<Review>

The Use of Computer Hardware and Software in Bible Translation

Daud Soesilo*

This is a very practical presentation on the use of computer hardware and software in Bible translation. The use of computers has changed the way in which Bible translation work is done. It cannot replace human translators yet, as this anecdotal example shows:

Matthew 26:41 "The spirit is willing, but the flesh is weak"was translated by computer as "The vodka is agreeable, but the meat is tasteless".

Nevertheless, the technology to assist us in our work is getting better everyday. Many translation projects around the world these days are utilizing computers for their work. Although there are a few exceptions, it is taken for granted today that it is inevitable that Bible translation projects will be computerized.

Technological explosion

Technology is changing many aspects of our lives. Things that we could not imagine being influenced by technology have been transformed. We have numerous gadgets available to us to make old tasks easier, and new tasks possible. For example, how many of these technologies do you use every day?

- Mobile/Handphone/Cell Phone
- SMS (Short Message Service)
- USB and MP3 Player
- Electronic diaries
- Electronic games

* United Bible Societies Asia Pacific Regional Translations Coordinator

The following examples showcase the virtually unlimited applications possible through technology and human imagination.

- In Singapore you can order a can of Coke from a vending machine in subway stations, and it will be charged to your mobile phone bill.
- A Personal Digital Assistant (PDA) with wireless GSM/GPRS can display maps and give specific driving directions. (GSM = Global System for Mobile communications; GPRS = General Packet Radio Service)
- E-Books use of digital technology to organize and present static and rich media content such as text, photos, etc. There are 1,600 publicly-available E-Books in MS Reader and Palm format including classic British and American fiction, children's literature, the Bible, Shakespeare, American history, African- American documents, and more.
- An Audio Book is available to all passengers in the new Singapore Airlines direct flights from Singapore to Los Angeles and New York.
- The advances in data storage from audio tape as media, to 5.25″ diskettes, to 3.5″ diskettes, to USB thumb drives or flash disks, secure digital (SD) card, compact flash card and multi-media cards (MMC), show how technology can improve the way that we do things, and increase the efficiency, capacity and reliability

Technology and religious activities

Even religious activities have not been immune to "technological upgrade". It is now possible to give your freewill offering online (e.g. City Harvest Church, Singapore), and even to participate in online worship services. Launched a few months ago, an online church has proved to be a heavenly hit attracting as many as 41,000 visitors a day at one point. Have a look at www.churchoffools.com:

> Church of Fools is an attempt to create holy ground on the net, where visitors can worship, pray and talk about faith. The church is intended for people on the edges (and beyond) of faith, and for Christians from all church traditions.

The language of technology also has come into our faith lives. Bible Society in Australia provides SMS Bible – you can send Bible verses to your friends or colleagues. The sender buys credits on his or her computer (paid to Bible Society in Australia) to be able to send, and the recipients get the messages for free. For example,

here is the CEV 23rd Psalm in SMS style:

> u, Lord, r my shepherd. I will neva be in need.
> u let me rest in fields of green grass. u lead me 2 streams
>   of peaceful waters,
> & u refresh my life. u true 2 ur name, & u lead me along
>   da right paths.
> I may walk thru valleys as dRk as death, but I won't be
>   afraid. ur wit me, & ur shepherd's rod makes me feel safe.
> u treat me 2 a feast, while my enemies watch. u honour
>   me as ur guest, & u fill my cup until it ovaflows.
> ur kindness & luv will always be wit me each day of my
>   life, & I will live 4 eva in ur house, Lord.

The Indonesian Bible Society has a similar service in partnership with a local provider. Those with a mobile (also called hand phone in SE Asia, or cell phone in north America) can request a verse in one of three available Indonesian versions and the charge is minimal (Rp 800, or less than 10 cents USD).

Technology for outreach

Technology provides a means to reach out to people who have not been reached by the Word of God through conventional means. There are still 12,000 language groups that have no written language, and many more with no published Scriptures. There is also a generation who, due the pervasive dominance of television, prefer to watch and listen rather than to read, even among literates.


