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## **Is It Worth Learning Translation Technology?**

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### 0. INTRODUCTION

When discussing the relevance of technological training in the translation curricula, it is important to clarify the factors that make technology more indispensable and show how the training should be tuned accordingly. The relevance of technology will depend on the medium that contains the text to be translated. This particular aspect is becoming increasingly evident with the rise of the localization industry, which deals solely with information in digital form. There may be no other imaginable means for approaching the translation of such things as on-line manuals in software packages or CD-ROMs with technical documentation than computational ones. On the other hand, the traditional crafts of interpreting natural speech or translating printed material, which are peripheral to technology, may still benefit from technological training slightly more than anecdotally. It is clear that word processors, on-line dictionaries and all sorts of background documentation, such as concordances or collated texts, besides e-mail or other ways of network interaction with colleagues anywhere in the world may substantially help the literary translator's work. With the exception of a few eccentrics or maniacs, it will be rare in the future to see good professional interpreters and literary translators not using more or less sophisticated and specialized tools for their jobs, comparable to the familiarization with tape recorders or typewriters in the past. In any case, this might be something best left to the professional to decide, and may not be indispensable.

However, the greater number of jobs for our students is in the localization market. Information of many types is rapidly changing

format and is going digital. Electronic documentation is the adequate realm for the incorporation of translation technology. This is something that young students of translation must learn. As the conception and design of technical documentation becomes progressively influenced by the electronic medium, it is integrating more and more with the whole concept of a software product. The strategies and means for translating both software packages and electronic documents are becoming very similar and both are now, as we will see, the goal of the localization industry.

### 1. THE LOCALIZATION INDUSTRY

The increase of information in electronic format is linked to advances in computational techniques for dealing with it. Together with the proliferation of informational webs in Internet, we can also see a growing number of search and retrieval devices, some of which integrate translation technology. Technical documentation is becoming electronic, in the form of CD-ROM, on-line manuals, intranets, etc. An important consequence of the popularization of Internet is that the access to information is now truly global and the demand for localizing institutional and commercial Web-sites is growing fast. In the localization industry, the utilization of technology is congenital, and developing adequate tools has immediate economic benefits.

The main role of localization companies is to help software publishers, hardware manufacturers and telecommunications companies with versions of their software, documentation, marketing, and Web-based information in different languages for simultaneous worldwide release. The recent expansion of these industries has considerably increased the demand for translation products and has created a new burgeoning market for the language business. According to a recent industry survey by LISA (the Localization Industry Standards Association), almost one third of software publishers, such as Microsoft, Oracle, Adobe, Quark, etc., generate above 20 percent of their sales from localized products, that is, from products which have been adapted to the language and

culture of their targeted markets, and the great majority of publishers expect to be localizing into more than ten different languages.

Localization is not limited to the software-publishing business but it has infiltrated many other facets of the market, from software for manufacturing and enterprise resource planning, games, home banking, and edutainment (education and entertainment), to retail automation systems, medical instruments, mobile phones, personal digital assistants (PDA), and the Internet. Doing business in an integrated global economy, with growing electronic transactions, and world wide access to products and services means an urgent need to breakthrough language barriers. A prediction of \$220 billion online spending by 2001 shows the potential of this new market. It means that product information, from purchasing procedures to user manuals, must be made available in the languages of potential customers. According to the latest surveys, there are more than 35 million non-English-speaking Internet users. Internet is thus evolving into a huge consumer of Web-based information in different languages. The company Nua Ltd. provides a good example of how the demand for multilingual Web-sites is changing the notion of translation into localization. Nua has recently won a substantial contract to develop and maintain a searchable multilingual intranet for the American Export Group (AEG), a division of Thomas Publishing International. Nua's task is to transform the existing American Export Register (AER), a directory of some 6,000 pages, into a localized database of 45,000 company listings, with information about each company, including a categorization into one of AEG's 5,000 categories. AEG's intranet will link 47,000 US firms to overseas clients. The first version of the AER register will provide access in five languages: English, French, German, Spanish, and Portuguese. Russian is due to follow, and the company hopes eventually to have an Arabic version. Any such multilingual service involves frequent revisions and updates, which in turn means a high demand for constant localization effort.

Besides Internet, another emerging sector for the localization industry is the introduction of the e-book (electronic book) in the literary market. Microsoft, Bertelsmann, Harper Collins, Penguin

Putnam, Simon & Schuster, and Time Warner Books have launched a new association for standardizing the format of electronic books. Although there may be doubts about whether we will ever be able to approach the electronic page in terms of readability and ease of use, it is clear that for a new generation of console and video-game users, who are more than adapted to reading on screens, literature on the console may be more than appealing.

