 2015), a vast number of value dimensions are discussed as well, including well-being, inclusiveness, presence, privacy, regulation, responsibility, safety, sustainability, trust, accountability and transparency, and democracy and justice. Most chapters in this book are strongly connected to these kinds of values.

3. VALUE-BASED MANAGEMENT OF BUILDINGS AND FACILITIES

In the late 1980s, the Dutch Minister of Education installed a so-called 'Verkenningscommissie' [scouting committee] to assess the programs of the Delft and Eindhoven Universities of Technology. One of its conclusions was the need for a broader study profile at the Faculty of Architecture. More attention should be paid to project and process management during the whole building cycle, from the first initiative till management of buildings-in-use. As a consequence, in Delft a new department was founded, initially called Real Estate and Project Management, currently called Department of Management in the Built Environment (MBE). MBE covers Real Estate Management (REM), Urban Development Management (UDM), Design and Construction Management (DCM), and Housing (H) (Prins & Hobma, 2016). One of its key values is that clients and end-users should be in the core of design and management of the built environment. For this reason, the REM section focuses on Corporate Real Estate Management (CREM) i.e., real estate for one's own use, in contrast to real estate that is being developed by developers and investors to get a return on investment in the real estate market. The concept of *added value* is included in the definition of CREM as 'the alignment of the real estate portfolio of a corporation or public authority to the needs of the core business, in order to obtain maximum added value for the business and to contribute optimally to the overall performance of the organisation' (Dewulf et al., 2000: 32). 'Added' refers to the difference between consolidation (no intervention at all), and alternative choices. Currently, in addition to business needs, other needs are incorporated as well. This clearly comes to the fore in the definition of added value as the trade-off between the benefits of a particular choice or intervention i.e., its contribution to the needs and objectives of clients, end-users and other stakeholders, and society as a whole, and the costs, risks and sacrifices to achieve these benefits (Jensen & van der Voordt, 2017).

A related discipline, Facilities Management (FM), originally focussed on management of facilities and services in the phase of buildings-in-use. According to the *Comité Européen de Normalisation* (CEN), FM may be defined as the integration of processes within an organisation to maintain and develop the agreed services, which support and improve the effectiveness of its primary activities (CEN, 2006). This definition emphasises the importance of supportive processes in order to facilitate the main activities of an organisation. In the new standard of the International Organization for Standardization (ISO), FM is also linked to the quality of life (ISO, 2017a). A key topic in FM is usability, which incorporates effectiveness (providing the right output), efficiency (using the right input), and satisfaction or experience of clients, customers, and end-users (Alexander, 2005; ISO, 2017b).

The developments in CREM and FM have in common that an optimal alignment with the values and needs of clients, end-users and other stakeholders, and society is key to