The *MegaVoice* project seeks to develop a self-contained device that can hold a recorded message to reach illiterate and non-reading people. It can fit a small pocket, it cannot be taped over, it does not need electricity to run it and it does not need a player.

The ***Talk Bible,*** developed by Japan Bible Society, is aimed at people with hearing impairment, and people who travel a lot. The whole Bible can be loaded and listeners can select what passage to listen to.

American Bible Society uses its for Ministry website to equip church leaders around the world for online ministry. As well as web hosting, it provides training and information in online ministry, with the goals of equipping the church to "connect a new generation to God's Word; and engage our emerging culture". For Ministry was launched in 1999 and since then more than 25,000 churches have launched Web sites through its service, and thousands use its 'eQuip' service each month to keep up with the ever-changing online world, learning best practices for effective Internet communication.
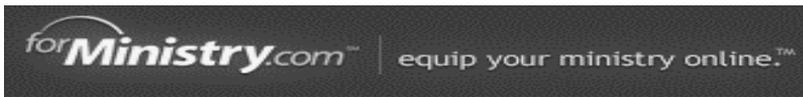

Technology for Biblical studies and Bible translation

There is a large potential for use of technology in the fields of Biblical studies and Bible translation. Software resources are being developed which bring together information which could be previously only be accessed through extensive library work, and the information is far more easily accessible and "searchable" than the shelves of books from which these resources have been developed.

Memory Cards is a software program to help beginner students to memorise Hebrew and Greek vocabulary, replacing the previously-used flash card. As well as showing the words to be learnt, the software allows students to see their scores, and provide reinforcement for improving results. The ***Navigating Bible*** program teaches students how to pronounce the Hebrew text.

Logos Libronix is one the examples of software collections to assist Bible scholars and translators. They have CDs with collections of past issues of leading journals, such as Biblical Archeologist in which you can access every one of the 325 articles

published from 1977 to 1992, without needing to leaf through the 64 issues covered in the collection. Logos also produces Thomas Nelson's Word Biblical Commentary, which includes 45 volumes of "one of the world's most widely acclaimed Biblical commentary series" on CD-ROM.
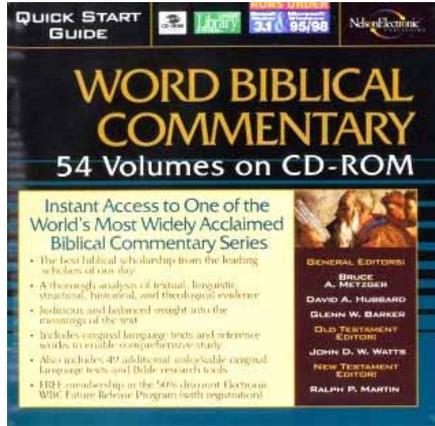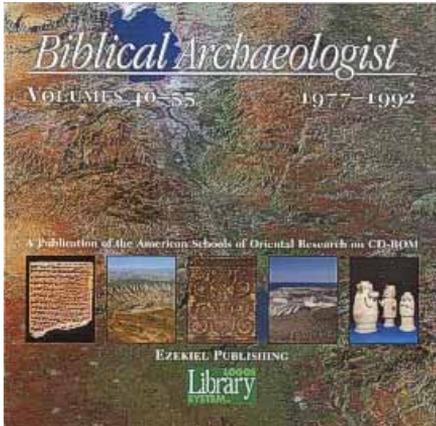
Union Theological Seminary and Presbyterian School of Christian Education's *Interpretation Bible Commentary – New Testament* and *Interpretation Bible Commentary – Old Testament* is now published as part the Logos Libronix collection. In terms of ease of access and portability, the CD version is probably the better choice!
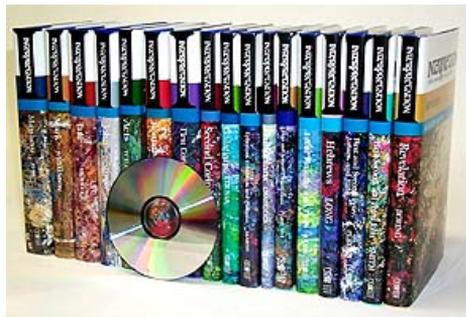
To see the bigger list of resources available in the Libronix system, let's look at what the *Scholar's Library (QB) CD-ROM* contains:

