

Furthermore, marrying electronics and biology promises new devices that could transform million of lives. Right now, most bio-artificial organs are meant as temporary solutions until the patient receives a human organ. Ultimately, scientists want to “grow” living tissue that will eliminate the need for a transplant. These new technologies will force us to change our approach toward how we define life, culture, and civilization. What is gained and what is lost by being digital is answered by the Krokers (1997) in their fascinating book under a very meaningful title “*Digital Delirium*.” Grossman (1995) thinks that we are even building the Electronic Republic, where democracy is being redefined by information-communication processes.

Therefore, the role of technology cannot be ignored in discussion on civilization. One of the first who understood this role very well was Lewis Mumford (1966), who in his book *Technics and Human Development*, goes back to the origins of human culture and does not accept the view that man’s rise was the result of his command of tools and conquest of nature. Mumford demonstrates how tools did not and could not develop greatly without a series of more significant inventions in ritual, language, and social organization. Mumford and McLuhan (1962), both great philosophers of technology, did not live to see the information-communication revolution (late 1990s) and could not extend their findings about the role of electronic information-communication processes in civilization. The modern role of technology is marked in the world-system model of production in Figure 1-8.

## THE EMERGENCE OF CIVILIZATION

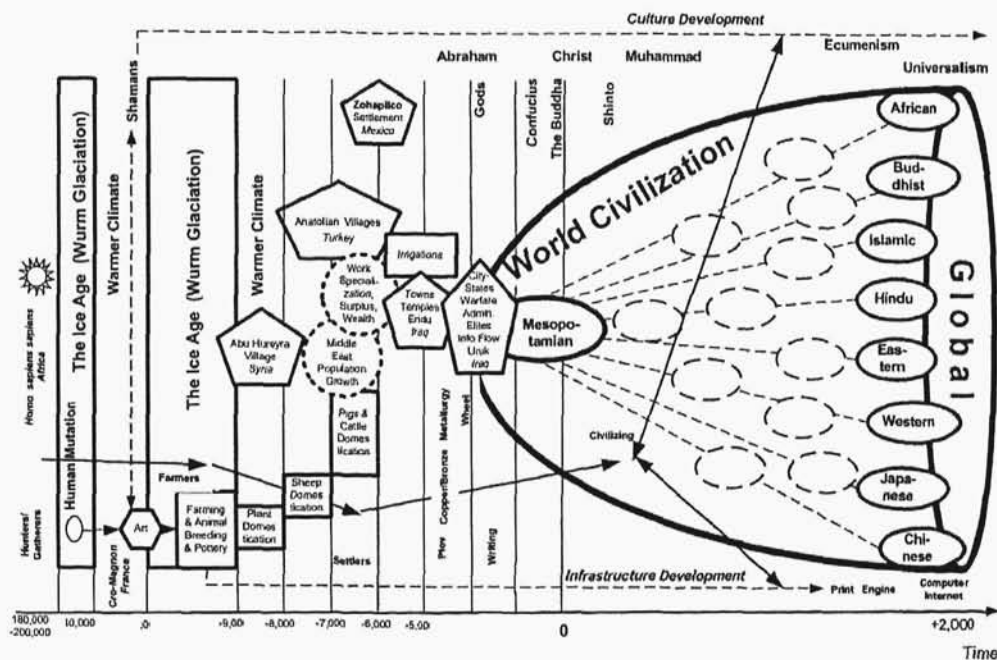
Civilization had been growing gradually along with the cultural and industrial development of man as *homo sapiens* during the last 200,000 years. About 40,000-50,000 years ago, humans

underwent a very important genetic mutation, when the DRD4 gene was developed that encodes the dopamine neurotransmitter. It is this neurotransmitter which is responsible for human personality traits (Ding et al., 2002). In such a way, humans became more intellectually alert and as a result developed increasing capacities for leadership and socializing. Fortunately, the climate warming that occurred around 10,000 B.C. [3] helped humans demonstrate their more developed societies, allowing them to migrate across continents and form the beginnings of infrastructure. Some time after 10,000 B.C., people became farmers, animal breeders, and pottery makers. When the Ice Age ended in about 8,000 B.C., the warmer climate was friendlier for humans and their civilizing processes. In the years between 8,000 and 6,000 B.C., sheep, pigs, cattle and other livestock were domesticated and more people were settling in the Euphrates-Tigris river valley. Around 7,500 B.C., villages were growing in nearby Anatolia.