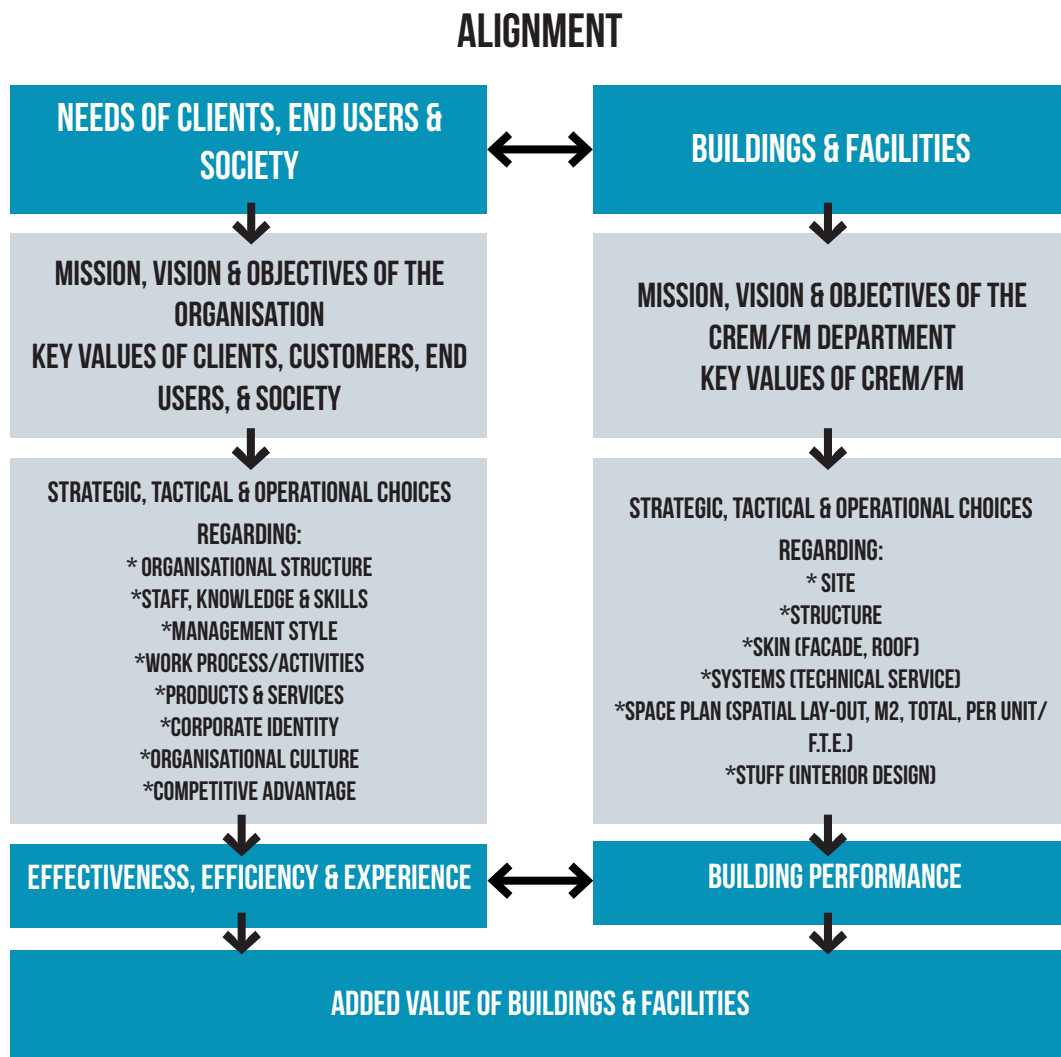


Figure 1: Alignment of buildings and facilities to the needs of clients, end-users, and society (adapted from Jensen and van der Voordt, 2017: 31).

be able to add value by appropriate management of buildings and facilities, see Figure 1.

The left side of Figure 1 regards the 'demand' side and shows a number of organisational choices that have to be made to realise the mission, vision, and objectives of the organisation, and to support the key values of clients, end-users, and society. The right side of Figure 1 regards the 'supply' side and shows a number of choices regarding the design and management of buildings and facilities, based on the taxonomy of Stewart Brand (1995). Building and facilities' characteristics that contribute to building performance and fit with key values of the demand side actually add value.

EXAMPLE: KEY VALUES OF A HOSPITAL AND ITS HOUSING AMBITIONS

The mission statement of a Dutch hospital includes ten leading topics:

1. Our hospital wants to be in the top ten of best European academic hospitals
2. Our patients are key. This requires excellent services, optimal care, and communication, and a professional treatment
3. All our scientific research should be at top level
4. We are leading in regional education of doctors, nurses, and other care staff, and provide state-of-the-art education
5. We play an innovative role in our core activities
6. We work evidence-based
7. We are leading in identifying, stimulating, and guiding young talented people who want to work in the care sector or on medical research
8. As a leading institution we play a prominent role in the region of Amsterdam. Vice versa, our activities are influenced by the local context
9. We act both nationally and internationally
10. Our staff has the right knowledge, skills, and talents to conduct our core activities and supportive activities

HOUSING AMBITIONS

The accommodation policy of this hospital is derived from its organisational strategy and presents nine leading housing ambitions:

1. Optimal facilitating of our primary processes, and contributing to employee satisfaction and labour productivity
2. Healing environment. Patients should feel themselves comfortable in our building. This supports their well-being and healing process
3. Safety: Being accredited by the Joint Commission International (JCI)
4. Innovation power: The building should stimulate the creativity of our staff
5. Culture of collaboration
6. Flexibility and future value, by a high level of adaptability to new developments
7. Positive image, by attractive architecture and one-person bedrooms
8. Sustainability
9. Cost effectiveness: Cost reduction but not at the expense of our objectives

3.1. VALUE DIMENSIONS

An important distinction between values is the dichotomy of transaction value versus use value. The first one focuses on financial value and prices on the market, whereas the latter focuses on fit for purpose or fit-for-use. A more detailed distinction can be found in the book chapters by authors from different countries, disciplines, and sectors (offices, universities, health care, and industry) in Jensen et al. (2012). The editors detected fifty different descriptions of value parameters, which have been clustered in six types:

1. Use value: Quality in relation to the needs and preferences of the end-users
2. Customer value: Trade-off between benefits and costs for the customers or consumers
3. Economic, financial, or exchange value: The economic trade-off between costs and benefits
4. Social value: Connecting people by supporting social interaction, identity, and civic pride
5. Environmental value: Environmental impact of FM, Green FM
6. Relationship value: For example, getting high-quality services or experiencing a special treatment

The huge variety in value definitions and value parameters shows that this topic is still under development and needs more clarity and standardisation of its terminology. In a follow-up book on *Corporate Real Estate and Facilities Management as Value Drivers*, Jensen and van der Voordt (2017) compared many value parameters from different publications on corporate real estate and facilities management. Building on the work of, inter alia, Nourse and Roulac (1993), Lindholm and Nenonen (2006), and various PhD research projects at the department of MBE, a taxonomy of added value of corporate real estate (CRE) has been developed. Overall, 12 value parameters were seen to be leading: four people-related values (satisfaction, image, culture, health and safety), four process and product-related values (productivity, adaptability, innovation and creativity, risk), two economic values (cost, and value of assets), and two societal values (sustainability, and corporate social responsibility).

The next section briefly summarises which design and management choices may support these twelve value parameters, and how to measure them. The names of the authors of the related book chapters are included to do justice to their input.

4. A CLOSER LOOK AT TWELVE VALUE PARAMETERS

4.1. EMPLOYEE SATISFACTION (VAN DER VOORDT, DE BEEN, AND APPEL-MEULENBROEK)

Employee satisfaction can be an objective in itself, or a means to attain other goals, such as to attract and retain talented staff, or to stimulate engagement, motivation, and high work performance. Employee satisfaction can be supported by a functional spatial layout, spaces that support social interaction and privacy, ambiance, comfort, ergonomics, high quality IT equipment, and personal control of the indoor climate. Numerous satisfaction surveys among office workers show that accessibility of buildings and opportunities to communicate rank high in employee satisfaction. The architectural appearance, interior design, atmosphere, and available facilities are usually also highly appreciated in flexible offices with activity-based workplaces, more than in traditional cellular offices. However, indoor climate, privacy, opportunities to concentrate, storage facilities, and acoustics are much less appreciated (Brunia et al., 2016). Employee satisfaction with buildings, facilities, and services can be measured by asking the employees how satisfied they are with various topics, what they find most important, and which option they prefer out of various alternatives, and why.

4.2. IMAGE (VAN DER VOORDT)

The accommodation of an organisation can also be used as a means to support a particular image and to communicate brand values and corporate identity. The accommodation of a bank or law firm has a different look and feel than a building that accommodates a start-up or a high-tech firm. Transparency may be expressed by the use of glass, open voids or atriums, and open spaces. Caring for people may be expressed by user participation in the design and management process, and a user-friendly building. Hospitality might be translated into a nice and welcoming entrance area, a reception desk with friendly staff, easy wayfinding, and an attractive interior design. The Rotterdam Eye Hospital pays much attention to an attractive interior design to give patients a feeling of being welcome and comfortable and to reduce patients' stress. A company's commitment to sustainability can be expressed by proximity to public transport, a high score on BREEAM or LEED, and the choice of sustainable equipment. The contribution of architecture to a corporate identity can be measured by asking people: What image the building evokes? Which values do they associate with the accommodated organisation? And which characteristics of the building contribute most to particular brand values? Or to assess how the organisation and its building(s) appear in the media and on social media.



Figure 2: Eye Hospital, Rotterdam, the Netherlands. Photos by the author.

The spatial lay-out (above left), paintings (above right), and the patio (below left) show that this is not just a building, but an eye hospital. The waiting room (below right) shows two quotes by Antoine de Saint-Exupéry: 'one can only see with the heart', and 'what is essential is invisible for the eyes', in order to distract visitors from worrying about their eye problems. All these clues are meant to make patients feel comfortable and less stressed.