- English Bibles
- Interlinear Hebrew and Greek
- Greek Texts
- Hebrew Texts
- Greek Lexicons
- Hebrew & Aramaic Lexicons

- Original Language Grammars
- Original Language Tools
- Introductions
- Bible Commentaries
- Bible Dictionaries
- Bible Maps
- History of the Church
- Theology
- Biblical Ethics
- Pastoral Resources
- Christian Living
- Worship
- Devotionals

The *Stuttgart Electronic Study Bible* has just been released by the German Bible Society in July 2004. It includes a new Hebrew database, and is interfaced with the Logos Libronix collection, so you can work on both programs. It also includes the critical apparatus not found in other Bible software, and therefore opens a new dimension in electronic Bible studies.
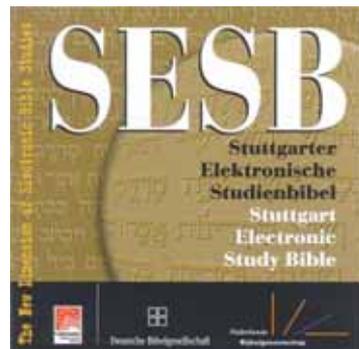
BibleWorks 6 is another significant resource for Biblical exegesis and research. The features include:

- Greek & Hebrew Texts, Bible Versions & Lexicons
- Easy grammatical and morphological searching
- Original Language Texts
- Bible Translations
- Lexical-Grammatical Reference Works
- Reference Works
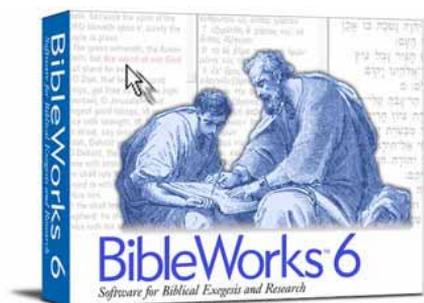
● Program Features and Analysis Tools

Olive Tree Bible Software (illustrated left) provides access to the original languages (BHS & UBS GNT), English, and other languages. These are available for use on your PDA (personal digital assistant), either using the Palm operating system or Windows CE (Pocket PC).

Laridian Electronic Publishing produces programs for use on hand-held or palm device. It provides access to several English translations, including ASV, ESV, KJV, NASB, NKJV, NLT, RSV, The Message, and notably, the NIV.

The *SWORD Project* of the CrossWire Bible Society is: "an effort to create a software platform for research and study of God and His Word. The open source model is the basis of development, maximizing the rapid growth and features of this project by leveraging the contributions of many developers. Components of the project include all types of Biblical texts and helps, a portable, plaform-agnostic engine to access them, and a variety of front ends to bring this to as many users as possible". One of their products is *Pocket e-Sword* for Pocket PCs, which features:

- ● Hebrew & Greek
  - ○ Consonantal Hebrew text
  - ○ Greek (majority text & Scrivener Textus Receptus, Byzantine, Wescott-Hort)
- ● Greek OT (Septuagint)
- ● English Bibles
  - ○ Contemporary English Version & Good News Translation (courtesy of American B Society)
  - ○ Douay-Rheims Bible with DC

More information is available on the Crosswire website, http://www.crosswire.org.

Paratext

UBS has developed Paratext as its tool for translators. The current version, *Paratext 6*, is no longer merely a library of Bible texts (Hebrew, Aramaic, Greek) and translations in major languages of the world, including English, German, French, Spanish, and other major national languages from around the globe. It is now a resource of biblical resources such as the UBS Handbooks in English and the Adaptation of UBS handbooks into some other languages, e.g. Spanish, Indonesian, Russian, Chinese. It also includes the Hebrew, Aramaic and Greek lexicons – using the associated tools of Analusis and Vocabula. Translators have all these resources available on screen.

