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Cooperation and Collaboration in Terminology

Introduction

Cooperation – the term predominantly used in the past – in the *field of terminology* became a major topic after World War II. In this connection a clear distinction often needs to be made between *cooperation* as the act of working together with someone or doing what they ask you and *collaboration* as the situation of two or more people working together to create or achieve the same thing. In this contribution *collaboration* is also used as the umbrella concept. C*ooperation* and *collaboration* belong to the oldest characteristics of humankind, they must have occurred already in a very distant past. First evidence can be provided when complex societies evolved and writing systems were developed. Since the 1990s, complex *terminology infrastructures* have evolved. When talking about *terminology* a distinction must be made between *terminologies*, viz. the vocabularies of a domain or subject and the *field of terminology* comprising *terminology science* and its manifold applications.

Today, successful *terminology collaboration* needs systematic approaches to planning and organization involving many stakeholders today. Before the 1970s literature about this aspect was rare. After Infoterm was founded in 1971 by UNESCO with the mandate "*to promote, organize, and coordinate cooperation* in *the field of terminology"*, literature about this topic started to become more frequent –

especially after international conferences on the topic were organized (Infoterm, 1976). In the beginning, the focus of Infoterm activities was on the requirements for organizing *cooperation/ collaboration* and on finding out where it occurred (Krommer-Benz, 1977), less on what kind of *collaboration* happened in the past. This article provides an outline of the development of *terminology collaboration* from the earliest beginnings till today.

The Evolution of Terminology Collaboration

Hominization is the co-evolutionary process of the development of the physical and mental characteristics of *humankind* which probably started already 7~5 million years ago. Anatomically modern humans (viz., *homo sapiens*) appeared in Africa about 300,000 years ago. A much bigger brain size (compared to the body volume) and much higher complexity of brain structure and functions distinguish humans from related species. *H. sapiens* gradually developed highly complex interhuman relationships, communities, and sophisticated cultures.

Cooperation/collaboration, communication, and mobility seem to have been keys for the success of this evolution. In the very distant past, they took place rather informally between individuals and groups and certainly within families. *Collaboration* later occurred in and between larger communities, and finally developed into various forms of international *cooperation* and *collaboration* today. An advanced pre-linguistic system of communication developed into highly complex means of communication including languages capable to express sophisticated meanings in *general language* as well as in *specialized languages.* Thus, *specialized knowledge* increasingly could be shared among humans by means of *specialized communication*.

The thinking agency of the human brain ultimately led to the development of specialized *domains* (sciences and technologies) and *subjects* (specialized human activities that require specialized skills). *Collaboration* and mobility substantially helped to acquire knowledge and skills which could be maintained even after knowledgeable individuals passed away. Mobility helped humans to acquire and transfer knowledge, finally overcoming time and space limitations through the

developments of writing (Galinski, 2021). Interhuman communication is the third major success factor in the evolution of *humankind*.

Between the pre-linguistic system of communication of the early *h. sapiens* and the beginnings of modern language, which is articulate and utilizes complex syntax and phonemics as well as a comparatively voluminous and diverse vocabulary, there are about 150,000 years of development of the human brain. The emergence of musical abilities, auditory working memory, and capability to produce complex vocalizations could mark the beginning of language evolution (Larsson, 2014). Just under the perspective of evolutionary (Darwinian) adaptation, there are several competing theories of how language might have evolved. Evolutionary psychology studying the evolutionary history of language came up with three camps: believers in adaptation, a by-product of another adaptation, or exaptation (or co-option describing a shift in the function of a trait during evolution). Genetics is also involved in this speculation, whether for instance a specific gene gives humans the ability to develop grammar and syntax (Gould/Vrba, 1982).

With respect to *terminologies*, the question arises at what stage of development (which may vary in different locations of prehistoric communities) did it become necessary to use archaic forms of *specialized language* (including 'terms' representing 'concepts') or could specialized *concepts* already have been expressed by a pre-linguistic system of communication? In fact, till today human communication through language is almost always accompanied by meta-communication (incl. *paralanguage*).

Emerging skills and techniques required a strong evolution of the human brain later accompanied by the evolution of language. This happened in fact in the Neolithic (i.e., New Stone Age), about 12,000 years ago when the so far prevailing small mobile groups of hunter-gatherers were gradually replaced by sedentary (i.e., non-nomadic) societies based in built-up villages and towns. These societies started to radically change their natural environment by means of specialized food-crop cultivation supported by irrigation and deforestation methods and techniques. Pottery and metallurgy emerged, leading up to the Bronze Age and Iron Age. Surplus food production allowed for larger

and densely populated settlements, the advancement of material culture and arts, division of labor, increased trade, non-portable art and architecture, property ownership, etc. Gradually social evolution became as important as biological evolution.Towards the end of the age of *proto-languages*, about 40,000 ~ 6,000 years ago, a fast differentiation into different languages began. Thus, the capability of speaking a language evolved quite late in the development of humankind. From the findings of Paleolinguistics or Archaeolinguistics in combination with Genetics, Evolutionary Biology, and Brain Research, it can be concluded so far that some sort of *specialized communication* (including conventions of concept representations) is likely to have existed already in archaic times. Only after writing systems emerged about 5,600 years ago, there is concrete evidence of how languages and *specialized languages* co-evolved (Galinski, 2020). Here, *co-evolution* seems to be the right term, as the development of language was preceded by *pre-articulate language* and the representation of specialized *concepts* (in pre-linguistic communication) does not entirely depend on the existence of articulate language.

Thus, from the perspective of *special language* and special communication research, *terminologies* emerged and exist already since the prehistoric ages, the latest towards the end of the Neolithic (Knobloch, 1998). They developed out of specialized practices, such as in agriculture, military, building, shipbuilding, etc. This was inevitably accompanied by the development of technical *terminologies* and *specialized languages* that spread through cultural contact, peaceful trade or warlike conquests.

Ancient history generally extends from the beginning of writing (e.g., in Sumer towards 3000 BCE) and recorded human history till as far as post-classical history. During this time, the world population was increasing exponentially due to the Neolithic Revolution. Around 3000 BCE, the world population had stood at 2 million. By the end of the period in 500 CE, it is estimated to have stood at 209 million. This means that for 3500 years, the world population increased by 100 times.[1] More

[1] Acc. to the History Database of the Global Environment (HYDE) https://themasites.pbl.nl/tridion/en/themasites/hyde/index.html

and more people lived in cities with a higher degree of social differentiation fostering *cooperation* and *collaboration*.