4.3. CULTURE (VAN DER VOORDT AND VAN MEEL)

Buildings act as cultural artefacts and symbols that reflect the culture of their inhabitants and express particular norms and values. Some companies put the CEO in an open plan work-area to demonstrate that the company wants to create a culture of openness and equality. Managers seated in spacious corner offices on the building's top floor express a hierarchical culture. In leading technology companies like Google and Facebook, the casual and informal culture is reflected in the interior design and facilities such as slides and game rooms. In individual cultures, kitchenettes and lounge rooms may be underused, whereas group cultures are more likely to make use of social places as gathering points to exchange knowledge, ideas, and ordinary gossip. Organisations that are open to change and experimentation may be

more successful in adopting innovative workplace concepts than organisations with a culture that is focused on stability and structure. So, it is important to understand if and how design decisions can support a current organisational culture or culture change. However, it should be noticed that a change in physical environment will never suffice to change a company's culture and may even be counterproductive if it is not part of a wider change process. When moving people from cellular offices into open plan offices, this intervention alone will not suddenly create a collaborative culture. Organisational culture can be measured by the Organisational Culture Assessment Instrument (Cameron & Quinn, 2006). Interviews with clients and a survey among end-users and visitors can shed light on how people rate an organisation on diverse cultural dimensions, and which design choices fit best with the current or desired culture.

4.4. HEALTH AND SAFETY (JENSEN AND VAN DER VOORDT)

The World Health Organization defines health as a state of complete physical, mental, and social well-being. This represents a wider scope than just the absence of disease. Design can contribute to health and well-being by creating a healthy environment, and to prevent or reduce work fatigue, occupational stress, headache, migraine, irritation of eyes, nose or throat, or worse diseases, such as a burnout. Important factors include a spatial layout that both supports social interaction and concentration, biophilic design (contact with nature, natural materials), appropriate lighting and acoustics, thermal comfort, ergonomic furniture, a healthy Indoor Air Quality (IAQ) without chemical and biological agents, and avoiding hazardous materials and radiation. 'Active design' may stimulate active behaviour, for instance by providing an inviting staircase to seduce people to take the stairs instead of the elevator, and sit-stand desks. Safety regards physical safety, such as prevention or reduction of accidents that may damage people, and social safety, by protecting people against theft, burglary, and violent behaviour. Health and safety are strongly regulated by authorities e.g., in Health & Safety Acts, and by national and international standards. Ways to measure health and safety are, for instance, collecting data about absenteeism and sick leave, the number of accidents (per week, month, or annually), self-measurement of health and health supportive behaviour by technical devices, and self-reported complaints in end-user surveys. Nowadays, the WELL Building standard is a widely used tool as well.



Figure 3: Menzis Building, Enschede, the Netherlands. Menzis is a Dutch health insurance company, that puts much effort in providing a healthy work environment, by a healthy indoor climate, physical activity, a sound balance between collaboration and concentration, sufficient rest and relaxation, autonomy in ways of working, and healthy food. Design choices regard, inter alia, a clear zoning system, a variety of (small clusters of) activity-based workplaces, advanced acoustics, relaxation spaces, sit-stand desks, welcoming staircases, living rooms, attractive sanitary provisions, natural forms and materials, a nice outdoor terrace, reduction of travel time, and a focus on people. Photos by Wouter van der Sar. Printed with permission.

4.5. PRODUCTIVITY (DE BEEN, VAN DER VOORDT, AND HAYNES)

Productivity is usually defined as the ratio between output and input, or results and sacrifices, quantitatively and qualitatively. To ensure that a knowledge worker is optimally productive and happy, it is important that he or she can attain personal and organisational objectives, and the environment fits with personal needs. An appropriate physical environment should optimally facilitate both collaboration and concentration, and different moods, from being calm and relaxed to being stressed or excited. Supportive characteristics of the built environment include a spatial layout that supports communication, concentration and privacy, proximity and short walking distances between features that are used frequently, an appropriate indoor climate, a healthy indoor air quality, daylight and outside view, personal control of environmental factors such as temperature, light, and noise levels, and an attractive interior design with ergonomic furniture, nice colours and materials, plants and other greenery. Although measuring the productivity of knowledge workers is not easy, self-rated productivity support by the physical environment and surveys with questions such as to what extent people are able to collaborate and concentrate properly, or the frequency of being distracted, have shown to be highly valuable.