The policy of the Asia- Pacific region of UBS is that Translation Officers of the Bible Society need to plan an adequate training whenever Paratext is made available for a translation team, so they can get good use out of the program.

Paratext 6 now has a fully integrated CAP checking tool. The translation team members will use P6 for keying in texts using uSFM (unified Standard Format Markers), to correct and revise the drafts, and, using the CAP checking tools which are built in P6, to get the texts as clean as possible. So, the role of the CAP Officers of the Bible Society will be to do the final CAP check, including layout and typesetting and the preparation of Camera Ready Copy using Ventura (Page Maker, In-Design, etc).

The full details of Paratext are too numerous to mention here, but the points below highlight a number of distinct aspects of the translation task for which the computer is an invaluable tool for the trade.

1. Keying in Translation Drafts:

The draft is typed into the computer and stored in electronic format. From this, multiple copies can be printed out and circulated to the reviewers. Changes and

corrections can be quickly and easily made without retyping the entire document.

Drafts can be keyed in to any text-processing software and then imported into Paratext 6, or they can be directly keyed into a Paratext6 window. Inputting text using P6 is highly recommended, especially if translators are able to key in their own text.

The translator can now view the newly translated text – either in formatted or un-formatted mode – in parallel with the source texts, UBS handbooks and other biblical resources. They can also search their text, make word lists, run a large range of consistency checks, and produce formatted printouts of drafts for checking.

uSFM are used to identify the features of a text such as chapter and verse, paragraphs, section headings, footnotes, illustrations, and many more important features of a printed Bible. Use of uSFM also means that decisions about what the final product looks like can be made at any stage in the process, and these formatting decision are then applied consistently to the entire text because of the presence of the appropriate uSFMs. The same text can also be used to generate different products in different formats, simply by instructing the typesetting software to interpret the uSFMs with different styles.

Translators should note that electronic copies of the keyed-in drafts should be stored carefully in a location away from the translator's own work place, and a further copy stored at the Bible Society office and/or with the Translation Officer working with the project. This ensures that in the event of computer breakdown or other difficulties, there is always a copy of the most recent draft available. Translators should always record on the draft the date of the latest update, and where necessary, mark any changes made.

2. Checking for content and consistency

Paratext provides the ability to perform a large number of different types of checks on the text, some of which were previously done by separate computer programs. It is important that Translation Officers be provided with adequate training on how these checks should be performed. Some of the main areas of use are as follows:

Word lists and spelling checks

Paratext can create a word list from a text at any stage, and this list can then be checked for obvious spelling errors. A corrected list can then become the basis for

checking the spelling of a text – it can work well within Paratext 6 or using it in Microsoft Word as spell checker. The Paratext word list has a function which can indicate the location of every occurrence of a word (it will display actual chapter and verse plus the actual phrase of the verse) so that typos and mistakes can be easily found and corrected. This is also effectively serves as a concordance of the translated text. Paratext's "search and replace" function allows global changes to be made where necessary, although translation team should use this with the utmost caution since it may change more than was supposed to be changed.

Format Marker checks

Paratext allows the translator to check the consistency of the use of uSFM in a translated text, or to compare the use with that in a standard text in a national language of the country or in an international language (e.g. GNT or CEV etc) and produce a list of places where they do not agree.

Completeness checks

Paratext enables the translator to check that every chapter and verse is present in each translated text. The software can identify a missing verse or a verse that appears twice, or uncover other similar inconsistencies in the draft. Another of Paratext's checking tools allows you to look for verses which are unusually short -- where text may have been omitted or unusually long -- where something may have been entered twice.

Punctuation checks

Paratext can check that capital letters are used consistently, that quotation marks and brackets are correctly paired, and can identify unusual combinations of punctuation marks, for example single quotes or double quotes, opening or closing quotes.

Key-words, names and parallel passages

There are separate checking tools, first of all, for key terms (presently NT only) – distinguishing different meanings based on the usage in the original languages, but listed in English, which allow translators to check every verse in their translated text where these words should occur, in parallel with selected standard texts, and to approve particular translation renderings, or to approve a verse with no explicit rendering.

