USERS of SYSTEMS

The Current State of MT Usage – Or: How Do I Use Thee? Let Me Count the Ways[1]

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PCMT: A New Passion that Changes Everything

Two years ago, when we met in Washington at MT Summit III, it was obvious that MT was increasingly headed for the personal computer. Today the revolution is upon us. The advent of affordable software that can run on anyone's desktop ("PCMT"[2]) has totally challenged the received wisdom about MT usage. We must take a new look at the user profile, the purposes of MT, the products and the markets to which they are being directed, and the long-range future of the industry as a whole.

This report addresses the gap in our understanding of current MT usage by attempting an overview of all uses of MT based on the most concrete facts that could be found. It has considered only tried-and-true experiences and cumulative data reported directly by users. Information is particularly nebulous in the area of PCMT. Since there is no major up-front investment that needs to be justified, the user is less motivated to keep statistics. Nevertheless, some impressive facts are already a matter of record.

In the first place, there is now evidence that we are talking in rather large numbers of MT users. The June 1993 issue of *WordPerfect Magazine* reported the results of a mail-in poll in which readers voted for their favourite PCMT software. A total of 7,865 respondents took the trouble to send in their vote[3]. Presumably these people have road-tested at least one of the products and may in fact be using MT for practical purposes. The top three choices were Linguistic Products' PC-Translator, MicroTac Software's Translation Assistant, and Globalink's GTS (version unspecified). PC-Translator has doubled in sales each year since it first appeared on the market in 1985. The company periodically introduces improvements in its 12 language combinations and usually has new combinations in the pipeline; the developers have been heartened by the high percentage of registered users who request upgrades and new languages[4]. Globalink, which offers seven language combinations, went public in June 1993[5], and their prospectus states that approximately 13,000 units have been sold or placed with dealers since 1990. MicroTac, for its part, leads the market by a wide margin: in May 1993, all-time total sales of its four bidirectional packages reached a staggering 150,000 units[6]. The Translation Assistants are priced at under US$100 and, in some discount houses, as little as US$60.

In all, there are 10 companies selling PCMT in the United States. Together they translate in a total of 17 different directions, and a number of other systems and language combinations are under development[7].

These products are being used in myriad ways. In the long run, translation varies as greatly as the texts that undergo it, the people who perform the process, and the consumers who require it. Each use is somewhat unique.

Even more impressive than the numbers is the fact that many users of the PCMT systems are happy campers. Their ranks include both translators and nontranslators, and it is among the latter that PCMT is cutting its widest swath. From unsolicited testimonials received by the vendors[8], we learn that many people are enlisting these packages to prepare letters and memos in languages that are foreign to them. One user of this kind writes: "The PC-Translator is doing wonderfully, we are all satisfied." There seems to be a slight preference for enlisting them to produce translations of texts prepared by the user rather than to comprehend foreign texts, which are typically input by hand or by a pesky process of optical scanning.

Sometimes the users do not know the target language at all. Installed on a laptop, PCMT has served as a practical companion in social situations where language is a barrier, and it has helped travellers to get around in foreign countries. An American in Paris reports that he used French Assistant to explain to the caretaker of his building that the hot water was off. Another MicroTac user, an American priest filling in at the last minute on a cruise ship, relied on this same software to prepare his sermon in French. Most touching, perhaps, is the user of Italian Assistant who wrote: "Through your product I have been able to correspond with my relatives in Italy since my trip in 1990, when I was introduced to them for the first time. My dad passed away two years ago and my mom is too old to write."

Finding the Real MT Users

Finding out who really uses machine translation is no simple task. A few years ago it was possible, with help from the vendors, to identify at least those customers who were using MT on a significant scale. Today, however, with PCMT selling in large volume and with vendors busy attending to a broader customer base, the picture is far less clear. For the purpose of this report, a strategy was devised for locating a representative sample of MT users, who were to be presented with the following list of questions[9].

Survey Questions

System used? Since when?
Language combinations (from => into)?
Hardware platform? Since when?
Form of input (e.g., disk, downloaded files, OCR, manual keying)?
Purpose of translation?
Type of documents translated -- discourse genre (e.g., "technical manuals"), subject matter?
Output per year (number of words) percentage of total translation volume?
Dictionary size (number of entries) for each language combination?
Description of personnel who use it (e.g., contract translators, etc.)? How many?
Type and amount of pre-editing done?
Type and amount of postediting done?
System for incorporating feedback from end-consumers?
Advantages, disadvantages of MT?
News flash: Latest developments? Novel uses of MT? Plans for the future?

