[From: *Tools for the trade: Translating and the Computer 5*. Proceedings of a conference ... 10-11 November 1983, ed. Veronica Lawson (London: Aslib, 1985)]

A Commission of the European Communities user looks at machine translation

Dr P.A. Walker

DG Employment and Social Affairs, Commission of the European Communities, Luxembourg

TABLE OF CONTENTS

Part IV: The future: a personal view

4.1. Machine translation availability
4.2. Acceptability and post-editing
4.3. The immediate future
4.4. Systran and alternative systems of machine translation

Part V: Conclusions

Part VI: The usefulness of this conference

NOTE: The views expressed in this paper are those of the author; they are not necessarily those of the Commission of the European Communities, or of DG XIII, DG IX or DG V.

PART I: A SPECIFICATION OF REQUIREMENTS

1.1. The Commission as a user of translation services

The Commission of the European Communities is basically a Civil Service working to establish a Community of ten Member States for the improvement of the living and working conditions of 270 million people. Allied institutions include the European Parliament, the Council, the Economic and Social Committee, the Investment Bank, the Court of Justice and the Court of Auditors. The Commission employs about 11,500 staff, mainly in Brussels and Luxembourg; there are smaller establishments in Ispra, Karlsruhe and Culham. There are seven official languages.

Its range of activities can be seen by a glance at its organisation chart (Figure 1). There are twenty different Directorates General, covering almost every aspect of human life, plus service departments such as the Statistical Office, Legal Service, Publications Office.

The Commission has staff from all Member States. It translates about 600,000 pages of documentation per year for

(a) meetings
(b) internal circulation
(c) as preparatory and final documents for

- Directives or laws
- regulations
- policy documents
- information reports

(d) official publications.

The Commission therefore has certain specific characteristics as a user of translation services.

1.2. The volume of translation and the number of language combinations

The language spread of the total of 600,000 pages translated per annum is given in Table 1. The seven official languages give 42 language pairs.

1.3. The accuracy and quality requirement

For many translation services, all that is required is a broad appreciation of what a document says; but this is not adequate for many Commission purposes. The translation must often be factually accurate, and reflect the implications and nuances of the original, while respecting its literary style.

Substantial political, social or commercial interests may

DIRECTORATES GENERAL			SERVICE DEPARTMENTS AND AGENCIES'
DG I	-	EXTERNAL RELATIONS	SECRETARIAT GENERAL OF THE COMMISSION
DG II	-	ECONOMIC AND FINANCIAL AFFAIRS	LEGAL SERVICE
DG III	-	INTERNAL MARKET AND INDUSTRIAL AFFAIRS	JOINT INTERPRETING AND CONFERENCE SERVICE
DG IV	-	COMPETITION	STATISTICAL OFFICE
DG V	-	EMPLOYMENT, SOCIAL AFFAIRS AND EDUCATION	CUSTOMS UNION SERVICE
DG VI	-	AGRICULTURE	SECURITY OFFICE
DG VII	-	TRANSPORT	OFFICE FOR OFFICIAL PUBLICATIONS OF THE EUROPEAN COMMUNITIES
DG VIII	-	DEVELOPMENT	EURATOM SUPPLY AGENCY
DG IX	-	PERSONNEL AND ADMINISTRATION	
DC X	-	INFORMATION - SPOKESMAN'S GROUP	
DG XI	-	ENVIRONMENT, CONSUMER PROTECTION AND NUCLEAR SAFETY	
DG XII	-	SCIENCE, RESEARCH AND DEVELOPMENT - JOINT RESEARCH CENTRE	
DG XIII	-	INFORMATION MARKET AND INNOVATION	
DC XIV	-	FISHERIES	
DG XV	-	FINANCIAL INSTITUTIONS AND TAXATION	
DG XVI	-	REGIONAL POLICY	
DG XVII	-	ENERGY	
DG XVIII	-	CREDIT AND INVESTMENTS	
DG XIX	-	BUDGETS	
DC XX	-	FINANCIAL CONTROL	

Figure 1. The organisation chart of the Commission of the European Communities

Table 1. Total number of pages translated by the Commission's services in Luxembourg and Brussels - output per language (number of pages)