Other lists enable the same to be done with both Old Testament and New Testament proper names. Another function allows comparison of OT and NT parallel passages, displaying both the translated text and selected standard texts for the different parallel passages side by side. Also checking tools are available for OT quotations in the NT, rhetorical questions, inclusive and exclusive pronouns, metaphors, etc.

3. Text management

Paratext enables a number of important functions of text management:

Back-up, restore and file transfer

Creating compressed back-up files of a translated text is made easy in Paratext, and the program will also prompt the user to make back-ups if they have not been done for 7 days for any translation or revision that is being worked on. Restoring texts from the compressed files is similarly straightforward. The process of back-up and restore also provides a quick and reliable way of transferring text files from one computer to another. It also allows sharing of updated texts to other translation team members.

Printing

Although texts can be printed directly from Paratext, this is still not a highly refined function. But Paratext 6 allows texts to be prepared for draft printing, by the creation of output files in either RTF or XML format. These can be further formatted (eg. double spaced) in order to produce draft printouts for reviewers and external readers.

Storing and comparing drafts

It is important that the translated text be saved as a draft at certain relatively stable points in its development, such as the draft which the team has agreed on to send out to reviewers and readers. These form points of reference and comparison for future revision and development and while work on the text goes on, the team can always revert to these or identify the changes that have been made since the draft was saved.

A new feature of Paratext 6 – released in July 2003 – is the 'compare' function. The revised text can be compared with the original, and additions or omissions can be marked in different colors, highlighting changes that have been made (similar to MS

Word's track changes function).

4. Electronic text and publishing

One of the great advantages of having the Bible text in electronic format is that the typesetting and publication of the text becomes much simpler, provided that the keying-in has been done properly according to standards set. Not only is the task simpler, it is also quicker and more efficient. Paratext provides the possibility to export text in a format that is acceptable by some typesetting software packages (e.g. Ventura, In-Design, Page Maker, Ultra XML etc). The same text can also be used to produce a large variety of products. Bibles in a variety of sizes and formats, such as double column, single column, large type, study editions, pocket editions, portions and selections, and Braille versions, all can be generated from the one electronic text. For Bible publishers this is perhaps the most important feature of having the text available in the electronic format. It also shows the importance of electronic archiving.

Using P6 for Revision of Existing Translations

Since all languages change with time, the revision of older translations is an ongoing task. This has been true of all Bible versions. Having the Bible text available electronically means that revisions of any translation can be done more efficiently and speedily. Changes can be made only at those places where change is necessary, without having to retype the entire manuscript. For older Bibles, published before the days of electronic text, there are several ways of producing an electronic text – either by scanning (using optical character recognition software and careful proof-reading) or by re-typing (and careful proof-reading) – which can then form the basis of ongoing revision.

Paratext 6 offers the ideal environment for revision processing and consistency checking. It enables the revision team to process the revised texts against the original translation, the biblical source texts, model translations, UBS handbooks, and other reference tools. The team can carry out quality checks in relation to content and format. Drafts for the team and the advisory group can be printed in the desired format. Finally a generic textbase can be produced that can be exported into the desired typesetting format.

The best way to use Paratext in revision projects is to install the original text to be revised as a version, if it is not there already. Next to create a new version with a distinct name, copy all books from the original textbase into the directory in which the new version files are located, make the new version editable (tick the appropriate box in the Scripture version settings), and load it in a window below or beneath the original version. Now the version to be revised will synchronize with the original one. As desired, the biblical source texts and other helpful translation models can be loaded and consulted.

Once the basic revision work is done, the revised book(s) should be copied to the Paratext sub-directory in which the revised version resides and made to overwrite what was there. From this point onwards, Paratext will be used for consistency checking.

When the revision team has revised one or more books and established a basis for categorization of changes made (syntactic, grammatical, lexical), it is the right moment to start putting together a list of changes that correspond with what has been agreed to do in the revision policy document. It is vitally important that the list gets updated as the work proceeds. The project coordinator has the responsibility for sharing updated lists with the team members and interested members of the advisory group. If this is not done and communicated properly, we will end up with highly inconsistent books and an extremely tedious task of minimizing the mess at an advanced stage.