As the first step, a list was drawn up of known users for whom fax addresses were available[10]. There were 33 of these (two of whom could not be reached). Next, a list was prepared of individuals who had checked the "User" box on their application form when they joined the Association for Machine Translation in the Americas. This exercise garnered 15 more names. It was known that some of these people were prospective users still investigating the feasibility of MT, so a letter was prepared addressing each one as a "user or potential user of MT" and asking them to report on their plans for using it if they did not already have it installed. The third step was to contact the vendors directly to ask them for the names and fax numbers of "some of [their] principal clients," sharing with them the list of questions that would be asked. Because of multiple sites and contacts, a total of 32 inquiries were sent out to vendors of 23 systems or families of systems. Six additional known vendors could not be reached. Of the 32 who were contacted, 14 replied and provided information about their users. These replies yielded 22 additional users, all of whom were approached. In the end, fax letters went out to 70 users or potential users.

Thus a fairly wide net was cast. Even so, the coverage was far from complete. The information obtained without the assistance of the vendors was not collected in any systematic way. In the vendor cycle, not all of them could be contacted, many who were contacted did not respond, and those who did reply did not necessarily give a full list of their customers. Response from the PCMT vendors, who account for far and away the largest volume of purchased (if not operating) units, was particularly low: only three replied, and only one of these directed us to specific users. Given such large gaps in the coverage, the answers received can only be considered representative of the vendors and users who were reached and had the time and inclination to share their experience. They do not speak for MT as a whole.

Another piece of missing information, which would be difficult for any survey to ferret out, is the user sites that have fallen by the wayside -- and why. This information is important for a full understanding of MT usage. However, it is hard to come by. One usually learns it by chance. Recently, for example, in a translation service that had shown positive results with MT, there was a breakdown in the hardware on which the system depends, and management was unwilling to buy the same equipment again. Elsewhere, an MT operation was eliminated because of a company-wide "reorganization" – perhaps an indirect victim of the foundering economy. At yet other site the operation was dependent on an individual, and when that person left there is no structure to keep it going. There may also be MT failures in the true sense that the text was not a good match for the system or not enough time and money were being saved to justify the investment. For a variety of reasons, most of this information, which would be very illuminating, is kept dark.

Despite its limitations, however, the material collected for the present report is significant in many ways. Its very abundance gives it a certain authority. A total of **40** responses were received: **33** from actual MT users, one from a user with a commitment to start in July 1993, and **six** from companies that were in the process of investigating MT – two were running pilot tests, one had put out an invitation to bid, and three were undertaking feasibility studies. CompuServe was included in this last group, with plans to offer on-line service from English to French starting in the fall of 1993 and other combinations later. In addition, answers to the same questions, gathered within the last nine months, were available from five other users and were included in the study. The analysis that follows covers the 33 responses from actual users and the five additional ones for which information was available, for a total of **38** user sites – or 54% of those that had been contacted. In all, they represent **15** different systems: Atlas, DP/Translator, Duet Qt, Général TAO, Hicats, Shalt, JICST, Logos, MicroCat, Metal, PC-Translator, Pivot, NHK, Spanam/Engspan, and Systran (including Systran Express, the on-line service that anyone with a PC, a modem, and a checkbook can tap into). There were **16** users in the Americas, **11** from Europe, and **11** from Japan[11]. This may be the largest body of data ever collected at a single time on the use of MT. While it does not permit hard statistics, some very interesting conclusions can be drawn about how MT stands up to the test of translating texts in the real world.

Measuring MT Usage

We can learn a lot about how much MT is being used from the volume of translation being produced and the percentage that this represents of the total workload. The survey yielded some illuminating information in this regard.

Thirty of the 38 users gave information on the volume of translation they produce using MT, the percentage that this represents of their total workload, or both (see table). Many of them had statistics at their fingertips, and it is easy to see that high-volume users, new or pilot users who are keeping a close watch on the effect of MT implementation, and users closely involved with development of the system itself would have reason to keep careful records.