Language	1980	1981	1982
DANISH (DA)	70,121	61,808	66,108
GERMAN (DE)	100,432	96,525	99,178
GREEK (EL)	5,582	38,015	44,361
ENGLISH (EN)	96,836	97,029	100,949
FRENCH (FR)	87,663	86,430	86,610
ITALIAN (IT)	86,221	78,807	82,441
DUTCH (NE)	81,537	74,139	73,808
SPANISH (ES)	611	220	463
PORTUGUESE (PORT)	10	-	215
OTHER	96	29	33
TOTAL	529,109	533,002	554,166

be affected when a document reaches the stage of a Directive or policy statement, and it is clear that the texts must be identical in the various Community languages, despite the differences of structure of the languages, and literary style differences specific to certain subjects or professions.

1.4. Diversity of material and diversity of input

The range of subject matter translated is very wide indeed. A large proportion is supplied by the national delegations. This material is written to varying standards, with no commonly respected rules of syntax, typesetting or arrangement. In other words, quality control of the input material is not possible.

1.5. Likely trends in the workload

Up to 1973, there were four official languages: French, German, Italian, and Dutch. The accession of the UK, Denmark, and Ireland increased the working languages of the Commission to six, and the accession of Greece in 1982

increased the languages to seven. Spain and Portugal have applied for entry, and within the foreseeable future the working languages may well increase to nine.

Excluding the workload from the European Coal and Steel Community, the earlier business of the Commission was in broad principles, defining objectives and general policies, with detail only in certain specific areas such as agriculture, or taxes and customs union. However, as these generalities were resolved, more and more of the work involved consideration of technical detail such as design parameters, measuring and sampling procedures, etc., across an ever increasing range of subjects.

While Table 1 shows the volume of translation handled by the Commission services year by year, it does not show the change in nature of the material translated. Tables 2 and 3 show the number of translators employed to cater for the increased workload. To maintain quality, it is the Commission's policy to use translators working only into their mother tongue. Most Commission translators work out of at least two languages, and many three or more, but with the likely increase in working languages it is probable that increases in staff with special competence will be required, in addition to extensive in-house language training for the present translators.

Apart from the translators and interpreters, all Commission staff speak and understand at least one other Community language, and many speak two or even three.

1.6. The cost of errors in translation

The unnoticed error in a translation (e.g. a double negative translated as a negative or a word misspelled and correctly translated but causing a misunderstanding) may well result in up to thirty minutes lost time at a ten-country meeting, at which there are twenty-five persons and ten interpreters. The cost of such a loss of time may be over £500 - for a single error. If errors pass unnoticed and are discovered subsequently, the cost may be ten times more.

To sum up this first part of the paper, I have attempted to show that the Commission has certain peculiarities in its translation requirement: it is a large user, translating into many languages, with an expanding requirement. The material is extremely diverse, and it has, for much of its workload, a high and uniform quality requirement. As with the production of any article, quality costs money.

Table 2. Total of authorised posts (translators not included) compared with total authorised translator posts (Brussels and Luxembourg together)

Years	Total authorised posts (translators not included) (*)	Total authorised translator posts (Brussels & Luxembourg) (*)	TOTAL (*)
1975	6,656	1,120 (**)	7,776
1980	7,500	1,254 (**)	8,754
1981	7,885	916	9,150
1982	8,225	946	9,565
1983	8,473	963	9,840

(*) Permanent and temporary posts

(**) Interpreters also included

Table 3. Distribution of translator posts between language sections in Luxembourg

Year	DA	DE	EL	EN	FR	IT	NE	ES	'Terminology'	Other	TOTAL
1970	-	16	-	1	11	8	9	-	6	-	51
1975	22	31	-	33	37	27	30	-	19	-	199
1980	17	39	4(T)	38	38	33	32	-	26	3	230
1981	24	43	13	36	37	30	32	-	25	2	242
1982	24	45	19	37	37	30	33	-	25	2	252
August 1983	23	41	17	38	34	29	31	2(T)	27	1	243

PART II: LOOKING AT MACHINE TRANSLATION AS PART OF A MULTILINGUAL INFORMATION TRANSMISSION SYSTEM (i.e. DATA HANDLING)

2.1. The present system from a user's standpoint

When a document arrives from an external source in a foreign language, the user must decide what should be done with it and how much should be translated. The Commission doesn't operate a real quality choice system as such, but the user can advise the translation services that a quick translation will do. Currently few users utilise this choice.