From about 3000 BCE, the Mesopotamian states of Sumer, Akkad and Assyria, together with Ancient Egypt and Ebla began using arithmetic, algebra and geometry for purposes of taxation, commerce, trade, etc. – their astronomers conceived calendars, measured time and started to record history. Ancient Egypt coalesced around 3100 BCE with the political unification of Upper and Lower Egypt under Pharaoh Menes. The Egypt empire developed a system of mathematics, a practical and effective system of medicine, its famous architecture, irrigation system and shipbuilding techniques. In Southern India, the Indus Valley Civilization flourished around 2600~1900 BCE in the Indus and Ghaggar-Hakra river valleys (primarily in what is now Pakistan). In China, *Neolithic* cultures originated in various cultural centers along both the Yellow River and Yangtze River. The earliest known written records of the history of China date around 1250 BCE from the Shang dynasty (around 1600~1046 BCE).

In some of the above and other early civilizations, various fields of measuring developed together with a unification of the *measurement units* – e.g., for taxation purposes. The beginnings of metrology as well as the unification of military equipment and organization are often cited as early examples of *standardization* which – at that time – surely was not yet based on proper *terminology standardization*. However, unified *terminologies* pertaining to certain subjects must have existed.

The later part of the above-mentioned period is called the Axial Age (in the sense of a pivotal age) when early 'globalization' was pervasive in many parts of the world. It refers to the history around Eurasia 800~200 BCE, including Ancient Greece, Iran, India, and China. The period saw the rise of Buddhism in India and beyond, Zoroastrianism and Judaism in the Near East and Ancient Greek Philosophy in the west. Widespread trade and communication between distinct regions, facilitated by the emergence of the Silk Road, saw the rise of philosophy and proselytizing religions.

The Axial Age and its aftermath saw large wars and the formation of great empires that stretched beyond the dimensions of earlier Iron

Age societies. Significant for the time was the Persian Achaemenid Empire. The empire's vast territory extended from today's Egypt to Xinjiang (China). The empire's legacy includes the rise of commerce over land routes through Eurasia as well as the spreading of Persian culture throughout the Middle East. The Royal Road allowed for efficient trade and taxation. The Macedonian Alexander the Great (356 ~ 323 BCE) conquered the Achaemenid Empire in its entirety but the unity of Alexander's conquests did not outlast him. Notwithstanding, Greek culture, and technology spread through West and South Asia often synthesizing with local cultures.

In this period, language had already reached a high level of development. Religious and philosophical figures appeared who were searching for meaning in human life. Some thinkers in several parts of the world even had thoughts about the nature of *concepts* or *terms* (as representing *concepts*), but this was not developed into a somehow coherent theory – with one exception: classical Greek philosophy. Plato (428/427 or 424/423 ~ 348/347 BCE) is widely considered the pivotal figure in the history of Ancient Greek and Western philosophy, along with his teacher, Socrates, and his most famous student, Aristotle (384 ~ 322 BCE). Plato's works are believed to have survived intact for over 2400 years and have never been without readers since the time they were written. Aristotle got called the "Father of Western Philosophy". His writings cover many subjects – including physics, biology, zoology, metaphysics, logic, ethics, aesthetics, poetry, theatre, music, rhetoric, psychology, linguistics, economics, politics, and government. Aristotle devised a complex synthesis of the various philosophies existing prior to him. It was above all from his teachings that Western Europe inherited its philosophical *terminology*, as well as methods of inquiry.

Through Aristotle's student Alexandre the Great, his ideas and Greek culture spread over three continents: Europe, (Northern) Africa, and Central and South Asia. Greek became the *lingua franca* far beyond Greece itself, and Hellenistic culture interacted with the cultures of Persia, the Kingdom of Israel and the Kingdom of Judah, Central Asia and Egypt. Significant advances were made in the sciences, notably by Aristotle's followers. This Hellenistic period (323 ~ 246 BCE) which had

started during Alexandre's conquests, was not discontinued by the fragmentation of his empire after his death in 323 – on the contrary, it continued to flourish. As a period, it only ended with the rise of the Roman Republic to a supra-regional power in the second century BCE and the Roman conquest of Greece in 146 BCE. However, at that time the Roman Empire had already been significantly Hellenized.

The Romans preserved, imitated, and spread Greek ideas until they were able to rival Greek culture. The Latin language became widespread, and the classical world became bilingual, Greek and Latin. But Romans also added syncretic "eastern" traditions, such as Mithraism, Gnosticism, and most notably Christianity to the Greek culture – while blending it with their own traditions. Besides, they achieved high levels of technology because they borrowed technologies from the Greeks, Etruscans, Celts, and others, and ingeniously further developed them. The Roman Empire was in fact one of the most technologically advanced civilizations of antiquity, with many advanced concepts and inventions forgotten during the turbulent eras of Late Antiquity and the early Middle Ages.

This Greco-Roman cultural foundation has been immensely influential in languages, politics, law, educational systems, philosophy, science, warfare, poetry, historiography, ethics, rhetoric, arts, and architecture of the modern world. In any case, many *specialized languages* – and their respective *terminologies* – were developed in a more and more systematic way until the fall of the Western Roman Empire in the fifth century CE. Grammatical terminology for example was shaped by the Greek, imparted by the Romans, and largely exists in modern languages today (Funke, 1999:2256) – not to forget the Roman Law whose importance is reflected by the continued use of Latin legal terminology in many legal systems, including common law (see good overview in Hoffmann et al., 1999). The Greco-Roman cultural foundation has been immensely influential in the languages, politics, law, educational systems, philosophy, science, warfare, poetry, historiography, ethics, rhetoric, art, and architecture of the modern world.

The above-mentioned legacy of the Greco-Roman culture had a most changeful history after the Roman emperor Constantine the Great

(272 ~ 337) who reigned Rome 306 ~ 337 decriminalized Christianity and paved the way towards it becoming the State Church of the Roman Empire. Christianity emerged as part of the syncretistic Hellenistic world of the first century CE, which was dominated by Roman law and Greek culture. When the Western Roman collapsed in the fifth century after decades of external attacks and internal turmoil, the Eastern Roman empire became the political and cultural centre of the Greco-Roman legacy. The university that Constantine had founded in Constantinople was reorganized in 425. It became the most important centre of learning in the empire. By the following century, Latin had fallen out of use in Constantinople. Christians and scholars of educational institutions migrating eastward encountered Persian and other high cultures. The medical school in Jundishapur, in western Persia, became a centre for the translation of works in medicine, cosmology, astronomy, and Aristotelian philosophy; the languages involved at various times included Greek, Syriac, Sanskrit, Pahlavi, and, subsequently Arabic (Freely, 2009).