4.6. ADAPTABILITY (GERAEDTS, OLSSON, AND HANSEN)

To enable a high-quality use and a high occupancy rate during its whole life cycle, a building should be able to move along with qualitative and quantitative changes in demands e.g., due to new ways of working, changing needs of the end-users, or new regulations by the government. The adaptive capacity of a building refers to all characteristics that enable it to keep its functionality during the technical life cycle in a sustainable and economically profitable way. A high-level of adaptability also benefits adaptive reuse. Adaptability regards the ability to rearrange, extend or reject (parts of) a location, a building, or a unit, with minimum effort, cost, and disturbance. Design choices that contribute to adaptability include a spatial layout that can accommodate distinct functions, a clear subdivision of a building in different layers (e.g., the support level with a long lifespan and the infill level with a shorter life span), modularity, and construction components that allow reuse and recycling with a minimum of effort and loss of quality. Flex 2.0, an assessment tool with 83 indicators of adaptability of buildings, and lighter versions like Flex 4.0, with 40 performance indicators (Geraedts, 2016), are helpful instruments to identify the demand for adaptability in the briefing and design phase, and to assess the adaptability of buildings in the use phase. These tools also include transformation dynamics indicators from both the perspective of the owner and of the users of a building.

4.7. INNOVATION AND CREATIVITY (APPEL-MEULENBROEK AND NARDELLI)

Innovation and creativity are important prerequisites for the survival and growth of organisations. Worldwide, these value parameters are ranked highly in real estate strategies. For instance, by adopting new workplace concepts that increase knowledge sharing among employees. One of the influencing factors is proximity. Most interactions occur between colleagues sitting within 20-30 metres, with most interactions taking place between colleagues seated within eight metres. Visibility and placement in the room have an impact as well. Central spaces show more unplanned interactions with passers-by. Facilities on campus, such as cafeterias and fitness centres, contribute to inter-organisational interaction. Building design may support creativity by providing inviting settings for meetings and a nurturing environment, communal and private spaces, beauty, window view and sunlight penetration, plants, colours, positive sounds (e.g., music), fresh air, and personal control regarding lighting and noise. People also like opportunities to exhibit the products of innovation and creativity. Ways to measure the impact of design on innovation and creativity are for instance to ask people about their perceived level of support by the built environment and analyse these data in connection to enclosure/openness of the spatial layout of the building, walking distances between employees, level of personal control of indoor climate, the diversity of available workspaces and meeting areas, and perceived quality of visual cues.

4.8. RISK REDUCTION / RISK CONTROL (JENSEN AND REDLEIN)

Risk management regards a proactive approach to cope with future uncertainty and risks that may endanger people, property, financial resources, data and other information. It aims to prevent or limit the consequences of risks, and to implement suitable measures, such as security installations, guarding, and disaster or emergency plans in case of fire or threats by destructive behaviour or terrorist attacks. An interviewee in a biotech company mentioned preventing downtime as extremely important, and compliance to legal requirements to be top priority. In hospitals, reducing the risk of spreading infections is very important and one of the reasons to provide one-person bedrooms. Design choices to decrease the risk of hazards are, for instance, avoidance of harmful products, materials, and substances. Health and well-being, reliability, (data) security, business continuation, and reducing financial risks can be underlying values in risk management. A one-sided view on risk prevention may result in avoiding any risk, despite the favourable probability of success. Ways to assess the costs of risks and risk prevention in buildings-in-use are the total risk expenses, insurance expenses, damage prevention expenses, and actual damage expenses as percentage of company turnover.

4.9. COST REDUCTION / COST EFFECTIVENESS (REDLEIN AND JENSEN)

Cost reduction or cost-effectiveness is often mentioned as one of the three most important value parameters in real estate and facilities management (van der Voordt & Jensen, 2021) and plays an important role in the briefing and design phase of buildings and facilities. Companies with an own FM department tend to have more areas of cost savings than companies without an own FM department. Outsourcing of particular services can also be cost-effective. These findings are mainly relevant for cost-effective management of buildings-in-use. From a client's point of view, the impact of design decisions on investment and running costs are very important as well. Gerritse (2004) analysed the impact of building height and percentage of inside space on building costs. The books by Mann and Mann (1992) and Jaggar and Morton (1995) are quite old but still valuable. Ways to measure the costs of buildings-in-use include the total cost of occupancy per m², workstation or full time equivalent (fte), space cost per fte, etc., and workplace cost per fte, etc. In the design phase, benchmarking data from earlier projects can support cost-effective design decisions.

4.10. VALUE OF ASSETS (REMØY, HORDIJK, AND APPEL-MEULENBROEK)

The financial value of a building may go down in time, *inter alia*, due to aging, a changing market demand, trends in society, changes in urban surroundings, or a misfit with new regulations. On the contrary, if it is high-quality, fit for multiple purposes, easy to be adapted, renovated, restructured, or adapted for alternative use, sustainability, and uniqueness, it may keep its value high, and higher than comparable buildings. For this reason, investors and clients may ask designers to incorporate the current and future financial value of the building in their design choices. Common ways to measure the value of assets are a sales comparison approach (analysing the market price of similar buildings), a cost approach (analysing the cost of alternatives of renovation or building new), and an income capitalisation approach (return on investment in the long run). The latter is the most common approach for investment purposes. It is based on an estimate of the annual potential gross income and annual operating expenses, taking vacancy and rent collection losses into consideration. Benchmarking data of the value of different buildings and its design characteristics can be used to incorporate the current and future value of a building in various design decisions.