In Paratext, the revisers and project coordinator can carry out searches of words and phrases where necessary, in order to check if consistency has been observed. Consistent changes can be carried out with search and replace. The new checking lists that are built into Paratext 6 will greatly simplify and enhance the consistency checking process.

A word of warning

A number of tools are now available in electronic format, either on CD-ROM or on the Internet, including Bible dictionaries and handbooks, commentaries on biblical books, Bible texts in original languages and in translation, and many more. However, Translation Officers should provide should provide some guidance to team members who do not have adequate background training in biblical studies. Because the amount of material now available is vast, the value of it for Bible Society translation team members is sometimes questionable. Not everything available on CD-ROM or the Internet is of equal value; it may be available because the group or person able to make

it available considers it worthy, or it is no longer under copyright and therefore in the public domain, or free to the public. These are not necessarily good reasons for it being preserved. Translators may need help to discern what material they should rely upon for guidance.

Computer programs for the workplace

Many of the office software applications used in business can be useful for our translation work and administration duties.

One of the major programs used throughout the world is ***Microsoft Office***, which contains Word word processor, Excel spreadsheet, PowerPoint presentation software, Access database and Publisher desktop publisher. **Open Office** has similar features to Microsoft Office, but is available for free use.

Your word processing program has many useful features as well as the basic typing function. It allows for typing, printing and storing of correspondence, reports, papers, theses, or dissertations. Among the many functions, you will find:
- Spell check – even using your own customized dictionary for vernaculars
- Automatic footnotes
- Track changes – useful for exchange of manuscripts and correcting and editing
- In Microsoft Word 2003 there is even a translation function from one language to another (for example, English to Korean)

Presentation software such as PowerPoint gives you the ability to prepare professional-looking slide presentations and displays. This is very useful when conducting training or presenting a paper, as it gives the participants some visual input as well as verbal input. The integration between Microsoft Office programs means you don't need to retype, as you can import text from your word processor.

Spreadsheets such as Microsoft Excel are a powerful tool for working with numbers, and can be used for such tasks as financial record-keeping and data entry.

The computer today is like typewriter in the last century. It is a required work tool. In places where there is no electricity, one can use solar panels with a deep cycle battery and inverter to run a computer.

Even if the functionality of a full computer is not required, the ***Alphasmart 3000*** is a simple tool that can be used of for keying in texts. It is an "intelligent keyboard", with four lines of LCD display, which allows text to be input and stored up to a maximum of about 100 pages of plain text (ASCII). This can be over 50 chapters of Bible text (around 128 kB). This text can then be downloaded through a USB connection to a computer for processing. When connected, the Alphasmart acts like another keyboard, and at the push of a single button all the text in a particular file is sent to the computer, appearing in any word-processing program as though it was being typed. Thus it can be inserted into a Word file, or into a directly into a Paratext project file. Although this may not seem a spectacular claim, the main draw-card is that the Alphasmart 3000 runs for 600-700 hours on a single set of 3 AA alkaline batteries. Details of the Alphasmarts can be found on the internet at www.alphasmart.com.

Electronic Communication with translation team members

There is generally a lot of correspondence between the translator and other members of the translation team, such as the church authorities, translation officers and Bible Society representatives. This is an important part of our work that can be aided by the use of technology.

Electronic forms of correspondence by e-mail or by the use of various internet chat services are quick, efficient and generally less costly than other forms of correspondence. Examples of these programs are ***MSN Messenger,*** and ***Yahoo Messenger.*** Many have voice and webcam capabilities as well as text communication.

It is possible in some areas to get free or low-cost phone calls, utilizing Voice over IP technology (VOIP), from such providers as ***Skype*** or ***Net2Phone.***

Frequent communication between members of the team, and between the team and the Translation Officer or the NBS should be encouraged.