To understand the relevance of the localization market we can look at some figures provided by companies in the field. AlpNet, for example, who claims to be the largest publicly owned dedicated supplier of worldwide translation and product localization services, with over 375 employees in 13 countries, has recently reported sales of US\$10.4 million in one quarter of 1997, with net income of US\$619,000. In addition to AlpNet, here are some more names of buoyant companies in the localization business: International Software Products, EnCompas Globalization, Lernout & Hauspie, Flanders Language Valley, Vertaalbureau Bothof, Intertrans, Bowne Global Solutions, LionBridge Technologies, Language Management International, International Language Engineering, Techno-Graphics & Translations Accent Software International Ltd.. The specialized magazine *Language International*, with six issues a year, is a good source of information to find out more about these companies. Many claim to have problems recruiting people. The General Manager of LionBridge, Santi van der Kruk, for example, declares:

The profile we look for in translators is an excellent knowledge of computer technology and superb linguistic ability in both the source and target languages. They must know how to use the leading CAT [computer assisted translation] tools and applications and be flexible. The information technology and localization industries are evolving very rapidly and translators need to move with them.

Van der Meer, president of AlpNet, puts it this way:

Localization was originally intended to set software (or information technology) translators apart from 'old fashioned' non-technical translators of all types of documents. Software translation required a different skill set: software translators had to understand programming

code, they had to work under tremendous time pressure and be flexible about product changes and updates. Originally there was only a select group - the localizer - who knew how to respond to the needs of the software industry. From these beginnings, pure localization companies emerged focusing on testing, engineering, and project management.

This shows that the localization market is requiring an expertise that the vast majority of academic centers is not properly providing. This state of affairs explains why the localization industry itself, around the LISA association, has seen the need to promote an educational initiative.

## 2. LISA EDUCATION INITIATIVE TASKFORCE (LEIT)

LISA Education Initiative Taskforce (LEIT) is a consortium of schools training translators and computational linguists that was announced in 1998 as an initiative to develop a promotional program for the academic communities in Europe, North America, and Asia. The initial mandate of LEIT was to conduct a survey among academic and non-academic programs that offer courseware and training for internationalizers and localizers and to query the market players to determine their needs with respect to major job profiles. LEIT's main objective is to stimulate more formal education in skills beneficial to the localization industry that complains of a labor shortage. The academic institutions involved in the first release of LEIT are: University of Geneva (Switzerland), Brigham Young University (Utah), Kent State University (Ohio), University of Cologne (Germany), City College of Dublin (Ireland), Monterey Institute of International Studies (California), and National Software Center in Bombay (India).

Professor Margaret King of Geneva University described the first step of the project as consisting of the "clarification of the state of affairs and to plan courses that are comprehensive enough to cover all aspects of interest of the localization industry, to review all aspects of the localization Industry, from translation and technical writing through globalization, internationalization, and localization". The definition of the critical terms involved was a contentious topic,

although there seems to be a consensus with the following:

*Globalization:* The adaptation of marketing strategies to regional requirements of all kinds (e.g., cultural, legal, and linguistic).

*Internationalization:* The engineering of a product (usually software) to enable efficient adaptation of the product to local requirements.

*Localization:* The adaptation of a product to a target language and culture (locale).

The main goal of the LEIT initiative is to introduce localization courseware into translation studies, with versions ready for the start of the 1999 academic year. However, this must be done with care. Bert Esselink (1998), from AlpNet, for example, argues against separating localization from other disciplines and claims its basic principles should be covered in all areas of translation training. Furthermore, it would be useful to add the trainers not only need constant feedback and guidance from the commercial sector, they also need to maintain close contact with the software industry. So, perhaps, one of the best features of the LEIT initiative is its combination of partnership from the academic as well as from the industry world. LISA offers the first version of this courseware on its Web-site and users have the possibility to contact the LEIT group and collaborate through an on-line questionnaire.

### 3. TOOLS FOR THE INDUSTRY

Until comparatively recent times, there has been a gulf between what translation software developers provided for the translator and what in fact the translator needed. This has brought about many confronted views in connection with translation technology. Mark Homnack, president of SimulTrans poses the following questions (*Language International* 10.6):

How much money has been lost in the pursuit of translation technology? Ask the developers, and their investors. How much benefit has been gained? Ask the clients who have bought their tools. To what extent should we believe the analysts' fantastic forecasts

about translation technologies? Ask the people who have managed significant translation activities for five years or more.