Growing populations required more food and more productive farms, which led to the development of irrigation systems and work specialization. The latter and other kinds of non-farming tasks in 5,000 B.C. led to the rise of elites, which were living in towns and worshiped in temples. Eventually about 4,000 B.C., city-states were formed in Mesopotamia. One of these was Uruk, where several thousand people lived, with crafts, architecture and writing. These city-states were united under power-keeping dynasties and led to the creation of the Mesopotamian civilization, the first historic example. According to Toynbee (1995), there were about 26 different civilizations. Nowadays, these have eight heirs: the Chinese, Japanese, Western, Eastern (“Orthodox Christian,” or “Byzantine-Russian”), Islamic, Buddhist, Hindu, and African civilizations. All these interact with the emerging global civilization.

A model of the process by which civilizations emerge is shown in Figure 1-1.

Figure 1-1. The emergence of civilization (civilizations' duration not in a scale)



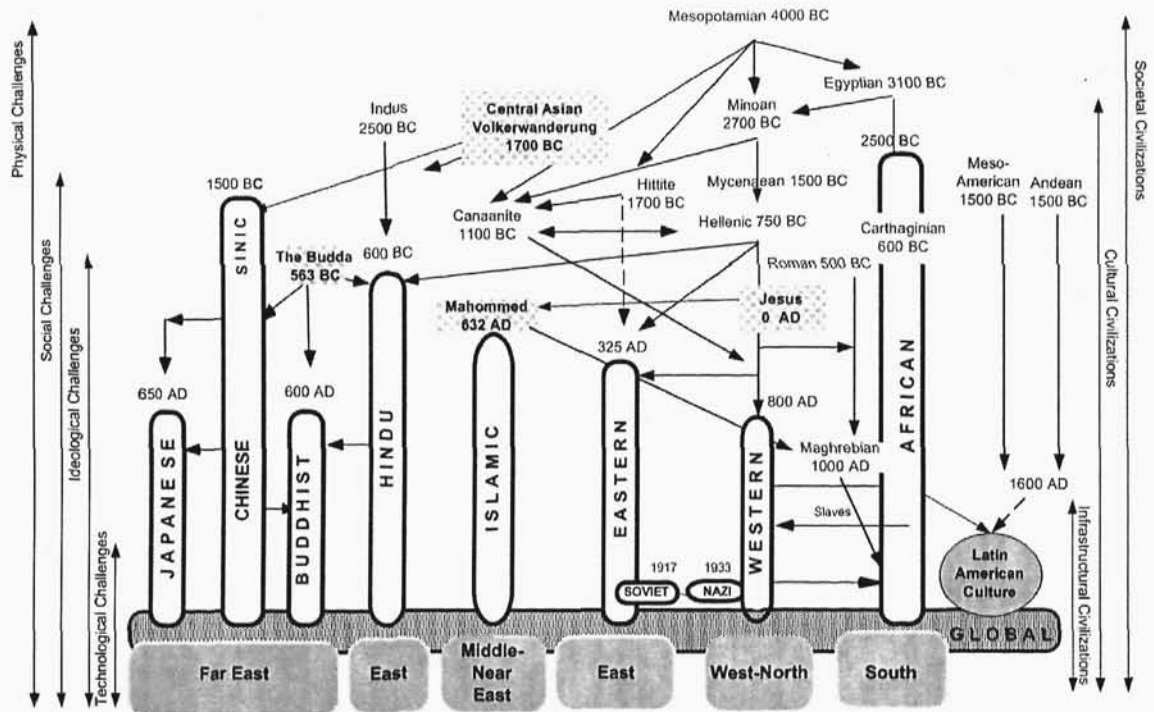
## THE EMPIRICAL MODEL OF CIVILIZATION EVOLUTION

In this study of civilization, we begin with the construction of an empirical model of civilization development. Figure 1-2 illustrates this model and indicates that the world civilization has a continuous character and can be also perceived as a mosaic of *autonomous* civilizations.

There is only one world civilization, yet there are about 29 main autonomous civilizations that have been developed in the last 6,000 years. Perhaps, if one could find more autonomous civilizations or rather satellite civilizations (cultures), their number could reach 100 or even more. However, for the clarity of this synthesis, we would like to limit the number of candidates to 29 autonomous civilization-types. In this sense, Toynbee as well as Braudel were right; there is one civilization and at the same time there are many.