In the category of large-volume users, the figures show that there are some truly industrial-strength MT operations. The European Commission is near the top of the list with 30 million words a year of general translation, for which they use Systran in a total of 13 different language combinations and serve from 400 to 500 end-consumers. These numbers take on special importance because the translations are in a wide range of subject areas and discourse genres. They amount to 15% of the total translation workload of the CEC. Interestingly, only 30% of Systran's output is postedited by professional translators; the rest is delivered "raw" and is used for information purposes only.

Two other very large users are Bull in France, which expects to be using Systran at an annual rate of 45 million words by the end of 1993, and Lexi-tech, which uses Logos for about 25 million words a year. Both these companies are using MT for technical documentation. Météo generates about 17 million words of weather bulletins each year for Environment Canada. The U.S. Air Force/FASTC, in its venerable information-gathering operation, annually translates between 10 and 12.5 million words with Systran. Intergraph relies on their own DP/Translator for about 10 million words. Xerox produces about 9 million words with Systran. Nikkei Printing uses NEC's Pivot and Sharp's Duet Qt for about 4.5 million words. And so on.

Added together, the volume of MT produced by these users – slightly over half the known users approached in the survey -- comes to about 180 million words a year. MT use in the world undoubtedly exceeds 380 million. These figures translate, respectively, to some 720,000 pages of known use and about 1.2 million pages of estimated use. It is impossible to guess what percentage this represents of total translation in the world, however, since experts recognize that there is really no way to quantify the latter.

It can be seen from the table that the bulk of the work is translations of technical manuals and other material related to localization. The volume produced by the 15 users that provided this information comes to approximately 108 million, or 60% of the total volume reported. Of the entire sample of 38 users, 23, or 61% of them, fall into this category.

Another important parameter to look at is the proportion of the total translation load being handled by MT. The figures on percentage of the overall workload run the gamut. For the 24 who answered this question, the proportions ranged from 5% to 100% and formed an almost perfect bell-shaped curve. The average was 46% and

the mean was 50%. Lexi-tech, one of the biggest users, relies on MT for 100% of its workload, and Nikkei Printing, also with a very large volume, uses it for 95%. Environment Canada uses Météo for 85% of all weather bulletins. The U.S. Air Force, which has had an MT installation since 1970, reports 80%. Some respondents seemed unclear on whether they should include languages not offered by their MT system in calculating the percentage, so it should be kept in mind that the figures may not always be referring to the same thing.

The high-percentage users are often high-volume users as well. The 10 respondents in the table that reported at least 50% usage and also reported figures for volume together produce 118.5 million words, or 66% of the total. As might be expected, many of these high-percentage users do technical manuals and other types of localization work: of the 12 users at 50% or higher, seven do this kind of work, and, as noted already, they account for a large share of the total volume. This should be concrete proof of the long-held assumption that there is a comfortable fit between technical manuals/localization and the automation of translation. In other words, MT does seem to work well for these applications.

Another interesting fact that emerges from the table is that most of the respondents have started using MT in the last five years. Of those in the table, 22, or 73%, began to use MT in 1988 or later. For the entire responding population of 38 users, the figure is 82%. In other words, MT use has recently taken quite a spurt. And of course, with the advent of PCMT, this trend can be expected to accelerate sharply.

Contribution Required of the Human User

Closely related to how much of the job MT is doing is the amount of human effort involved in the form of pre- and posteditng. (None of the respondents had interactive workstations.)

Pre-editing was cited as a major issue only by the Raytheon user translating software written in the Ada programming language and by two of the three respondents who work with Japanese-English. While one said "pre-editing is basically division of long sentences and we usually don't spend that much time on it," another said that it is contracted out, and the third J-E user reported that pre-editing takes about 40% of total translation time. The other 30 respondents, all working with a Western language as the source, regarded pre-editing to be negligible or at least easily justifiable; 24 said they did little or none – although interpretations of the term appeared to vary. Five said that they run an automatic spell-checker on the input; five mentioned conversion software or adaptation of the format; one referred to the need to proofread OCR output; and two indicated that pre-editing mainly involved blocking material that does not require translation. One user spends time "cutting overly long sentences into shorter ones, fixing up punctuation, etc." A user in France has tried "end-user sensitization to 'clear writing,' with no evidence of success," while another one gives informal guidance on how to write for MT. Two said that their documents are written originally in a controlled language, and one reported that the input is edited to conform to the company's controlled language at a rate of 3,750 words a day – which also happens to be their rate of *post*editing. Estimates of percentage of total translation time were given at 5%-10%, 10% (two respondents), and 20%-30%. One user included terminology research and dictionary maintenance under this heading, for approximately 60% of total MT time.

