

## The MT User Experience Panel Discussion

**Chair: Muriel Vasconcellos**, on SPANAM/ENGSPAN  
at the Pan American Health Organization, Washington, D.C.  
Bernard Scott, on applications of LOGOS  
John Chandieux, on METEO at Environment Canada  
Hideki Tanaka, on STAR at Nippon Hoso Kyokai, Tokyo

### 1 Introduction

The “proof of the pudding” for machine translation lies in its track record of successful use in practical applications. Whole conferences have been devoted to this subject—“Practical Experience of Machine Translation” (London, 1982), “World Systran Conference” (Luxembourg, 1986), “International Forum on Translation Technology” (Oiso, Japan, 1988), “Benefits of Computer Assisted Translation to Information Managers and End-Users” (Washington, etc. 1990), to mention a few—and of course it has figured on the agenda of many other conferences as well, including the two previous MT Summits. Each year new sites are added to the roster of MT users. It is no longer possible to represent them all. This brief panel attempts to cover a spectrum that illustrates the wide range of tasks in the service of which MT is currently being enlisted.<sup>1</sup>

### 2 Logos

#### 2.1 Overview

The LOGOS system is a general-purpose multilingual machine translation system first introduced in Germany in 1983. Today there are over 30 systems installed worldwide, including six sites within the Canadian Government, Lexitech (also in Canada), AT&T (USA), Siemens-Nixdorf (Germany, France), Computer Associates Incorporated (USA, France), Information Builders Incorporated (USA), and Thamus (Italy). The language offerings include English to French, German, Spanish, and soon Italian (fourth quarter of 1991) and German to English, French, and Italian. The system runs on UNIX workstations (third quarter 1991), IBM mainframes (VM/CMS and MVS), and the Wang VS. The translation process itself is automatic. Postediting and database work is interactive.

<sup>1</sup> The statements are presented in alphabetical order by name of system.

One of the most interesting LOGOS sites is the ultra-sophisticated translation bureau at Lexitech in New Brunswick, Canada, where the system is integrated with an Interleaf publishing operation running on a VAX server connecting over 20 Interleaf workstations. Source documents are input via a Kurzweil scanner, graphics are stripped out automatically, texts (and legends) are routed to LOGOS for translation (on an IBM 9370), and the MT output is then reintegrated with the graphics and downloaded to individual Interleaf workstations for final revision. Lexitech has extended the LOGOS dictionary to a total of 350,000 entries and is regularly processing tens of thousands of pages annually. Much of the translation is done under contract to the Canadian Department of National Defense, but Lexitech also offers its services to national industry. Indicative of the scale and efficiency of this operation is the fact that just one of its industrial contracts last year entailed 25,000 pages of technical translation. This high-tech operation may well represent a prototype of the future.

MT-based translation bureaus of this sort appear to be catching on. The Swiss-Canadian aerospace firm, Oerlikon, has opened a translation bureau also based on a LOGOS-Interleaf integration. Originally begun in order to address in-house translation requirements, Oerlikon has now expanded its operation into a full-blown translation subsidiary, doing work for Canadian Government and industry as well. Northern Telecom, GM, and Bell of Canada are some of the corporations benefiting from LOGOS technology via these automated translation bureaus. The cost-benefits to corporations appear to be quite dramatic. One Canadian company reports saving \$300,000 in 1990 alone by out-sourcing translation to a LOGOS-based bureau. In the United States, the Antler translation company, working on-line to the computers at the Logos Technology Center in Mt. Arlington, New Jersey, recently completed 1,000 pages of English-to-French translation for a U.S. automotive company in just 28 days. In a similar arrangement two years

ago with AT&T's Network Systems division in Winston-Salem, North Carolina, the Logos Technology Center ran off 10,000 pages of text and shipped the raw Spanish output to Madrid for postediting by a translation bureau (which had had no previous exposure to MT). The elapsed time from start to finished product was a remarkable two months!

AT&T's experience with the LOGOS system in the past few years reflects the growing use of MT in the United States as well. The Network Systems Division has built a new in-house translation capability around its LOGOS English-Spanish system, producing large volumes of translation in connection with billion-dollar equipment sales to Spain and Mexico. Now they are expanding, adding French, German, and eventually Italian as target languages, with a view to offering general-purpose translation services company-wide.