4.11. SUSTAINABILITY (BALSLEV NIELSEN, JUNGHANS, AND JONES)

Sustainable design and circular building contribute to a reduction of the negative impact of buildings on the environment. For instance, by choosing a location close to public transport, an optimal fit with the criteria of certification systems such as the Building Research Establishment's Environmental Assessment Method (BREEAM) or Leadership in Energy and Environmental Design (LEED), and sustainable equipment. Sustainability is a crucial value dimension in the whole life-cycle of a building, and is influenced by what kind of materials (resources) are used, how the building is produced, components are transported, spaces are used, and how a building is finally disposed of. So, sustainability includes more than energy reduction. In line with the triple People-Planet-Profit or Prosperity, sustainability is also connected to the impact of a building on social well-being and economic benefits to the business, *inter alia* through reduced maintenance and refurbishment costs. Key Performance Indicators are BREEAM and LEED scores, total CO² emissions in tonnes per annum, total energy consumption in kWh per annum, water usage in m³ per annum, total waste production in tonnes per annum, and land use and ecological value of the site.

4.12. CORPORATE SOCIAL RESPONSIBILITY (CSR) (GROEN, VONK, MELISSEN, AND TERMAAT)

Over recent decades, organisations have become more aware of the social, ecological, and economic consequences of their activities, and seek for ways to incorporate their responsibilities in their governance and be transparent about it. An economic driver is the scarcity of resources, leading to lean processes and cradle-to-cradle principles. Morality has become an important factor as well, both from within organisations and from society. Due to social media, public opinion has gained influence by revealing corporate activities and denouncing misconduct. The internationally recognised ISO 26000 Guidance on Social Responsibility (2010) acknowledges seven principles of social responsibility, namely: accountability, transparency, ethical behaviour, respect for stakeholder interests, respect for the rule of law, respect for international norms of behaviour, and respect for human rights. Other guidance focuses on, inter alia, sustainable development, health, safety and welfare of individuals and society, labour practices, consumer issues, and community involvement and development. These topics may also be used to assess whether designers behave in a social, responsible way and design decisions fit with social, ecological, and economic values.

5. CONFLICTS, SYNERGY, AND PRIORITISING

Values may conflict or strengthen each other. For instance, focussing on cost reduction by reducing space per person may result in decreased employee satisfaction and productivity. An example of synergy between values are healthy workplaces which contribute to health and well-being and also have a positive impact on employee satisfaction, labour productivity, and cost reduction due to less health complaints and sick leave (van der Voordt & Jensen, 2021). The Eye Hospital in Rotterdam is a clear example of synergy between a positive image and the well-being of its patients. Sustainable design will result in reduced demand for resources and reduced waste production and, as such, in lower annual costs, and enhanced competitive advantage because sustainability initiatives are important to attract future staff and customers. Working from a CSR perspective, and taking into account the interests of all stakeholders in a balanced way, may lead to more satisfaction and engagement among employees. In this context, a distinction can be made between intrinsic values, which are valuable for their own sake or are an end in themselves, and instrumental values i.e., values that are instrumental to achieving another good or value (Spiekermann, 2015).

What is highly valued by one person may be ranked lower or less important by another person. Therefore, it is important to identify all stakeholders (Macmillan, 2006) who will benefit from particular design and management choices, and those who are

responsible for the costs and sacrifices. For instance, real estate investors, developers, and shareholders usually focus on return on investment, although completely neglecting other values may result in pricing themselves out of the market. Clients focus on organisational objectives and highly prioritise cost-effectiveness and cost reduction, support of productivity, and satisfaction of employees and customers. End-users focus on usability and prefer an attractive, comfortable, healthy, and stimulating environment. Society may focus on the impact of buildings on the quality of public space, health and well-being, and sustainability. Within an organisation, den Heijer (2012) presents four perspectives: the strategic perspective of policymakers, such as CEOs; the financial perspective of the controllers; the functional perspective of the end-users; and the spatial-technical perspective of property managers and technical specialists. This approach can be zoomed-in to smaller scales, such as business units and departments, and zoomed-out to larger scales, such as umbrella organisations and the society as a whole, local, national, or global.