It can be concluded that *collaboration* with respect to creating *concepts* and *terms* must have existed in the period of the early ancient empires not least due to a higher population density in cities and the emergence of complex communities with common cultures and beliefs. Contacts within and between these empires led to geographically far-ranging cooperation in the form of knowledge transfer by means of enhanced trade and political (peaceful and warlike) relations. Already in the early BCE centuries schools of thought developed in different parts of the world, which were cooperating or competing. Some thinkers collaborated with others over large distances and accepted students from far away. Many endeavored to clarify concepts. In the Western part of Eurasia, early roots of philosophical thinking about concepts and terms continued to develop and were passed on to the next generations slowly over many centuries in several languages and across cultural boundaries. Aristotle (384~322 BCE) for instance was keen to clarify *concepts* in all subjects he dealt with (Wenskus,1998) as was the Roman educator Quintilian (about 35 ~ 100) (Laurén et al., 1998, pp. 5ff.).

The following Early Middle Ages (or early medieval period) is regarded as lasting from the late 5th or early 6th century to the 10th century of European history. The alternative term "late antiquity" emphasizes elements of continuity with the Roman Empire. In this period Western Europe saw a continuation of trends evident since late classical antiquity, namely a general decline of the West Roman empire, while the Eastern Roman Empire (or Byzantine Empire), continued to survive, though in the 7th century, the Islamic Rashidun Caliphate (632 ~ 661) and the Umayyad Caliphate (661 ~ 750) conquered large parts of formerly Roman territory. During this period, Western Christianity gradually transformed into its medieval forms as exemplified by the creation of the Papal state, and the alliance between the papacy and the militant Frankish king Charlemagne. The Roman emperor's properties came into the possession of the bishop of Rome, and that is when conversions of temples into churches genuinely began. Nevertheless, many existing libraries and philosophical and scientific knowledge survived. In Western Europe, this early Greek philosophical literature – even when translated into Latin – largely got lost or was forbidden for several centuries after the collapse of the Roman empire (Kintzinger, 2003). However, some antique Greek knowledge survived in monasteries which formed a flourishing network of exchange of knowledge through individual contacts, travelling monks, interchange, or lending of hand-copied books and other material. That exchange even extended (however small-scale) beyond the area of the declined Western Roman Empire.

In the High Middle Ages (around 1100-1300), Europe's population increased greatly as technological and agricultural innovations allowed trade to flourish, and the climate change of the "Medieval Warm Period" allowed crop yields to increase. It was a period of great technological advances. Intellectual life was marked by scholasticism, a philosophy that emphasised joining faith to reason. Individual intellectuals tried to break the chains of ecclesiastic suppression of non-Catholic thinking. Knowledge – especially practical knowledge beyond religious scripts – gradually became an asset for the rulers of countries and the administration of larger cities. As a result, the first universities were

established competing with traditional religious education. The Thomistic reconciliation of the teachings of Aristotle with Christian theology became the predominant school of thought in the 13th century.

The following Late Middle Ages (around 1300-1500) was marked by difficulties and calamities including famine, plague, and war, which significantly diminished the population of Europe. Strong, royalty-based nation-states rose throughout Europe, particularly in England, France, and the Christian kingdoms of the Iberian Peninsula: Aragon, Castile, and Portugal. Secular expert knowledge became required leading to the emergence of a secular educational system. It was a period of great geographical discoveries based on new technological advances in many fields. The first patent law in 1447 in Venice protected the rights of inventors to their inventions. Cultural and technological developments transformed European society (Epstein, 2009).

During the Middle Ages, the ideas of early Greek philosophers were partly re-discovered but largely re-introduced especially via Arabic translations in Western Europe with great impact on Europe's Renaissance period marking the transition from the Middle Ages to modernity (15th ~ 16th c.). They were adopted and adapted to lay the basis for scientific and technological development over the next centuries leading up to the First Industrial Revolution in Europe (1760 ~ 1820/1840) (Freely, 2009). This development was supported in the 13th century among others by the great spread of culture, technology, and ideas along the Silk Road under the Mongol Empire. Trade through the Silk Road area and its branches also brought about considerable knowledge and technology transfer between Europe and Asian empires.

It is noteworthy to recognize the crucial role of Arab philosophers, scientists, and translators particularly from the 9th to the 13th centuries in transmitting Greek, Hindu, and other pre-Islamic knowledge to the Christian West. Monastic reform inspired change in the secular Church which ultimately led to the creation of a papal monarchy separate from and equal to lay authorities. Amazingly, Aristotle's philosophy throughout the centuries exerted a unique influence on almost every form of knowledge in the West and continues to be a subject of today's philosophical discussion worldwide.

Evolving Terminological Activities

The modern era (also called modern period, modern history or modern times) is commonly divided into the early modern period (about 1500 ~ 1800) and the late modern period (1800 ~ 1900/1945). The early modern period overlaps with the Renaissance period (about 1500 ~ 1600). By the 11th century, numerous city-states and maritime republics, mostly in the North of Italy, became prosperous through trade, commerce, and banking, laying the groundwork for capitalism in the modern era. The Renaissance began in Italy and spread to the rest of Europe, bringing a renewed interest in humanism, science, exploration, and art. During the Middle Ages, Italian explorers discovered new routes to the Far East and the New World, helping to usher in the European Age of Discovery. Later Italy's commercial and political power significantly waned with the opening of trade routes that bypassed the Mediterranean. This development also brought about new *terminologies* and terminological thinking.

During the Age of Enlightenment after the Middle Ages, great advances took place in several field of philosophy, natural science and technology: They were mostly accompanied by efforts to clarify *terminology*. Printing technology (invented around 1450) started to boost the exchange of ideas at national and international level which among others led to large-scale national specialized encyclopaedic endeavours in several countries. The person usually referred to in this connection is Denis Diderot (1713 ~ 1784), one of the most important organizers and authors of the French *Encyclopédie* which was a huge endeavor in all respects. Pioneering scientists to be mentioned among others are Leonardo da Vinci (1452 ~ 1519), Nicolaus Copernicus (1473 ~ 1543), Galileo Galilei (1564 ~ 1642), René Descartes (1596 ~ 1650), Blaise Pascal (1623 ~ 1662), Gottfried Wilhelm Leibniz (1646 ~ 1716) – not to forget Isaac Newton (1642 ~ 1727) and Denis Diderot. Newton's publication *Principia Mathematica* (1687) is often regarded as the first major enlightenment work. Some thinkers of this period were also great scientific discoverers or technical inventors.

