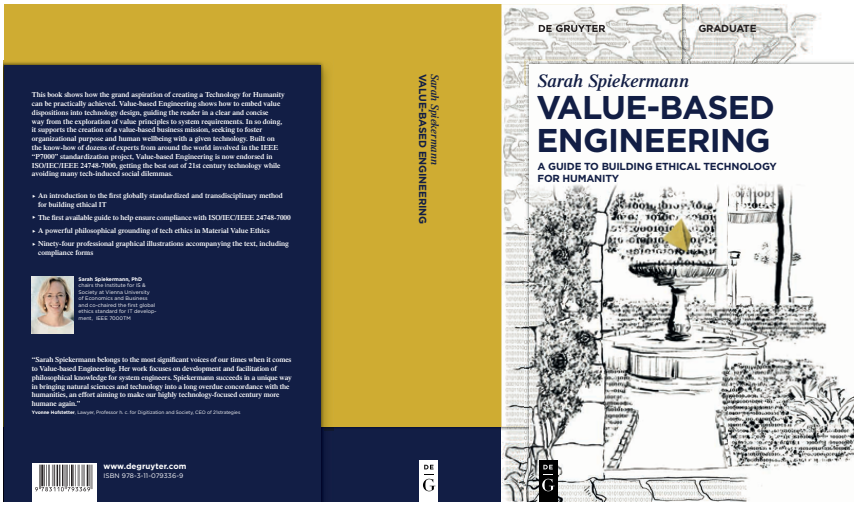

This text is chapter 3 of the book: Spiekermannn, S. "Value-based Engineering - A Guide to building ethical Technology for Humanity", Berlin, De Gruyter, forthcoming in 2023

What Values are

The term value is derived from the Latin word "valere," which means "to be strong" or "to be worthy." Values seem to be at the core of cultures and of the innovations brought forth by them. They allow people and organizations to frame the meaning and ends of their actions. But despite their central role in human behavior, what values *are* precisely is not common knowledge.

In our modern economic world, the value of something is often equated with money. But this equating of value with money overlooks the fact that money is only a tool facilitating the exchange of goods that are the actual bearers of value. So, what are values? And how can they be instantiated in a computer system?

Towards a definition of values

Defining values is not an easy endeavor in our modern times because values are not tangible things and therefore cannot be physically measured, inspected or touched. Instead, they force our scientific mindset to venture into an invisible phenomenon of symbolic meaning.

The biggest stumbling block in understanding and working with values is the idea that they are individual preferences primarily originating within peoples' thoughts (Figure 3.1). Modern definitions of value(s), such as the one in the Oxford English Dictionary, encourage

this view. The Dictionary defines values as "principles or standards of a person or society, the personal or societal judgements of what is valuable and important in life" (taken from p. 23 of Friedmann, 2019). Other contemporary philosophical definitions of value(s) define values along the same line, 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." (p. 1 in (van de Poel, 2018)).

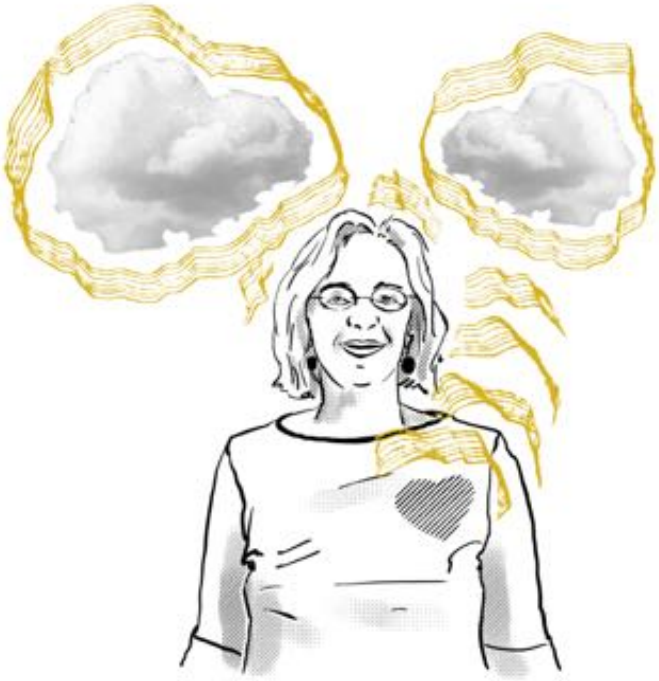

Fig. 3.1 Values as personal convictions?

Such subjectivist definitions of values as personal judgments, convictions or perhaps just personal opinions might not hold true upon deeper scrutiny, though. Take the value of privacy as an example. Many people might be convinced that privacy has ceased to be important in a time where ubiquitous computing and social networks see more data exchange than ever before in human history. Some societies, like China today, might even establish a norm of citizen surveillance, thereby seeming to refute the value of privacy. But such personal preferences or societal norms do not make the value of privacy disappear. The fact that the value of privacy continues to be discussed — no matter anyone's convictions or social norms — is an indicator that values as such are somehow independent phenomena that exist a priori of any individual's or group's judgment. As Max Scheler famously put it in his magnum opus on Material Value Ethics (p. 77), the world and its value principles do not depend as much on human thought and opinions as we often like to believe: "… the ego is neither the point of departure for the apprehension nor the producer of essences," he wrote (Scheler, 1921 (1973)) (Figure 3.2). He saw values as "the ultimate stuff of our moral consciousness; they are the material to which moral consciousness *is directed*; they are the intentional *objects of acts* of feeling, or conscience, or moral consciousness." (p. 7, (Kelly, 2011))

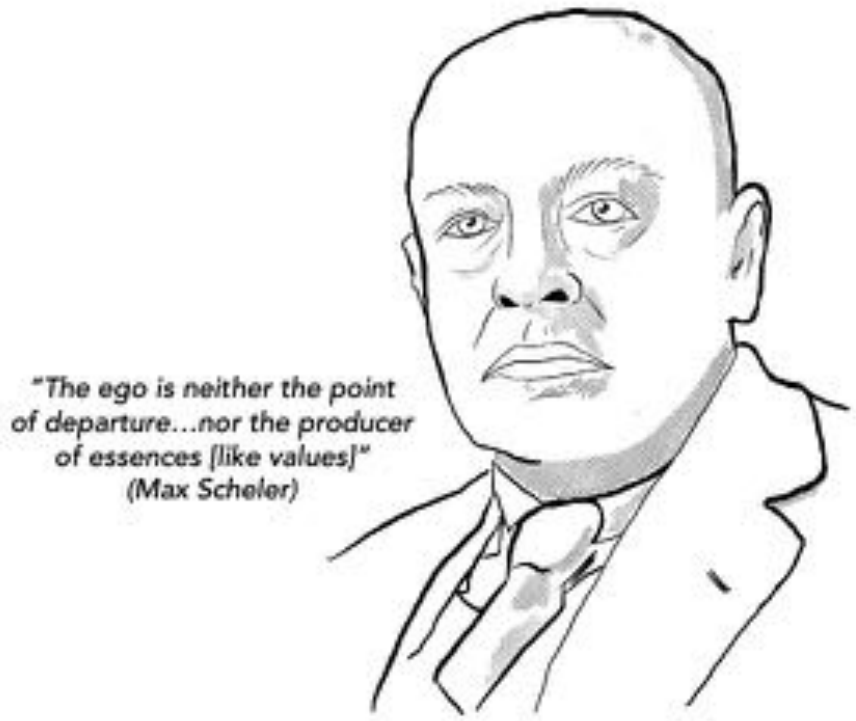

Fig. 3.2 Max Scheler (1874 – 1928)

Embracing Scheler's objectivist understanding of values, Nicolai Hartmann described how we might think of values in similar ways as we think of geometric principles existing in our cosmos. We know objectively what an ideal triangle is in principle and can describe it with the Pythagorean theorem. And when we see a thing with a triangular shape in reality, we recognize the objectively given principle of the triangle in it. This is not a matter of personal conviction or judgment. The same goes for values. We see that the Gestalt of something is good or right. For example: courage. When we observe someone being courageous, we immediately recognize the principle of courage in the action, even though courageous actions can be very diverse. Hartmann defined values as "principles of the ought-to-be" (Figure 3.3), which we intuitively perceive and to which we have given words in our languages.