## 2.2 Factors Affecting the Success of MT

A great many factors go into the success of a LOGOS MT installation. In brief, installations are invariably successful to the extent that they do everything, or nearly everything, right. What these "things" are (in the opinion of the present writer) are suggested below.

- **Management.** The importance of management to the success of an MT installation can hardly be overstated. The manager must want to make it work, staying on top of the process, especially during the critical first six months when policies, procedures, and attitudes are set. Issues requiring management initiative include: system integration, training, source text screening (for appropriateness and/or the possible need for selective pre-editing), quality control, vendor communications, logging and backup procedures, etc. Once sound practices are in place and startup problems resolved, experience shows that these MT installations will run smoothly and routinely.
- **Source Text Quality.** The writing quality of the source text is apt to be the biggest single factor affecting productivity. "There is no doubt," states Manager Jean Gordon of the Centre d'Expertise at the Canadian Secretary of State, speaking of their experience with the LOGOS English-French system, "as long as the source text is well written, the raw translations will be quite good." Inevitably, the reverse is also true, in pretty much the same ratio. Long-term LOGOS user Siemens-Nixdorf in Paderborn, Germany, noting this correlation, has placed writers and translators in close proximity so that when a raw translation comes out below par they can have the source document originators revise the text. As a consequence, reports Nixdorf's translation manager Julian Cox, a page of raw German-English output winds up requiring very little editing. Feedback from the MT experience here is affecting the infrastructure of an organization and the way it performs its work, resulting in better source

documentation generally, in addition to everything else.

- **Motivation.** An installation is successful because the translators who do the work, page after page, are doing their job and doing it well. Unfortunately, the reverse of this, for whatever reason, is also apt to be true. I have personally witnessed how sufficiently motivated translators can turn out as many as 40 finished pages of technical German-English translation in a single day—better than an eight-fold increase in productivity! And I have also seen translators turn out the same number of pages per day regardless of whether or not they have a sophisticated machine translation system at their service. One thing seems advisable: assignments to work with MT should be voluntary. The Canadian Secretary of State has followed this practice and it has worked well. Translators who are motivated to work collaboratively with an MT system adjust to this new mode quite quickly, and some have gone on record as stating they would not like to return to traditional human translation.

Historically we have seen that translators may at times become discouraged by some small system deficiency that seems inconsequential to its developers but which looms large to the person who must deal with it frequently in a text. An example might be a small formatting glitch of some kind which obliges the translator to become a proofreader and a keyboardist. Good communications between users and the vendor is one way to keep what are really minor problems just that—minor.

- **Job Satisfaction.** Finally, there is the matter of professional fulfillment. We at Logos have traditionally sought to allow the user to make an impact on the machine process. The ALEX dictionary interface is one such example. Users, after only 20 hours of training, quickly attain input rates of as many as 400 entries a day. Beyond this, the SEMANTHA interface enables users to update the semantic rule base and thus affect the deepest part of the system's analysis. With SEMANTHA, a user can easily compose a rule, for example, that renders the verb *temper* with the French verb *adoucir* in contexts of words like *attitude* and with the verb *diluer* in the context of wine—while the default transfer for *temper* is 'temper'. Experience reveals that, as users become more seasoned, interest in and reliance on SEMANTHA for optimizing raw machine output tends to increase dramatically.

## 2.3 Effectiveness of MT Systems

The original motivation for turning to machine translation has always varied among LOGOS users. One company is looking to meet critical deadlines in connection with product introduction in overseas markets; another is coping with periodic volume spikes that cannot be handled by regular staff; still another primarily wants to

lower costs; and finally, another is looking for ways to get a handle on terminology usage in their documents in order to spare their readership the confusion that inconsistent and nonstandard usage creates. Of course, all these factors are present to some degree in any decision to go with MT. The classic appeal of MT, after all, is that huge quantities of translation can be done quickly, relatively more cheaply, and with greater consistency. And all this is indeed the case, provided the installation is well managed, the translators want to make it work, and the system is such that these translators over time experience job satisfaction in their interaction with it.

## **2.4 Conclusion**

A new LOGOS installation typically is up and running in weeks and is realizing cost benefits within months. General-purpose, automatic translation has clearly arrived on the international scene, and its use can only grow. Given the times, and the advent of such things as desktop workstations, this growth we predict will finally accelerate in the 1990's until the use of MT becomes standard procedure. But it would be a mistake to assume that automatic translation is now about to yield all its benefits automatically, at the mere push of a button. For some time to come, these benefits will continue to depend on human motivation and human intelligence.