The above development over more than four centuries prepared the ground for the First Industrial Revolution when widely unified and

harmonized – often multilingual – nomenclatures became a need against the terminology chaos. In fact, the development of modern scientific *specialized languages* had started without established rules and principles in the 18th and 19th centuries. "*The consequence was chaos in the concept systems of almost all scientific disciplines at the dawn of the modern era. … In all subject fields, the natural systems of concepts start to proliferate with an unordered multitude of terms which can be reduced only later.*" (Oeser, 1994, pp. 24 ~ 25) This situation, highly detrimental to scientific and technical development, necessitated the international collaboration of experts towards harmonizing theoretical and methodological approaches, which led to *terminology unification* efforts in various fields of science, for instance the emergence of scientific nomenclatures and taxonomies, such as the *Systema Naturae* (1758) and *Species Plantarum* (1753) of the Swedish botanist Carl Linnaeus (1707 ~ 1778) whose binominal system was rapidly adopted after their publication. This development was supported by the emerging media as well as advances in printing technology, postal services, and later telecommunication. However, industrialization in Europe needed *harmonization* approaches going beyond these *unification* efforts in the sciences. Some of the *unification* efforts grew into big international organizations (such as IUPAC[1]) – or were taken as a model for highly authoritative organizations (such as WIPO[2]). Others were absorbed by the upcoming standardizing activities, which from the very beginning also required the *standardization* of the *terminology* used in standards. In 1875, the International Bureau of Weights and Measures (BIPM) was created in Paris. In 1881, the first International Electrical Congress took place in Paris. In any case, the awareness for the need to engage in international collaboration became evident.

As can be gathered from the above, the strongest impulses for systematic terminological activities emanated from the emerging scientific and technical domains during the First and Second Industrial Revolution when:

[1] IUPAC – International Union of Pure and Applied Chemistry

[2] WIPO – World Intellectual Property Organization

- Latin as *lingua franca* lost ground making way for national languages,
- The mechanization of production transformed into industrial production,
- *Specialized knowledge* – and thus also new concepts and terms – started to grow exponentially (see Laurén et al., 1998, pp. 6ff.).

In 1865, the International Telegraph Union (today: International Telecommunication Union, ITU) was created as the first international standardizing organization for *international standards* to connect national telegraph networks. As consequence of discussions at the 1900 Paris International Electrical Congress and later Congresses, the International Electrotechnical Commission[1] (IEC) was founded in 1906. In 1926, the International Federation of the National Standardizing Associations (ISA) – the forerunner of today's International Organization for Standardization (ISO) – was founded back then primarily focusing on mechanical engineering.

The Second Industrial Revolution (Industry 2.0) which started towards the end of the 19th century is characterized by mass production, also involving raw materials, semi-finished goods, and components from outside to be integrated into the mass production process. Differences in standards between companies were making trade increasingly difficult and strained leading to complaints, such as for instance by an English iron and steel dealer who complained:

> "*Architects and engineers generally specify such unnecessarily diverse types of sectional material or given work that anything like economical and continuous manufacture becomes impossible. In this country no two professional men are agreed upon the size and weight of a girder to employ for given work.*" (The Times[2])

Given increasing needs in industry, the Engineering Standards Committee was established in London in 1901 as the world's first national standardizing body. In standardizing organizations, it was soon recognized that *"you cannot properly standardize any subject matter if*

[1] See How & why the IEC was started | IEC

[2] towards the end of 19th century; retrieved 2022-12-19 18:39 UTC: https://en.wikipedia.org/w/index.php?title=Standardization&oldid=1120586543

you do not clearly know what you are talking about" (as later formulated by Wüster 1970a).

Soon after 1900, the Association of German Engineers contracted an expert in German language studies for the task of collecting all *terminology* existing in the German language in the *VDI-Technolexikon*. In 1907, the first results were evaluated, and found that it would need another 40 years to complete this compilation if the alphabetical approach chosen were continued. Discovering that the new method of classified order of the German engineer Schlomann is superior to traditional lexicographical methods, the VDI stopped work on the Technolexikon and started to support Schlomann who 1907 ~ 1932 published – in international collaboration with trained *terminologists* – 17 *Illustrierte Technische Wörterbücher* [Illustrated technical dictionaries] in six languages in different subject fields based on guidelines conceived by him (Felber/Budin, 1998, 140). They followed a classified order and contained many figures. IEC started pre-systematic work on *terminology* in 1908 but switched to a structured approach in 1927 resulting in the 1st edition of the International Electrotechnical Vocabulary (IEV) in 1938. The current content of the IEV is accessible today online through IEC's "Electropedia".

Triggered by the publication of Eugen Wüster's (1931/1970b) dissertation *Internationale Sprachnormung in der Technik* [International standardization of technical language], ISA 1936 established a Technical Committee ISA/TC 37 *Terminology* to formulate general principles and rules for *terminology standardization*. ISA planned four classes of future recommendations:

1. Vocabulary of terminology
2. Procedure for preparing national or international standardized vocabularies
3. National and international standardization of concepts, terms, and their definitions: principles for their establishment and criteria of value
4. Layout of monolingual and multilingual vocabularies, including lexicographical symbols.

The awareness grew that whenever a systematic approach was chosen for t*erminology work*, it needs to be based on explicit principles and methods. No wonder that the *prescriptive approach* in *terminology work* emerged in *terminology unification* and *technical standardization* largely involving technical *domain* experts. The discussions in ISO/TC 37 can be seen as one of the roots of *terminology science* starting out of *technical standardization*.