Fig. 3.3 Nicolai Hartmann (1882 – 1950)

That said, in perceiving an objectively given value like courage or privacy it is still true that individuals bring in their own subjective history, culture, character and knowledge. People differ in how they individually recognize positive values as something desirable and equally diverge in noticing the absence thereof, such as a disappointing lack of courage in someone's behavior or a lack of privacy in a surveillance situation. And as a consequence, people react differently. Many will applaud the courageous or avoid the privacy-intrusive environment. Their behavior responds to the existence or absence of values. Humans, values and the things that bear them are ontologically inseparable from the start.[1]

Fitting this conception of values, Harvard anthropologist Clyde Kluckhohn defined values as "conceptions of the desirable that influence the selection from available modes, means and ends of action" (Kluckhohn, 1962) (Figure 3.4). Unlike Hartmann, Kluckhohn's definition accommodated for the observation that values trigger emotional responsivity towards or away from the value-bearer. Yet in his definition the word "conception" could be misread to accommodate for the kind of subjective constructivism of values refuted above.

In order to align the objective phenomenal nature of values with their individually distinct perception Value-based Engineering defines values as follows:

"Values are phenomena disclosing the degree of desirability of something or someone, giving meaning to and motivating the selection of available modes, means and ends of action."

[1] In his review article on „Entanglement HCI", Chris Frauenberger cites (Introna, 2009) writing: "Humans and things are 'ontologically inseparable from the start'."(Frauenberger, 2019)

By using the verb "to disclose" the *mediating dimension* of value perception is embraced (Verbeek, 2016): They disclose something about the object (person, symbol, relationship, ect.) by which they are born. And they are actualized only through the perception of an observer who learns that which is disclosed. The above definition is thereby embracing the recent scientific argument that values could also be disclosed via affordances (Affordance Account of Value Embedding) (Klenk, 2021).[2]

When observers of a value situation are inattentive, however — inexperienced, distracted or strangers to a respective value milieu — they can easily forgo the potential in front of their eyes. They may miss the beauty, or reliability of something, for example. In such cases, value dispositions may very well be embedded in a person or a thing in front of an observer, but they remain dormant as potentials and are not actualized in perception. In the design of computer systems this happens very often. For example, when functionality for the benefit of a user is buried deep down in a technical menu structure. It is there as a potential, for instance, to improve privacy protection, but nobody uses it. And, therefore, a value like privacy does not materialize.

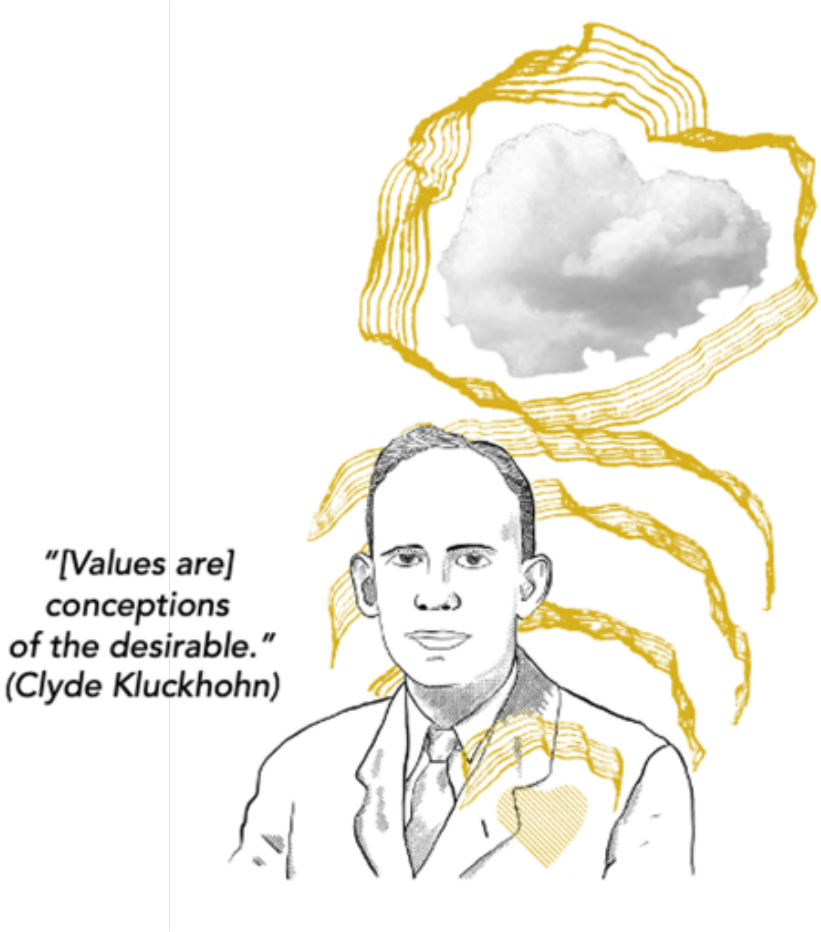

Fig. 3.4 Clyde Kluckhohn (1905-1960)

[2] "Artefact x embodies value V if x affords to a set of subjects S in conditions C an ability A and there is reason to positively respond to A (positive value), or there is reason to negatively respond to A (negative value)" (p. 535 in (Klenk, 2021)).

Why is a rigorous value definition important?

The terminological details of the value definition might seem like over-egging the pudding. Yet an ontologically misguided understanding of values can create confusion and harm. In fact, misunderstanding what values are can lead to poor policy making, poor business models as well as suboptimal expectations of what makes a system valuable.

Policy implications of a weak value definition

Starting with policy making: In the EU Commission's proposed Artificial Intelligence Act, the term "union values" is referred to over a dozen times (EU Commission, 2021). It may be argued that union values should be built "into" systems so that European technology then "has" these in their design somewhere. But building values physically "into" a system seems physically impossible. How could anyone build an intangible principle tangibly into a product?

Some computer ethicists suggest that this challenge is just a matter of value definition, and embrace what is called an "Intentional History Account of Value Embedding" (short "IHAVE") (Klenk, 2021; van de Poel & Kroes, 2014). Ignoring the phenomenologically independent and objective nature of values, the Cartesian IHAVE definition of a value is that a system simply "has" it from the moment it was intentionally designed by an engineer to have it. For example, when an engineer really wants a system to respect user privacy and builds it with a privacy-by-design approach, then IHAVE scholars would argue that the system "has" the value of privacy automatically embedded in it, because the designer wanted the value of privacy to be there. The personal judgement or intention of the designer is what counts for the value *to exist*. And indeed, having good intentions and translating them into a system design is hugely important for the propensity of a system to later bear the intended value(s).

However, one must admit that there should be a difference between a good intention to do something on one side and the ability and effectiveness in doing it on the other. Real value only materializes when it effectively unfolds in the world. And this is what is ultimately important for companies. Customers cannot live only by good designer intentions. What happens if these are not playing out in the real experience of a product? Too often, intended values simply do not unfold as expected, not even when customers properly follow use manuals. The history of product use shows that intended value is often ignored if it is not technically enforced by system affordances. Sometimes unexpected positive value(s) are suddenly appreciated that nobody expected. At other times, negative values appear that nobody anticipated. Since such dynamics are the norm when new products and services are introduced, it seems questionable to credit the ontological existence of values exclusively to designer intentions. If this is done, then two factors are ignored that are vital for successful Value-based Engineering: (1) the effectiveness by which a designer's intentions are actually embedded in a system through respective value dispositions and (2) the role of

the system user necessary to perceive the value intended. For these reasons, policy makers seem well advised to insist on proofs of value creation and value protection over time and not just well-documented compliance proofs that show designer intentions. Value realization should be tested in practice. Value recognition by ordinary users should be investigated. And value monitoring over time as well as processes to adjust systems with negative value implications should be in place, at least for risky systems.

Business implications of a misguided value definition

A limited value definition is not only problematic for policy makers but also for business. This becomes particularly apparent when business scholars equate values with product features — product features they may even declare to be a "value proposition." The highly regarded strategy consultant Alexander Osterwalder (Osterwalder & Pigneur, 2010), for example, described in a public lecture the value proposition of a Tesla car as follows:

- the car !
- a powerful battery,
- a lot of space in the car,
- luxury image,
- fuel for free,
- upgrades,
- great design,
- power range (to drive with the battery) and
- safety.