The world civilization as a *continuum* never dies—only evolves from one stage to another. This evolution takes place through the life cycle of *autonomous* civilizations. At the very beginning of human civilization, there were several successful formations of living entities that could be considered initial *autonomous* civilizations. They took place in different parts of the world and created about eight cases. The first autonomous civilization is the Mesopotamian civilization (including Sumerian), which emerged in the valley of the Euphrates and Tigris rivers in the Middle East, about 4,000 B.C. In the Far East, the first autonomous civilizations rose inland: Indus (Harappan) around 2,500 B.C. and Sinic around 1,500 B.C. In Africa, the initial civilization was the Egyptian in 3,100 B.C. In South America, early autonomous civilizations included the Andean civilization that emerged around 1,500 B.C. In Central America, the first autonomous civilization was the Mesoamerican civilization

Figure 1-2. The empirical model of autonomous and global civilizations development (time progresses from top to bottom of the chart)



which rose around 1,500 B.C. Both civilizations fell around 1,500 A.D.

Autonomous civilizations rose in a response to physical challenges of nature (ecosystem). Humans began to organize themselves into a society which provided exchangeable and specialized services, such as food hunting, food production, house building, road construction, transportation, healthcare, and entertainment. These services and growing human communication led toward the formation of cities. These types of autonomous civilizations we will call *societal* civilizations.

In addition to the environmental challenges, the societal civilization as a whole has been threatened by its own internal structure involving power, wealth creation, beliefs enforcement, family formation, leadership, and so forth. As societal civilizations evolved into more complex entities, they were managed by cultural manipulation. This type of autonomous civilization we will name the

*cultural* civilization. By culture, we understand a values- and symbols-driven patterned behavior of a human entity.

Ever since religion was transformed from beliefs in magic to beliefs in poly-gods and then to a mono-god, the cultural civilization has applied religion as the main tool of cultural control. Religious and military forces were the foundations of the power apparatus that maintained the society as a governed entity. These forces civilized the society and moved it into higher levels of organization. Among cultural civilizations, one can recognize about 16 cases, such as the Egyptian civilization (3,100 B.C.), the Minoan civilization (2,700 B.C.), the Mycenaean civilization (1,500 B.C.), the Sinic civilization (1,500 B.C.), the Hellenic civilization (750 B.C.), the Canaanite civilization (1,100 B.C.), the Hindu civilization (600 B.C.), the Roman civilization (500 B.C.), the Eastern civilization (350 A.D.), the Hellenistic

(Hellenic) civilization (323 B.C.), the Buddhist civilization (600 A.D.), the Ethiopian civilization (400 A.D.), the Sub-Saharan civilization (800 A.D.), the Western civilization (800 A.D.), the Islamic civilization (632 A.D.) and the Maghrebian civilization (1,000 A.D.). The cultural civilization evolves into a civilization with challenges generated by intra- and inter-civilization issues of war and peace. These types of issues have been managed by technological means of domination. Such a civilization we will call the *infrastructural* civilization.

The *infrastructural* civilization's purpose is to expand spheres of influence by means of technology. Technology drives the development of infrastructural civilizations. The prime target of technological applications has been a war machine which supports the main values of a given civilization. By-products of military applications of technology affect the civilian part of its infrastructure. Among eight infrastructural civilizations one can recognize the Sinic civilization, the Hindu civilization, the Japanese civilization, the Western civilization, the Eastern civilization, the Buddhist civilization, the Islamic civilization, and the African civilization (Burenhult, 2003).

By the end of the 2<sup>nd</sup> millennium, infrastructural civilizations had become civilizations responsible for world or hemispheric influence and domination. Hence, the Western civilization dominates the western hemisphere, the Eastern and Hindu civilizations rule the eastern and southern sub-continent, the Islamic civilization rules the Near and Middle Eastern sub-continent and some parts of the Far Eastern continent, the Japanese civilization governs some parts of the Far Eastern continent, the Chinese civilization influences the majority of the Far Eastern continent, and the Buddhist civilization influences a small part of the Far Eastern continent.

In the majority of autonomous civilizations, one can differentiate more than one culture, with the exception of the Egyptian, Hittite, and Japanese civilizations, which are mono-cultural. Figure 1-

3 provides 88 examples of empirical civilization cultures. By "empirical" cultures, we would like to emphasize that their names have been created by historians during the discovery process. Of course, some names have been modified to read as they are perceived nowadays.