If a document is to be translated he must then arrange for the typing of a request for translation, the photocopying of the original, the assembly of all reference documents, and the transport of these packets (one for each language requested) to the translation department. The document passes through a Planning Service, and out to the translation unit concerned. Translators normally dictate their translation in their mother tongue, for typing in a central pool. The translation is revised either by full-time revisers or by an expert in the subject, and is then returned through the same system with the reference documents to the user. The user arranges for the translation to be typed, photocopied and issued to the members of his staff.

The salient point is that for even the shortest document, there is a minimum of two days to get it to the translators and three days to get it back, unless special arrangements are made in advance.

2.2. Machine translation superimposed on existing system

The Commission of the European Communities in Luxembourg has experimented with the Systran system of machine translation over a period of seven years. The main experience has been with the language pairs French-to-English, English-to-French and English-to-Italian, whilst English-to-German and French-to-German are under development. To date - again a personal view and not accepted by many staff - the French-to-English appears by far the most successful of these combinations, although I am informed that of the raw Systran translations, the best quality is English-to-French.

In Luxembourg, where some 2,000 Commission staff work, the translation load is 175,000 pages per annum, and of these some 4,000 pages pass through the machine translation system. It should be remembered that MT deals with only three of the 42 language pairs handled by the translation service, and it is perhaps more meaningful to state that in a fairly typical month 20 per cent of the

French-to-English workload and 50 per cent of the English-to-Italian workload was handled by machine translation, either as an aid to the translator or on request from the user for a rapid-post-edited machine translation.

Even allowing for the limited area in which machine translation is applied, it represents a small proportion of the total translations. The reason for this is partly the difficulty of getting the system to operate to the quality required and partly the natural resistance by some staff to an innovation.

Machine translation presents some advantages to the user, notably in the overall economy of time and effort in his own department. These largely occur (a) due to the rapidity of machine translation vis-à-vis manual translation and (b) as spin-off benefits from the use of word processors on the input and output sides.

When a document is sent for machine translation, the user still has to complete the initial steps of decision as to use, photocopying, the assembly of reference documents, etc., together with a request for machine translation. On receipt by the machine translation section, the document has to be typed onto a Wang word processor which stores the information until it is sent by telephone line to the Systran mainframe computer. Translation time is about 10 seconds per page, and the document is returned to another Wang VDU/word processor outlet either for machine printing at about the same rate as it is translated, or for display and direct editing by the reviser.

The MT system is used in two ways. In general, translators are encouraged to send documents they consider suitable away for a machine translation, which they will then use as a basis for their own translation. This represents some 70 per cent of the MT throughout. In this case the requester of the translation is not aware of use of the machine as an aid, as the translator and the reviser have the responsibility of ensuring quality output. The second and perhaps more interesting use is machine translation with rapid post-editing, and in this case the user specifies the machine translation himself. Here the post-editor's responsibility is to perform a rapid correction of the raw MT (at a rate of at least two pages per hour). Every effort is made to ensure factual accuracy, but each page is marked 'rapid-post-edited machine translation' to distinguish it from a normal translation for which there is a guarantee of quality. The need for correction of the raw Systran output can be seen by comparing the texts in Figures 2 and 3. With practice a translator who is experienced can complete three to four pages per hour to final copy standard.

The advantage to a user of the rapid-post-edited machine translation is that he can receive a 35-40 page

document, translated to an acceptable standard of accuracy and style, in less than two days, fully typed and set out, ready for copying. In many cases it is virtually indistinguishable from a normal translation. For comparison, a normal translation of the same length is unlikely to be copy ready in less than ten days unless special arrangements are made with the translation and typing services.

2.3. The benefits of machine translation for the user

In summary, machine translation has two major benefits for the user:

- more rapid translation, i.e. an economy of time
- the use of word processors enables a finished text to be produced.

A third potential saving derives from the fact that many documents produced by the Commission, particularly at Directive, recommendation or policy statement level, are revised on many occasions following the advice of experts and committees. They finally see the light of day as edition 12 to 20 of the original document. With machine translation and the obligatory use of word processors, only the changes have to be translated and checked. A finished, revised text can be produced at little extra cost.