6. ADDING VALUE AS A PROCESS

In order to integrate Value Adding Management of buildings and facilities in business management and to make it applicable as a decision support tool, Hoendervanger et al. (2017) developed a Value Adding Management process model in four steps (see Figure 2). This model builds on the well-known Deming cycle of Plan-Do-Check-Act (PDCA). The cyclic character emphasises that Value Adding Management is a continuous process. Valuation of output/outcome/added value may be a starting point for alternative choices or new interventions in existing buildings. These four steps may also be useful in value-sensitive design, in connection to common steps in the design process, such as analysis, synthesis, simulation, evaluation, and decision.

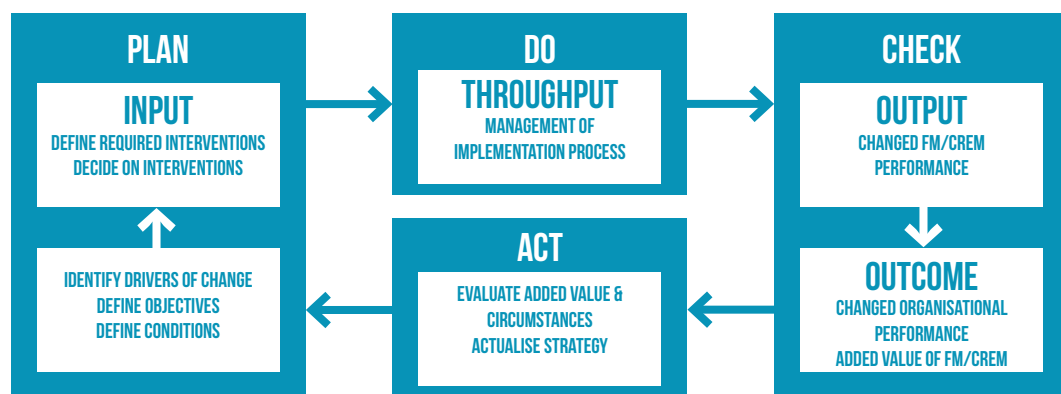


Figure 2: Value Adding Management process model in four steps (Hoendervanger et al., 2017).

The main actions in the Plan phase are to identify the values that should be incorporated in the design phase, and how. This requires an assessment of the main values of all stakeholders, operationalisation of these values in design options (Kroes & van de Poel, 2015), and prioritisation of values, based on level of importance, urgency, practicality, and affordability. The Plan phase ends with well-thought-out decisions about what values will be incorporated, why, and for whom. The Do phase encompasses the implementation of the proposed values in the design process and the design itself, i.e., in a preliminary design, assessment of potential further improvements regarding its support to employee satisfaction, labour productivity, cost-effectiveness, and so on, and implementing these improvements in the final design and construction phase. The Check phase includes an assessment of the costs and benefits of design decisions and its impact on the performance of the client organisation, end-users, and society as a whole, both during the design process and ex-post, in the building-in-use phase. The Act phase is quite similar to the Plan phase but starts from a different situation. Whereas the Plan phase starts with the identification of prioritised values, these values are already known in the Act phase. When all objectives have been attained and maximum value has been added, the Act phase may include acceptance of the design. If the objectives are not sufficiently attained or not optimally, or if too many negative side effects come to the fore, new design options should be considered. Another option is to reconsider the aimed values. It may happen that to attain all values of all stakeholders in an optimal way is not realistic and not feasible in practice, due to limited conditions. If so, then Plan and Do phases start again.

In order to be able to identify whether the aimed values are attained in a particular design or design options and buildings-in-use, values have to be made measurable, as input for a Design Assessment and a Post-Occupancy Evaluation (POE) of buildings-in-use. The former section on twelve value parameters presented a number of ways to measure. In addition, design tools such as Space Syntax may be helpful to assess a design on its usability (see e.g., van der Zwart & van der Voordt, 2015). The Design Quality Indicator may be useful as well (Gan et al., 2003). Friedman et al. (2017) presented 14 value-sensitive design methods that can be used to support the four steps as well: 1) direct and indirect stakeholder analysis; 2) value source analysis; 3) co-evolution of technology and social structure; 4) value scenario; 5) value sketch; 6) value-oriented semi-structured interviews; 7) scalable information dimensions; 8) value-oriented coding manual; 9) value-oriented mock-up, prototype, or field deployment; 10) ethnographically informed inquiry regarding values and technology; 11) model of informed consent online; 12) value dams and flows; 13) value-sensitive action-reflection model; and 14) Envisioning Cards™.