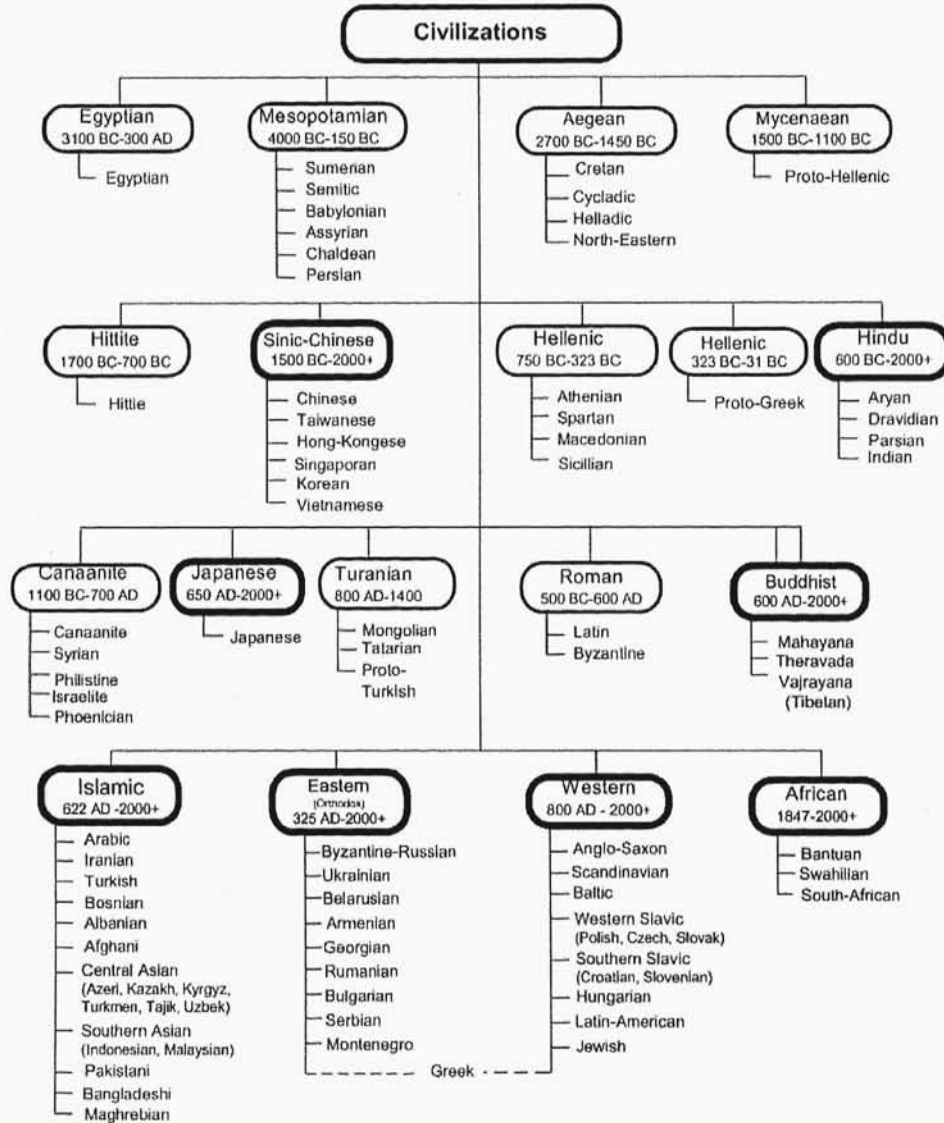
## METHODS OF CIVILIZATION STUDY

Civilization is an info-material structure developed by humans to cope effectively with themselves, nature, and their creator. It is a vibrant "interface" which differentiates civilized humans from animals (Figure 1-3). The concept of "civilization" is applied to a wide diversity of particulars: to the level of religious ideas, to the level of customs, to the level of technology, to the level of manners, to the level of knowledge, and so forth. It can refer to the type of a city, or a relationship between men and women in family, tribe, or society. A type of a law and its application reflects civilization also.