2.4. Manual translation as a possible bottleneck

One of the dangers of increasing the facility of translation and the availability of material fully prepared for a user at relatively low cost, is that, by Parkinson's Law, the demand will expand to the capacity. It is important that some sort of control be exercised to ensure that only important and useful material is translated. A formal system of 'The user pays from his budget' may not be fully applicable to the Commission services, but in the event of machine translation being widely available, then some system of control will clearly be necessary.

PART III: THE POSSIBILITIES FOR IMPROVEMENT

3.1. Compatibility of equipment and land-lines within the Commission buildings

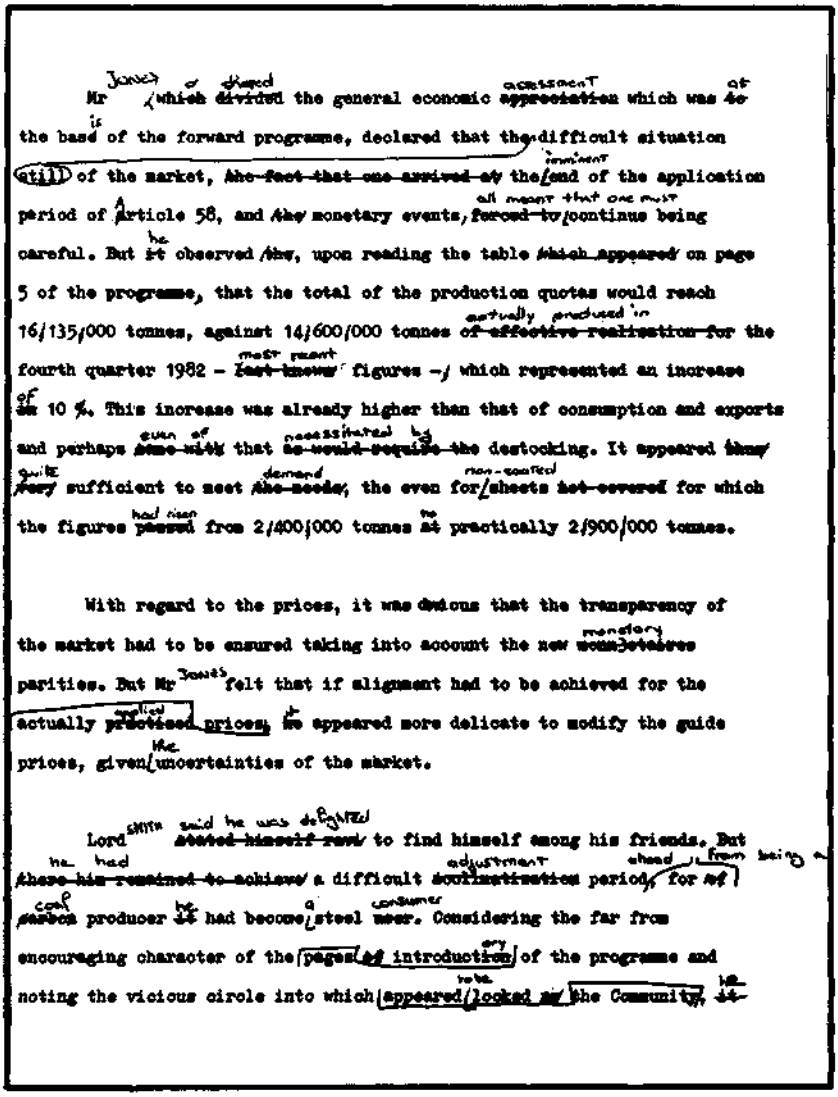
The expanding application of machine translation has resulted in a re-examination of the system of multilingual data handling, to enable more economic use of translation and allied services, and an increased capacity.

Mr Jones which divided the general economic appreciation which was to the base of the forward programme, declared that the difficult situation still of the market, the fact that one arrived at the end of the application period of article 58 and the monetary events forced to continue being careful. But it observed the upon reading the table which appeared on page 5 of the programme that the total of the production quotas would reach 16,135,000 tonnes, against 14,600,000 tonnes of effective realisation for the fourth quarter 1982 - last known figures - which represented an increase in 10%. This increase was already higher than that of consumption and exports and perhaps same with that as would require the destocking. It appeared thus very sufficient to meet the needs, the even for sheets not covered for which the figures passed from 2,400,000 tonnes at practically 2,900,000 tonnes.