He goes on to say:

I have just given up hope of any universal translation technology. After listening to the eternal and forever broken promises of Weidner 20 years ago, Systran 15 years ago, Logos 10 years ago, XL8 five years ago, and now Mendez's Internet ploys, I have grown cynical about the sprite hopes of Spring.

Yet machine translation is never plug-and-play. It requires a huge effort in preparation, evaluation, and maintenance. Suitability of technology depends on many factors, but fundamentally text type. Without these considerations, the technology may be seen as a fiasco. Few informed people still see the original ideal of fully automatic high-quality translation of arbitrary texts as a realistic goal. Translation technology suppliers are now working under the assumption that, rather than batch processes, man-machine interaction together with the integration of tools into the translator's working environment is the solution.

There are recent briefs reporting achievements of faster turnaround, and substantial cost reductions resulting from an adequate use of translation technology. The Canadian Mitel company, with the Logos machine translation (MT) system, or the Dutch Baan, with an intelligent combination of Logos and the translation memory (TM) manager Transit, are both claiming time and quality improvements in their document production and translation cycles, with cost reductions of 40% to 60%. These companies have well established translation and document management departments which have incorporated new technology with extreme caution. However, despite the difficulties, the demand for translation technology is constantly growing. The British consulting company Ovum Ltd reported in 1996 that the world market for translation products in 1995 had been \$200 million, half of which had been in the Japanese market.

### 3.1 THE TRANSLATION WORKSTATION

Leaving behind the old conception of a monolithic compact translation engine, the industry is now moving in the direction of integrating systems: "In the future Trados will offer solutions that provide enterprise-wide applications for multilingual information creation and dissemination, integrating logistical and language-engineering applications into smooth workflow that spans the globe," says Trados manager Henri Broekmate. Logos, the veteran translation technology provider, has announced "an integrated technology-based translation package, which will combine term management, TM, MT and related tools to create a seamless full service localization environment." Other software manufacturers also in the race are Corel, Star, IBM, and the small but belligerent Spanish company Atril. This approach for integrating different tools is largely the view advocated by many language-technology specialists. Below is a description of an ideal engine which captures the answers given by Muriel Vasconcellos (from the Pan American Health Organization), Minako O'Hagan (author of *The Coming Age of Teletranslations*) and Eduard Hovy (President of the Association of Machine Translation in the Americas) to a recent survey (by *Language International* 10.6). The ideal workstation for the translator would combine the following features:

Full integration in the translator's general working environment, which comprises the operating system, the document editor (hypertext authoring, desktop publisher or the standard word-processor), as well as the emailer or the Web browser. These would be complemented with a wide collection of linguistic tools: from spell, grammar and style checkers to on-line dictionaries, and glossaries, including terminology management, annotated corpora, concordances, collated texts, etc. The system should comprise all advances in machine translation (MT) and translation memory (TM) technologies, be able to perform batch extraction and reuse of validated translations, enable searches into TM databases by various keywords (such as phrases, authors, or issuing institutions). These TM databases could be distributed and accessible through Internet. There is a new standard for TM exchange

(TMX) that would permit translators and companies to work remotely and share memories in real-time.

Eduard Hovy underlines the need for a genre detector. "We need a genre topology, a tree of more or less related types of text and ways of recognizing and treating the different types computationally." He also sees the difficulty of constantly up-dating the dictionaries and suggests a "restless lexicon builder that crawls all over the Web every night, ceaselessly collecting words, names, and phrases, and putting them into the appropriate lexicons."

Muriel Vasconcellos pictures her ideal design of the workstation in the following way:

Good view of the source text extensive enough to offer the overall context, including the previous sentence and two or three sentences after the current one. Relevant on-line topical word lists, glossaries and thesaurus. These should be immediately accessible and, in the case of topical lists, there should be an optimal switch that shows, possibly in color, when there are subject-specific entries available. Three target-text windows. The first would be the main working area, and it would start by providing a sentence from the original document (or a machine pre-translation), which could be over-struck or quickly deleted to allow the translator to work from scratch. The original text or pre-translation could be switched off. Characters of any language and other symbols should be easy to produce. Drag-and-drop is essential and editing macros are extremely helpful when overstriking or translating from scratch.

The second window would offer translation memory when it is available. The TM should be capable of fuzzy matching with a very large database, with the ability to include the organization's past texts if they are in some sort of electronic form.