## **3 Meteo: Environment Canada**

### **3.1 Overview**

Developed and leased by John Chandieux Consultants, Inc., to Environment Canada's public weather forecasting service, METEO has been in operation from English into French since 1978 and from French into English since 1988. For the first six years the program ran on a mainframe computer. In October 1984, operations were launched on a 68000 microcomputer with 512 Kb of random access memory, and currently it is being ported to an 80386 microcomputer.

Originally METEO produced 7,000 words per day, but the volume has grown to the point that it now generates 45,000 words a day, or approximately 16 million words a year, the equivalent of 30 person-years of traditional human translation. The all-time total long since passed 100 million words (Chandieux 1989).

### **3.2 Purpose of Translations**

The purpose of this application is to assist in the provision of timely weather bulletins in the two official languages of Canada. METEO translates forecasts received by satellite and computer links from all over Canada. The finished product is beamed to the public via radio and television stations, Coast Guard services, etc.

### **3.3 Domains and Text Types**

The weather forecasts that serve as METEO's input are written in a telegraphic style. They are prepared by meteorologists, rather than professional writers, located at

sites all across the country. Since the input is totally uncoordinated, there is considerable variation in the incoming texts, and this has been one of the biggest problems for the implementation of MT.

Our experience with METEO indicates that the most suitable texts for MT are those with a high percentage of repetitive and predictable terms and structures. The most problematic applications appear to be general-purpose texts and legal documents.

### **3.4 Human Intervention**

There is no pre- or interactive editing with METEO whatsoever, nor is the input customized. Revision, mandated by law, affects less than 4% of the machine output. This low error rate contributes to METEO's high productivity and hence to its extremely low cost to the consumer—an average of half a cent per word translated, or \$5 per 1,000 words.

### **3.5 User Involvement**

METEO's users are continuously polled for their feedback. METEO-assigned translators jot down suggestions for lexical or structural improvements on a hard-copy print of the original forecast showing where the problem arose.

### **3.6 Gains**

Increased volume and improved turnaround are clearly demonstrated by the use of METEO. With this system, as well as other "made-to-measure" MT solutions developed by the same company, productivity gains are estimated at between 700% and 800% based on the time required to translate a given volume of text by hand. This increased productivity is reflected in the very low cost per word. Another advantage reported is that METEO provides predictable, uniform terminology.

## **4 STAR: Nippon Hoso Kyokai**

### **4.1 Overview**

Nippon Hoso Kyokai, the Japan Broadcasting Corporation, has been using the STAR English-to-Japanese machine translation system on an experimental basis to aid in the production of Japanese subtitles for English-language telecasts since August 1989, when direct satellite broadcasting was inaugurated (Aizawa 1990). Since that time, subtitles for 5 minutes' worth of English news have been produced every day using a process that involves pre-editing and postediting by Japanese operators. The same basic STAR engine has also been used without human intervention since 1990 to provide real-time rough translations of incoming bulletins from an international wire service.

STAR, a commercial product of Catena-Resource Laboratories, Inc., has undergone further development by NHK's in-house staff to make it more suitable for the translation of news. Implementation and operation of the system is planned and managed by three units, all working in close cooperation: the News Department, the

Engineering Administration Department, and the Science and Technical Research Laboratories, Personnel from the three units meet periodically to coordinate their efforts and plan for the future.

Development of the two MT applications, coupled with the two-year experimental use of the subtitle production system, has provided us with some valuable pointers for producing and integrating an effective MT system. We regard our approach as an interesting way of conducting fundamental research, in which the evaluation of practical use is quickly returned to the researchers.

#### 4.2 Purpose of Translations

The two applications of STAR are for diametrically opposite purposes. The translation of subtitles, on the one hand, is for dissemination: the televised broadcast provides information to the Japanese public at large. The newswire translation service, on the other hand, is for assimilation: it aims to help reporters judge the importance of news immediately.

#### 4.3 Human Intervention

The different purposes for which the two applications were developed has made for a significant difference in operation and in strategies for the improvement of efficiency.