With regard to the prices, it was obvious that the transparency of the market had to be ensured taking into account the new monnaietaires parities. But Mr Jones felt that if alignment had to be achieved for the actually practised prices, he appeared more delicate to modify the guide prices, given uncertainties of the market.

Lord Smith stated himself ravi to find himself among his friends. But there him remained to achieve a difficult acclimatisation period, for of carbon producer it had become steel user. Considering the far from encouraging character of the pages of introduction of the programme and noting the vicious circle into which appeared locked up the Community, it

Figure 2. Raw Systran machine translation



Mr Jones ~~which divided~~ the general economic assessment ~~appreciation~~ which was ~~to~~ at the base of the forward programme, declared that the difficult situation is still imminent of the market, ~~the fact that one arrived at~~ the end of the application period of Article 58, and ~~the~~ monetary events, ~~forced to~~ all meant that one must continue being careful. But he observed ~~the~~, upon reading the table ~~which appeared~~ on page 5 of the programme, that the total of the production quotas would reach 16/135/000 tonnes, against 14/600/000 tonnes ~~of effective realisation for~~ actually produced in the fourth quarter 1982 – ~~last known~~ most recent figures –/ which represented an increase ~~of~~ in 10 %. This increase was already higher than that of consumption and exports and perhaps ~~some with~~ even of that necessitated by ~~we would require~~ the destocking. It appeared ~~thus~~ quite ~~very~~ sufficient to meet ~~the needs~~ demand, the even for non-coated sheets ~~not covered~~ for which the figures ~~passed~~ had risen from 2/400/000 tonnes to practically 2/900/000 tonnes.

With regard to the prices, it was obvious that the transparency of the market had to be ensured taking into account the new ~~monetaires~~ monetary parities. But Mr Jones felt that if alignment had to be achieved for the actually ~~practised~~ applied prices, it appeared more delicate to modify the guide prices, given the uncertainties of the market.

Lord Smith ~~stated himself rash~~ said he was delighted to find himself among his friends. But ~~there~~ he had ~~remained to achieve~~ a difficult adjustment ~~acclimatisation~~ period, ahead, from being ~~for~~ a ~~carbon~~ coal producer ~~it~~ he had become a steel consumer. Considering the far from encouraging character of the ~~pages of~~ introduction, very of the programme and noting the vicious circle into which ~~appeared~~ looked at the Community, ~~it~~ he

Figure 3. Rapid-post-edited Systran machine translation

The introduction of word processors clearly allows material written in one department to be transferred directly to another (perhaps 500 miles away or even 5,000 kilometres away), by either internal or external lines. Such an operation presupposes total compatibility between word processors, or the use of interfacing equipment.

It is regrettable that, to date, the Commission has not been able to specify or achieve a standard system of compatibility or data transmission between its various machines and services, but this matter is now being actively considered.

3.2. Print readers

The next stage is to consider the use of print readers. Here there is a serious problem. For my department, over 70 per cent of the documents sent for translation are written outside the Commission. They may come from France, Germany, Italy, the UK. Rather than retype the whole document in order to insert it into the Systran system, it would be much better to use a print reader for direct input to Systran. Actual machine translation times are extremely short, but retyping and checking the input occupies a major part of the time interval between the user sending the document and his receiving the usable translation. There appears to be no print reader currently available at an acceptable cost which can handle this diversity of material accurately. The solution appears to lie in some sort of specification and typing instructions which can be issued to and accepted by the majority of our outside input agencies in order to ensure that their scripts are compatible with our readers.

3.3. The grading of translations

A further economy which can serve for both human and machine translations is to offer a grading system to the user, whereby he can have his text quicker or fully typed in return for some reduction in stylistic quality. A notional 'payment' or translation budgeting system might be used to encourage users to use a simplified, reduced-cost translation rather than a manual translation at a much higher cost.