Looking at this list critically there is only one true value here and that is safety. All the other points he mentions are mostly prerequisites or dispositions that must be in place in order to create value qualities and values. For example, a powerful battery — if excellently engineered! — can support value qualities such as flexibility, time savings and range, which in turn are prerequisites for that value for which a car is ultimately bought: mobility! (Figure 3.5.) Upgrades are usually required to increase the reliability of the car and this in turn caters to safety. A lot of space is one disposition catering to comfort, but much more is needed to really make a car comfortable. In other words, anyone who esteems mere features or a few components like a battery or upgrades to be "values" has not yet understood the ontological status of true values. She or he risks confusing the technical preconditions of a value with values themselves and thereby dramatically underestimates what is actually required to create value. In Heidegger's terminology, one risks prematurely raising "stuff" (German: "Zeug") to be "goods," thereby misleading customers and executives alike.

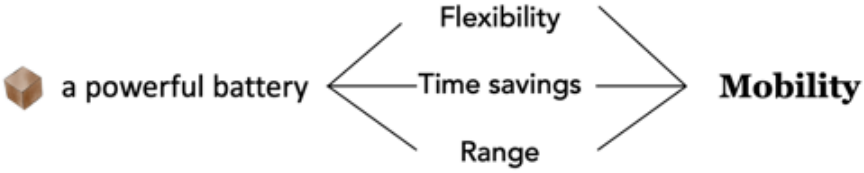

Fig. 3.5 Discerning system features from values

That said, material dispositions catering to values in a system are, of course, important. They are the prerequisites for value creation. Yet exactly what role they play both for the corporate value proposition as well as for engineering can only be understood after we deepen our understanding of the value phenomenon.

The value phenomenon

In our colloquial talk about values, it is often said that we "have" or "hold" certain values. But strictly speaking, we cannot "have" or "hold" values since we cannot strictly own an invisible, intangible, metaphysical entity as we have or hold physical things. So, what would be a precise way of verbally referring to values?

According to the value phenomenologist Max Scheler, a person can perceive values in something or someone and can resonate with these. She or he can be attracted to or repelled from positive or negative values "borne by" or "carried by" objects, people, symbols or activities encountered in their environment (Scheler, 1921 (1973)) (Figure 3.6). But in order for this "valueception" to happen, two things need to be in place: First, the objects and people in the environment really need to be equipped with the right "value dispositions" (p. 79 in (Scheler, 1921 (1973)). And second, the value-perceiver must have the value knowledge and experience to actually recognize and correctly classify values. Figure 3.6 illustrates this.

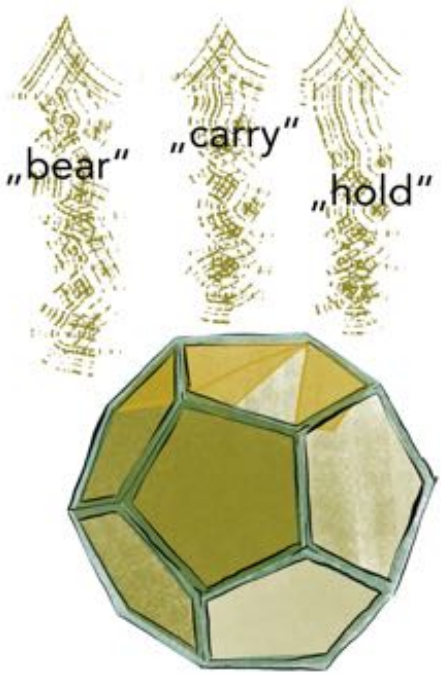

Fig. 3.6

A value disposition is the capacity, characteristic or property "in" an object (or person) that physically provides the potential to enable or inhibit one or more values.[3] Value dispositions are what auditors can indeed tangibly find in a computer system. She or he inspects a computer system and finds that the data stored on a hard drive is or is not encrypted. In the software, she or he will see whether encryption is symmetric or asymmetric, what kind of encryption algorithm is used and what key length. And seeing these dispositional facts, the auditor can make a value judgment on whether the system is secure or not.

Note that this value judgment is not subjective or a personal preference. Whether an algorithm can be considered secure or not depends on best available techniques (BAT) and standard recommendations for encryption at a specific time and in a specific context. An auditor will need to know about these. He or she will need security (value) knowledge in addition to some (security) milieu experience in order to judge a system as either secure or not based on factual properties (Figure 3.7).

[3] The IEEE 7000™ standard defines a value disposition in line with this view as "a system characteristic that is an enabler or inhibitor for one or more values" (p. 23 in (IEEE, 2021))

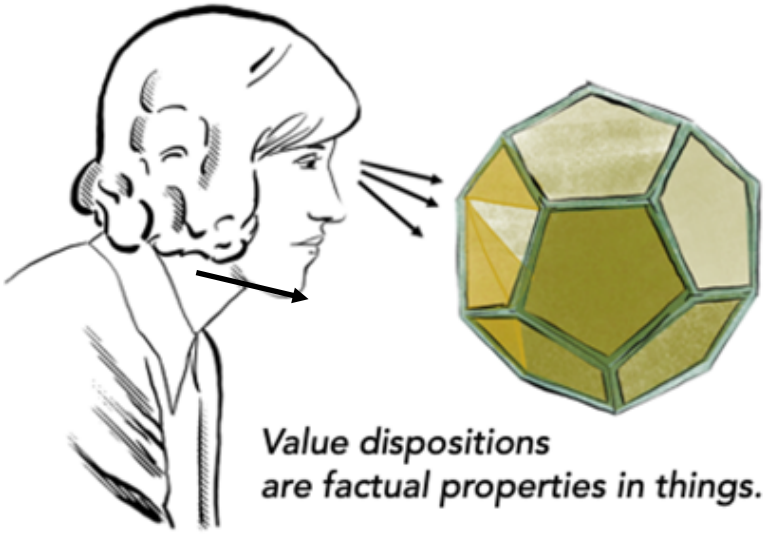

Fig. 3.7 Perceiving the value of a thing

Values are objective and not a matter of personal taste

Let's give the auditor the name Annie. Annie has privately been part of a hacker community since her teenage years and has inhaled a milieu of extremely high-level "security speak." So Annie's long-term "life-form" (in Wittgenstein's sense (Wittgenstein, 1993)) has led her to develop a relatively elaborate knowledge of security. As she audits a bank's encryption system, she may be relatively tougher in her judgment on the system's security dispositions than an alternative auditor, Paul, who has just passed his first security-officer certificate, but who has not spent his life in the domain. Annie might, for instance, find the encryption key to not be strong enough. She might disagree with Paul, who has learned that the law accepts 128-bit key length as adequate for meeting the legal security standard. Despite this guideline, Annie thinks it is not secure enough though for bank customers, and therefore recommends the bank uses a 256-bit key length. This judgment of the right security level is not her "subjective" judgment, even though she expresses it as a "subject." Instead, her judgment on how to ensure the bank's security would probably be shared by her peers from the hacker community. It is "intersubjectively" true.[4] That said, the inexperienced Paul does not share Annie's value judgment. What the example shows is that a given value disposition in a system (the key length, the algorithm's symmetry, etc.) can obviously be valued in different ways. So, are we back to subjectivity and preferences then? Should Annie have her opinion and Paul his and both are equally right and respectable? Certainly not!

[4] Mark Sagoff neatly clarifies how using the word "subject" or "intersubjectivity" is not equal to an individual (subjectist) conception. He writes: "When you and I perceive the same table, for example, our perceiving, being acts of states of mind, are subjective; that which is perceived, the 'content' of the act of perception, however, exists objectively, as what we both see. Thus, even though acts of perceiving are subjective, the object perceived is intersubjective, belonging to a world that is not mine or yours but ours in an epistemological sense." (p. 314 in (Sagoff, 1986)).

Annie and Paul differ in how they evaluate the relationship between the (banking) system's factual dispositions and the security quality potential they entail. This relationship can be analyzed quite objectively (Figure 3.8): First, the potential for the system to be considered secure is objectively backbound to tangible system dispositions: A longer key is harder to decipher than a shorter one and therefore has an indisputably higher quality potential for security. An asymmetric encryption system is harder to attack than a symmetric one and therefore has an objectively higher security quality potential as well. Hence, the material properties of the thing (the value dispositions) enable or hinder value quality potentials to a different degree. Second, context factors have a relatively stable influence on value potentials. The context of banking, for instance, is specifically vulnerable when it comes to protecting customer security. The social constituency of the banking context, therefore, means that the materialization of security requires particularly sophisticated protection properties (elaborate tangible value dispositions) to resist attacks.