The subtitle production system, on the one hand, is subject to a series of demanding conditions:

- Input. Since English news manuscripts are not received in machine-readable form, they have to be transcribed by hand. The operator first listens to the news and keys in the transcription, then pre-edits the text, and finally submits it for translation. Listening and comprehending the English news is the most time-consuming process for Japanese operators.
- Output. The product is constrained in several ways. In the first place, great accuracy is required, because NHK must stand behind the information it provides to the Japanese public. In addition, the Japanese subtitle must be short enough to be superimposed on a single scene and at the same time as informative as the original English text. And the subtitles must be synchronized with the respective scenes. These requirements make postediting indispensable.

With the wire service news translation, on the other hand, translation quality can be compromised to some extent. As a result, neither pre- nor postediting is necessary. The Japanese output format has no special requirements. The entire operation is totally independent of human intervention. The main goal of this application, translation speed, has already been met. The simple structure allows us to concentrate on improving the translation engine itself in order to get better results.

#### 4.4 User Involvement

There are three ways in which an operator can feed information back to the researchers. The first is through hard-copy feedback from the operation site. This feedback mainly relates to correcting errors in the dictionary or grammatical problems in the MT system.

A second form of feedback is analysis of the log files. The pre-editing process, the translation, and the subtitles are recorded in the system log file. This provides useful information such as the number of subtitles produced for a given news item, the amount of work involved in producing the subtitles, accuracy of the operator's transcription of the English news, etc.

Feedback can also be obtained through direct contact with STAR. One of the operators spends two days a week at the lab evaluating the system. This intensive effort quickly reveals the system's weak points. More valuable information can be gained through an interview with the operator. The operator may ask for such capabilities as a sophisticated spelling checker, a change in system configuration, the display of alternative translations, etc. These requests and suggestions need to be analyzed carefully because they differ from one person to the next. The interview also serves as an important educational opportunity for the operator.

#### 4.5 Obstacles and Solutions

Hardware problems were dealt with when the existing platform was modified when the MT system was integrated. The translation workstation was connected to the character overlay system and some PCs were added to enable the supervisor to check the subtitles. This kind of change was not difficult.

One of the main challenges at this time is to streamline human intervention in the subtitle production system. Currently the operation is highly labor-intensive, and not always are the tasks performed by the most suitable personnel. Although the cost and availability of operators makes it preferable to keep their number to a minimum, the ideal operation would break the process down into small modules—input, pre-editing, postediting, etc.—to be carried out by the most economical and suitable operator—i.e. a native English speaker to listen to the text and prepare the input, a native Japanese speaker to postedit the output, and a less professional operator or systems operator for other tasks. These individuals would form a production line. It has been decided to conduct studies on the selection of these operators and the definition of their assignments. With successful restructuring, it should be possible to reduce the more time-consuming and difficult aspects, minimize the number of operators, maximize the best advantages of MT, and therefore produce subtitles more quickly.

Basic difficulties lie in the nature of news text itself. The coverage is very broad, and thus a domain-specific approach is not applicable. Proper nouns appear frequently, many of them unknown words that cause failure in parsing (Kato 1991). The frequent use of so-called

polysemic verbs makes it difficult to produce a proper translation (Tanaka 1991). These problems have been tackled using a research-based approach. To back up the research, news from the wire service has been gathered over a period of two years. This voluminous text data base and the Japanese and English sentence pairs obtained from our two-year experience will help to reveal the nature of news text and provide us with valuable information for improving our system.

## **5 SPANAM/ENGSPAN: Pan American Health Organization**

### **5.1 Overview**

The Pan American Health Organization, Regional Office of the World Health Organization for the Americas, has been using machine translation to meet its internal needs since January 1980. Today MT is the Organization's primary mode of translation. The systems, SPANAM and ENGSPAN, were developed in-house under a project that began in 1976 (Vasconcellos & Leon 1988). Development and production are carried out simultaneously in the same environment. SPANAM (Spanish to English), in steadily improving versions, has been in continuous operation since 1980, and ENGSPAN (English to Spanish), since 1985. They now each produce an average of 100,000 words a month, the major portion of which is postedited by professional translators,

ENGSPAN is also in use at the International Center for Tropical Agriculture (CIAT) in Colombia.