3.4. Staff and personnel training

Resistance to the use of machine translation arises from a concern about inadequate quality, a lack of appreciation of the advantages, and a fear that artistic and artisan skill will be replaced by a machine. There is little reason for most of these, with the present expanding demand for a large volume

and wide range of quality translations.

Some staff show a resistance to learning to use word processors, and the problem is not simplified by the many different makes of machine found in our service. As a result one of the Community institutions is considering buying all its text handling equipment from one manufacturer to simplify staff training, staff mobility and compatibility of the system. There is also the problem of obtaining sufficient capital to provide the equipment needed.

There is a need for senior staff training to explain the objectives and broad principles and the likely advantages of possible systems. There is also a need for personnel training at secretarial level.

But the most pressing need is to train translators to make full use of the capabilities of the combined Systran/word processor system, which has in the case of our more interested translators eliminated the need for all dictation, typing and external revision; they do their own revision and final document preparation on the VDU, to permit the user to receive a finished document. With a land-line, this could be transmitted directly to the user secretary's office. Some training for the Wang word processors has been given, but translators who are interested have had to develop most of the required skill themselves. There is a clear need for a pooling of experience and a planned training scheme in this field.

PART IV: THE FUTURE - A PERSONAL VIEW

4.1. Machine translation availability

The exponential nature of the industrial development of processes from their initial discovery to widespread application is well known. It is clear that with this expansion to universal usage, there is a marked reduction in cost per unit produced.

I believe that today we have not yet reached the take-off point for machine translation, and that it is currently difficult to justify its use in many circumstances in straight financial terms.

Yet I am equally convinced that it is necessary to pursue this path. At present, for my own use, the economies which are associated with machine translation both in time and cost are largest in the spin-off area of text handling. Multiple revisions and amendments which involve resetting paragraphs used to be a major problem, demanding periodic retyping of a document. Now they are easily handled.

4.2. Acceptability and post-editing

A major factor which is going to concern us all is the user reaction to translations; in particular, whether he is both able and prepared to accept some temporary inconvenience while the standard of translation by machine is improved to that which is readily available from the best human translation. The need for post-editing is clearly shown by comparing raw Systran output and the accepted edited version prepared at a rate of about three pages per hour. There are also problems in the personnel area which will require attention. Understanding bosses and perhaps increased medical surveillance of the operators seem at least part of the answer.

4.3. The immediate future

Nearly 2,000 persons work in the Commission's Jean Monnet Building in Luxembourg (and about 2,500 more in the European Parliament building nearby). The sheer length and width of the building are important factors. We clearly need more in-house land-lines and word processors in the user department (e.g. the Consultative Committee and DG V/3) compatible with the Systran system. The first batch of this equipment is currently being installed.

We need to agree and set out the ground rules for machine compatibility. We must also set out and issue ground rules for standardised typing of documents (including typeface and spacing), so that we can effectively use print readers.

More economic reproduction facilities are also needed.

4.4. Systran and alternative systems of machine translation

Both translators and users accept that the quality of raw Systran translations is not perfect. This has caused many of the Commission's translators (particularly in the French section) to reject the system and to suggest that it is of little value. Systran is not a new system, for it has been in use for nearly twenty years, and this is why the Commission is considering alternative systems. In November 1982, it was decided to financially aid a pilot project for the development of Eurotra, by a grant of 16 million European units of account (approximately £9.3 million) to be spent over five and a half years. It is estimated that a further five years will be required to bring this system to a fully usable stage comparable with the current standard of Systran.

The new system should start from a new base and aim at the specific quality requirements of a multilingual organi-

sation such as the Commission, where at present there are 42 language pairs to be handled, and where we may shortly be faced with an increase to 72 if Spain and Portugal join the Community. The total period of 11 years for design and development strikes this user as excessive.

One is bound to pose the question immediately as to who else is interested, and to what extent large companies, etc. can be involved; for the Commission of the European Communities is not alone in having to work in many languages.

PART V: CONCLUSIONS

5.1. It is suggested that the development of machine translation facilities is vital to the continued extension of our work within the Community, the aim of which is an improvement in the standard of living for all the 270 million people involved.

5.2. Machine translation does not appear to be a threat to the employment of translators, but instead is another avenue for employment, and an extension to their armoury to deal with the increasing volume of work with which they will be faced.