An expert like Annie simultaneously integrates these two value dimensions in her judgment (Figure 3.8): First, the knowledge on whether system dispositions are sufficient to actualize a value and second, the knowledge of the contextually co-determined value unfolding. It is hence not her personal convictions that dominate the security judgment, but objectively given instances in the world. And it is likely that if Paul had the same experience knowledge (or milieu) that Annie has, he would probably reach the same conclusions as she does. So, with experience, both are likely to converge towards a shared value truth.

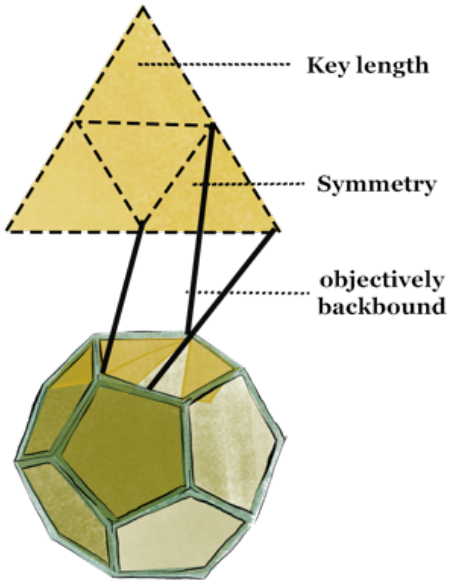

Fig. 3.8 Value quality potentials backbound to the system

The importance of experience in value quality judgments

Is Paul an inferior auditor? What is it that makes his value quality judgment poorer than Annie's?

Annie is able to simultaneously integrate the backbound and contextual knowledge relevant for the value judgment. It is not that she mentally weighs each one of the value dispositions she sees as a fact and then calculates some kind of security value score. Even though some representationalists might theoretically describe the cognitive exercise of valuation in this way, this is not what can be confirmed phenomenologically to happen (Hobbs, 2017). Long-term research in attention psychology has shown that only beginners in a field (like Paul) need to consciously call up their declarative knowledge of something (like the crypto dispositions here) and then cognitively weigh the facts they observe to reach a conclusion or initiate an action. In contrast, experts (like Annie) who have learned a skill have procedural knowledge to act in a situation (Taatgen & Lee, 2003); this is what Polanyi termed "tacit knowledge" (Polanyi, 1974). Phenomenologically, they have the skilled intuition to recognize one or several value qualities of a thing as a whole (Figure 3.8) and have learned to tend to them, similar to the way in which an experienced car driver uses various gears automatically when accelerating a car.

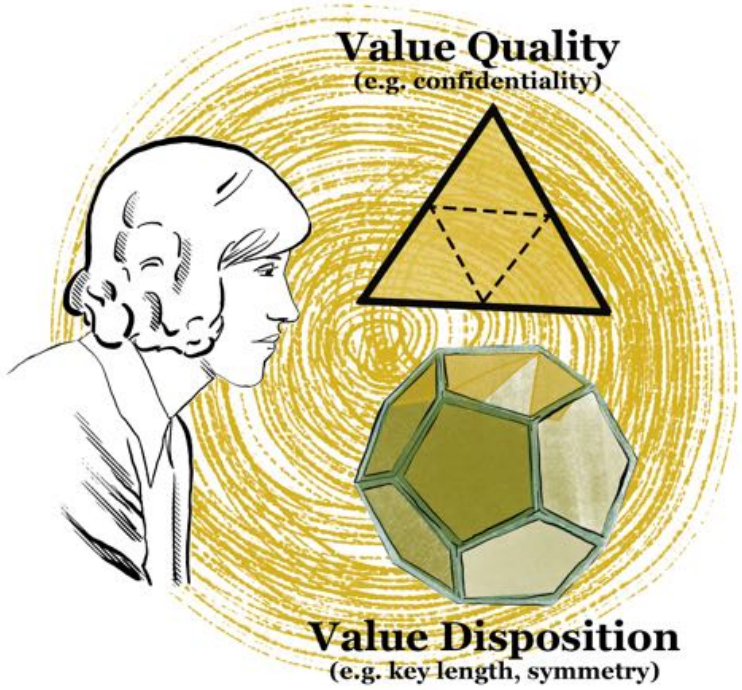

Fig. 3.9 Two ontological value layers

So, does the holistic perception of value qualities that experts like Annie possess make them better assessors of values? Yes indeed. And there are at least two reasons for this: First, inexperienced beginners run through the sequential stages of declarative knowledge application, and in doing so their performance is typically slow and error-prone (Taatgen & Lee, 2003). In his accumulation of relevant security value dispositions, for instance, the inexperienced Paul is likely to make mistakes: not attending to some or forgetting about other issues, and combining them in a suboptimal way or falsely judging their relevance for ensuring security. This can degrade his assessment of the given value. Secondly, Annie intuitively observes the security disposition and value qualities as "wholes," or what psychologists call "Gestalten" (von Ehrenfels, 1890). Annie acts vis-a-vis these mentally integrated value wholes and this is not only more efficient as observed in attention research. Gestalt psychology also recognizes how wholes are typically greater than their parts. In a Gestalt, it may, for instance, be the constellation of parts that makes a quality difference. And as Annie's expert knowledge allows her to recognize the Gestalt of the bank's security, she might therefore recognize issues that Paul could not even recognize if he wanted to.[5]

Against this background, we can distinguish two ontological value layers for a thing like a computer system: a lower material layer of value dispositions, such as key length or symmetry that can be touched and inspected one by one; and a higher value level of qualities, which are objectively backbound to these dispositions and which are recognized by milieu experts as wholes (just like Annie is judging the computer confidentiality as a whole).[6] This is illustrated in Figure 3.9.

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[5] Moreover, note that value quality Gestalten are mental objects of consciousness that actualize potentialities of the physical entities that bear them. They are ontologically on a higher "layer" than the value dispositions. Those who have philosophically studied the layered ontology of life have shown how reality is constituted of different layers and how higher layers bear properties that lower layers do not possess (Hartmann, 1953). Take the example of the corpus of a fly that Wittgenstein expands upon. He makes clear that any normal living being is able to recognize that the corpus of a dead fly is different from a live fly. The difference being that the value of "life" actualizes potentialities of the underlying matter, which cannot be weighed, touched, combined or made to cause anything in a Newtonian way. Life actualizes an additional "layer" to the underlying matter as Nicolai Hartmann puts it, and that layer, while depending on the properties of the material layer underneath, still contains properties that the underlying layer does not have (Hartmann, 1953).

[6] Note that these mental value quality wholes or phenomena available to human consciousness are not physical. As Edmund Husserl wrote: "Value is not a being, value is something relating to being or not-being, but it belongs in another dimension" (p. 340 in (Husserl, 1908-1914 (1988)). Regardless of their real constitution, however, both of these value layers are objectively given. Even though the value layers are not physically touchable or visible, we have given names to values. And how could humans give names to the non-existent? However, the way they are given is as "pre-theoretic reason" in a judgment situation (p. 59 in (Hobbs, 2017)). Only if need be they can be "re-understood" (German verb: "nachverstehen") (p. 65 in (Hobbs, 2017)). Note that there are also scientific positions in cognitive neuroscience and philosophy that claim that the world does not really exist, but is created purely in our brains as a kind of simulation. From this perspective, values would be imagined by individuals. Thomas Metzinger, for example, wrote in 2009 that "our brains generate a world-simulation," or Francis Crick (1994) claimed that "[w]hat you see is not really there, it is what your brain believes is there." This picture of a bodiless and worldless subject stuck in an anthropomorphic ego-tunnel is still quite influential; especially since it is actively nourished by science fiction stories like *The Matrix* or *Transcendence*. And as shown in Chapter 7, science fiction actively fuels IT investments and is therefore quite influential. VBE does not follow this neuro-constructivist perspective. There are three reasons for this: First, constructivism seems scientifically contested through neuroscience itself as well as through ecological psychology and cognitive science (for a good overview see (Fuchs, 2017; Noe, 2005)) Secondly, even though the term "speciesism" is contested, it seems arrogant to put humans into the position of creators of earth by being-through-their-brains. VBE is based on Max Scheler's *Material Value Ethics* where he says, "… the ego is neither the point of departure for the apprehension nor the producer of essences" (Scheler, 1921 (1973))

Towards a three-layered Value Ontology

In thinking about Annie and Paul, we have seen that the two are responsive in a more or less sophisticated way to what are called "value qualities" — value qualities that are to some extent objectively backbound to concrete value dispositions in a thing. What a security expert might have noticed, though, is that so far, the encryption example only referred to one specific value quality relevant for security, which is confidentiality. IT system security, however, is not achievable through confidentiality alone. System security is typically created only if other value qualities are present as well, such as content integrity and service availability. It must ensure that no viruses can corrupt customers' account information (example for integrity) and it needs to make sure that customer accounts are always available for customers. For security audits, a recognized trio of value qualities that constitute system security are referred to as the "CIA" principles (ISO, 2014). Thus, it is actually multiple value qualities taken together that constitute one value (see Figure 3.10).

