The Foundation for Indigenous ICT in Ethiopia
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Abstract

Ethiopia's standards body, the Quality and Standards Authority of Ethiopia, has legalized the nation's first character set standard. The highly anticipated standard, ES 781:2002, sets the foundation that future computer, software, and electronic communication standards of Ethiopia will be built upon.

With "Ethiocode" now at hand, Ethiopia is braced to take on much awaited standards for localization and native language support. While working towards international acceptance of the new character set, this next phase of work is already underway.

ES 781 specifies all symbols required for orthography in every part of the country. The standard includes the 345 "basic" characters found already in Unicode 4.0, plus it introduces 114 characters targeted for the "Extended Ethiopic" domain of the Unicode Roadmap. While perhaps new to electronic standardization, a number of the "extended" elements have been in active use for over 1400 years and may present some new software challenges. This paper reviews these new characters, standards activity in Ethiopia and their implications over the next few years.

Introduction

"Ethiopic", as we know it in Unicode 4.0 today[1], is not the character set of any single language. Rather, Ethiopic in Unicode is the collection of character sets used by Ethiopia's three most spoken and widely known languages. The Ethiopic specification was carefully considered and was designed to meet the broadest needs that available and reliable information could allow. Indeed it has proven itself to be a solid foundation for an electronic orthography. While devised with the best information available at the time, it was fully anticipated that, as a specification built around the requirements of only a few languages from a land with nearly ninety, it would eventually have to be updated. No such revision could be considered, however, until information became available that was at least as reliable as that of the initial or "basic" set. In the decade that has passed since the basic range was defined, this authoritative data now lies before us.

As would certainly be the case for a unified character set of Europe, the average person will be familiar with only those characters required for the rendering of his or her own language and will most likely be oblivious to different needs and practices of neighboring languages and regions. It should come as no surprise then that Ethiopic letters elements in use by communities distant from Ethiopia's capital, where the bulk of publishing and computer use occurs, could go unnoticed for an extended period, even at the level of the national government. At the local level however, there can be no such lack of awareness. In fact the local governments are an integral part of adopting new symbols.

During the previous ruling regime, 1974-1991, the government maintained tight control over all publishing, and no materials could be printed and distributed unless reviewed and approved by government censors. During this period the government employed censors only for Ethiopia's three most spoken languages: Amharic, Oromigna, and Tigrigna. Needless to say this policy had a negative impact on the development of literature for societies just beginning to modernize and encountering increasing need for mother tongue written materials. This societal pressure, and momentum from efforts underway before the change of regimes, lead to clandestine literature that employed new syllables –the Sebatbeit New Testament, "ገደር ጉርጻ", being perhaps the largest such example. In later years the government was behind, and maintained control over, the development and promotion of new symbols as part of a national literacy campaign.

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[1] Ethiopic became part of the Unicode standard in version 3.0.

During the twentieth century, efforts emerged in cycles of roughly 10-15 years with the aims of reforming or extending the Ethiopic syllabary in some way. Efforts born of government agencies or academicians have been met with the least success as their approach has been to prescribe an orthography for a particular purpose or perceived need. Ethiopic has been more accommodating when the need for revision (and only for extensions) has come from within the community it would serve.

Following the arrival of the new government in 1991, press laws were reformed and regional governments were given greater autonomy. While Amharic publications have flourished with over 150 private newspapers appearing in thirteen years, the stigma of publishing in one's own language as "a bad and forbidden thing that leads to jail" was slow to die during the '90s in the psyches of the nation's once prohibited languages. In a few cases an outright backlash has occurred in communities where they have felt Amharic was imposed upon them for nearly twenty years as a form of cultural repression. Flexing new found political might and seeking cultural identity these groups have striven to abandon most everything associated with Amharic, including Ethiopic script, and have adopted Latin script as their orthography. This transition is ongoing and has not been without internal turmoil as one basis of a society's literacy has been swept away for another.

Other groups, as the legacy of fear diminishes, have opted to put the same fervor into embracing and extending Ethiopic for the needs of their own languages. These efforts include taking stock of a language's phonemic inventory and employing the redundant symbols of Amharic orthography to carry additional phonemes. These efforts also include making use of syllabic elements introduced thirty years earlier or more while refining typeface attributes and devising new syllographs when necessary.

The Ethiopic orthographies have the invariant trait of "one letter, one sound". The practice, as with English, of combining letters to represent additional sounds *(e.g. 'th' for 'θ')* is unknown in Ethiopic traditions. Were the practice started for one language there would be an incompatibility with the national language and two contextual conventions would have to be learnt by readers of the minority language. Inventing new symbols to maintain the "one letter, one sound" relationship has to date always been preferable. Ultimately, to be of any real use to society new orthographies have to be adopted into school systems and government bureaus. Local government must first approve a new orthography before it can be adopted into the school system's curriculum and be used in the production of primers and other printed materials for education.

The 1990s have very much been a time of transition for Ethiopian society. In twenty years three major upheavals in government have occurred, Eritrea, the northernmost region has broken away to become an independent nation (and later a war adversary), the ongoing modernization of rural societies, demobilization of nomadic peoples, encroaching industrialization, political turmoil, an ever changing legal system and cultural revolutions have been the backdrop for which literary practices have had to struggle to develop. Ethiopia was not in a position to participate in the definition of the Unicode standard for Ethiopic during the early '90s, a time when computers in Ethiopia could be counted in the low thousands. The arrival of the Internet in early 1997 helped bring about awareness and appreciation of character encoding problems as once isolated computers were now able to exchange data with one another readily. The availability of operating systems capable of supporting Unicode likewise aided in assessing the adequacy of Unicode for Ethiopian society through practical use.

These two factors, coupled with explosive growth in computer use in the public, private and government sectors, lead to the realization of the value and need for standards in electronic media. Outside of the comparatively small scientific community, computers and the Internet meet their greatest utilization as instruments for composing, manipulating, and exchanging textual data. The character, as the smallest component of text, becomes the atomic element upon which other standards are built upon. For example: input methods, collation, localization, etc. Accordingly, standardization efforts in Ethiopia began by examining this foundation level. Doing so would build as strong a basis as possible for all standards that would follow. The fundamental question that had to be answered first was: *"What is Ethiopic?"*

ES 781:2002 aka "Ethiopic"

In October of 2002 Ethiopia's standards body, the Quality and Standards Authority of Ethiopia, legalized the nation's first character set standard. This new standard, ES 781:2002 represents the first time the national government has recognized a comprehensive standard for Ethiopic script. Primarily intended for electronic information interchange, the standard provides a national character set for all media and environs, electronic or otherwise.