7. TEACHING VALUE-SENSITIVE DESIGN AND MANAGEMENT

This chapter has been written from the perspective of corporate real estate and facilities management. Value-sensitive design and management should go hand in hand and incorporate the values of different stakeholders. Where value-sensitive design focuses on ethical and moral values, value-adding management focuses on twelve value parameters from the perspective of clients, end-users, and other stakeholders, with societal values as common values. Sustainability and social corporate responsibility are most strongly connected to ethics and morality. Other communalities between value-sensitive design and management are the plea for transparency, and the need of measuring whether values are attained. Management of buildings and facilities in all phases of the building cycle is increasingly research-based and data-driven. The search for empirical evidence is also key in Evidence Based Design, a renowned concept, in particular in the area of healthcare facilities (Ulrich et al., 2008; Mahmood, 2021). As such, both disciplines may benefit from a multidisciplinary approach.

The concept of value is presented as a multidimensional concept, that incorporates many value parameters. Value is defined as the trade-off between the benefits and burdens of design and management decisions, i.e., between its support of organisational, individual, and societal objectives, and the costs and sacrifices that are needed to attain the aimed benefits. Different values may conflict or strengthen each other. Different stakeholders may have different values and different priorities. The influence of different stakeholders and differently ranked values make value-sensitive design and management rather complex processes. It is not easy to balance different needs, and to cope with the different levels of influence and power of all involved parties. Besides, values are not static but may change, for instance, because of unexpected side-effects, or because new values come to the fore. Therefore, design processes should include a thorough assessment of the main values of all stakeholders, prioritisation of values, and a clear operationalisation of these values in design choices. Transparent discussions in meetings and workshops may be helpful as well.

In an educational context, it is important to make students aware of the concept of value-sensitive design and management of buildings and building related facilities. Awareness of different values and different priorities of clients, end-users, other stakeholders, and society is a prerequisite for socially responsible and user-centred design and management.

In the department of MBE, a particular MSc course is dedicated to corporate real estate management and how to add value by well-thought design and management choices. In addition to lectures and group sessions, students have to write an accommodation plan for a client from practice, based on an analysis of the currently

available real estate, the (mis)match between supply and demand, a stakeholder analysis, and scenario analysis of possible impacts of trends and future developments. Besides, they also have to write an advice on how to transform the current real estate into real estate that better fits with the current and future demands, plus a planning and indication of the costs.

Ways to teach architectural design students how to incorporate value-sensitive design in their design assignments may be:

- Lecturing on value-sensitive design and management of buildings and facilities, i.e., presenting an overview of (added) value theory and buildings in which certain values have been taken into account or are ignored, and the impact on clients, end-users, other stakeholders, and society
- Conducting case studies, individually or in small groups, analysis of precedents and buildings-in-use, both best practices and worst cases, to explore to what extent these cases support different values, and organising sessions to discuss the findings
- Including the explicit incorporation of one or more values in design assignments and asking students to discuss how they cope with these values, what are the benefits and burdens of particular design choices, and for whom, and what generic lessons can be learned from this assignment
- Additional options could be to allocate different values to different (groups of) students, or to ask groups of students to take the perspective of a particular stakeholder as leading in the design considerations
- Group discussions or bilateral discussions between students to reflect on designs from fellow students on their fit with various values, and to compare the design results for similarities and/or dissimilarities

These teaching tools may also help students to explore conflicting and strengthening values. This book and related literature, such as Vermaas et al. (2015) and Friedman et al. (2017) can be very helpful as input to lecturing in design for values, design assignments, assessments of preliminary and final designs, evaluation of buildings-in-use and accommodation strategies, and discussing results.

Another way to involve students in value-sensitive design and management is to incorporate this topic in their graduation project and related graduation research. An interesting topic is the impact of cultural differences. This chapter may be biased by a Western point of view. It is mainly based on European studies and interviews with practitioners from EU countries. Other cultural landscapes may have different

shared values e.g., regarding respect for authority, loyalty to the group, religiousness, male authority, etc. Other research topics are, for instance, a further elaboration of interrelationships between different values, ways to predict whether particular design and management choices will support certain values, and to what extent, and ways to measure the ratio between benefits and costs. The latter is important input for a so-called value-based business case, that goes beyond a one-sided financial focus on return on investment.



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