Postediting, on the other hand, generally accounted for a large share of production time and cost, and it was also the subject of a lot of comments when it came to discussing the disadvantages of MT. A number of respondents said that postediting is done directly on a word processor, one of them preferring commercial off-the-shelf word processing to the product developed by the MT vendor. Many pointed out that the requirement for postediting varies depending on the quality of the output, and that some language combinations give better results than others (e.g., "German-English [is better than] English-German"). The J-E user that did not report very much pre-editing said: "We rewrite the sentences after MT rather than [pre-]editing. Usually it takes a lot of time and manual power." An E-J user, in turn, felt that the main disadvantage of MT was the difficulty of postediting to achieve "acceptable" expressions in Japanese. The system developed by NHK has a user interface that presents several choices of output for the user to pick from, and the user can specify how many choices the system offers. Général TAO, when it gets overly challenged, leaves segments in the source language untranslated, and these passages must then be done by hand.

Several used the word "extensive" in characterizing their postediting. One respondent indicated that 75% or more of the text is touched during the postediting phase, although this proportion might vary depending on the translator, the product, or the language. On the other hand, Météo requires intervention in less than 5% of the output for a translation of good quality.

A number of respondents said that they review the entire text or do a "100% full postedit." This percentage should not be confused with the percentage of text that is actually corrected. A few require very high quality (e.g., for subtitles of television broadcasts, insurance contracts, publications), while some of them settle for an in-between product – from "clean[ing] up the language, adjust[ing] the format, and review[ing] for technical accuracy," to "editing for accuracy but not for style unless requested," and, finally, to "quick and dirty." The U.S. Air Force has special software developed by Systran, called Editsys, which automatically picks out problem areas and leaves the rest of the text, usually about 80%, to be delivered without review. Some users have two levels of editing – "information only" (or "for understanding only") versus a full translation. One respondent indicated that they offer both raw and reviewed translation but that only reviewed translation is "marketed" and accounts for 95% of their usage.

In terms of share of the total process, the user who said that terminology and dictionary work accounted for 60% of total MT time went on to attribute 20% of this time to postediting. Another said postediting represented 25% of the time. A third one said the proportion was 30%.

In the discussion of the disadvantages of MT, postediting kept coming up as a sore point. The respondents complained of the high cost, the time it takes, and the lack of user-friendly functions for posteditors.

"To the Level of Everyday's Most Quiet Need"

Underlying the whole question of production is the purpose for which the translation is required. It is important to assess whether or not MT contributes to achieving the user's long-term service objective. As we saw earlier, a large percentage of the respondents are engaged in producing localization materials, often including immense volumes of technical manuals and, in at least three cases, software as well. Their responses definitely show that MT helps to move the process along so that they can get their products to market sooner. Perhaps the contribution of MT is not so much in producing a structurally correct text as it is in keeping terminology consistent and in eliminating the need to reintroduce graphics and format codes in target-language documents. Fisher-Rosemount, a high-volume user and manufacturer of machinery for industrial fluids, said that "translation would be barely feasible for this volume at this speed without it. By retaining formatting attributes, tables, and illustrations, [MT] saves enormous work and money." This user's bottom line: "Cost savings of nearly 50%." The sentiment is echoed by the owner of a commercial translation service that relies heavily on MT, who says: MT is "indispensable for high-volume jobs."

MT is being used for other purposes as well, of course. The sharing of scientific and technical information, especially from on-line databases, is a growing area. The U.S. Air Force (FASTC) has now expanded its MT operation to 17 subject fields and five languages and is starting to translate titles and short abstracts from on-line sources. Since 1990 the Japan Information Center for Science and Technology has been translating the mammoth JICST database into English with its own MT system and reports a 40% reduction in cost. Also in Japan, the Bio Information Center provides up-to-date data in medical and biotechnical fields (medical reports, database abstracts) with the help of MT, while the Pan American Health Organization in Washington, D.C., uses MT for publication-quality texts in similar technical fields as well as others. And Henkel KgaA in Düsseldorf uses MT to translate chemical abstracts, reports, and data sheets.