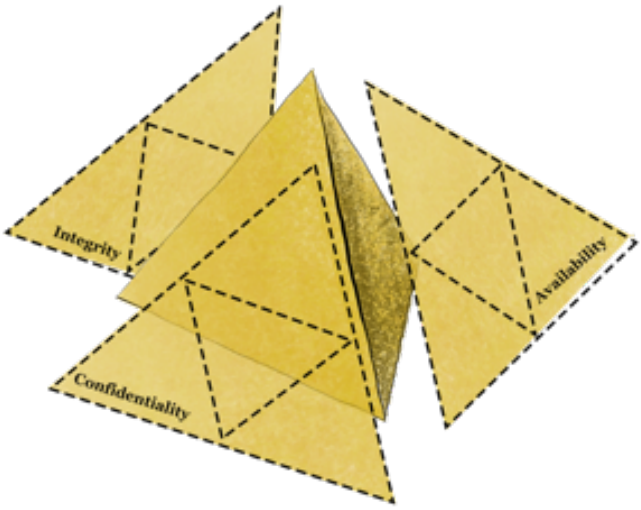

Fig. 3.10 Multiple value qualities constitute a core value

As Annie screens the system, the varying value qualities come to her mind one by one. When Annie sees that encryption is weak, for example, and that the bank thus offers poor confidentiality, this observation can easily influence her expectations of other value qualities like integrity. If it is so easy for an attacker to decrypt customer data, then what would stop him from altering a deciphered file, corrupting its integrity, re-encrypting it and leaving the system looking normal? Edmund Husserl, the scientific father of phenomenology, described how we often have a mental awareness of what is at the back of a thing we initially only see the two-dimensional surface of. Due to our knowledge and experience we already anticipate

Thirdly is seems that the constructivist perspective on reality is also an extremely dangerous one to follow in times of enormous environmental sustainability challenges. The scientific position that the world is just a simulation would allow humanity to not care for it since it is imagined anyway. Neuroconstructivism releases humanity from its responsibility for nature.

what is next or what is behind. Husserl described this process of subsequent detection of reality as "progressive self-giving" (p. 115 in (Hobbs, 2017).

It is for this reason that a tetrahedron is used in this book to depict values (Figure 3.10). A value (like security) has multiple sides or qualities to it that give themselves progressively to observers. This is similar to holding a tetrahedron. Even though observers only see one or two faces at a time, the entire solidness is nevertheless apprehended. This solidness of the platonic tetrahedron is similar to the wholeness which we speak of when we refer to values. Very typically we would talk, for instance, about the security of a system as a whole even though, precisely speaking, we only thought of one value quality, such as confidentiality. It is within this wholeness of perception that value qualities give themselves progressively to consciousness.

Ideal core values

The security example shows that there is a difference between the overall value of security and various distinguishable value qualities that progressively emerge in our experience and awareness of things (confidentiality, integrity, availability, etc.). The overall value reveals itself in one "unitary experience" of various progressively unfolded value qualities (p. 104 in (Hobbs, 2017)). The overall values, which are called "ideal core values" in Value-based Engineering, are often the ones we generically refer to when we speak about ethical or value-based IT systems. We call for security, privacy or freedom of systems. We generically refer to union values, or values so important that we consider them a human right. Taking these ideal core values and value qualities together and adding to these the physical value dispositions described above (e.g. the encryption), a three-layered value ontology becomes

apparent as depicted in Figure 3.11[7] (note that this value ontology is of philosophical nature. It needs to be discerned from what computer scientists call "ontology"[8]).

[7] I am not the first one to make a discernment of values from their qualities. Explaining the value ontology and the role of living beings, Scheler wrote (p. 13 in (Scheler, 1921 (1973)): "Goods and Values — No more than the names of colors refer to mere properties of corporeal things — notwithstanding the fact that appearances of colors in the natural standpoint come to our attention only insofar as they function as a means for distinguishing various corporeal, thinglike unities — do the names of values refer to mere properties of the thing like given unities that we call goods. Just as I can bring to givenness a red color as a mere extensive quale, e.g., as a pure color of the spectrum, without regarding it as covering a corporeal surface or as something spatial, so also are such values as agreeable, charming, lovely, friendly, distinguished, and noble in principle accessible to me without my having to represent them as properties belonging to things or men. Let us first attempt to demonstrate this by considering the simplest of values taken from the sphere of sensory agreeableness, where the relation of the value-quality to its concrete bearer is no doubt the most intimate that can be conceived. Every savory fruit always has its particular kind of pleasant taste. It is therefore not the case that one and the same savor of a fruit, e.g., a cherry, an apricot, or a peach, is only an amalgamation of various sensations given in tasting, seeing, or touching. Each of these fruits has a savor that is qualitatively distinct from that of the others; and what determines the qualitative difference of the savor consists neither in the complexes of sensations of taste, touch, and sight, which are in such cases allied with the savor, nor in the diverse properties of these fruits, which are manifested in the perception of them. The ***value-qualities***, which in these cases 'sensory agreeableness' possesses, are authentic qualities of a value itself. And insofar as we have the ability to grasp these ***qualities***, there is no doubt that we can distinguish fruits without reference to the optical, tactile, or any other image except that given by taste; of course it is difficult to effect such a distinction without the function of scent, for example, when we are accustomed to such a function. For the amateur it may be difficult to distinguish red wine from white while in the dark. However, this and many similar facts, such as decreased ability to distinguish among flavors when scent is set aside, show only the very many degrees of competence found among the men in question and their particular habituation to the ways in which they take and grasp a particular flavor." In this phenomenological reflection, Scheler first likens the nature of values to the nature of colors. This is helpful, because the comparison allows us to grasp the metaphysical difference between a value bearer with "mere properties" and the value itself: Just because green grass turns yellowish in a hot summer does not mean that the colors green and yellow lose their independent existence as the soil dries. The waves meeting your retina are altered in structure as the soil changes, but the independent understanding of color and the ability to discern colors remains untouched. Moreover, just like for colors, one can close one's eyes and bring values in front of the inner eye. A value is "in principle accessible to me without my having to represent them as properties… ." This possibility of accessing values in thought is important for the moral anticipation or impact assessment of values resulting from technology. Scheler then goes on and takes the exemplary value of "sensory agreeableness" of a fruit, which "possesses" "authentic qualities," making the ontological distinction pursued in VBE (introduced through the value example of security). He explains that if one has three different cherry trees and one agrees that all of them taste good (are "sensor[il]y agreeable"), it is still possible to recognize that all three types of cherry taste slightly differently. For one cherry tree the sensory agreeableness of its cherries will come particularly from the quality of sweetness, while for the other cherry tree the quality of juiciness might stick out . "Each of these fruits has a savor that is qualitatively distinct from that of the others…" However, since it is a human being who tastes the three different kinds of cherry in all cases and this human being's "complexes of sensations of taste, touch, and sight" are not altered, the difference in the juiciness and sweetness between the cherries (the qualities) can obviously not stem from that human judge or "subject-pole". The differences in taste also do not come from the human eater inspecting all "the diverse properties of these fruits" and then judging the cherry as juicy, because he or she recognizes a relatively high percentage of water in the fruit. Instead the human eater puts the cherry in his or her mouth and immediately has a taste of the various qualities at a higher layer of consciousness than if he or she discerned the property details (the value dispositions). So the human experience integrates the various qualities that allow to draw conclusions on the overall sensory agreeableness of the cherries. For cherries this integration is easy. For technology and a value like security, expertise is needed to get "a taste" of the various qualities.