"Ethiocode", a colloquialism for ES 781:2002, includes letters in addition to the Unicode set required for the languages: Awngi, Me'en, Mursi, Qimant, Suri, Sebatbeit (or "Chaha"), Xamtanga, and Blin (spoken in Eritrea). The 114 additional symbols also provide intonation marks used by the Ethiopian Orthodox Church for their liturgy.

The road to Ethiocode goes back to 1997 and the formation of the Ethiopian Computer Standards Association (ECoSA) which was established specifically to work on standards definitions for Ethiopic script and languages in a liaison role between the government and the private sectors. ECoSA shortly came to the realization that before such standards for Ethiopic could be developed that "Ethiopic" itself would have to be defined. In pursuit of this underlying definition the QSAE and ECoSA hosted a workshop on the subject of the character set on July 4, 1998 at the QSAE headquarters in Addis Ababa [9]. The workshop was well attended and valuable input was contributed that lead to future meetings and informational contributions.

Shortly following the workshop, ECoSA was encouraged to provide input and a representative for an ISO 10646 working group meeting to be held in the following October. While members were ultimately not able to attend, the office of the prime minister did take the matter very seriously and assisted in the collection of data from the regional governments. More questions arose during this process than there was time to adequately resolve before a proposal had to be submitted for the ISO meeting. On September 11, 1998 (coincidently New Year's Day of 1991 in Ethiopia) the document that became ISO/IEC JTC1/SC2/WG2 N1846 was submitted for the working group's consideration.

N1846 was never pushed from the Ethiopian side, in part from the uncertainty surrounding certain elements as well the availability of personnel to address lingering issues. Once fast paced, character set activity cooled for a period until late 2000 when the QSAE formed the subcommittee QSAE/TC1/SC7. The subcommittee's mandate would be to continue the national character set movement and arrive at a national standard. The subcommittee produced a draft proposal and held a one day meeting on March 30, 2001 to present it to the public. Feedback was incorporated into the proposal producing a second draft (CD 5214:2001) that was completed on November 30th of the same year. The document became an official Draft Ethiopian Standard (DES 5214:2002) and was widely circulated for public comment.

DES 5214:2002 was circulated amongst 55 government and non-government organizations as well as concerned professionals within Ethiopia [11]. A public announcement was made in the nation's most widely available newspaper, "Addis Zemen", where 11 new requests for review copies were received from professionals and organizations [11]. The draft standard is also notable in that it became the first standard proposal of Ethiopia where solicitation for comments was sought over the Internet, through the QSAE's new homepage (http://www.qsae.org/). Intended to serve as Ethiopia's first standard for electronic interchange of Ethiopic text it was somehow fitting that it be developed, at least in part, over the medium it was intended to serve. A deadline of March 6, 2002 was initially set for Internet comments. Response was so overwhelming that the deadline was extended three weeks to March 27th.

Altogether 126 pages of comments from home and abroad were compiled into a new document, QSAE/TC1/SC7/N12. The feedback was reviewed within the QSAE and amongst the committee members and on April 18, 2002 a one day meeting was held where the working group debated final points with selected commentators to arrive at the standard [10]. The first addition of ES 781:2002 was legalized October 2, 2002 [11].

Why ES 781:2002 is Significant

With ES 781:2002 Ethiopia now has a legal document that defines for the country precisely what Ethiopic is. ES 781 is a "national alphabet" agreed upon by all sectors of society that is may serve as the basis for education materials, typography references, requirements for electronic devices (such as cell phones) and of course the basis of future standards. The Ethiocode standard also includes punctuation from Latin script that has been determined essential to the modern orthography of Ethiopian languages. The standard does not address numeric encoding nor collation directly, it is simply a character repertoire for Ethiopia. The order that the elements are presented in, however, is intended to be a reference for the canonical sort order for the syllabary as a whole. Each language may of course still elect alternative collation schemes.

An important aspect of ES 781 is that it attempts to address the "chicken versus the egg" problem for the development of new characters. Computers have established themselves as the instrument of choice for composing any new literature intended for mass publication. As one of Ethiopia's traditional societies begins a literary tradition in their own language they must address the applicability of the Ethiopic syllabary to their own phonemic inventory. They may determine that new syllables should be devised for a unique consonant or vowel type found in their language. Ethiopic must be able to adapt to serve these needs which in the 21st century means computer fonts must be adapted to serve these societies. Even in the most technically advanced societies, font editing remains a highly specialized skill out of reach for the average person. Font vendors do not want to provide symbols unless there is a standard behind them, standard organizations in turn do not want to define new symbols without an established use for them. Established use must be evidenced by printed materials which of course can not be produced without computer support which brings us back to fonts…

To help break this cycle and to allow communities to experiment with and evolve new symbols for their orthographies, Ethiocode allows for character incubation by defining symbols as "provisional". This is somewhat analogous to having a Private Use Area, as Unicode provides, but with tentatively defined symbols included. There is no implied requirement that provisional symbols be included with ES 781 compliant fonts. Government agencies and NGOs working for the applicable communities, however, are expected to adhere to the provisional definitions. The elements of Ethiocode not found in Unicode are the most interesting to review in detail. The next section will examine these "new" elements in turn as per the alphabetic order of the languages employing them.

Agaw (Awngi, Blin, Qimant, Xamtanga)

The Agaw language is the oft source of confusion and debate. Due in no small part to the fact that there is no "Agaw" language. Agaw is a family of languages and dialects. Any one of which may be simply referred to as "Agaw" within Ethiopia and increasingly as "Central Cushitic" externally. In Ethiopia the "Agaw" family includes Awngi, Qimant and Xamtanga which has collectively over a half million speakers.

Agaw orthography has likewise been perplexing not just from confusion over the language it applies to discussion but from rapidly evolving writing practices. Uncertainty over the state of Agaw orthography had an impact on N1846 where some letters were proposed that had not yet been well established. The vowel like symbols ኽ, ኽ·, ኽ., ኽ, ኽ, ኽ and ኽ came from the Agaw region administrative bureau without explanation. They were later found to be a proposed phonetic symbology that could be used to denote the isolated vowel component of an Ethiopic syllable[2]. While clever and potentially useful in the future, such notation should not have been a part of an international standard for Ethiopic. Other Agaw symbols that were premature in N1846 are the three labialisations ኽ., ዏ and ኜ.