The Canadian agency DTSB-Statistics recently started using MT to translate technical papers and repetitive texts such as consumer price indexes for dissemination purposes. And of course Météo's weather bulletins for Environment Canada are a well-known example of MT use; translation is now bidirectional, and turnaround time for a given bulletin is less than 6 minutes.

One of the most novel uses of MT was reported at MT Summit III -- namely, NHK's television captioning project. Their MT system is now bundled in a prototype subtitle production system that also includes integrated modules for videotape monitoring on-screen, manual superimpose-timing input, and preview of the completed program. It was unveiled in June 1993.

From the users' responses, it would appear that the issue is not whether MT can meet these needs, but rather how efficiently it can do so. In some cases it has proved to be highly functional, while in others the jury is still out.

"With Smiles and Tears"

The users were forthcoming about both the advantages and disadvantages of MT. Several listed a number of advantages and no disadvantages. The advantages cited most often were consistency of terminology, faster turnaround (to speed up market penetration), and increased productivity. One user commented that the terminology factor directly contributed to increased productivity ("at least 1.8 times better than human-only translation"). It was noted that certain types of errors are avoided – e.g., skipped passages, numbers incorrectly copied. Filters on publishing systems which eliminate the need to re-enter format codes were very popular. Also cited was MT's ability to quickly process hugh volumes of material in many languages simultaneously.

Other specific comments were: "When the requester requires FYI translation, we can speed up the edit and still make the translation intelligible." "Less need for top quality translator." "We expect a capacity increase as soon as we have gained more experience with the system" (a user who started at beginning of 1993). "It gets better" (a new user).

And from the operator's perspective: "Lightens the translator's load." "No cumbersome typing." "It also maintains the original format created in WordPerfect." "Beneficial for us because the kind of text we translate is very dry and very repetitive." "I really enjoy working with DP/Translator; it requires a lot of work at the beginning with the creation of custom dictionaries but helps maintain consistency. The machine generates a draft translation, performing the most boring part of the task, so that I can concentrate on perfecting the output."

The respondents were equally expressive about the disadvantages. Many of them complained about the poor quality of the output and the cumbersome process of postediting. They want better interfaces and postediting tools.

From the manager's viewpoint, several respondents cited the high cost of source text preparation and postediting. Two said it was difficult to find texts suitable for MT. One complained that it involves a lot of training, and two of them noted that it's costly for smaller projects. Another remarked that system development is too slow and that there should be more user support. In one case it was noted that inclusion of MT in the production scheme had complicated the workflow. With regard to one particular system, the respondent mentioned that enhancements are very costly because of its size. Two of them regretted that hardcopy input documents were not scannable; "efficiency from the use of MT is largely lost in the time required to manually key in a text." A user of the old Weidner MicroCat workstation reported that the equipment is wearing out and the alternatives seem too expensive. Also cited were the high cost of purchase and maintenance; complicated handling; "an un-ergonomic user interface"; lack of acceptance by internal translators. A new user said: "No improvement in speed so far."

Other comments were: "It somewhat inhibits creativity"; "loss of idiomacy and style"; "resulting text is a little stilted and awkward"; "excessive adherence to MT output changes expression"; "translation system not sufficiently flexible about using one term in one context but another in a different context."

The following response gave real food for thought: "Up to now we have not really been able to make use of the advantages (consistency of terminology, speed, etc.). One of the advantages mentioned by salesmen, etc., [namely] that MT relieves translators of boring, repetitive tasks, is not relevant in my opinion as there are other repetitive tasks instead: text conversion, parameter editing, deformatting, writing Pattern Matcher instructions, reformatting, etc. I enjoy working with MT because it is an interesting tool and you learn a lot, but whether it really beats manual translation remains to be seen."

The "Future's Epigraph"

By and large the users have a positive outlook, a desire to streamline their MT operations, and a keen interest in introducing improvements and trying out new applications. One current user plans to take on a new application, joining the ranks of those who use MT to screen translation requests. Another site is plugging MT into databases on CD-ROM.

