The Business Case for Machine Translation

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Fifty years of MT… this time the breakthrough is for real!

Machine Translation (MT) has long been a controversial topic, the source of illusions, jokes and even serious disputes. But nothing has stopped people from believing in its ability to help us cross the language barrier. Research and development in fully automatic translation has been carried out for fifty years. At regular intervals, researchers from Japan, USA, Russia, Germany, France, Netherlands and other countries have heralded the big breakthrough. This time the breakthrough is real. While academics debate linguistic and statistical approaches to MT, organisations in the public and private sector are putting it to work. Companies like Cisco, Oracle, SAP, Océ, Fortis A.G., DaimlerChrysler, IBM and Ford see tremendous benefits in MT, and rapid returns on investment. The breakthrough is market-driven rather than technical: MT is not perfect, but it has become an economic necessity. We must learn how to use it and how to optimise its benefits in practical business environments. This article provides a snapshot of solutions for automated multilingual communications on corporate Intranets and Extranets and in translation production environments.

Machine Translation makes perfect business sense

The tide is changing

Growing volumes of information and an ever-faster pace of doing business, at home and across borders, make automatic real-time translation an economic necessity for many corporations. Machine Translation sounds like a curse to some and a fantasy to others. And yet many corporations are realising tremendous benefits by integrating MT and other language technologies into their localisation processes, Intranets and customer support and e-commerce sites. While researchers and translators are often disappointed with the output of MT systems, more and more users accept the imperfections and embrace the technology.

Every day, portals like Altavista and Google process nearly 10 million requests for automatic translation. Translators, at institutions like the European Commission as well as freelancers, realise that they can produce much more work in a day by post-editing MT instead of translating from scratch. And companies invest in customised MT systems for their specific domains to allow for real-time automatic cross-lingual communication with their customers, employees and suppliers.

Language is, quite simply, a business instrument. It helps us to communicate facts and tasks, and where that is the primary goal, MT is often preferable to human translation. Several factors determine the indisputable need for MT, most notably the need to reduce translation costs, shorten translation cycles and improve efficiency. Where the need for translation is instant, or the volumes are high, MT may be the only translation solution available.

Intranet solutions

Intranets go global

The impact of globalisation on the external face of business is well documented. There has been less focus, however, on the impact internally, particularly on language requirements. Sixty-seven percent of the largest European companies have employees in more than five countries.[1] Even though management may impose English as a "corporate language", many documents are still written and stored in multiple languages. According to some estimates the volume of content on corporate Intranets is doubling every six to nine months and employees spend half of their time looking for information, while finding it continues to get harder.

Every company has a *language deficiency factor*. This is the proportion of employees who are not fluent in the corporate language. Language deficiency can seriously undermine the efficiency of office and factory workers. The language deficiency factor has a significant negative effect on the retrieval of information on corporate Intranets.

MT can be a powerful tool to compensate for corporate language deficiencies - for example:

- Daimler-Chrysler uses MT for translation of company email and Intranet web pages

- PricewaterhouseCoopers uses MT for translation and sharing of reports and proposals on its Intranet

- NCR uses MT for e-learning and HR documents

- Administrators at the European Commission use MT to write reports in a secondary language.

Intranet solution: pay-back scenario

Investments in Machine Translation for an Intranet can be earned back very quickly. In a typical scenario, 10% of non-local employees of a medium-sized company may lack fluency in the corporate language(s). They may simply miss information published on the Intranet altogether and "reinvent the wheel", or they may attempt to compensate by translating on their own, with the probability that they will misinterpret information and make errors.

Intranet pay-back scenario - medium-sized company		
Corporate assumptions		
Number of employees		12,000
% of overseas employees		50%
Average labour costs		50,000
Intranet information assumptions		
Language deficiency factor		10%
Total loss of efficiency	15%	4,500,000
Employee self-translation factor	5%	1,500,000
Reinvent the wheel factor	7%	2,100,000
Error factor	3%	900,000
Quality scoring rate		60%
Loss of efficiency		2,700,000

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[1] Global Literacies, Robert Rosen, 2000

The value of MT in this scenario is calculated based on the impact of employee strategies to compensate for language deficiencies. In the example, the total loss of efficiency is estimated at $2,700,000. This is calculated by multiplying the green shaded cells in the table below.

MT Maintenance	250,000
Value	2,450,000
Investment	450,000
Return-on-investment	544%
Pay-back period	2.2 month

To continually improve the performance of the MT system it is recommended that the company maintains a small team of computational linguists. Their work can involve the classification of enterprise content in domains and multiple levels of sub-domains. A taxonomy can be built in parallel with the domain structure and linked to a cross-lingual search tool. This will allow users to search in their native language and retrieve information in other languages.

The value of the MT solution in this example is estimated at $2,450,000. Investment in the solution is around $450,000. This results in a ROI of over 500% with a pay-back period of just over two months.

Localisation departments

Localisation under pressure

Translation and localisation services are under pressure to produce higher volumes in shorter time at lower costs. Product releases follow at ever-shorter intervals. This makes time-to-market one of the most crucial factors for success. Online help replaces traditional user docs, resulting in continuous publishing cycles. This makes multilingual content updates more challenging than ever.