The enthusiasm in the Agaw communities to write in their own language can hardly be contained and they will surely be the juggernauts for Ethiopic in the 21st century. The lessons of caution were learned from the N1846 experience and ES 781 accepted, from dozens of proposed symbols, a handful of letters under provisional status to help the development of Agaw orthographies. These letters include the velar-

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[2] The Alef-A consonant-less syllables, ኽ, ኽ·, ኽ., etc. are perceived as semivowels.

fricative (IPA ɣ) and two of the labialised symbols from N1846. Table 1 presents the letters of ES 781:2002:

Table 1: Letters of ES 781:2002 for Agaw Languages

	ə	u	i	a	e	(ɪ)	o
ɣ	ぺ	ぽ	ぽ	ぽ	ぽ	ぽ	ぽ

	ʷə	ʷu	ʷi	ʷa	ʷe	ʷ(ɪ)	ʷo
ɣ	ぽ		ぽ	ぽ	ぽ	ぽ	
ŋ	ぽ		ぽ	ぽ	ぽ	ぽ	
ʔ				ぽ			
ʕ				ぽ			

Since the legalization of ES 781:2002 Awngi and Xamtanga intellectuals have been exposed to Sebatbeit velar-palatal syllables, ぽ-ぽ, and found the letter forms preferable to the working glyphs for their velar-fricative syllables. Potentially then, these provisional Agaw syllables may be removed or modified in a future revision of the standard.

Blin
Blin, a language solely of Eritrea, was not addressed directly by the Ethiopian standard but as a member of the Agaw language family is supported indirectly by it. In contrast to other Agaw languages, Blin orthography has been stable for over a century and it is in Blin that the velar-nasal (IPA ŋ) syllables (ぽ-ぽ) have their origin. The extension letters of Ethiocode that support Blin are the rounded velar-nasal syllables ぽ, ぽ, ぽ, ぽ and ぽ which have been in use since at least 1882 and are required by all members of the Agaw language family. The absence of these letters in Unicode has already complicated localization efforts for Blin ("byn" in ISO-639-2). For instance, the month name for "June" is "ምኪኤል ትጔኒሪ" and work-arounds have been required for localized resources such as IBM's ICU package and GNU's Standard C Library (glibc).

Bench
Kaffa, the birthplace of coffee in south-western Ethiopia, is the home region of the Bench people amongst others. The Bench have unique orthographic requirements for the rendering of retroflexed postalveolar phonemes in their language. The characters developed for Bench orthography are derived from the simple postalveolar forms in ሽ, ች, ዠ and ጨ of the Ethiopic syllabary. The retroflex augmentation to the glyphs is denoted systematically through a stroke, (Ɗ) on the left side of the syllables as shown in Table 2:

Table 2: Letters of ES 781:2002 for the Bench Language

	ə	u	i	a	e	(ɪ)	o
ʃ	ʃ̈	ʃ̈·	ʃ̈.	ʃ̈	ʃ̈	ʃ̈	ʃ̈
tʃ	𝔉	𝔉	𝔉	𝔉	𝔉	𝔉	𝔉
ʒ	ꓱ	ꓱ	ꓱ	ꓱ	ꓱ	ꓱ	ꓱ
tʃ’	·ᏏᏏ	·ᏏᏏ	·ᏏᏏ.	·Ꮟ,	·ᏏᏏ	·ᏏᏏ	·ᏏᏏ

Bench is the only Omotic language that has so far encountered special orthography needs that had to be addressed under Ethiocode. The Bench orthography has been taught in the school system for over a decade since mother tongue education has become publicly available.

Me'en, Mursi & Suri

Neighboring the Bench in Kaffa and the Omo Valley are the Me'en, Mursi and Suri people whose respective languages are members of the Nilo-Saharan family. Only Suri can also be found spoken in Sudan. A characteristic of these languages is the open-o vowel (IPA 'ɔ') which may follow any one of twenty seven consonants in the collective phonemic inventory. Similar to the retroflex symbol used in Bench, a stroke is added to the left side of the classic seventh form syllables. The stroke itself appears more perpendicular to the syllable's body and more parallel to the horizontal than does the Bench stroke which will be sloping downwards. Table 3 presents the open-o syllographs:

Table 3: Letters of ES 781:2002 for Me'en, Mursi & Suri Languages

hɔ	lɔ	mɔ	rɔ	sɔ	ʃɔ	k'ɔ	bɔ	tɔ	tʃɔ	ŋɔ	nɔ	ñɔ	ɔ
·ሆ	ሎ·	·ም	·ር	·ሶ	·ሾ	·ቆ	·ቦ	·ቶ	·ቾ	·ኞ	·ኖ	·ኞ	·አ

kɔ	wɔ	zɔ	yɔ	dɔ	ɗɔ	jɔ	gɔ	t'ɔ	c'ɔ	p'ɔ	s'ɔ	pɔ
·ኮ	·ዎ	·ዞ	·ዮ	·ዶ	·ዷ	·ጆ	·ጎ	·ጠ	·ᏏᏏ	·ጶ	·ጾ	·ፖ

Sebatbeit

Like Agaw, "Gurage" is also a family of languages (Sebatbeit, Silte and Sodo) and dialects where any one of which may be referred to simply as "Gurage". Sebatbeit, a collection of seven dialects, was previously more widely known by the dialect "Chaha" before the adoption of the more neutral name. Again like Agaw, Sebatbeit suffered from a bit of confusion during the N1846 effort though to a lesser degree. A feature of the Sebatbeit language is the frequent occurrence of labialisations relative to other members of the Ethiopic-Semitic language family. As Sebatbeit typography grew more sophisticated during the computer era the subtle difference between the 2nd and 3rd (classic order) labialisations (e.g. ጕ vs ጉ) became problematic to discern. Distinguishing between the two, it was found, becomes a visual strain at small print sizes and on computer screens. The same difficulty is not incurred as much by other languages where the two letter forms, the labialised 3rd form in particular, occur at very low frequencies.

To remedy the problem a typeface design was created whereby the labialised second form was constructed from the diatricitcal symbol (@) from the first labialised form was added to the sixth[3] form syllable in ቀ, ከ, ኸ and ገ. For example ግ + ጐ > ጕ as a replacement for ጉ. Respectively ቄ, ከ and ኼ become the alternative typeface renderings of ቍ, ኩ and ኵ. The critical piece of information that would link this complexity of phonemes, orders and typefaces together was missing in the flurry of activity leading up to N1846. These typeface variants were erroneously proposed as new encoded character elements. The error was not uncovered until January of 1999 when Sebatbeit native speakers were available to review the document.