[8] In computer science, ontologies don't deal with the real nature of being but try to represent conceptions of being in a reduced, man-made and machine-readable metadata structure. This metadata structure (called Resource Description Framework) contains logical relationships between human pre-defined data entities that a computer is able to process, which is only the case if these relationships are provided in the modeling and

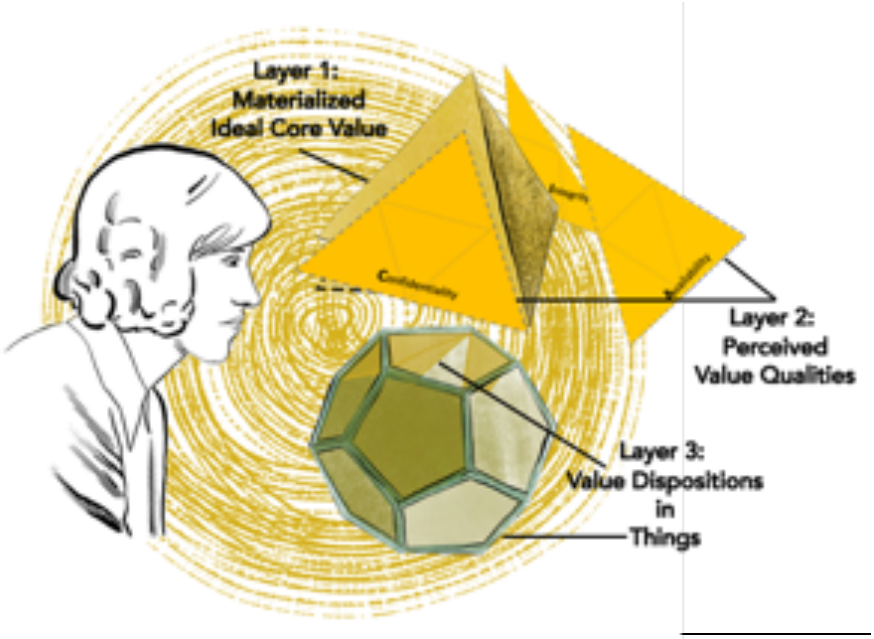

Fig. 3.11 Three layered value ontology

Ideal core values are important lead principles for system engineering. Take values beyond security, such as beauty, knowledge or friendship. Apple devices set a global benchmark for the beauty of computer systems, which made Apple one of the most valuable companies on earth today. Knowledge is a core value sought by an encyclopedia like Wikipedia. And social networks continue to fuel heated discussions, because on the one hand they are used for friendship and on the other hand they undermine that same sense of community through hate, envy and miscommunication. Perhaps it would have been good for a company like Facebook to reflect a bit more on the ideal value of "friendship" before just "connecting people."

One philosopher who significantly contributed to our understanding of ideal values was Nicolai Hartmann (Figure 3.3). In his work on ethics he detailed the nature of many of them (Hartmann, 1932), such as goodness, nobility, abundance, purity, justice, wisdom, courage, prudence, charity, honesty, loyalty, trust, humbleness, etc. Hartmann was a Platonist. He argued that values are ideal principles that have a form of being that is ontologically objective. But this objective ideal is not entirely perceptible to human observers. Ideal values in Hartmann's understanding are just as Plato's eternal ideas in the Cave analogy. They are like light outside a cave inhabited by humans. We humans, according to this Cave analogy, are only able to observe shadows of the eternal ideas from the perspective of our cave. Or in other words, while we grasp the core idea about a value when we see it, what we actually see is really only a selection of qualities. One real-world example that illustrates this is the value of beauty.

programming language the computer understands. An example is the Friend-of-a-Friend (FOAF) ontology, which allows machines to integrate family and friend relationships in its reasoning.

Ideal values materialize as complex value quality structures

Imagine a live performance of Beethoven's Sonata op. 2 No. 3; a sonata that has been recognized for its musical beauty. While the sonata may be theoretically recognized for its ideal beauty, its real beauty really depends on a multitude of value quality factors that need to be in place for this beauty to materialize. First there is the pianist (value bearer 1) whose clarity and precision of play as well as correctness and gentleness of touch are vital interactive qualities for the listener to actually enjoy the beauty of the piece. Furthermore, the piano (value bearer 2) needs to be correctly tuned. Professional pianists often use a grand piano, because the volume and shape of this bigger instrument (its value dispositions) mean that the beauty of the piece can come about even more, enabling a range and fullness of sound that is not achievable with an ordinary piano. Finally, the pianist's and piano's dispositions come together with the structure, the pitch and the sequence of tones in the score (value bearer 3). These value dispositions of the piece itself are responsible for value qualities like the perceived harmony and transportiveness in listening.

This example makes plain how an ideal value like beauty is unveiled through a complex web of real value qualities, which are again backbound to objective dispositions in people and objects; that is, multiple value bearers (Figure 3.12). Observers — to come back to Plato — may talk about the "beauty" of a musical piece; but what they really refer to is what they are able to observe subsequently, which might be the pianist's performance or the harmony of the musical score. Or alternatively, they don't see the beauty of the piece at all, because the grand piano was out of tune. So, while humans frequently refer to ideal values in their language and are quick to judge on them, they should really humbly recognize that they always only perceive aspects of the ideal. Ideal values such as beauty are like the invisible vanishing point in a painting. Everything is ordered towards it while it itself is invisible.[9]

[9] James Gibson, the inventor of the term "affordance" famously wrote: "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill" (p. x in (Gibson, 1986 (1979)). Future research could investigate what parts of the value ontology are actually capturing best the notion of affordances, which have been associated with values (Klenk, 2019). Are affordances of an ideal value nature embodying an overall value Gestalt? Are they that, which the human animal responds to, that is the value qualities? Or are affordances value dispositions (properties, features) that engineers can actually work on, which determine how the object can be used, which is what Don Normal would argue who made the concept of affordance popular in technology design (Norman, 1988).

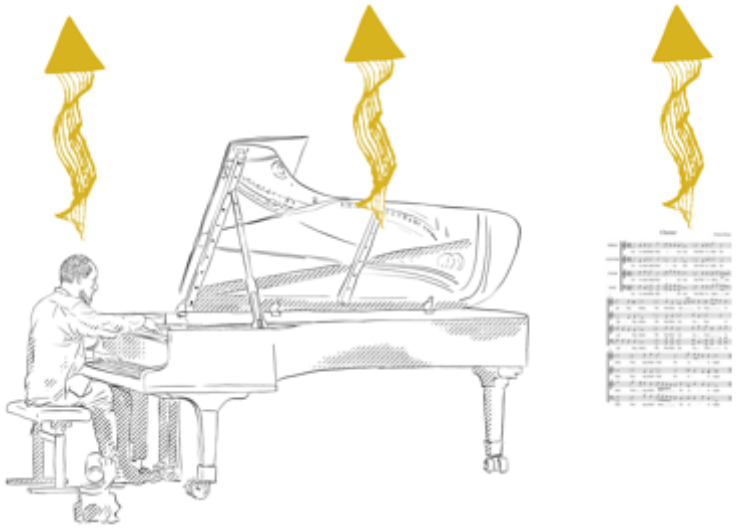

Fig. 3.12 Multiple value bearers of beauty in a sonata

The contextual meaning of values

Another aspect adding to the complexity of the value phenomenon is that a value which we call by one name, such as beauty, means something completely different from one context to another. While it is possible to describe the beauty of a sonata with value qualities like the clarity, correctness, precision and gentleness of touch, the range and fullness of sound and harmony and the ease in listening, beauty in a person comes down to very different qualities. In his *History of Beauty*, Umberto Eco takes readers on a journey of how the ideal of human beauty has changed over the course of the past 2,500 years. He explains how human beauty was originally conceived of as symmetry of features and proportionality of limbs. These qualities were later complemented or marginalized by aspects such as naturalness (in the middle ages), or complemented by adornment and splendor in later times (Eco, 2004).[10] Today, beauty is regularly equated with slimness and athleticism (Figure 3.13). So, the real value qualities through which an ideal value like beauty manifests itself in the world always depends on context and historic time.