The mission of a civilization is to improve human existence. As Toynbee (1995, p. 87) writes, "the goal of Mankind's continuous and increasing endeavors is still out of sight, we know, never the less, what it is." What changed our pre-human predecessors into human beings is the attainment of awareness and problem-solving faculties. The cost of human independent thinking, learning, and quest for freedom is a mental and moral relativity. Hence, the goal of a civilization, or in general of the world civilization, is to minimize "hate" and maximize "love"—two opposite forces driving the pulse of human relativity.

A role of civilization is shown in Figure 1-4, which reflects in a graphic model the system of the Universe. The Universe system is composed of three sub-systems: humans, nature (ecosystem), and civilization. The creator is the steerer of the Universe. Relationships among these four components are of two types. The first one contains imbedded relationships such as A, B, and D, that

Figure 1-3. The empirical classification of civilization cultures



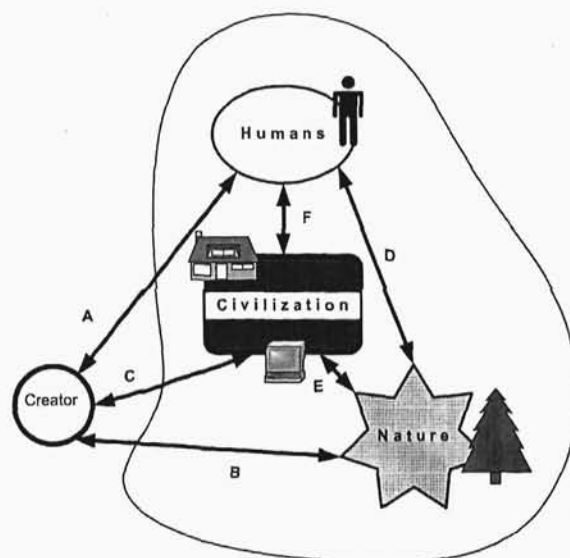
are rather beyond civilization control, with some exception for sects (e.g., New Age) that define their own gods (the southern direction of the A relation). The second type of relationships, such as F, E, and C are controlled by the civilization.

To understand the control function of a civilization, one must open the civilization structure and analyze its purpose, components, and their

relationships. In civilization studies, one can recognize so far two approaches to this task. The English, French, and American single-elemental model (SEM) of the humans' interface treats equally "civilization" and "culture." The German two-elemental model (TEM) subordinates "zivilisation" to "kultur."



Figure 1-4. The universe system



The English-French-American concept of “civilization” contains all aspects of human life: religious, political, social, economic, and cultural. The German concept of “zivilisation” is limited to useful things, but is nevertheless considered only a value of the second rank. The value of the first rank is “*kultur*,” which refers to religious, intellectual, and artistic achievements. The “*kultur*” controls “*zivilisation*” and develops it as a continuous motion of material-driven human development. The German concept of “*kultur*” emphasizes differences among nations that may share the same “*zivilisation*.”

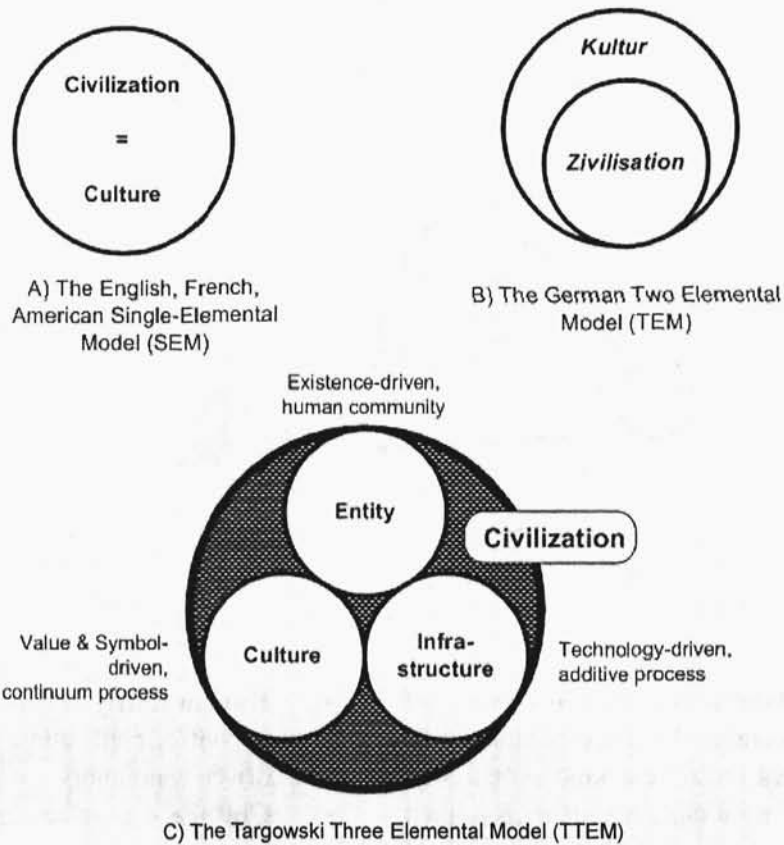
There is no doubt that the German model is more elaborate than the English-French-American model. However, the German model is still limited, since it does not recognize human entities that determine the whole civilizing process. A new model is needed which could integrate the contributions of these two historic models.