As *standardization* is a prime example of collaboration among experts, the same applies to *terminology standardization* as it evolved over the years. This collaboration today takes place in a complex *standardization* ecosystem of *standards developing organizations* (SDO):

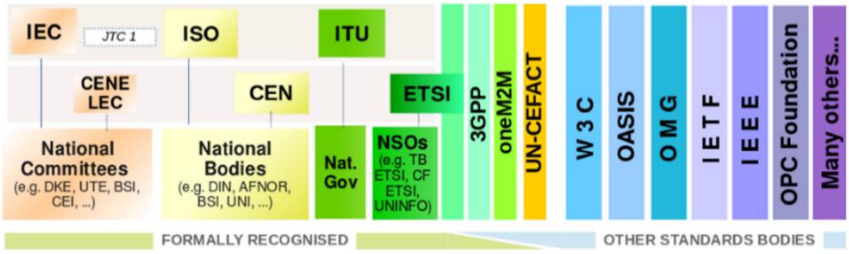

Figure: High-level Overview of the global standardization ecosystem (Conte 2019)

Everywhere in this ecosystem *terminology standardization* takes place.

Infoterm and Terminology Standardization after WWII

Officially, ISO began operations in 1947 and established ISO/TC 37 *Terminology (principles and coordination)* as one of its first technical committees (French, 1985). When ISO/TC 37 was in danger of being disbanded because of inactivity, Wüster made great efforts to save the committee and had it re-installed in 1951 under his chairmanship on behalf of Austria. This date happens to coincide with the beginning of the *Third Industrial Revolution* in 1954 if electronic automation[1] is taken as its starting point.

Terminology standardization can be divided into two distinct activities: standardization of terminologies and standardization of termi-

[1] The Third Industrial Revolution started in 1969 if the first programmable logic controller is taken as its starting point.

nological principles and methods for *terminology standardization*. After the establishment of Infoterm in 1971, the development phases of ISO/TC 37 and Infoterm largely converged, starting with the foundation phase of ISO/TC 37 (1952 ~ 1980) and Infoterm (1971 ~ 1980). The following paragraphs summarize the development of *terminology standardization* at international level which is closely related to the history of ISO/TC 37 and Infoterm whose development phases largely coincide with the respective decades, though certain developments may have started earlier or set in later by a few years.

Work in ISA/TC 37, interrupted by World War II, was resumed in the framework of ISO/TC 37 after the committee became operational in 1952. It started with an adapted ISA/TC 37 scheme of planned recommendations (ISO/R) and took more than 15 years before five ISO/Rs and one ISO standard were published (Felber et al., 1979a):

- ISO/R 1087:1969 *Vocabulary of terminology*
- ISO/R 919:1969 *Guide for the preparation of classified vocabularies*
- ISO/R 704:1968 *Naming principles*
- ISO/R 860:1968 *International unification of concepts and terms*
- ISO/R 1149:1969: *Layout of multilingual classified vocabularies*
- ISO/R 639:1967: *Symbols for languages, countries and authorities*
- ISO 1951:1973 *Lexicographical symbols particularly for use in classified defining vocabularies.*

When Infoterm was established in 1971, Helmut Felber (1925~2005) became the first Director of Infoterm and assumed the role of Secretary of ISO/TC 37. Both Wüster and Felber cooperated with ISO Central Secretariat, e.g. in the process of developing the early versions of the *Directives for the technical work of ISO* and of the ISO Guide 2:1983 *General terms and their definitions concerning standardization, certification and testing laboratories* (4th edition). The two-page section on terminology in the early ISO Directives began with the statement:

> "*Terminology may appear as an independent vocabulary standard or as part of a standard dealing also with other aspects. When preparing terminology standards, the principles and methods related thereto as established by ISO/TC 37 shall be followed whenever applicable*."

Parallel to the activities of ISO/TC 37, Infoterm engaged in *information and documentation* (I&D) activities in the *field of terminology* including aspects of *terminology standardization*. In 1977, the first edition of the *World Guide to terminological activities* was published (Krommer-Benz, 1977), resulting 1979 in the second edition of the *International Bibliography of standardized vocabularies / Bibliographie de vocabulaires normalisés/Bibliographie der Normwörterbücher* (Felber et al., 1979b). For the sake of international cooperation, the first Infoterm Symposium on *International co-operation in terminology/Coopération internationale en terminologie* (Infoterm, 1976) was organized in 1975 under UNESCO auspices.

After 1979 up into the 1990s, Infoterm continued to collect data on:

- general vocabularies (also including "hidden glossaries", comprising a significant number of entries as part of a scientific article, book or journal),
- standardized vocabularies (also including subject standards with a substantial number of entries in their clause on terms and definitions),
- authors and institutional developers as well as publishers of such data.

In addition, Infoterm started extensive publication activities and engaged in numerous consultation activities under its UNESCO mandate.

In the following consolidation phase 1980 ~ 1990, *terminology standardization* became an attractive topic, not least due to the international Terminology Summer School (TSS) organized by Infoterm in 1982, the publication of Felber's (1984) *Terminology Manual,* and many project activities for UNESCO and European institutions. The number of experts delegated from national SDOs to participate in

ISO/TC 37 *standardization* activities increased – even the industry got interested. This spawned a restructuring of ISO/TC 37: SC 1 *Principles and methods* established in 1980, SC 2 *Terminology workflow and language coding* in 1983, SC 3 *Management of terminology resources* in 1985. Not least due to its first annual meeting week outside of Europe (1989 in Tunis), ISO/TC 37 had started to open beyond European perspectives considering other linguistic and cultural traditions in its standards. New working items indicated a shift towards application-oriented approaches. This and the following offered opportunities for recruiting new experts for ISO/TC 37 *standardization* activities.

Towards the end of the 1980s "terminology" started to become a topic of strategic interest especially in Europe where machine translation and multilingualism was high on the political agenda. This allowed Infoterm to establish the Association for Knowledge Transfer (GTW) and to organize the first international conference on *Terminology and Knowledge Engineering (TKE)* in cooperation with the European Commission in 1987. In 1988, the International Network for Terminology (TermNet) was founded with the support of UNESCO, followed by the establishment of the International Institute for Terminology Research (IITF) in 1989.

New formal cooperation agreements to organizations in many countries of the world led to the intensification of conference and publication activities. Several national and regional networks, such as ARABTERM, ASS.I.Term (Italy), JTA (Japan), NORDTERM, RITerm and Rint (Iberoamerica) were established facilitating bi- and multilateral projects of all sorts. This led to the expansion phase 1990 ~ 2000.