Otherwise there is a perfect agreement between N1846 and ES 781:2002 for Sebatbeit elements. Requirements for Sebatbeit orthography are the four palatalizations in ቀ, ከ, ኸ and ገ shown by placement of the E symbol at the top of the syllables. Four additional rounded labials in መ, በ, ፈ and ፐ are also essential. Table 4 presents the additions for Sebatbeit orthography:

Table 4: Letters of ES 781:2002 for the Sebatbeit Language

	^{y}ə	^{y}u	^{y}i	^{y}a	^{y}e	^{y}(ɪ)	^{y}o
k'	ቘ	቙	ቚ	ቛ	ቜ	ቝ	቞
k	ኯ	ኰ	ኲ	ኳ	ኴ	ኵ	኶
x	ዀ	ዂ	ዃ	ዄ	ዅ	ዂ	ዄ
g	ጘ	ጙ	ጚ	ጛ	ጜ	ጝ	ጞ

	^{w}ə	^{w}u	^{w}i	^{w}a	^{w}e	^{w}(ɪ)	^{w}o
m	መ		ሟ		ሜ	ም	
b	ቧ		ቧ		ቧ	ቧ	
f	ፇ		ፇ		ፈ	ፇ	
p	ፏ		ፏ		ፐ	ፏ	

It is noteworthy that a very early form of the Bench retroflex mark was the E used for Sebatbeit palatization. This is the same mark mentioned earlier that the Agaw parties have taken interest in since the ES 781:2002 legalization for their velar-fricative syllables.

Ethiopic Tonal Marks

When music was first recorded in Europe in the 9th century, the Orthodox Church in Ethiopia was delivering liturgy in melodies recorded centuries earlier. Saint Yared, born Miazia 5, 505 AD (Ethiopian calendar) in the city of Axum, was a struggling student who, thru hard work and perseverance, would later become an educator and church leader. Three angels descended from Paradise to visit Yared in the form of birds (one each in green, yellow and red) to teach him the songs of heaven as could be sung in his language, Ge'ez. The mesmerized Yared was whisked away to heaven where he bore witness to a performance by a chorus of twenty four angels [1,4].

Enlightened and with a new sense of purpose the inspired Yared went to the chief priest of Axum at nine the next morning and before The Ark of the Covenant raised his hands and sang in the first Aryam

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[3] The choice of the sixth form syllable initially may seem odd. The classical order is in the labialised 2nd form, the linguistic order is in the labialised 6th form, which is also the Unicode ordering.

(rhythm of angels). Yared devised a system of ten notations to mark the rise, fall and intonations of the voice. While in heaven Yared observed angels playing musical instruments such as the Inzira (a large flute), the Masinquo (a one-stringed violin), the Tsenatsil (a type of sistrum), the Kebero (a large drum), and the Begena (great harp). Yared had these instruments made and used them to accompany his hymns, they are also an important part of secular music today. Thus was born Ethiopia's oldest musical tradition as alive today as it was in the time of Yared who lived until Genbot 11, 571 EC [1,4].

The notation developed by St Yared is only used to guide inflections in the voice and does not serve as a means to record musical notes for instruments. In the present day the notation may experience some variation depending on where it is taught but a general agreement on the core of the notation is found. The collection of roughly 150 notations is known as "Yaredawi YeZaima Meleketoc" and contains the set of the 20 Ethiopic numerals (often sans the lower line), 121 abbreviated words and the 9 unique marks not represented by letter symbols. The notation is used on three rows above a line of text. Each row (from bottom upward formally named: Ge'ez, Ezel and Ararai) is a different mode for how the passages are to be voiced during different ceremonies. Ge'ez (the name of the language but also meaning "the first" in many contexts) is the plain chant for ordinary days; Ezel is a more measured beat for funerals, the Ezel row is often written in red ink for distinction; Ararai means a lighter, free mood for festivals. The three modes are also supposed to represent the Father, The Son and the Holy Ghost respectively [1,12]. The nine unique symbols are presented in Table 5:

Table 5: Letters of ES 781:2002 for Ethiopic Tonal Marks

ይዘት	ደረት	ርክርክ	ድፋት	ቅናት	ጭረት	ሒደት	ደረት፡ሒደት	ቁርጥ
Yizet	Deret	Rikrik	Difat	Kenat	Chiret	Hidet	Deret-Hidet	Kurt
.	∪	⋮	⋮	⌒	╯	╯	___	⌣

Figure 1: Ethiopic tonal notation in three modes: Ge'ez (bottom), Ezel (red), Ararai (top black) [6]

Other Symbols

Following the tonal marks two symbols not found in Unicode appear in the Ethiocode standard. The first is "Tebek" (Ö̆), the Ethiopic germination mark. Ethiopic writing practices do not "double" letters to show gemination, rather it is left to the reader to determine from context. A word's meaning may in fact change depending on where these stresses occur. Tebek is employed primarily in linguistic works, dictionaries, and material aimed at language education. In less common cases a single dot might be used or the marks are put beneath letters rather than above. In these instances the variation on Tebek may have occurred due to a typographic limitation where the preferred form of Tebek was not available. Circular variants of

Tebek are indeed graphically similar to "Non-Spacing Diaeresis" (U+0308), but the similarity ends there as semantically the two are not interchangeable.

The second additional symbol appearing in Ethiocode is a punctuation mark that is primarily used as an end of paragraph or section indicator: '❋'. While the Unicode standard for Ethiopic does include an end of paragraph symbol already, this additional symbol was found to be important enough for historic documents (that may use both symbols) to include in the new standard. The point has also been raised that the symbol may have been used in some works for the purpose of indentation, in which case the symbol becomes semantically unique under such usage.

Ethiopic Beyond ES 781:2002

What happens next for Ethiopic is nearly one in the same as asking what happens next for Ethiopian languages. It has been predicted that "the coming century will see either the death or the doom of 90% of mankind's languages" [8]. Language is so closely tied to culture that this prediction, if only accurate in part, would represent a terrible loss to Ethiopia's rich cultural diversity. Socio-economical and anthropological forces are very much at work as Ethiopia modernizes. Some social mechanisms clearly are working in favor of this prediction while conscious activities directly oppose it.