The third window would provide a raw machine translation which should be easy to paste into the target document. The grammar checker can be tailored so that it is not so sensitive. It would be ideal if one could write one's own grammar rules.

### 3.2 *Software localization tools*

The above lines depict a view of a translation environment which is closer to more traditional needs of the translator than to current

requirements of the industry. Many aspects of software localization have not been considered, particularly the concepts of multilingual management and document-life monitoring. Corporations are now realizing that documentation is an integral part of the production line where the distinction between product, marketing and technical material is becoming more and more blurred. Product documentation is gaining importance in the whole process of product development with direct impact on time-to-market. Software engineering techniques that apply in other phases of software development are beginning to apply to document production as well. The appraisal of national and international standards of various types is also significant: text and character coding standards (e.g. SGML/XML and Unicode), as well as translation quality control standards (e.g. DIN 2345 in Germany, or UNI 10574 in Italy).

In response to these new challenges, localization packages are now being designed to assist users throughout the whole life cycle of a multilingual document. These take them through job setup, authoring, translation preparation, translation, validation, and publishing, besides ensuring consistency and quality in source and target language variants of the documentation. New systems help developers monitor different versions, variants and languages of product documentation, and author customer specific solutions. An average localization package today will normally consist of an industry standard SGML/XML editor (e.g. ArborText), a translation and terminology toolkit (Trados Translator's Workbench), and a publishing engine (e.g. Adobe's Frame+SGML).

Unlike traditional translators, software localizers may be engaged in early stages of software development, as there are issues, such as platform portability, code exchange, format conversion, etc. which if not properly dealt with may hinder product internationalization. Localizers are often involved in the selection and application of utilities that perform code scanning and checking, that automatically isolate and suggest solutions to National Language Support (NLS) issues, which save time during the internationalization enabling process. There are run-time libraries that enable software developers

and localizers to create single-source, multilingual, and portable cross-platform applications. Unicode support is also fundamental for software developers who work with multilingual texts, as it provides a consistent coding format for international character sets.

In the words of Rose Lockwood (Language International 10.5), a consultant from Equipe Consortium Ltd, “as traditional translation methods give way to language engineering and disciplined authoring, translation and document-management methods, the role of technically proficient linguists and authors will be increasingly important to global WWW. The challenge will be to employ the skills used in conventional technical publishing in the new environment of a digital economy.”

#### 4. HUMAN EXCELLENCE

Having said all this, it is important to reassess the human factor. Like cooks, tailors or architects, professional translators need to become acquainted with technology, because good use of technology will make their jobs more competitive and satisfactory. But they should not dismiss craftsmanship. Technology enhances productivity, but translation excellence goes beyond technology. It is important to delimit the roles of humans and machines in translation. Martin Kay's (1987) words in this respect are most illustrative:

A computer is a device that can be used to magnify human productivity. Properly used, it does not dehumanize by imposing its own Orwellian stamp on the products of human spirit and the dignity of human labor but, by taking over what is mechanical and routine, it frees human beings over what is mechanical and routine. Translation is a fine and exacting art, but there is much about it that is mechanical and routine, if this were given over to a machine, the productivity of the translator would not only be magnified but this work would become more rewarding, more exciting, more human.

It has taken some 40 years for the specialists involved in the development of MT to realize that the limits to technology arise when going beyond the mechanical and routine aspects of language. From the outside, translation is often seen as a mere mechanical

process, not any more complex than playing chess, for example. If computers have been programmed with the capacity of beating a chess master champion such as Kasparov, why should they not be capable of performing translation of the highest quality? Few people are aware of the complexity of literary translation. Douglas Hofstadter (1998) depicts this well:

A skilled literary translator makes a far larger number of changes, and far more significant changes, than any virtuoso performer of classical music would ever dare to make in playing notes in the score of, say, a Beethoven piano sonata. In literary translation, it's totally humdrum stuff for new ideas to be interpreted, old ideas to be deleted, structures to be inverted, twisted around, and on and on.

