Machine translation: the trade- offs and the pay-backs

by Jean DATTA

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Whenever a new computer application comes up for discussion, the talk soon turns to the trade-offs and the pay-backs. The fine art of successfully developing a new system generally lies in juggling advantages and attendant disadvantages against economies and cost factors until just the right balance has been found. As might be expected, the situation is not very different with machine translation (MT).

Those who oppose it will point an accusatory finger at a post-edited MT text and challenge: "But you would never actually write that!" As true as this may be, it misses the point. Translators tend to be perfectionists: we want to get everything just right. Above all, we want our output to read as though it had been written originally in our target language. For the post-editor of MT output, on the other hand, the desideratum is not a piece of polished prose, but a "quick fix". The aim is to do just enough to make the text intelligible - no more. Every extra stroke of the pen, or keystroke, beyond that is uneconomic. The post-editor has to forget about feeling a sense of ownership concerning the translation. While it may be hard to cut the umbilical cord and accept that a translation is no longer "his", the translator thus also escapes from the double-bind of responsibility.

A computer professional recently commented to me that an EDP study our service had translated some time before had been about 20 per cent unintelligible. "The translators don't know computer terminology", he complained. I was sure that we had made no serious errors of terminology, but I thought it best not to reply. We continued our conversation, and he reverted to the study: "The person who drafted it is very competent; he has an excellent reputation. I just can't believe that his logic could have been as confused as it appeared in that study." With that, he was probably coming closer to the truth, but I again preferred to keep my counsel.

If a post-editor does not "own" an MT print-out, he also does not "own" the responsibility for its flaws. However, a real question of quality does arise concerning MT, and one that touches us very closely in our professional pride. Sometimes, in our zeal to do the best possible job, we may lose sight of our ultimate "boss", the user of our translations. He is waiting while we polish; whether he will appreciate, or even notice, the fine sheen we achieve is a moot point.

Countless times I have consulted the submitting officer of a document concerning some point on which I had lavished great care, spending hours consulting dictionaries, only to find that he did not see the problem at all. "Never mind; leave it out. But when will I get the translation?" will commonly be the response. In the United Nations, at least, a large proportion of the people drafting and using documents are working in a language which is not their mother tongue. They are not necessarily attuned to the finer points of style. None the less, we strive to make silk purses. When we succeed, we are asked, "Why did it take so long?" When we fail, we are sometimes called incompetent.

Does MT offer a way out? The answer is not as clear as either its advocates or its detractors would have it. The debate on MT will undoubtedly continue unabated until somebody teaches a computer to tell whether the words "management issues directives" refer to directives concerning management issues or whether they state that the top people in an organisation are the ones who bring out guidelines. How does the human mind actually determine whether "management" is a noun or an adjective and whether "issues" is a verb, a noun or indeed an adjective? The answer lies in what computer professionals are pleased to call heuristics and what every translator knows is often enough the by-guess-and-by-golly approach.

There is no guess work, though, about the speed of machine translation. Algorithms run on a mainframe computer can achieve microsecond reactions that are too fast to be meaningful to the human mind. The raw translation spews out of the printer by the mile. The impatient user has his output in his hands almost before the inputting is complete. He no longer has to wonder when he will get his translation, but what he is to make of a sentence such as: "What could make if the government in cost with its former practices?" (Que pourra-t-on faire si le gouvernement en revient a ses pratiques anterieures? The tense shift is explained by the fact that the example is taken from minutes.) Presumably nothing much. This is where the human post-editor comes into the picture. But if the post-editor has to rewrite the raw output, then the MT stage might just as well have been skipped in the first place. The trade-off between speed and quality no longer has anything to offer.