They are asking for, and working on, new and better tools. They want to be on high-end workstations instead of mainframes. They want software to test texts ahead of time to see if they lend themselves to MT. Much in demand is a good system for repetitions processing, whereby previously translated texts are matched against the ongoing translation process and displayed for possible pasting in. They need better converters for moving freely between different publishing environments. They are also working on terminology managers. Integration of the workstation seems to be the key. The Canadian Government is putting the finishing touches on a "fully equipped zero-wait-time multimedia workstation on a LAN server" with access to terminology banks, multi-task word-processing packages,

automated terminology searching, text analysis, and other specialized software.

They are also asking for, and working on, more language combinations, more domains, and better strategies for controlling the quality of input texts. At least two of them are seriously looking into interlingual MT, and the Unión Fenosa in Spain, working with Carnegie Mellon's Kant system, is dreaming the impossible dream and turning it into reality: MT with no postediting!

Notes

1. Updated version of invited lecture presented at MT Summit IV (Kobe, Japan, 19-22 July 1993). Published with permission.
2. "PCMT" is understood here to refer to PC-based MT products that do full-sentence batch translation.
3. From a larger "Reader's Choice" questionnaire, this number of people cast votes specifically for a PCMT package (source: Shannon Harmon, WordPerfect Corporation).
4. Source: Ralph Dessau, Linguistic Products.
5. GLNK U on the National Capitalization Market. Globalink regretted not being able to provide more information for the current report but was under a routine temporary period of silence.
6. Source: Michael Tacelosky, President, MicroTac Software (figure does not include upgrades.)
7. Source: "Report on PC-based MT products", American Translators Association, December 1992, compiled by L.Chris Miller.
8. Copies of the original testimonials provided by Linguistic Products and MicroTac Software.
9. Questions based on a model developed by Joann Ryan for research presented at the seminar "Machine Translation for Translators" (San Diego, 4 November 1992), sponsored jointly by the American Translators Association and the Association for Machine Translation in the Americas.
10. The entry criterion for the study was that the user could be reached by fax.
11. The list of users, together with the type of text they are translating, was published in the proceedings of MT Summit IV. To this list should be added late responses received from the Commission of the European Communities (general and technical translation, including 70% information-only), Inter Group (technical manuals), and JAPO (patent titles and abstracts), which are included in the totals cited in the present version of the paper.

Summary of MT Use by Survey Respondents[a]

User #	Year of startup	Estimated no. of words per year[b] volume (thousands)	Percentage of total	Type of text
1	1970	11,250	80	Scientific and technical articles
2	1977	17,000	85	Weather bulletins
3	1978	9,000	50	Dissemination
4	1980	2,500	67	General and technical
5	1981	30,000	15	Low-level in-house documents
6	1982	-	10	Technical manuals
7	1986	10-100	100	Service publications
8	1987	-	20	Technical manuals
9	1988	25,000	100	Technical manuals
10	1988	10,000	-	Software, hardware documentation
11	1988	4,500	95	Technical manuals
12	1988	1,600	-	Technical manuals
13	1988	-	10	Customer documentation
14	1989	2,500-3,000	40	Technical manuals
15	1989	44-60	-	Subtitles for news in English
16	1989	750-1,000	5	Internal technical documentation
17	1990	2,500	50	Insurance and pension contracts
18	1990	3,445[c]	-[e]	Titles + abstracts, JICST database
19	1990	2,000	25	On-line, hardcopy documentation
20	1990	480	-	Technical manuals
21	1990	350	20	Technical manuals

22	1991	1,600	67	Technical manuals
23	1991	375	30	Manuals, technical reports
24	1991	-	80	Chemical abstracts, data sheets
25	1992	45,000	50	Technical manuals
26	1992	1,500	-	Software, user manuals
27	1992	345[d]	9	Titles of unexamined patents
28	1992	25	5	Scientific publications
29	1993	3,300	30	Technical manuals, price indexes
30	1993	-	90	Computer manuals

a. Eight of the 38 respondents did not provide the information being compared in this table.
b. Figures for numbers of pages were multiplied by 250 to permit comparison. Those for less than a year were annualized.
c. 85,000 titles plus 15,000 abstracts; average length of title estimated at 10 English words and average length of abstract (200 Japanese characters with upper limit of 300) estimated at 150 English words.
d. About 23,000 titles per year at an average of 15 English words each.
e. 90% of the abstracts are written in English by bilingual abstractors; of the remaining 10%, all (100%) are translated by MT.