Ethiopia's linguists are well aware of the threat to the nation's languages and are actively working to record and preserve the lexicons and grammatical structures for posterity. Concurrently, mother tongue education is being offered in primary schools for the first time in many societies. The international threat of diseases like HIV and AIDS has lead to the production of in-language health awareness publications produced by NGOs and the health ministries. Regional self autonomy and active people's associations are all playing a role to strengthen the place of local languages in local communities.

Ethiocode is meant to be an evolving standard capable of supporting Ethiopia's diverse linguistic heritage as written language requirements evolve. At the time of this paper's publication, ES 781 may have already been amended.

ICT Status and Standards in Ethiopia

Ethiopia in 2004 is a place bristling with consumer electronics and poised for the emergence of large scale networks. Projects underway like SchoolNet and WoredaNet promise to connect the nation's schools (over 500 sites), research institutes (32 sites) and local governments (594 sites) [2]. Other projects like the Global University System aim to provide high-speed connections for the nation's higher education institutes to help utilize E-Learning and E-Healthcare [2]. Coming late into the information age has not necessarily been a disadvantage. The outside world has incurred the cost and burden of competing protocols and technologies until one eventually rises to the top. Ethiopia gets to adopt the best of breed victors and leap-frog over the pitfalls and passing fads that bogged down more progressive societies.

In Ethiopia today "Unicode" is known even to the average computer user as the solution to email problems. Computer vendors have started to ship Unicode fonts and keyboard drivers with new computer systems. National legislation is proposed to make doing so a requirement –boldly promising that no computer could be sold in Ethiopia that did not already support the capability to read and write in Ethiopic. Mobile phones are everywhere now and the demand is mounting to have them Ethiopic text enabled.

While Ethiopia is ripe with potential, Internet and all telecom services remain state run monopolies regulated by the Ethiopian Telecom Authority (ETA) with services provided by the Ethiopian Telecom Corporation (ETC). The ETC follows the predictable trends of a monopoly and as such sets the pace of development in the telecom sector. Mobile phones and basic Internet service are of course available but customers must pay a premium and regularly remain months on waiting lists before the service is provided.

The private sector is welcome to pursue Information and Communication Technology (ICT) sales and services that do no conflict with ETC areas. This leaves open the areas of training, maintenance,

hardware sales and software sales and development. These public areas are unregulated and require only a business license to engage in. Entrepreneurs have enjoyed this freedom, within bounds, to develop their businesses without interference. There has been a reluctance to embrace standards when, like government regulations, they are perceived as taking away freedom to operate as one pleases. Perhaps the most famous example, that has also left the most bitter and lasting taste in the mouths of IT business owners, is a regulation set by the Nation Computer and Information Center in the late 1980s. This regulation required that all computers imported into Ethiopia had to have 80386 CPUs. While this policy may have made sense at the end of the 80286 lifecycle and protected the country from "technology dumping", it became the cause of much anguish and fury as entrepreneurs had their new and expensive 80486 computers rejected by the import authority.

In recent years Unicode, initially received with a sense of caution, has made inroads more from consumer demand for the standard. The increasing ease of APIs and information resources to work with the standard has at the same time made it easier for vendors to support. As newer operating systems have come to replace the old, the potential market for Unicode software has expanded while also making it increasing difficult to maintain legacy systems that were not standards compliant.

Five years ago the notion of electronic standards seemed as academic a discussion as optimization of satellite orbital trajectories. The critical mass of computers and the volume of electronic data exchange between them had not yet been reached where standards begin to seem relevant. Now that more and more government institutes are being networked together, standardization problems have become the government's problems. Hence they have at last become "problems".

The Ministry of Capacity Building in Ethiopia is the coordinating body for developing the National Information and Communication Infrastructure (NICI), a foundation framework for ICT sector and broader socio-economic development for the country [13]. The ministry has cited that the absence of standards as a primary inhibitor to local language content development, online government services and the full utilization of ICT in the country [5]. The problems can only become more pronounced as ICT use grows and as the NICI comes closer to fruition. The effective and efficient use if ICTs is seen as crucial to sustainable economic growth and poverty alleviation in Ethiopia. To this end the ICT Capacity Building Program was launched by the ministry to identify, propose and undertake initiatives to enhance the ICT infrastructure in Ethiopia. The ICTCBP mandate goes beyond the development of physical infrastructures, it also encompasses creation of a favorable regulatory environment for the harmonious development of ICTs.

Early efforts by the ICTCBP have been to assess and prioritize the electronic standards that would have to be developed for the support of Ethiopic in computer systems. A comprehensive report on Ethiopic standardization was completed in May of 2003 and implementation of the findings (standards development) is expected to get underway after April of the present year [3]. An even broader effort has concluded at the end of March, 2004 that identifies standards beyond those required for Ethiopic and local language support but for ICT use in general. This second effort addresses standard requirements for hardware, software, software development, data exchange, quality of service, electronic commerce, risk management, and ICT personnel certification. The effort considers all government sectors at the national and local levels, it also develops guidelines for private sector organizations wishing to implement a standards policy and assure compatibility with government agencies.

Ethiopia in 2004 is very much awake to the need for software standards to support Ethiopic script and Ethiopian languages. Ethiopia is however very new to the area of software standards development. The government agencies responsible for standards development and enforcement (QSAE, ICTCBP) while having the will to do so, lack in personnel resources and expertise to follow thru in "Internet Time". With 3,000 years of history to its credit, Ethiopia has however mastered that elusive temporal discipline of "patience". Standardization will move forward in a manor, while at a pace perhaps slower than "iTime", very purposefully and carefully considered.