5.3. What is required in the Commission is a flexible high-quality machine translation system to lighten the load on the existing translation services, together with suitable interfacing equipment to permit it to work effectively in the whole system of multilingual data handling.

5.4. Currently, users are finding that machine translation has brought some benefit in enabling a rapid translation to be prepared, but the greatest advantage has been in the availability in a much shorter time of a fully-finished text ready for distribution without further treatment. The immediate future seems to lie in the improvement of these ancillaries so that data may be handled more effectively within large institutions such as the Commission.

5.5. As the Community explores further the development of improved co-operation, living standards, and harmonisation of norms, practices and legislation, it is inevitable that the Commission's activities will enter further and further into the detailed consideration of political and technical subjects. Figure 4 is an example of the sort of material which we are now having to translate, and it is clear that we need not only to expand the quantitative capability, but also the quality. These factors will involve a corresponding increase in machine translation vocabulary.

PART VI: THE USEFULNESS OF THIS CONFERENCE

If the recent history of science and technology is examined, one can see that the fields where there has been the most rapid utilisation of new processes and tools to benefit mankind have been precisely those areas where there has been a high level of international co-operation on a worldwide basis. The international trading of ideas is essential, given the very high costs of research and development in high-level technology. Conferences such as this bring people together and cause an exchange of ideas which help to promote the rapid development of such technology. It is for this reason that I welcome the opportunity to address you today. Thank you.

AUTHOR

Dr P.A. Walker, DG Employment and Social Affairs,
Commission of the European Communities, Batiment Jean Monnet, BP 1907, Plateau du Kirchberg, L-2920 Luxembourg, Luxembourg GD.

2.2.6. A vertical plane — $D_1K_1E_1E_2K_2D_2$ — perpendicular to the reference plane and passing 40 mm in front of the outer edge of the steering wheel.

2.2.7. A horizontal plane — $E_1F_1P_1N_1N_2P_2F_2E_2$ — passing through the seat reference point.

2.2.8. A curvilinear surface — $G_1L_1M_1N_1N_2M_2L_2G_2$ — perpendicular to the reference plane and in contact with the back of the seat back-rest.

2.2.9. Two vertical planes — $K_1I_1F_1E_1$ and $K_2I_2F_2E_2$ — parallel to the reference plane, 250 mm either side of this plane, and bounded towards the top 300 mm above the horizontal plane passing through the seat reference point.

2.2.10. Two inclined and parallel planes — $A_1B_1C_1D_1K_1L_1G_1H_1$ and $A_2B_2C_2D_2K_2L_2G_2H_2$ — starting from the upper edge of the planes defined in Item 2.2.9 above and joining the horizontal plane defined in Item 2.2.1 above at least 100 mm from the reference plane on the side where the impact is applied.

2.2.11. Two vertical planes — $Q_1P_1N_1M_1$ and $Q_2P_2N_2M_2$ — parallel to the reference plane, 200 mm either side of this plane, and bounded towards the top 300 mm above the horizontal plane passing through the seat reference point.

2.2.12. Two portions — $I_1Q_1P_1F_1$ and $I_2Q_2P_2F_2$ — of a vertical plane, perpendicular to the reference plane and passing 350 mm in front of the seat reference point.

2.2.13. Two portions — $I_1Q_1M_1L_1$ — and $I_2Q_2M_2L_2$ — of the horizontal plane passing 300 mm above the seat reference point.

2.3. Seat location and seat reference point

2.3.1. Seat reference point

2.3.1.1. The reference point shall be established using the apparatus illustrated in figures 3a and 3b of Annex IV. The apparatus shall consist of a seat pan board and backrest boards. The lower backrest board shall be jointed in the region of the ischium humps (A) and loin (B), the joint (B) being adjustable in height.

2.3.1.2. The reference point is defined as the point in the median longitudinal plane of the seat where the tangential plane of the lower backrest and a horizontal plane intersect. This horizontal plane cuts the lower surface of the seat pan board 150 mm in front of the abovementioned tangent.

2.3.1.3. The apparatus shall be positioned on the seat. It shall then be loaded with a force of 550 N at a point 50 mm in front of joint (A), and the two parts of the backrest board shall be lightly pressed tangentially against the backrest.

Figure 4. Example of the sort of material to be translated