By 1990, an increasing number of SDOs were demanding principles, rules and guidelines for *terminology standardization*. Given the imminent development of parallel – possibly conflicting – rules and guidelines for *terminology standardization*, the international standard 10241:1992 *International terminology standards – Preparation and layout* was published in 1992. This publication triggered the revision of ISO 704 which finally resulted in its second edition ISO 704:2000 *Terminology work – Principles and methods* in 2000. ISO 10241 had a great impact on the "professionalization" of *terminology standardization*

in ISO and beyond. In ISO/TC 37, the number of standards published (or under development) reached more than fifteen. A similar atmosphere of departure as in ISO/TC 37 also took place at the international level – especially in policies and activities of the organizations of the UN system. Infoterm members in collaboration and coordination with ISO/TC 37 experts endeavoured to firmly integrate the topics of terminology and terminological methodology *standardization* into the general discourse going on at policy levels in the 1990s.

In addition to the above, major research topics in the 1990s were, among others, multilingualism and digital content, accompanied by a general shift in discourse from "information society" to "knowledge societies". At the European level Infoterm participated in the planning and implementation of the Multilingual Action Plan (MLAP), Multilingual Information Society (MLIS) up to the eContent Programmes parallel to the EU's Fourth and Fifth RTD Framework Programmes[1]. Since then, all EU projects must consider multilingual and terminology aspects. Infoterm members and ISO/TC 37 experts were involved or regularly informed about these developments also impacting *standardization* activities in ISO/TC 37.

After initiating the EU project *Proposals for an Operational Infrastructure for Terminology in Europe* (POINTER) in close cooperation with TermNet within the EU's MLAP (Multilingual Action Plan) framework, Infoterm organized the EU project *European Network of Terminology Information and Documentation Centres* (TDCnet) under MLIS (Multilingual Information Society Programme) in 1998. The projects were also ideal for promoting ISO/TC 37 standards and recruiting new experts for ISO/TC 37 activities. Thus, the activities of the 1990s paved the ground for new dynamics in the first expansion phase 2000 ~ 2010 in the new millennium.

Not least due to the TDCnet activities and in close cooperation with the European Language Resource Association (ELRA) the new ISO/TC 37/SC 4 *Language resource management* was established in 2002 with the scope: *"Standardization of specifications for computer-assisted*

[1] Framework Programmes for Research and Technological Development of the European Union

language resource management". Consequently, the title of ISO/TC 37 was adapted to *Terminology and other language resources*. The activities in this decade resulted among others in more than doubling the number of ISO/TC 37 standards primarily by adding new standards concerning aspects of language resource management, since SC 4 was actively involving many new experts from language technologies fields. ISO/TC 37 gradually gained recognition as one of the nine ISO/TCs working on horizontal subjects. This not only had an impact on the revised ISO/IEC *Directives* but also on many SDOs at international, European, and national levels. Moreover, international organizations like OECD, UNESCO, WHO, FAO, and other organizations of the UN system modernized their approaches concerning their *terminological data* and its best application for several purposes – and to collaborate among each other for this objective. Some of them joined ISO/TC 37 activities as international liaisons.

The developments during this phase were largely reinforced by UNESCO activities concerning language related issues, such as endangered languages, cultural heritage, language rights, etc. in which Infoterm was actively involved. In 2003, UNESCO released the *Recommendation concerning the Promotion and Use of Multilingualism and Universal Access to Cyberspace*[1]. In 2005, the General Assembly of the United Nations proclaimed 2008 *International Year of Languages* (IYL) and designated UNESCO as the lead agency. Timely in 2005, the *Guidelines for terminology policies. Formulating and implementing terminology policy in language communities*[2], prepared by Infoterm were published by UNESCO (Infoterm, 2005). In 2009, Infoterm was tasked with coordinating the activities for a *Feasibility Study for the establishment of a Cyber Network for Learning Languages (CNLL)*[3] and

[1] Recommendation concerning the Promotion and Use of Multilingualism and Universal Access to Cyberspace | UNESCO

[2] Guidelines for terminology policies: formulating and implementing terminology policy in language communities - UNESCO Digital Library

[3] Report by the Director-General on the proposal for the establishment of a cyber network for learning languages - UNESCO Digital Library

organized or co-organized several events related to strategic language issues in cooperation with UNESCO.

At the start of the second expansion phase (2010 ~ 2020), Infoterm reorganized its work towards engaging in strategic topics with a need for terminological approaches: a) communication with and among persons with disabilities, b) multilingual eCataloguing and eClassification in eBusiness to facilitate cross-border eProcurement, c) making competing ontology approaches interoperable through the development of an ontology metalanguage for distributed knowledge representation, and d) certification schemes related to the above. Each of these new foci resulted in standards documents, some also in certification systems. But also beyond this, Infoterm continues to support ISO/TC 37 in many ways. In 2012 for instance, ISO/TC 37/SC 5 *Translation, interpreting and related technology* was established out of an activity in the European Committee for Standardization (CEN), in which Infoterm was involved. This subcommittee largely contributed to the *standardization* achievements of ISO/TC 37, which reached more than 60 published international standards by the end of 2019.

Infoterm continues to advise SDOs on *terminology standardization* and the potential of a microcontent approach to the increasing number of database standards for the sake of higher efficiency in standards development, promotion and marketing, as well as a higher average quality of the content of standards deliverables. Infoterm activities further include advice to international organizations of all sorts in questions of terminology policies and strategies, assistance to national institutions and experts in their terminological activities, and informal coordination of related (or potentially related) *standardization* activities. ISO/TC 37's success story indicated above continues also after 2020 –the end of 2022, 78 standards have been published and most of the ongoing 33 at projects concern the development of new standards.

Best Practice in Terminology Collaboration

As a follow up of an investigation in the 1980s, the author (Galinski/Reineke, 2011) roughly estimated the total number of all scientific and technical *concepts* adding up to 30 million – duly considering the

increasing number of new subjects, the assumed average annual *specialized knowledge* growth at around 10% depending on the *domain* or *subject*, and also considering the unceasing increase of inter-, trans-, and multidisciplinary fields). The estimate in 2011, amounted to around 100~150 million *concepts*. Given the accelerated growth of scientific and technical knowledge, this figure may well exceed 500 million today. Apart from that, the number of scientific and technical *concepts* is increasing at a much higher degree than *general language* vocabulary. For reasons, such as that many *concepts* only appear in texts, not in vocabularies or databases of structured content, precise estimates are difficult.