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Acknowledgements

Appendix A: The ES 781:2002 Ordered Character Set

1	2	3	4	5	6	7	8	9	10
ሀ	ሁ	ሂ	ሃ		ሄ	ህ	ሆ		
ለ	ሉ	ሊ	ላ	ሏ	ሌ	ል	ሎ		
ሐ	ሑ	ሒ	ሓ	ሧ	ሔ	ሕ	ሖ	ሗ	
መ	ሙ	ሚ	ማ		ሜ	ም	ሞ	ሟ	
ሗ		ሟ	ሟ		ሟ	ምዐ			ሟ
ሠ	ሡ	ሢ	ሣ	ሧ	ሤ	ሥ	ሦ		
ረ	ሩ	ሪ	ራ	ሯ	ሬ	ር	ሮ	ሯ	ሯ
ሰ	ሱ	ሲ	ሳ	ሷ	ሴ	ስ	ሶ	ሷ	
ሸ	ሹ	ሺ	ሻ	ሿ	ሼ	ሽ	ሾ	ሿ	
ሸ	ሹ	ሺ	ሻ		ሼ	ሽ	ሾ		
ቀ	ቁ	ቂ	ቃ		ቄ	ቅ	ቆ	ቇ	
ቈ		ቊ	ቋ		ቌ	ቍ			
ቐ	ቑ	ቒ	ቓ		ቔ	ቕ	ቖ		
ቘ		ቚ	ቛ		ቜ	ቝ			
ቀ	ቁ	ቂ	ቃ		ቄ	ቅ	ቆ		
በ	ቡ	ቢ	ባ		ቤ	ብ	ቦ	ቧ	
ቈ		ቊ	ቋ		ቌ	ቍ			
ቨ	ቩ	ቪ	ቫ	ቯ	ቬ	ቭ	ቮ		
ተ	ቱ	ቲ	ታ	ቷ	ቴ	ት	ቶ	ቷ	
ቸ	ቹ	ቺ	ቻ	ቿ	ቼ	ች	ቾ	ቿ	
ቸ	ቹ	ቺ	ቻ		ቼ	ች	ቾ		
ኀ	ኁ	ኂ	ኃ		ኄ	ኅ	ኆ	ኇ	
ኈ		ኊ	ኋ		ኌ	ኍ			
ነ	ኑ	ኒ	ና	ኗ	ኔ	ን	ኖ	ኗ	
ኘ	ኙ	ኚ	ኛ	ኟ	ኜ	ኝ	ኞ	ኟ	
አ	ኡ	ኢ	ኣ	ኧ	ኤ	እ	ኦ	ኧ	ኧ
ከ	ኩ	ኪ	ካ		ኬ	ክ	ኮ	ኯ	
ኰ		ኲ	ኳ		ኴ	ኵ			
ዀ	ዂ	ዂ	ዃ		ዄ	ዅ	ዅ		
ኸ	ኹ	ኺ	ኻ		ኼ	ኽ	ኾ		
ዀ		ዂ	ዃ		ዄ	ዅ			
ዀ	ዀ	ዂ	ዃ		ዄ	ዅ	ዅ		

1	2	3	4	5	6	7	8	9	10
ወ	ዉ	ዊ	ዋ		ዌ	ው	ዎ	·ዎ	
ዐ	ዑ	ዒ	ዓ	ዔ	ዕ	ዕ	ዖ		
ዘ	ዙ	ዚ	ዛ	ዜ	ዜ	ዝ	ዞ	·ዞ	
ዠ	ዡ	ዢ	ዣ	ዤ	ዤ	ዥ	ዦ		
ዧ	ዧ	ዧ	ዧ		ዧ	ዧ	ዧ		
የ	ዩ	ዪ	ያ		ዬ	ይ	ዮ	·ዮ	
ደ	ዱ	ዲ	ዳ	ዳ	ዴ	ድ	ዶ	·ዷ	
ዸ	ዹ	ዺ	ዻ	ዻ	ዼ	ዽ	ዾ	·ዿ	
ጀ	ጁ	ጂ	ጃ	ጄ	ጄ	ጅ	ጆ	·ጇ	
ገ	ጉ	ጊ	ጋ		ጌ	ግ	ጎ	ጏ	
ጐ		ጒ	ጓ		ጔ	ጕ			
ጘ	ጙ	ጚ	ጛ		ጜ	ጝ	ጞ		
ጘ		ጚ	ጛ		ጜ	ጝ			
ኀ	ኁ	ኂ	ኃ		ኄ	ኅ	ኆ		
ኇ	ኇ	ኇ	ኇ		ኇ	ኇ	ኇ		
ኈ		ኊ	ኋ		ኌ	ኍ			
ጠ	ጡ	ጢ	ጣ	ጣ	ጤ	ጥ	ጦ	·ጧ	
ጨ	ጩ	ጪ	ጫ	ጫ	ጬ	ጭ	ጮ	·ጯ	
·ጨ	·ጩ	·ጪ	·ጫ		·ጬ	·ጭ	·ጮ		
ጰ	ጱ	ጲ	ጳ	ጳ	ጴ	ጵ	ጶ	·ጷ	
ጸ	ጹ	ጺ	ጻ	ጻ	ጼ	ጽ	ጾ		
ፀ	ፁ	ፂ	ፃ		ፄ	ፅ	ፆ	·ፇ	
ፈ	ፉ	ፊ	ፋ		ፌ	ፍ	ፎ		
ፏ		ፏ	ፏ		ፏ	ፏ			ዼ
ፐ	ፑ	ፒ	ፓ		ፔ	ፕ	ፖ	·ፗ	
ፗ		ፗ	ፗ		ፗ	ፗ			
ፘ	ፙ	ፚ	ፚ	ፚ	ፚ	ፚ	ፚ	ፚ	ፚ
ፚ	ፚ	ፚ	ፚ	ፚ	ፚ	ፚ	ፚ	ፚ	ፚ
1	2	3	4	5	6	7	8	9	0
።	፡	?	፣	፤	፥	፦	!	¡	.
'	,	«	»	"	"	/	(	)	[
]	{	}	<	=	>	\	#	%	&
*	-	+	±	×	÷	፨	⁙	※	‾
.	‿	⋮	⌒	⌣	⌐	—	‿	ト	̈
‹	›								

Appendix B: "What is Unicode" in Sebatbeit by Sahle Jingo

ዩኒኮድ ምቃሩ?

ዩኒኮድ እንም ኤነት ፈደል፣
ሚኒም ኤነት ኮምፒተር ቢ ኽር፣
ሚኒም ኤነት ይቾቺቃር ቢ ኽር፣
ሚኒም ኤነት ይዝረክ�ጮ ቢ ኽር፣
ብ�ችርም ኤነት ቄጥር ቢ ኽር ይጠፍ።

የዘንጋታ ኮምፒተር የቾችዩ ተ�ቄጥር ጋመ�ው። ያታት ፈደል �ቄጥር በጣ�ድት ፈደልም እንጉ�ድም ጥፈት ይጠፎ። ዩኒኮድ ተትቶቶተታ (ተትፈጠሮተታ) ይፍቴ ዝኽ �ቄጥር ይጠ�ቀ�ዩ በበቅር ይትሜዘሮ ብዘ ኤነት የጣ�ድ ቃር ይ�ድቾ�ጮ ኤማ ባነቦ። ዝም ወበር አተ የጣ�ድ ቃር ይ�ድቼዩ ብዘ ጥፈት የጠበጠቃር አነፐረ። የዘንጋታ እኽር የአውሮጸ እግጣነት ንኽነ ብምብነ እንም ሰብ ይዝር�ኽ�ወ አ�ድ እማት ያ�መ�ርዩ ብዘዝም የትቤተሮም ይ�ድቾዩ ኤማ ያት�ኽ�ሽ ባነ። የእንግሊዝ አ�ቀም ዳር እማት የኽረ ይ�ድቾ�ጮ ኤማ ይንም ፈደል፣ ይንም ነጥብም መርኽትም እጣቴ ይጠቀ�ም�ዬ ቤወጣን።