[10] Hartmann and Scheler were criticized for their value conception by Heidegger, who insisted that any value analysis of being should be more anchored in "the being of the thing" itself. From Heidegger's perspective, "an analysis of the valuative character of valuable things [can only be] a subsidiary enterprise to a thorough inquiry into the being of those objects themselves; values would be nothing more than abstractions incorrectly derived from our actual experience of objects" … For Heidegger, any attempt to think of values on their own terms necessarily substitutes an unjustified abstraction for a genuine analysis of the being of valuable things. As he writes in the Humanism letter: "Rather, it is important finally to realize that precisely through the characterization of something as 'a value' what is so valued is robbed of its worth . . . [Valuing] does not let beings: be. Rather, valuing lets beings: be valid — solely as the objects of its doing" (cited from p. 32 in (Hobbs, 2017)). One could argue that by understanding the process of valuation as one holistic phenomenon by which value dispositions in the thing bear value qualities actualizing ideal values we can overcome the philosophical dispute. Reality is multilayered. For a more nuanced discussion of this philosophical position see (Hoff, 2021)

Fig. 3.13 The qualities of the ideal value of beauty over time

Conceptual Value Analysis

Even though the qualities of ideal values differ between value bearers, contexts and time, it is still true to say that ideal values also share some qualities by which they can repeatedly be recognized. There is an essence captured in words like "beauty" that is transferable from one context to another. For example, the qualities of symmetry, naturalness or splendor used to describe human beauty might as well be used to describe the qualities of a sonata. There is an essence in these qualities shared by the "concept" of beauty. Reflecting spontaneously about a sonata's qualities of beauty, concert visitors (stakeholders) might discuss the harmony and transportiveness of the piece they listened to. But a music professional who knows about the structure of music might point out that the symmetry of a piece should also be considered in the valuation process. So, what is actually needed to understand an ideal value at depth is a conceptual analysis that brings together stakeholders' bottom-up quality observations with experts top-down value quality knowledge. This is what takes place in Value-based Engineering in order to understand the core value structures of a technology. Conceptual value analysis as a 2nd order analysis is used to systematically capture and complete what we can know about an ideal value's qualities.

Conceptual analysis of the value of privacy

A real-world example that shows how conceptual value analysis can enrich our understanding of an ideal value is a case- study that was conducted with UNICEF in South Africa for a new IT platform called "Yoma". The goal of this project was to build a talent platform for African youth. Young people would find interesting projects through the platform and upon participating in them would build up an online CV with credentials garnered from the things they had done. They could curate their CVs through the system and also mentor others once their CV and project history was above average.

Discussions with regional stakeholders found African youth to be concerned about a self-determined usage of their data. They would not want an unauthorized secondary use of their personal CV data. And they wished for their data to be securely stored and to not be

inspectable by governments. The ideal core value of privacy as described bottom-up by stakeholders is depicted in Figure 3.14.

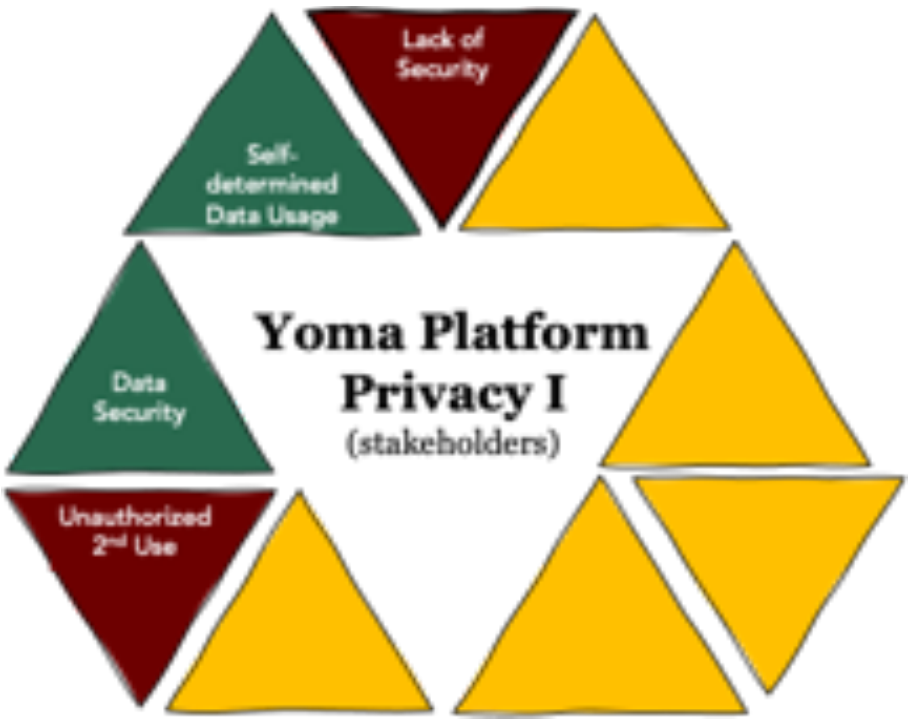

Fig. 3.14 Bottom-up privacy (value) qualities seen by Yoma stakeholders (1st version privacy cluster)

What becomes apparent from looking at the value qualities derived from Yoma stakeholders is that only a few privacy qualities were progressively identified to them. A value lead and privacy expert would need to combine this bottom-up conceptualization of the value of privacy with an official taxonomy of privacy, taken, for instance, from a legal source. The European Data Protection Regulation, for example, contains more privacy-related qualities relevant for Yoma. A conceptual analysis would add this top-down knowledge to derive an ideal understanding of privacy on the Yoma platform, adding such qualities as data processing transparency, data portability and accessibility, informed consent, etc. (see Figure 3.15).

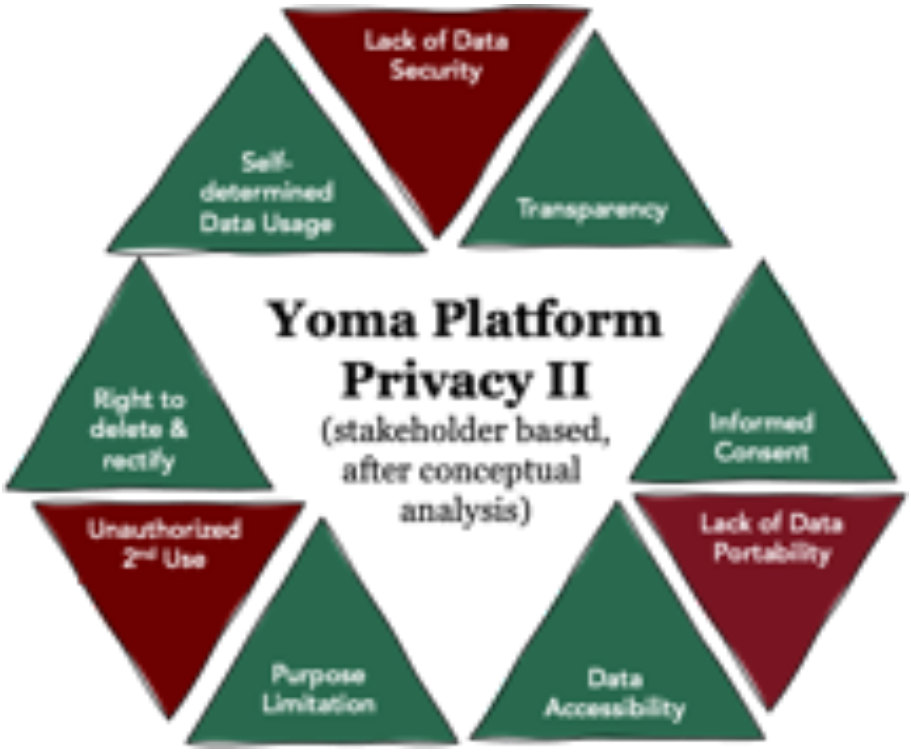

Fig. 3.15 Yoma's privacy (value) quality cluster
after conceptual analysis

What the two ideal value clusters (Figures 3.14 and 3.15) show is that the qualities through which an ideal value like privacy expresses itself in the real world come in very distinct forms and manifestations. They can come as enabling qualities, such as being informed about something; alternatively, they can come as something someone is able to do. Due to value qualities being so diverse, they are simply defined in the IEEE 7000™ standard as "potential manifestations of an ideal value, which are either instrumental to an ideal value or undermine it." (p. 23 in (IEEE, 2021)). Note, though, that IEEE 7000™ calls value qualities "value demonstrators" (IEEE, 2021). The term value demonstrator signals that an ideal value "demonstrates" itself in the world in a certain way; it shows itself; it becomes real, as Husserl would probably have said.

The two value quality clusters depicted in Figures 3.14 and 3.15 also show how ideal values are visually represented in Value-based Engineering projects as being at the core of a cluster of value qualities (or demonstrators). This is why the IEEE 7000™ standardization project opted to call ideal values at the center of a cluster "core values." A core value is defined as "a value that is identified as central in the context of a system of interest" (p. 17 in (IEEE, 2021)). In the following the terms core value and ideal value are used interchangeably.