The new model of civilization recognizes the following elements (dimensions):

- **Human Entity** - organized humans in the pursuit of civilization; it is an existence-driven community.
- **Culture** - a value- and symbol-guided continuous process of developing patterned human behaviors, feelings, and reactions, based upon symbols, learning from it and being a product of it. Cultures do not satisfy needs; rather, they demand values and define symbols [1].
- **Infrastructure** - a technology-driven additive process of acquiring and applying material means.

The comparison of these socio-genesis models of human development is shown in Figure 1-5. In the new three-elemental model (TTEM), the German concept of “*zivilisation*” has been replaced by a concept of an “infrastructure,” and the German concept of “*kultur*” has been kept intact only in reference to the infrastructure, since the English-French-American concept of civilization prevails as the developed, holistic structure of human existence. The third component—the entity—has been

Figure 1-5. The Targowski three element model (TEM)



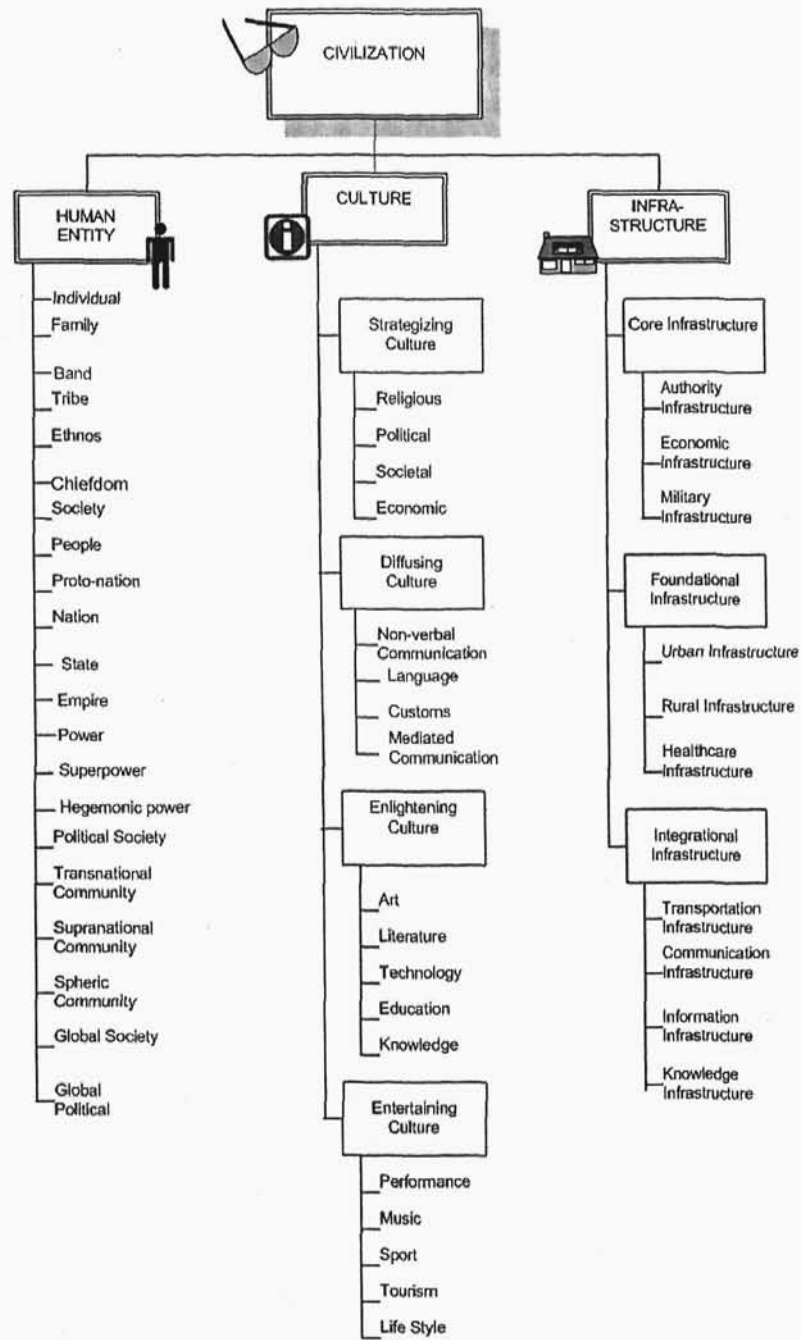
included in the concept of civilization. This model is similar to the Greek model called *Paideia* that unified civilization, culture, tradition, literature, and education, and has been described by Jaeger (1945). This approach reflects to a certain degree a civilization concept as a set of wealth, power, and meaning, defined by Arnason (2003).