In particular, files of translated or revised texts can be sent electronically to all members of the team, and especially to the Translation Officer involved. This enables the Translation Officer to examine the manuscript before visiting the project, and in some cases can mean that the Translation Officer does not have to visit so often. Questions can be raised and answers received quickly, and back-translations can be sent back and forth. Translation Officers are able to prepare for visits and make the

visit more effective if they have been able to work through the draft prior to meeting with the committee.

Conclusion

In the past we talked about common era (CE). I think today CE stands Computer Era as opposed to BCE - Before Computer Era. Indeed, computers have revolutionized all aspects of human lives including the tasks of Bible translation and revision. We will not be able to turn the clock back, so might as well make the best use of the available technology to get our task done more effectively and more efficiently.

Useful websites

- http://www.bskorea.or.kr
- www.worldscriptures.org
- www.biblesocieties.org
- www.bibletool.org
- mail2web.com
- hyperdictionary.com
- babelfish.altavista.com

Useful Search Engines

DRIVING THE ENGINE

Top search engines in April 2004

	Domain	Market share
1	www.google.com.au	29.28%
2	www.yahoo.com	8.37%
3	www.google.com	7.04%
4	au.yahoo.com	6.48%
5	www.msn.com	4.66%
6	au.search.yahoo.com	3.96%
7	search.yahoo.com	3.59%
8	search.ninemsn.com.au	3.37%
9	search.msn.com	2.97%
10	images.google.com.au	2.06%
11	my.yahoo.com	1.31%
12	www.whitepages.com.au	1.03%
13	www.altavista.com	0.78%
14	www.resultsmaster.com	0.76%
15	www.yellowpages.com.au	0.67%
16	www.netscape.com	0.58%
17	wp.netscape.com	0.57%
18	www.mywebsearch.com	0.51%
19	images.google.com	0.50%
20	hk.yahoo.com	0.50%

Source: Hitwise

* Keyword

Paratext 6, technology for Biblical studies, electronic communication, computer era, electronic text.

<Abstract>

성서 번역에 있어서
컴퓨터 하드웨어와 소프트웨어의 활용

다우드 소실로
(세계성서공회연합회 아시아태평양지역 번역책임자)

본 논문은 컴퓨터 프로그램의 활용이 성서 번역에 얼마나 큰 영향을 미치는가를 증명해 준다. 현대 사회는 기술의 급진전으로 이제 기술의 대중화 시대를 눈앞에 목도하고 있다. 심지어 현대 기술 문명의 영향력은 종교의 영역에로까지 확산되고 있다. 이와 같은 현대 기술 문명의 대중화 현상을 고려해 볼 때, 현대의 성서 번역 작업 역시 이러한 현대 문명의 기술과 그 혜택을 도외시 할 수 없다. 이제 성서 번역자들은 성서 번역의 효율성이 기술의 정보와 그 실용적 가치를 얼마나 잘 활용하는가에 따라 결정 지워진다는 점을 인식하기 시작했다. 실제로 성서 번역자들이 시중에 시판된 유익한 성서관련 프로그램들을 잘 활용한다면 성서의 번역과 그 효율성을 극대화시킬 수 있을 것이다. 성서 번역에 유익한 도움을 주는 대표적인 프로그램들로는 *Logos Libronix, Stuttart Electronic Study Bible, Bible Works 6, Olive Tree Bible Software* 등을 손꼽을 수 있으며, 특히 *Paratext 6*는 번역자들의 번역 작업을 매우 효율적으로 수행하도록 도울 수 있는 유익한 프로그램이다. 이 프로그램은 번역을 초안하며 내용의 일관성을 점검하며 본문을 관리하며 본문의 출력과 인쇄를 효과적으로 수행함으로써 성서 번역의 전 과정을 종합적으로 관리해 주는 필수적인 프로그램이다. 또한 번역자들은 빠른 전자 통신 수단을 사용함으로써 서로의 의사소통을 위해 극대화시킬 수 있다. 이처럼 기술 문명의 혜택과 그 효율성을 극대화시키는 것은 성서 번역자들에게 가장 필수적인 작업이 될 것이다.

(장세훈)