ዝኽ ያጣ�ድቃር ይ�ድቾ�ጮ ኤማ ገግ ተገገ�ኽ�ና ይትራከሶ�ጮ ግዝየ ነረ። ዝመታ ይኽር ኔት ይ�ድቾ�ጮ ኤማ የትቤተሮ ፈደል አተ ኤነት �ቄጥር ቢትጠቀሞ�ጮ ግዝየ ዌም የትቤተሮ �ቄጥር አተ ፈደል ቢትጠቀሞ�ጮ ግዝየው። ሚኒም ኮምፒተር ዋና ይትጠቀሞ�ጮ ኽና የትቤተሮም ብዘም ይ�ድቼዩ ኤማ ወደግፍ ነረቦ። ቢኽርም በትቤተሮ ይ�ድቾ�ጮ ኤማ ዌም በኮምፒተርኽና ግብት ጪግ የኽረ ዘንጋ ቢያልፈ ግዝየ የትቅራቀሮት ዘንጋ ይትፈጠሮ።

ዩኒኮድ ዝኽታ እንም ሽኮረንም

ዩኒኮድ የሚኒም ኮምፒተር፣ የሚኒም ይቾቺቃርም የሚኒም ይዝር�ኮ�ጮ አ�ቀ ያታት ፈደል ይሼ የትቤተረ �ቄጥር ያት�ቀ�ንብ። የዩኒኮድ ይቾትው ኤማ በኳ ግዝየ በት�ኽር ንቅ ንቅ ይፍቴ የኽሮ ፋብሪካኽማ Apple፣ HP፣ IBM፣ JustSystem፣ Microsoft፣ Oracle፣ SAP፣ SUN፣ Sybase፣ Unisys ም ብንጉ�ድሜ ባገኽሮት ደን ነረ። ዩኒኮድ XML፣ Java፣ ECMAScript (JavaScript)፣ LDAP፣ CORBA 3.0፣ WML ም እንጉ�ድመ�ኽ�ና ኽማ ባነቦ ወክተታ ቅራቦ ባነቦኽኖዩ ይትሽቃሩ ቲኽር ISO/IEC 10646 ም �ቅጥየ በኽረ ኤማ ባገክሮት ያወርቃሩ። ዩኒኮድ በብዘ የኮምፒተር ቢቾ�ጮ ኤነት ይቾቺቃር፣ ሚኒም ገደረ ዌብሳይት (ንቅ�ሜና) ይቾቺቃርም የኽክም �ብ�ች�ብ�ችር ይቾችዩቃር በዌብሳይትም ብንጉ�ድም ግብር የትደገፈው። የዩኒኮድ መኻሳ ተፈጠሮትመታ የ�ኽ�ት ያግዛ ግብር ወትረ�ኽበ�ኽ�ና በገዘበረታ ተትፈጠሮ በአለም ያነቦ የሶፍትዌር (በኮምፒተር ደን ይቾቱ) ዩክተታ ኽሪነት ታቾነኽ�ኽኖ ዋና�ኽኖሎ።

ዩኒኮድ በኔትወርክ ቢቾቱ ኮምፒተርም ዌብሳይትም ጋመ�ው� እማት ባምሮት ወኽት ተርቅ ወጪ ያተርፉ� አተ የሶፍትዌር ግብር ዌም አተ ዌብሳይት የብዘ ሜና ይወሮ ኮምፒተር ይዝረ�ኮ�ጮ አ�ቀም ገነም ኽ�ውም �ቅጥ አምሮት ቲያት�ኽ�ሽ በሜና አውሮት ይኽር።

ያት�ቅ�ንብኖም ዘንጋ ሚኒም ኤነት ጅ�ጋረ ቲያጅ�ኽ�ኖም በብ�ችር ብ�ችር ይቾ�ድ�ጮ ኤማ ይቾ�ድ�ኽማ ያሜ።

የዩኒኮድ እጣትነት

የዩኒኮድ እጣትነት፣ ያተርፈ የቄመ ድርጅት ቴኽር የትቋቋመ ዩኒኮድ ያትርቁ፣ ያቤትትሜ በሜናም ይወርኽማ ያሜዩው። ዩኒኮድ ያት�ቅ�ነውን ጥፈት በግዝየታ ሶፍትዌር ግብርም ኤነትም ይትወሰን። የዩኒኮድ እጣትነት አባል ወኽር ንቅ የኮምፒተርም ተኮምፒተምር ጋመ�ው� እማት ኽሮም ያር ሜና ይጠብጥ ንቅ ንቅ ድርጅት የጠበጠ ቃሩ። በአለም ዘሪያ ያነቦ የዩኒኮድ ሜና ይደግሮም በትራቆትመታ ኽረ በሜናመታ ያግዘዩ ይሰቦ ድርጅትም ሰብም የዩኒኮድ እጣትነት አባል ይኽሬ ወፈንቻታ አናጠዊ።

ይርቅ ት�ኽ�ሮዩ ም�ራ አሳበታ፣ በዩኒኮድ የትደገሮ ዘንጋ፣ ይቾ�ች�ጮም ያ�ኽ�ሮም ግብረታ እዞ።

Appendix C: "What is Unicode" in Xamtanga
by Dr Alimeraw Gebrehiwot

ዩኒኮድ ወረኘ የሻ?