#### 4.1 *The complexity of mastering translation*

Although it may not be perceived at first sight, the complexity of natural language is of an order of magnitude far superior to any purely mechanical process. To how many words should the vocabulary be limited to make the complexity of producing “free sonnets” (that is, any combination of 6 words in 14 verses) comparable to the number of possible chess games? It may be difficult to believe, but the vocabulary should be restricted to 100 words. That is, making free sonnets with 100 words offers as many different alternatives as there are ways of playing a chess game (roughly, 10120; see DELI’s Web page for discussion). The number of possibilities would quickly come down if combinations were restricted so that they not only made sense but acquired some sort of poetic value. However, defining formally or mechanically the properties of “make sense” and “have poetic value” is not an easy task. Or at least, it is far more difficult than establishing winning heuristics for a color to succeed in a chess game. No wonder then that Douglas Hofstadter’s MT experiment translating 16th century French Clement Marot’s poem *Ma Mignonne* into English using IBM’s *Candide* system should have performed so badly (see Sgrung’s interview in *Language International* 10.1) :

Well, when you look at [IBM's Candide's] translation of Ma Mignonne, thinking of Ma Mignonne as prose, not as poetry, it's by far the worst. It's so terrible that it's not even laughable, it just stinks! It's pathetic!

Obviously, Hofstadter's experiment has gone beyond the recommended mechanical and routine scope of language and is therefore an abuse of MT. Outside the limits of the mechanical and routine, MT is impracticable and human creativity becomes indispensable. Translators of the highest quality are only obtainable from first-class raw materials and constant and disciplined training. The potentially good translator must be a sensitive, wise, vigilant, talented, gifted, experienced, and knowledgeable person. An adequate use of mechanical means and resources can make a good human translator a much more productive one. Nevertheless, very much like dictionaries and other reference material, technology may be considered an excellent prosthesis, but little more than that. As Martin Kay (1992) argues, there is an intrinsic and irreplaceable human aspect of translation:

There is nothing that a person could know, or feel, or dream, that could not be crucial for getting a good translation of some text or other. To be a translator, therefore, one cannot just have some parts of humanity; one must be a complete human being.

However, even for skilled human translators, translation is often difficult. One clear example is when linguistic form, as opposed to content, becomes an important part of a literary piece. Conveying the content, but missing the poetic aspects of the signifier may considerably hinder the quality of the translation. This is a challenge to any translator. Jaime de Ojeda's (1989) Spanish translation of Lewis Carroll's Alice in Wonderland illustrates this problem:

Twinkle, twinkle, little bat  
how I wonder what you're at!  
Up above the world you fly  
like a tea-tray in the sky.

Brilla, luce, ratita alada  
 ¿en qué estas tan atareada?  
 Por encima del universo vuelas  
 como una bandeja de teteras.

Manuel Breva (1996) analyzes the example and shows how Ojeda solves the “formal hurdles” of the original:

The above lines are a parody of the famous poem “Twinkle, twinkle, little star” by Jane Taylor, which, in Carroll’s version, turns into a sarcastic attack against Bartholomew Price, a professor of mathematics, nicknamed “The Bat”. Jaime de Ojeda translates “bat” as “ratita alada” for rhythmical reasons. “Murciélagos”, the Spanish equivalent of “bat”, would be hard to fit in this context for the same poetic reasons. With Ojeda’s choice of words the Spanish version preserves the meaning and maintains the same rhyming pattern (AABB) as in the original English verse-lines.

What would the output of any MT system be like if confronted with this fragment? Obviously, the result would be disastrous. Compared with the complexity of natural language, the figures that serve to quantify the “knowledge” of any MT program are absurd: 100,000 word bilingual vocabularies, 5,000 transfer rules.... Well developed systems such as Systran, or Logos hardly surpass these figures. How many more bilingual entries and transfer rules would be necessary to match Ojeda’s competence? How long would it take to adequately train such a system? And even then, would it be capable of challenging Ojeda in the way the chess master Kasparov has been challenged? I have serious doubts about that being attainable at all. But there are other opinions, as is the case of the famous Artificial Intelligence master, Marvin Minsky. Minsky would argue that it is all a matter of time. He sees the human brain as an organic machine, and as such, its behavior, reactions and performance can be studied and reproduced. Other people believe there is an important aspect separating organic, living “machines” from synthetic machines. They would claim that creativity is in life, and that it is an exclusive faculty of living creatures to be creative.

#### 4.2 Expert TM systems

Away from such metaphysical dilemmas, what I personally expect are systems that learn while they are exposed to translations like Ojeda's; systems that are capable of memorizing any bilingual chunk which may be considered a translation unit. Sometimes the translation unit will correspond to just a word or a phrase, like "bat" and "ratita alada", but more often whole paragraphs or even entire literary works could be taken as translation units. One can think of systems that, when confronted with a text which contains an occurrence of Lewis Carroll's parody of Jane Taylor, would be clever enough to resort to Ojeda's translation, and not only use "ratita alada" instead of "murciélagos", but provide the whole verse if needed.