The above aggravates an old problem for *terminology* users: limited accessibility to qualified *terminological data*. In fact, there is a striking discrepancy between the enormous real figures of existing terminologies and the potential accessibility to the respective entities through the Internet. In addition, it is often difficult to recognize or assess the quality of *terminological data* in existing data collections. In this connection, the organized efforts carried out to maintain some international scientific *nomenclatures* (which account for a large share of *terminological data*), can be considered as a best practice of *terminology collaboration*.

Nomenclatures are systems of names or *terms* (and the rules for forming them) in a particular field of science or technology. To some extent *nomenclatures* overlap with systematically organized sets of proper names or proper nouns which are subjects of *onomastics*[1]. As already mentioned, the first large-scale *collaboration* in terminological endeavours occurred in the field of scientific *nomenclatures*. In this connection, Carl von Linné (1707 ~ 1778) can be called the forefather of

[1] Onomastics is the study of the etymology, history and use of proper names. The latter can be found in current coding systems for names of countries, languages, harbours, airports, rivers, mountains, etc. some of which are subject of highly authoritative *unification* or *standardization*. In eCommerce/eBusiness/eTrade coding systems for ships, containers, airplanes, etc. are indispensable. Considering Note 1 to entry to *designation* in ISO 10241-1:2011 reading "*In terminology work three types of designation are distinguished: terms, symbols and appellations.*", scientific nomenclatures and systems of proper names or proper nouns can be considered as *terminologies*.

terminology science with his work *Fundamenta botanica* (1736) where he systematically collected nearly thousand *terms* used to scientifically describe plants (see Oeser/Picht, 1998). Today there are more than ten major huge international *nomenclature* codes in biology, medicine, astronomy, chemistry, and others in fields like metallurgy, physics, archeology, etc. Some are called *classification*, such as those of the *WHO Family of International Classifications*, or the international and regional or national statistical *classifications*. Originally meant to unify names at international level, some *nomenclatures* or *classifications* similar to *nomenclatures* today are multilingual. Some of them or parts thereof are standardized – sometimes in series of standards, such as the extensive ISO and IEC 80000 series *Quantities and units*. Given the volume of some of the *nomenclatures*, they encompass probably more than two thirds of all scientific or technical *concepts*. In September 2009, for example, the Chemical Abstracts Service (CAS) had registered 50 million organic and inorganic substances. In May 2011 the number of registered substances hit the 60 million record. In October 2022, a Georgian expert of chemical documentation informed the author that the number of chemical substances has reached 160 million.

Most of the major *nomenclatures* today are freely accessible but cross-database search is limited. In any case, they are highly successful best practice endeavours involving probably tens of thousands of experts in their maintenance.

Terminology cooperation in the fields of the language industry can be taken as another case of best practice. After World War II, the organizations of experts dealing with language services on the one hand, and with library *classifications*, *thesauri,* and other kinds of *controlled vocabularies* on the other hand, faced increasing difficulties to find documents and publications in the exponentially growing number of documents in more and more languages. No wonder, the International Federation for Information and Documentation (FID) and the International Federation of Translators (FIT) supported E. Wüster's efforts to establish Infoterm after WWII.

Instead of card files, all kinds of information systems and language technologies are used today – not to forget *terminology management*

systems. Considering the complementarity of *theme classification* (e.g. in the form of library classification schemes) and *terminology* regarded as *concept classification* (Wüster, 1971) some language technologies are also dealing with *terminological data* or information similar to *terminologies* for rendering services. Software tools developed for this purpose can be seen as products or services depending on the way they are used. However, many products and services are commercialized in these fields. The tools – especially the high-end ones – are costlier the more complex they are. With rather few exceptions, the *terminologies* or information similar to *terminologies* is usually not freely accessible. The European Union with its official *terminology databank* IATE is one of the positive examples since everybody is allowed to use it, even for commercial purposes. Thus, the institutions of the European Union are setting a good example for the officially promoted FAIR[1] principles, whereby data should be findable, accessible, interoperable, and reusable.

However, language services and the language industry are cooperating in developing products (including terminological and similar data) and a variety of software tools on the one hand, and offering services, such as data provision, translation, and interpreting, technical documentation and communication, all kinds of support services (incl. certification schemes) on the other hand. This *cooperation* largely occurs in a fragmented way, mostly leading to restrictions for accessing *terminologies* and similar information.

Possibly so far, the most successful best practice of *terminology collaboration* is the field of *standardization*. In most technical committees of the international SDOs *terminology standardization* is done in an increasingly systematic way. Experts involved in *terminology standardization* at international level – also including international standards setting organizations, such as WHO, UNESCO, UNECE, etc. – amount to several ten thousand. Including several hundred SDOs at the national level and industry consortia, the number becomes a multiple. And the number of potential users is huge, as standards (viz. technical

[1] FAIR - collection of guidelines by which to improve the Findability, Accessibility, Interoperability, and Reusability of data objects

regulations) have gained a position as complementary to the law (viz. legal regulations).

The respective terminological and similar data are often freely accessible, as they are a main way for users to find pertinent standards. The rules and tools supporting *terminology standardization* are gradually improving. Unfortunately, the number of standardized *terminological entries* is not that big compared to the total number of scientific and technical *concepts*. Given new initiatives to reform the operation of SDOs, it can be expected that *standardized terminologies* will sooner or later be improved in quality and increased in number, as well as increasingly made freely accessible.

Considering the inherent limitations of the above-mentioned best practices, the educational sector potentially could become the largest best practice in *terminology collaboration*, as it encompasses nearly everybody at least at some time in their life. In addition, there is formal or informal instruction in nearly all *domains* and *subjects*. According to investigations around 2000 certificates, grades, or diplomas for knowledge or skills in more than 30,000 subjects can be acquired. Including micro-certificates, the number is much higher. As knowledge and skills most often are acquired by being taught or instructed or by self-learning – a process which increasingly lasts for the whole life in the form of life-long learning (LLL) – the need for *terminologies* and similar information is widespread. Nevertheless, the degree of terminology collaboration by teachers as well as students in the traditional educational sector is comparatively low.

What could improve this situation both for instructors and learners on the one hand and for society at large on the other hand? Among others

(1) Efforts are needed to make terminology endeavours more attractive and make good *terminologies* freely available.
(2) Better tools are necessary to support *terminology work*, to organize continuous maintenance and updating, low-cost supply of tools to all potential users and free access to *terminological data*.
(3) Potential stakeholders should be involved in supporting *terminology collaboration*.