The 49 empirical components of civilization are categorized and shown on Figure 1-6. This list is a static model and is of course a product of knowledge that we can apply now. In the past, this list would be much shorter. A list-hierarchy of entities requires some explanation. The world civilization began when human individuals organized themselves in a family, tribe, or ethnos.

These entities created pre-historic, primitive civilization, since every human group socializes itself, since it has a purpose, responds to challenges, and applies tools. Toynbee associates the beginning of a civilization with the emergence of a society. We could add that the emerged society triggers the outburst of an autonomous civilization developed from itself and leading to the development of the world civilization.

These civilization components are self-explanatory. A dynamic model of relationships among these components is a subject of the remaining part of this study. Most of these components have been developed or added along the 6,000 years of civilization history. The most recent compo-

Figure 1-6. The components of civilization as they are perceived in 2008





nents are those which belong to the integrational infrastructure and those which are emerging as post-national entities. From the point of view of the model to be proposed, the infrastructure dimension allows for a more profound evaluation of technology's role in civilization.

Based on the models shown in Figures 1-5 and 1-6, one can define *civilization* as an interface between organized humans and the creator and nature, which applies value-driven cultural behaviors, feelings, reactions and infrastructural tools to guide the purpose and quality of life and to control resources. By *civilization* we mean the improvement or deterioration of a person's external condition; it concerns a person's relation to nature, the creator (Nature or God), and his/her fellow people. It is a state of affairs, and is physical, social, mental, and spiritual.

However, more components one must add to a definition of civilization as it is shown in Table 1-1.

Based on these attributes and early definitions (already cited authors), the *composite* definition of civilization is as follows:

Civilization is a large society living in an autonomous, fuzzy reification (invisible-visible) which is not a part of larger one and exists over an extended period of time. It specializes in labor and differentiates from other civilizations by developing its own advanced cultural system driven by communication, religion, wealth, power, and sharing the same knowledge system within complex urban, agricultural infrastructures, and others such as industrial, information ones. It also progresses in a cycle of rising, growing, declining and falling.

Table 1-1. Key attributes of contemporary authors

AUTHOR	CIVILIZATION IS	CIVILIZATION IS ALSO	CIVILIZATION IS ALSO
Melko (1969; 2008)	Large society	Autonomous reification	Vague boundaries
Snyder (1999)	Cultural System	Preserving integrity	Adapting
Wilkinson [4]	Politico-military network	Not a part of a larger such network	
Hord [4]	Knowledge system	Interactive group subscribing to the same knowledge system	
McCaughey (2000)	Society with advanced culture	Communication-driven	Power-driven
Blaha [4]	Minimum several thousand people	Sharing common culture & unified by political structure	In monumental architecture, cycle-driven
Bosworth (2003)	Cultural infrastructure of information and knowledge	Aiming to survive & continue	Cultural memory
Farhat-Holzman [4]	Large urban area	Specialized in labor	Wealth accumulating
Fernandez-Morera [4]	Cities-oriented	In long-standing constructions	Larger than culture
Fernandez-Armesto (2001)	Distinguished area or period	striking continuities in ways of life and thought and feelings	Self-differentiation to be civilized
Krejei (2004)	In division of labor	Urbanized & literate	Above primitive societies
Targowski	Info-material interface between humans and Creator and nature	Composed of humans, culture & infrastructure	Cycle-driven