More remarkably than Carroll, Shakespeare may be taken as the literary author who is most frequently quoted or paraphrased in English. There are two established translators of Shakespeare into Spanish, Astrana Marin and Ángel Luis Pujante (Rupérez 1998). Astrana had been the main reference until Pujante's versions were published in 1998. Astrana translated Shakespeare in prose, with frequent paraphrases and explanations of the source text. Pujante tries to maintain as much poetic effect as possible not only in rhyme and rhythm, but also with the archaic flavor of the original. One would like to see a system with expertise in Shakespeare's translations into Spanish, where both Astrana and Pujante's versions were registered, together with other known alternatives, including Carmen Criado's work in the Spanish dubbed version of the film *Shakespeare in love*. It would be an attractive content for an e-book, as is in fact Francisco Rico's CD-ROM with collations and the final revised version of *El Quijote* in Spanish. Such an ideal MT system, rather than competing with Astrana's, or Pujante's translating skills, would just be able to reproduce their versions in one's own working environment, word by word, through the simple stroke of a key. And this is completely within the state of the art in translation technology.

## 5. TUNING INTO DIFFERENT SITUATIONS

What should students learn about translation technology? As we now know, there is no one single answer to this question. Technological skills will depend on how students see their own future as translators. Those with good aptitudes for interpreting or literary translation could leave technology on a secondary level. However, it is clear that the vast majority of students should be prepared to satisfy the growing demand for specialists in technical documentation, and in particular the demand from the localization industry. Thus, training centers should seriously consider introducing the LEIT initiative into their training curricula.

Apart from a basic common computational background these would include official and industrial standards in offimatics (with word-processing, data-base maintenance, spreadsheet management, Internet browsing, emailing, etc.); students should have realistic knowledge of some specific translation technology, ideally in the form of a translation workstation. However, it is important to realize that software is constantly evolving, software and hardware updating is expensive, and that key concepts and skills may be equally well acquired with tools which are two or three years old. What is most important is becoming competent with the basic functional operations such as file and window management, editing, and net interaction. More specialized operations will be easily acquired on top of the basic ones, and will largely depend on the student's natural sympathy for the computer. I would recommend at least one year of basic computer training before attempting any specialization.

It is thus important to tune training courses to the expectations of the students. Out of the following six options, any person with a University degree in Translation should be qualified at least to be able to carry out the first three of the following:

*Consultant:* A person that is sufficiently informed to advise potential users of translation technology. This person should be able to find out when and how technology may be useful of cost-effective; how to find out the most adequate tools or where to get the necessary information to come up with an answer. That is, a person that has read

at least one paper like this, or knows where to find the basic relevant literature and references.

*User:* A person that has sufficient technological training to be efficient not only using the computer but also any specialized translation software with a minimally standard way of working.

*Instructor:* A person that can both assess and use the technology is, with a little more experience, also capable of training other people. Teaching requires some confidence with hardware and software, so it would be desirable for the instructor to also be a regular computer user.

*Evaluator:* Evaluating the technology requires a little more expertise than being a consultant. An evaluator would be able to analyze how good or bad particular software is. Therefore, some experience in software evaluation in general, and in translation technology in particular, is recommendable.

*Manager:* A person that has the responsibility to make a translation or localization company profitable should have quite some experience in using and testing translation technology. That person should also be able to design an optimal distribution between human and machine resources; and should know what kind of professionals the company needs (translators, computational linguists, or software engineers), as well as how to acquire the most appropriate technological infrastructure.

*Developer:* Localization software very often needs customizing, integration or up-dating. Good professionals may be involved in software development, where both linguistic and technical skills may be required.

Thus, it can be seen that the traditional role of the translator will be changing very quickly and a direct consequence of this is that there will be more career opportunities for the graduate in Translation Studies than ever before. A recent survey, done by the Department of Languages at the University of Applied Sciences in Cologne provoked the following comments by Michael Grade, Professor of Technical English (*Language International* 10.4):

Career prospects are favorable for technical translation graduates with further job qualifications. The chances of finding a language-related job in scientific, medical, or technical fields appear high. The result of

the survey indicated that the most important area of activity was the international export and sales sector for technical products and services. The job description now includes a diversified range of activities such as commercial and specialized technical tasks, customer relations, clerical, and organizational responsibilities.

So this, together with the fact that the market is beginning to recognize the value of the translator in the world today, seems to augur well for the future.

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- This paper is being re-published here ( appeared earlier in volume Vol.12, 1-2, 2000) as some portions were left out due to an oversight. (Ed.)