It would be worth a comprehensive national effort in terminology collaboration taking the educational sector as a testbed. The numbers of instructors and learners involved in teaching, learning, or training at any time amount to a high share of the population of a country. If they are provided the societal recognition and technical support, as well as the conviction that *terminology collaboration* is good for themselves and for society at large, it could result in solving several existing issues addressed above thus greatly benefitting the whole society.

Outlook

Modern society is strongly governed by science and research, technology (especially the ICTs), industry and trade, not to forget astounding advances in medicine and medical technology, and many other fields. *Terminology science* and *terminologies* are fundamental for all *domains* and *subjects*. There is no *specialized knowledge* without specialized *concepts* represented by *terminology*. *Terminologies* increase in line with the exponential increase of *specialized knowledge* in an ever-growing number of *domains* and *subjects*. This quantitative and qualitative growth increasingly necessitates the systematically organized development of *terminology infrastructures* for the benefit of society at large. Such *terminology infrastructures* must be grounded on broad *collaboration* to be effective. In this connection, Infoterm is pleased to recognize that *collaboration* in the *field of terminology* is increasing steadily and that the level of professionalism of experts involved in terminological activities is greatly improving.

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საკვანძო სიტყვები: თანამშრომლობა ტერმინოლოგიაში, დარგობრივი ენები, ადამიანის ტვინის განვითარება, ტერმინოლოგიური მეცნიერება, ტერმინოლოგიური მეთოდოლოგია, ტერმინოლოგიის სტანდარტიზაცია, ინფოტერმი, ISO/TC 37, ტერმინოლოგიაში თანამშრომლობის ისტორია, ტერმინოლოგიური თანამშრომლობის საუკეთესო გამოცდილება.

შეთანხმებული მუშაობა და თანამშრომლობა ტერმინოლოგიაში

შეთანხმება და თანამშრომლობა ტერმინოლოგიაში სამეცნიერო ლიტერატურის ინტერესის სფეროდ მხოლოდ მეორე მსოფლიო ომის შემდეგ იქცა, თუმცა ის ბევრად უფრო ადრე, ჯერ კიდევ მაშინ უნდა წარმოქმნილიყო, როცა ადამიანებმა გაიაზრეს დარგობრივი ცნებების მნიშვნელობა. ეს, ალბათ, კაცობრიობის წარმოშობისთანავე მოხდა. შემეცნებითი აზროვნება არის ადამიანის გონების ბუნებრივი ნაწილი, სწორედ ის, რაც მას განასხვავებს სხვა ცოცხალი არსებებისაგან. ამგვარად, დარგობრივი ურთიერთობის თავდაპირველი ფორმა სამეტყველო ენის განვითარებამდეც უნდა არსებულიყო. მხოლოდ დამწერლობის სისტემების ჩამოყალიბების შემდეგ გაჩნდა მასალა, რომელზე დაკვირვებითაც შესაძლებელია დარგობრივი ენის განვითარებაზე თვალის მიდევნება. ამან ერთდროულად განაპირობა ორი რამ: ადამიანის გონებრივი შესაძლებლობების წინსვლა და მასთან ერთად განვითარებული საზოგადოებრივი წყობის შექმნა. მრეწველობის სწრაფი განვითარების კვალდაკვალ გაჩნდა სხვადასხვა ენაზე ტერმინოლოგიის შესამუშავებლად ქვეყნებს შორის თანამშრომლობის აუცილებლობა. ეს განსაკუთრებით შეეხებოდა ტერმინოლოგიის მეთოდოლოგიის საკითხებს, რამაც საბოლოოდ ხელი შეუწყო კიდეც ტერმინოლოგიის, როგორც მეცნიერების, განვითარებას, ასევე სხვადასხვა ტერმინოლოგიური ორგანიზაციისა თუ ინსტიტუციის ჩამოყალიბებას მთელ მსოფლიოში. სამეცნიერო და ტექნიკური ცნებების თვალსაჩინო ზრდის გათვალისწინებით ყველა დარგსა თუ საგანში, აუცილებელია ტერმინოლოგიური ურთიერთობისა და თანამშრობლობის გაღრმავება სხვადასხვა მიმართულებით.

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„სამღვდლო კონდაკის“ რამდენიმე ტერმინისათვის

მეუფე იოანე გამრეკელის, ქუთათელ-გაენათელი მიტროპოლიტის, ლოცვა-კურთხევით, გამოსაცემად მზადდება „სამღვდლო კონდაკის“ ახალი რედაქცია. ამჟამად საქართველოს მართლმადიდებლურ ეკლესიაში გამოიყენება 1899 წელს ექვთიმე ხელაძის სტამბაში დაბეჭდილი „კონდაკის“ძველი გამოცემა. ამის საჭიროება დიდი ხანია, დგას ქართულ ეკლესიაში, რადგან ამ გამოცემაში გარკვეული ენობრივი თუ სხვა უზუსტობები იჩენს თავს, რომელთა გამოსწორებაც, ვფიქრობთ, ბევრად გაუმარტივებს მღვდელს წირვის წარმართვას.

„კონდაკის“ წინამდებარე გამოცემის სარედაქციო ჯგუფმა რედაქტირება წარმართა ფონოლოგიური, მორფოლოგიური, სინტაქსური, ლექსიკური, ორთოგრაფიული და პუნქტუაციური მიმართულებით, ასევე მოხდა ტექსტის კორექტირება. გარდა ამისა, ძველი კონდაკი სტრუქტურულადაც მაქსიმალურად შემცირებულია, რაც გამოწვეულია თავის დროზე ქაღალდის, დროისა თუ რესურსის ეკონომიის გამო. შემცირება გულისხმობს იმას, რომ ზოგიერთი რამ ტექსტში დაქარაგმეულია (აქ იგულისხმება ისეთი ქარაგმების ჭარბი რაოდენობა, რომლებიც ტრადიციულად არ გამოიყენებოდა). ასევე, რადგან, მაგალითად, იოანე ოქროპირისა და ბასილი დიდის წირვა სტრუქტურულად თითქმის ერთნაირია, ისევ ეკონომიის მიზნით, ბასილი დიდის წირვა ძველ კონდაკში შემცირებულია და მღვდლისთვის არის მითითება, რომ წირვის დროს გამოიყენოს იოანე ოქროპირის წირვის ტექსტი. ახალ კონდაკში ეს ადგილები შესაბამისი ტექსტებით შეივსო. ასევე, დიდი სამუშაო ჩატარდა პირველშეწირული ლიტურგიის გა-