What should furthermore be noted is that for practical reasons the ideal core values at the center of clusters should normally be of *intrinsic* nature. Intrinsic values are those values that are valuable for their own sake, in themselves, on their own as an end (Ronnow-Rassmussen, 2015). Examples for values of intrinsic nature are goodness, beauty, friendship, dignity, etc. No matter what culture one considers, all have a conception of intrinsic values, even though they might differ in the qualities by which they see these intrinsic values materialize. This is

why they are ideal to put at the center of value clusters. All cultures can relate to them. The value qualities actualizing them, in contrast, are termed extrinsic values. *Extrinsic values* have been characterized as something valuable as a means, or for something else's sake (Ronnow-Rassmussen, 2015). Due to extrinsic values being means for something else they are also called "instrumental." In the security example given above, confidentiality, integrity and availability are instrumental to security. They are a means to the end of security. Therefore, they are extrinsic. We can apply these kinds of values back to the case of the piano-playing, where the intrinsic value of the beauty of the sonata depended on the extrinsic values of precision and gentleness of play.

Constitution of goodness through positive & negative values

The detailed analyses of the privacy and security values show that value qualities can be both positive and negative. Seeing one's own data being used for an undesired secondary purpose, for example, is negative. And in such a moment one could say that the positive value of privacy is suddenly nonexistent. Its absence creates negative value. Following Franz Brentano, Max Scheler captured this dynamic in the following axiology (p. 82 in (Scheler, 1921 (1973)):

- The existence of a positive value is itself a positive value.
- The non-existence of a positive value is itself a negative value.
- The existence of a negative value is itself a negative value.
- The non-existence of a negative value is itself a positive value.

Max Scheler did not discern the three layers of the value ontology as clearly as we have done it, distinguishing between ideal values, (real) value qualities and value dispositions. Furthermore, he also did not apply his philosophy to a system design context through which the existence of values can effectively be influenced. Refining Scheler's definition of goodness with a view to system design could read as follows:

- The existence or fostering of positive value qualities in a system constitutes positive value.
- The non-existence or undermining of positive value qualities in a system constitutes negative value.
- The existence or fostering of negative value qualities in a system constitutes negative value.
- The non-existence or prohibition of a negative value quality in a system is itself a positive value.

Applying this value axiology to the practice of system design and user experience, it is in a company's interest to build all those value dispositions into a system that are needed to ensure not only the existence of positive value qualities but also the exclusion of negative value qualities.

However, what happens if a system has so many value dispositions in place that only 80% of the value qualities can positively unfold? Will the ideal value still unveil itself to the user of the system given that 20% of the value qualities potentially relevant for the ideal are missing? Here we can turn back to the experience of values through progressive self-giving. The value of privacy will unveil itself up to the point where the observer suddenly recognizes that perhaps one value quality that she found important was absent. When this happens, she will doubt whether the overall ideal is being fulfilled. It is for this reason that innovating companies are well advised to test their early prototype systems thoroughly and monitor the unfolding of the value clusters in real-world deployment. Their aim should be to check whether relevant value qualities for the system and the context are absent, not perceived as they should be, or undermined. This practice of ensuring the existence of value qualities, and thereby, values, is also what links values to ethics. Max Scheler completed his axiology in the following way (p. 26 in (Scheler, 1921 (1973)):

- Good is the value that is attached to the realization of a positive value in the sphere of willing.
- Evil is the value that is attached to the realization of a negative value in the sphere of willing.

Check Questions

- What is the potential problem with a value definition that frames values as *conceptions of the desirable*?

- Why can the value judgments of one person be better than those of another person?

- How do we typically perceive values in our everyday life from a value ontological perspective?

- How do values relate to good and evil?

- How does value pluralism/relativism dissolve as an issue once the three-layered value ontology is adopted?

Sources

Eco, U. (2004). Die Geschichte der Schönheit. München, Germany: Carl Hanser Verlag.
Artificial Intelligence Act, COM(2021) 206 final C.F.R. (2021).
Frauenberger, C. (2019). Entanblement HCI The Next Wave? ACM Transactions on Computer Human Interaction (TOCHI), 27(1), 1-27. doi:10.1145/3364998
Fuchs, T. (2017). Ecology of the Brain. Oxford: Oxford University Press.
Gibson, J. J. (1986 (1979)). The ecological approach to visual perception. Hillsdale, NJ: Erlbaum.
Hartmann, N. (1932). Ethics. New York: The MacMillan Company.

Hartmann, N. (1953). New Ways of Ontology (R. C. Kuhn, Trans.). Chicago: Henry Regnery Company.
Hobbs, D. (2017). Investigations of Worth: Towards a Phenomenology of Values. (PhD). Marquette University, Milwaukee, Wisconsin. Retrieved from https://epublications.marquette.edu/cgi/viewcontent.cgi?article=1751&context=dissertations_mu
Hoff, J. (2021). Verteidigung des Heiligen - Anthropologie der digitalen Transformation. Freiburg: Herder
Husserl, E. (1908-1914 (1988)). Vorlesungen über Ethik und Wertlehre. In U. Melle (Ed.), Husserliana Band XXVIII. Dodrecht: Kluwer Academic Publishers.
IEEE. (2021). IEEE 7000 - Model Process for Addressing Ethical Concerns During System Design. In. Piscataway: IEEE Computer Society.
Introna, L. (2009). Ethics and the speaking of things. Theory, Culture & Society, 26(4), 25-46. doi:10.1177/0263276409104967
ISO. (2014). ISO/IEC 27000 Information technology — Security techniques — Information security management systems — Overview and vocabulary. In (Vol. ISO/IEC 27000:2014): International Organization for Standardization.
Kelly, E. (2011). Material Ethics of Value: Max Scheler and Nikolai Hartmann (Vol. 203). Heidelberg London New York: Springer.
Klenk, M. (2019). Moral Philosophy and the 'Ethical Turn' in Anthropology. Zeitschrift für Ethik und Moralphilosophie, 2, 331-353.
Klenk, M. (2021). How Do Technological Artefacts Embody Moral Values. Philosophy & Technology, 34, 525–544. doi:10.1007/s13347-020-00401-y
Kluckhohn, C. (1962). Values and Value-Orientations in the theory of action: an exploration in definition and classification. In T. Parsons, E. A. Shils, & N. J. Smelser (Eds.), Toward a general theory of action (pp. 388-433). Cambridge, Massachussetts: Transaction Publishers.
Noe, A. (2005). Action In Perception. Cambridge: MIT Press.
Norman, D. A. (1988). The Psychology of Everyday Things. New York, USA: Basic Books.
Osterwalder, A., & Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers Hoboken, New Jersey, USA: John Wiley & Sons.
Polanyi, M. (1974). Personal Knowledge: Towards a Post-Critical Philosophy. Chicago: University Of Chicago Press.
Ronnow-Rassmussen, T. (2015). Intrinsic and extrinsic value. In I. Hirose & J. Olson (Eds.), The Oxford Handbook of Value Theory (pp. 29-43). New York: Oxford University Press.
Sagoff, M. (1986). Values and Preferences. Ethics, 96(2), 301-316. doi:10.1086/292748
Scheler, M. (1921 (1973)). Formalism in Ethics and Non-formal Ethics of Values: A New Attempt Toward the Foundation of an Ethical Personalism. USA: Northwestern University Press.
Taatgen, N. A., & Lee, F. J. (2003). Production compilation: A simple mechanism to model complex skill acquisition. Human Factors, 45(1), 61-76. doi:10.1518/hfes.45.1.61.27224
van de Poel, I. (2018). Design for value change. Ethics and Information Technology, 23, 27-31.
van de Poel, I., & Kroes, P. (2014). Can Technology Embody Values. In P. Kroes & P.-P. Verbeek (Eds.), The Moral Status of Technical Artefacts (pp. 103-124). Delft: Springer.
Verbeek, P.-P. (2016). Toward a Theory of Technological Mediation - A Program for Postphenomenological Research. In J. K. Berg, O. Friis, & R. C. Crease (Eds.), Technoscience and Postphenomenology: The Manhatten Papers (pp. 184-204). London: Lexington Books.
von Ehrenfels, C. (1890). Über Gestaltqualitäten. Vierteljahresschrift für wissenschaftliche Philosophie, 4, 249-292.

Wittgenstein, L. (1993). Cause and effect: Intuitive awareness. In J. C. Klagge & A. Nordmann (Eds.), Philosophical Occasions (pp. 1912-1951). Indianapolis: Hacket.