ዩኒኮድ ውርኘ አይንት ፕላትፎርምም አነ፣
ውርኘ አይንት ፕሮግራም አነ፣
ውርኘ አይንት ቤንቋዋ አነ፣
ሻላው ላው፦ ባህሪስ ላው ቺተር እግዝ ይወኮ (አስለኮ)።

ሚስርቱዝ ኮምፒዩተረን እግጽ ጅቅ ሰራሽሽኮ። ሻታይም ሻላር ላርቱ ላው እግዝ አስለነውዝ ፌድለንዝመ ላዝ ባህሪየንዝ ቃጭልኘኮ (ጸጉዝሽኮ)። ዩኒኮድ ፌልስፍሽኔዝ በውግ እንዛይ እግጽድዛት አስለነንስ ላልዝ ሚግሽተኮ ቺተቺተቍ ሽጉ ዘንጥ እክሰንጥ ጸርጥ (መል) ዊኑጉ። ላው ናጸል ሽጉዘነ እክሰነ አጥቀ ባሀሪየነ ጸይጠ ቻላውም። ተከዝዞም፣ አውሮጦት አጽረ (ዮሮፒያን ዩነያ) ጭቍ ሻእንቅትቍ ቤንቍጥድ ሽፍነንስ ንቆጸቍ ቺተቺተቍ ሽጉዘንጥ እክሰንጥ ደምዞኮ (በነኮ)። እንግሊዝኘት ተከው ላው ናጸል ቤንቤስ እኳን ሻእንቅቱቅ ፌድለንስ፣ ነቍጠ ስረተንዝመ ላብጠ ጣቅምሽነቍ ምልክተንዝ ላው ናጸላ ሽጉዘነ እክሰነ አጡ ዊኒየውም።

እንዛይ ሽጉዘንጥ እክሰንጥ መልድ ቤሽ ላውድ ላዊጅቅ ገጫሽሽኮ (ጉርትኘኮ)። እንየንም ሊኘ ሽጉዘንጥ እክሰጥ ሊኘ ቺተቺተቍ ባህሪየንዝ ላው አይንት እግዝ ዊንም ላው አይንት ባህረዝ ቺተቺተቍ እግጽ ጣቅምሽነው ቻልኘኮ። ችሻሽው ኮምፒዩተርድቅ (ቺተዝ ሰርቨስ) ንቆጸቍ ቺተቺተቍ ሽጉዘንጥ እክሰንጥድ ከበነው ደምዞኮ (በነኮ)። አቆሽም ቺተቺተቍ ሽጉዘንጥ እክሰንጥ ዊንም ፕላትፎርመን ማኽሊል ከብሰረ (ዳታ) ዲቤን ትኮረ እን ከብረድ ዊትርቅ ጨቅሽት ዝለ ኻደገል ዊጥየኮ።

ዩኒኮድ እድየት እንቅትቅ ላው ጉጣጉስ የሻ

ዩኒኮድ ውርኘ አይንት ፕላትፍሮምም አነ፣ ውርትረ አይንት ፕሮግራምም አነ፣ ውርትረ አይንት ቤንቤም አነ ሻላር ላርት ባህሪስ ላው ቺተር እግዝ ይውኮ (አስለኮ)። ዩኒኮድቱ ዲ ስታንዳርድ (The Unicode Standard) እንጅ አልተቍ ኽየኽየቍ ኢንዱስትሪየን ቃውጥሀ ተከቍባ፦ ፋብሪካኽማ Apple፣ HP፣ IBM፣ JustSystems፣ Microsoft፣ Oracle፣ SAP፣ SUN፣ Sybase Unisys ዝመ ላዝ ንቆጸቍንዝ ለምርሽ ሰራሽታጉጉጉስ የሻ። ዩኒኮድ ዚ ምኑቅ ዲረጅንዝ የነትም XML፣ Java፣ ECMAScript (JavaScript)፣ LDAP፣ CORBA 3.0፣ WML፣ ተከተከ… ደሚተኮ። ISO/IEC 10646 ኘሽም ንቆጸቍ ሰብሽንጥ መልዝ እንቅ ዚምኑቅ (Browser) ዝመ ንቆጸቍ ላዝ ምርተን ፌጥዝ ከብሽው የሻ። ዩኒኮድቱቅ ዲረጀን ምልውተዝመ ሻት ከበነቍ መሰሪጥ እቻዝ ንጭ አልምቱ ቴክኖሎጄ ጸኘስ እቀኘ ጭቆኘ ወናሽቍ ማኽሊስ ወነ ወነጥድ ኘይ።

ዩኒኮድት ደንበኘጥ አገልግለቍ ዊንም ንቆጸቍ መልጥ ሰራሽንጥዝመ ዌብሳይትንዝ ትጉ ቀንጀዘነውዝ ባህሪየን አክብጉዝቍ ኒብረ ጣቅምሽነን ትኮረ አራስ ወየ ጸጉጉዘንጭያወኮ ዩኒኮድ ላው ናጸል ሶፍትዌር (Software) ፌት ዊንም ላው ናጸል ዌብሳይት (Website) ንቪሽተቍ ፕላትፎርመን፣ ቤንቍገጥዝመ ኻግረንዝ ትጉ ደግምን ተሲሻቅት ከሰነንስ ቻልሰኮ። ውረውረ ዘባሺንቀት (ጨቅሺንቀት) ከብረ (Data) ብጭቆ ቺተቺተቍ መልገ አቪዝ ቲክልሽኘጥኘ ማጥን ቻልሰኮ።

ዩኒኮድት ኮንሶርቲየም

ዩኒኮድ ኮንሶርቲየም ትርፍዝ ቻብረው ድርጅት አየው አቆ በር ዩኒኮድ ዲረጅድ (Unicode Standard) ጣቅምሽነቍ ለማዘነንስ፣ ፌራዘነንስመ ጸኘጸ ኘነንስ ቻከረው የሻ። ኘሻም አስለደ ዚምኑቍ ሶፍትዌረን ፌጥዝመ ዲረጅንዝ ዊክልሽኘድ ቺዝ ቃሊሰኮ። ኮንሶርቲየምቱ አቫልነይድ ኮምፒዩተርዘነዝመ ከብረ አስልነይ ኢንዱስትሪዘ ፍራትዝ ውላቆቍ ኮርፖሬሽኑኒዝመ ድርጅተፕንዝ ዊክለኮ። ኮንሶርቲየሙ ጊንግጽዝ ገብሽተውድ አቫልነይዙ ኪፍለነዝ ጭቍ የሻ። ዩኒኮድ ኮንሶርቲየምዙ አባልነይድ ዩኒኮድ ዲረጅድ ከሽቍዝመ። ኘፍራቲዝመ ግብር ግርዱኒዝ ከበነው በነቍ አልምል አውልም ጸበቍ ድርጅትኒዝመ ላውአውረቍዝ ቢተው የሻ።

ዲቤው ከብረዝ ቃለን ምዝግብ፣ ዩኒኮድ ፌጥ ቻልሱ፣ ቴክኒኮ ጥወነዝመ ጣቅመቍ ምንጨነዝ የውድ ቃል።