Different types of content are developed to support international products and services. Marketing literature needs to sell the product, the image and the corporate brand, and needs the unique skills of specialised human translators. But other types of product information are used primarily to communicate user instructions and reference data. Pressure to cut costs and shorten cycle times makes Machine Translation an obvious choice for translating this second type of material.

Many organisations use MT in translation production environments - for example:

- Océ uses MT for translation of all service literature, and has realised productivity increases and cost reductions of 65%.

- SAP, Caterpillar, and Ford all use MT for technical information.

- The European Commission uses MT for translation and for writing in a secondary language.

Translation production: cost-cutting scenario

Corporate translation departments can significantly reduce costs by implementing MT in a disciplined and professional way. This scenario shows cost savings for a translation department that produces eight million words per year at a cost of 15.8 cents per word. An MT system is introduced that processes 80% of the volume. Documented cases show that post-editing can be done two to three times faster than translation; adding 40% costs for post-editing is therefore a conservative estimate. It is recommended that the translation department introduces a permanent MT maintenance function dedicated to continually improve the performance of the MT system. This scenario results in a ROI of 169% and a pay-back period of seven months.

Translation Production scenario, In-house translation department		
Assumptions		
Total volume of words		8,000,000
Pre-MT translation costs	15.8	1,264,000
Translation cost reduction	80%	1,011,200
Add post-editing costs	40%	404,480
Add MT maintenance		100,000
Value		506,720
Investments		300,000
New *competitive* word rate		9.5 cents
Return-on-investment		169%
Pay-back period		7.1 month

These cost benefits will translate into increased business opportunities, or improvements in the ability of in-house departments to provide services. The productivity increase makes the translation department more competitive. Rates per word will go down to 9.5 cents. This cost reduction of 40% in turn will attract more business from internal customers.

Translation service companies usually work in the multiple industry and product domains of their customers. Unless the service company produces a large volume of work for one specific customer or it has the full buy-in from the customer, it is harder for this company to implement a MT solution.

In the translation production scenario it is also essential that a permanent MT maintenance function is installed. This function can look after integration of MT in a workflow system as well as integration with translation memory systems. A hybrid MT-TM environment ensures that the MT system will continuously improve its performance and will reduce the required human post-editing effort overtime. Another focus area for the MT maintenance function is detecting recurring MT mistakes. Repairs in the MT system may be possible which prevent such mistakes from re-occurring. Alternatively automatic routines can be set-up to filter such mistakes at the post-editing stage.

Extranet solutions

Unlock the Extranet for a multilingual audience

In Europe, 83% of the largest companies have customers in more than five countries.[2] Even though business is migrating more and more to the web, a lot of the information on corporate Extranets remains monolingual.

Web-based customer self-service is a very effective way to reduce support costs and improve customer retention. To realise this for a multilingual audience companies must translate their knowledge bases and online catalogues almost real-time.

Some large corporations invest in highly customised MT to give worldwide users direct access to their online knowledge bases. Many companies deploy MT to facilitate real-time translation of web sites - for example:

- Cisco uses MT to enable multilingual customer self-service via its online knowledge base.
- Gaumont, the French film distributor, uses MT to offer access to its online catalogue in multiple languages.

Extranet solution: multilingual customer support scenario

Investments in Machine Translation for e-support and e-commerce lead to a very rapid payback. In this scenario a company with $1 billion in revenue (30% of sales coming from outside the domestic market) invests in MT for customer support. Prior to implementing the MT solution the company relies on call centres for most of its interaction with foreign-market customers.

Multilingual Extranet - Customer support scenario	
Corporate assumptions	
Company revenues	1,000,000,000
% of overseas revenues	30%
Extranet information assumptions	
Volume of foreign language calls	150,000
Cross-lingual call centre costs	4,500,000
Call centre savings	2,250,000
Cost of web-based self-service	75,000
eCommerce revenue increase	3,000,000
Add maintenance costs	400,000
Value	4,775,000
Investments	900,000
Return-on-investment	531%
Pay-back period	2.3 months

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[2] Global Literacies, Robert Rosen, 2000

Once the content of the company's knowledge base is made available to all customers in their own languages, the volume of foreign language calls into the call centres will reduce by 150,000 per year. This alone generates a saving of $4.5 million. In addition the company increases its overseas revenue by 1% as a result of improved customer service.

The Extranet MT system will undergo extensive customisation to ensure adequate quality levels for real-time customer access. The company also appoints a team of computational linguists to ensure that the performance of the MT system continues to improve. Because of the extensive upfront customisation the investment in this solution is estimated at $900,000. In this scenario the ROI is more than 500% and the pay-back period is just over two months.

In this scenario an increasing number of the company's foreign language users will find their way to the online support site and prefer this web-based self-service over the option of calling the call center and talk to an operator. The number of incoming calls will therefore continue to decrease. This will support a further improvement of the business case for MT in an Extranet environment.

Implementation Strategies

Implementation of MT production systems and MT Intranet solutions takes from three to six months depending on the scope of customisation and integration. Implementation of MT Extranet solutions takes between six and twelve months, as they require more extensive customisation. Implementation plans are based on analysis and profiling of the text corpora of the selected information repositories. A series of measurements and analyses can be applied to text corpora to determine lexical closure, translatability, readability, domain, etc. These measurements are the basis for the customisation phase, which includes term extraction, term validation ("type-token"), filtering ("noise" and "do-not-translates"), coding and testing.

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