During a recent visit to the Commission of the European Communities, in Luxembourg, I had the opportunity to see how a variety of computerised aids to translation are being used to help move the massive translation workload. It is clear that some translators have misgivings about machine translation because they feel that so much human post-editing must be lavished on raw text to make it presentable that they might as well do the translation from scratch in the conventional way. On the other hand, there are texts which submitting officers are eager to have translated in a hurry, even if the product is rough. Translators find that they can "fix" the raw machine translation to the point where it is intelligible by spending a maximum of 30 minutes a page on it, and it is

hoped that, with experience, they will be able to reduce this to 15 minutes.

However, the issue of the speed/ quality trade-off may be resolved, when one takes into account the costs involved in running a machine translation system, it is obvious that MT is far from free and that any potential user must carefully balance needs and savings against costs before deciding whether to take the plunge into machine translation. These costs relate mainly to computer time, telecommunications if a remote computer is used, royalties and other payments in respect of intellectual property rights, and above all human resources. These are required not only for keying the source text into a word-processing system unless a sophisticated and costly optical character reader able to cope with a variety of typefaces and diacritical marks is available, but also for maintaining the computer program and developing the electronic dictionaries in response to inadequacies detected in raw machine translations.

If the amount of time spent in post-editing is kept strictly to a minimum and no research and checking are done, assuming that the translator works directly at the word-processing terminal, translator output can probably be expected to treble. Therefore, as a rule of thumb to gauge the cost-effectiveness of machine translation, one might take statistics for past manual translation operations as a basis and apply the following calculation:

Where:
T = cost of translator per word
P = cost of post-editor per word

then:
Savings per word on direct translation cost (S) = T-P
m = average number of words of MT per month (estimated)
and where:

C = cost of computer services per month (including cost of telecommunications if a remote computer is used)
R = royalties per word
D = cost of human resources for dictionary development per month (forecast)

Then, if machine translation is to be cost-effective, the following must be achieved:

999Sm > (or =) C + Rm + D

Any front-end expenses in respect of intellectual property rights, computer implementation or hardware (word-processing terminals, modem, optical character reader, etc.) would have to be amortised over a suitable period, but as the hardware, at least, could be used for other purposes as well, the whole cost would not have to be allocated to MT.

The cost of human resources for dictionary development should not be underestimated, since the quality of the MT output will depend largely on an intensive effort to integrate the terminology and idiomatic expressions needed into the dictionary. Depending on the size of the MT operation, it is perfectly possible that a translator will have to be assigned to this duty full-time for each target language.

Whether the above calculation gives a break-even figure or indicates a rapid pay-back of investment may play a less important role in the decision as to whether to introduce MT than the feelings of the end-users about the post-edited end-product. The end-user may like the speed and not mind about the lack of style. He may actually be willing to swallow a few substantive blunders. Even a service that might seem crude to a professional translator could appear to the end-user to be worth more than the higher quality conventional service. The speed/quality trade-off may be the deciding factor, and it may operate in a direction which seems unsatisfactory to the translator.

Although translators may find post-editing a thankless job, and have reservations about the end-product, there can be a few spin-offs for us, too. In conventional translation, we regularly find ourselves called upon to reconstitute badly drafted source text into intelligible target text. MT is not so kind to the drafter: it simply translates all the flaws (as well as possibly adding a few of its own). If drafters knew that what they wrote would be subjected to the ruthless mirror of MT, if they knew that MT could not cope with their "creative" efforts, which would therefore have to wait their turn in the queue for manual translation, they might begin to write simply and clearly, with a thought more to communicating than to impressing by means of frills and flourishes. In the end, this would work to the advantage not only of translators, but also of readers, and the writers themselves, for that matter.

The hope of reforming writers may admittedly be pie in the sky. A more immediate spin-off of MT would surely lie in simply showing submitting officers raw machine translation of texts they had sent for translation. In contemplating the ineptnesses of the bit-crunchers, submitting officers could not fail to gain a new appreciation of the prowess of human translators.

Even if no other spin-off materialises, if worst comes to worst and there are complaints about translation services involving MT, we can easily shrug them off. "The computer made a mistake; you had better fire it - and hire a few human beings", we can tell them.