### **5.2 Purpose of Translations**

Most of the translations are closely scrutinized by their consumers and are therefore edited to publication quality. ENGSPAN, in particular, is often used for texts to be widely disseminated in Spanish-speaking Latin America. Both SPANAM and ENGSPAN have helped to convey urgent messages in the current cholera epidemic and have provided broad support for programs dealing with AIDS. At the same time, there is a growing application for raw or semi-raw translations for information purposes only. With the mushrooming of specialised English-language data bases in fields related to public health and agriculture, ENGSPAN is being geared up to serve as an information tool in addition to a support for translators. It is currently translating a 400,000-word data base of the U.S. National Cancer Institute which is now available to the public via fax,

### **5.3 Domains and Text Types**

Both SPANAM and ENGSPAN are general-purpose systems. The tasks they address are quite varied in terms of subject matter, vocabulary, language style, and discourse type. In addition to medicine, public health, and the physical sciences, they are used in agriculture, computer science, law, management, sanitary engineering, and other fields.

In general, regardless of the domain or text type, texts that are well drafted constitute the best applications

and those that are poorly drafted, the worst--a circumstance which unfortunately cannot always be foreseen in advance. Speeches, thought to be the bane of MT, often fare surprisingly well because they are carefully prepared. On the other hand, technical abstracts from Spanish into English, believed to be an ideal application, are difficult for MT because the sentences in Spanish usually begin with an impersonal verb where a noun phrase is required in English. Even within these types of translation there has been a wide range of success; they are cited here to dispel prevalent myths. One of the new and especially promising applications at PAHO is for data bases--information which until recently there was no hope of making available in Spanish to the Latin American countries. Some of the least successful applications have been transcripts of spoken discourse, a script for a TV program, letters, and some types of legal texts.

### **5.4 Human Intervention**

Texts for SPANAM and ENGSPAN are not pre-edited or customized. Usually they are postedited. Contract posteditors are paid by the word at approximately 60% of the human translation rate.

### **5.5 User Involvement**

In the PAHO setting the translators provide the computational linguists with feedback on a constant basis, and frequently their wishes are answered from one day to the next. This environment has been stimulating for all the people involved and has shown the value of communication with the MT developer.

### **5.6 Client Satisfaction**

Feedback collected over a period of 8.5 months in 1987-1988 showed that 85.1% of the "clients" who received postedited MT were satisfied, whereas only 78.1% were satisfied with traditional human translations.

### **5.7 Obstacles**

Undoubtedly the single largest obstacle to implementing SPANAM and ENGSPAN has been a conservative attitude on the part of end recipients who feel that they might be getting an inferior product. Consumer education to allay their concerns has taken up a lot of the project's time. Another obstacle has been getting translation requesters to submit their texts on disk. Yet another problem has been to persuade translators not to change valid MT output; the fact that they intervened can be a sign that they did not understand the original meaning of the text, and by changing it they can, and often do, change the meaning.

### **5.8 Gains**

Cost savings have been demonstrated (Vasconcellos 1989), and translator productivity has shown improvements ranging from 30% to 300%, depending on the text and the skill of the translator.

## 6 Conclusions

As promised, a broad spectrum of MT applications has been presented. To a large extent these applications speak for themselves. It can be seen that MT use is increasing on all fronts. The technology is being enlisted to cope with a variety of new challenges, and in all areas, new and old, it is being used more intensively.

The impressive accomplishments of METEO speak to the advantage of special-purpose MT systems, in which the stable quality of the output makes it possible to minimize reliance on human intervention.

Translations of product manuals, the archetypical MT application, are rolling off the presses by the tens and even hundreds of thousands of pages, as we have seen with LOGOS. A number of MT systems, in fact, are doing this kind of work, and the clamor for product documentation in foreign languages continues to increase as companies throughout the world seek to internationalize their markets. This burgeoning trend was recently cited in the *New York Times* (Deutsch 1991).

In addition, general-purpose translation is getting increasing assistance from MT, not only in translation bureaus and in-house services, as we have seen with LOGOS, and SPANAM/ENGSPAN, but also in innovative applications such as the NHK subtitle production system using Catena's STAR system.

The use of MT for information only is also on the rise. We saw the innovative use of STAR to scan incoming newswire bulletins with no human intervention whatsoever. At the U.S. Air Force's Foreign Technology Division there is increased use of raw SYSTRAN accessed from remote terminals, and more source languages are being added to this operation. The translation of data bases is becoming a reality. Recently data bases in languages other than English have been gaining importance, and since these information sources are already in machine-readable form, there is a role to be played by robust MT systems that can help users to search their files. We saw that ENGSPAN provides translations into Spanish of data on cancer for use by the general public.

Thus, the trends appear to be: a greater variety of applications, more intensive use of existing applications, and, especially, use of MT to translate data bases, which with traditional human translation was out of the question.

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