



**Translation
Practices
Explained**

**SCIENTIFIC AND
TECHNICAL
TRANSLATION EX-
PLAINED**

Jody Byrne



Scientific and Technical Translation Explained

A Nuts and Bolts Guide for Beginners

Jody Byrne

 **Routledge**
Taylor & Francis Group
LONDON AND NEW YORK

First published 2012 by St. Jerome Publishing

Published 2014 by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN
711 Third Avenue, New York, NY 10017, USA

Routledge is an imprint of the Taylor & Francis Group, an informa business

© Jody Byrne 2012

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

Notices

Knowledge and best practice in this field are constantly changing. As new research and experience broaden our understanding, changes in research methods, professional practices, or medical treatment may become necessary.

Practitioners and researchers must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds, or experiments described herein. In using such information or methods they should be mindful of their own safety and the safety of others, including parties for whom they have a professional responsibility.

To the fullest extent of the law, neither the Publisher nor the authors, contributors, or editors, assume any liability for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions, or ideas contained in the material herein.

ISBN 13: 978-1-905763-36-8 (pbk)

ISSN 1470-966X (*Translation Practices Explained*)

Typeset by

Delta Typesetters, Cairo, Egypt

British Library Cataloguing in Publication Data

A catalogue record of this book is available from the British Library

Library of Congress Cataloging-in-Publication Data

Byrne, Jody.

Scientific and technical translation explained : a nuts and bolts guide for beginners /
Jody Byrne.

p. cm. -- (Translation practices explained)

Includes bibliographical references and index.

ISBN 978-1-905763-36-8 (pbk. : alk. paper)

1. Technology--Translating. 2. Communication of technical information. I. Title.

T11.5.B968 2012

418'.035--dc23

2011052578

For my beautiful daughter, Áine

Contents

Acknowledgements	xi
About this book	xiii
Using this book	xiv
1. Scientific and Technical Translation	1
1.1 Introduction	1
1.1.1 Some distinctions	2
1.1.2 Historical significance	3
1.1.3 Modern scientific and technical translation	5
1.1.4 Some legal dimensions	6
1.2 A place for translation theory?	8
1.2.1 Recreating the source text	8
1.2.2 Focusing on the target text	11
1.3 Tools of the trade	14
1.3.1 General tools	16
1.3.2 Text processing tools	16
1.3.3 Translation tools	17
1.4 Who's who in scientific and technical translation?	18
1.4.1 The translator	20
1.4.2 The clients	23
2. Translation and Technical Communication	25
2.1 Introduction	25
2.2 What is technical communication?	25
2.2.1 Generic features of technical communication	27
2.3 Who reads technical documentation?	30
2.3.1 Understanding audiences	30
2.3.2 Finding out who the audience is	35
2.3.2.1 Asking the right questions	37
2.4 Knowing what you're talking about	42
3. Understanding Technical Documentation	47
3.1 Introduction	47
3.1.1 Specific features of technical documentation	47
3.1.1.1 Language	48
3.1.1.2 Facts and specifications	52
3.1.1.3 References	53
3.1.1.4 Graphics	54
3.1.1.5 Formulae, equations and scientific notation	56
3.2 Typical text types	58

3.2.1	Manuals	59
3.2.2	Applications and proposals	62
3.2.3	Reports and scientific papers	63
3.2.4	Presentations	65
3.2.5	Regulatory documents	67
3.2.6	Popular science	68
3.2.7	A word on how texts are structured	69
3.2.8	Making sense of text types in translation	70
4.	Case Studies	74
4.1	Introduction	74
4.2	Scientific Journal Paper	74
4.3	Technical Data Sheet (TDS)	82
4.4	Creating your own document profiles	89
4.4.1	Document Profile Sheet	90
4.5	Test Instructions	91
4.6	Expert Technical Report	94
4.7	User Guide	101
4.8	Popular Science Book	106
4.9	Certificate of Conformity	111
4.10	Technical Case Study	114
5.	Basic Translation Techniques	118
5.1	Introduction	118
5.2	The basics	118
5.2.1	Direct translation	118
5.2.1.1	Literal translation	119
5.2.1.2	Borrowing	120
5.2.1.3	Calque	120
5.2.2	Oblique translation	120
5.2.2.1	Equivalence	121
5.2.2.2	Transposition/Recategorization	121
5.2.2.3	Modulation	122
5.2.2.4	Adaptation	123
5.2.3	Expansion and contraction	124
5.2.3.1	Recycling information	125
5.2.4	Generalizing and particularizing	127
5.2.5	Compensation	128
5.2.6	Restructuring	129
5.2.7	Iconic Linkage	130
5.3	What type of translation are you producing?	132
5.3.1	Instrumental and documentary translations	134
5.3.2	Producing a translation brief	137

5.3.3	When not to translate	138
5.3.3.1	Official translations and proper names	140
5.3.3.2	Laws	140
5.3.3.3	European Directives	141
5.4	Writing within limits	142
5.4.1	Terminology	144
5.4.2	Clarity, readability and usability	145
5.4.3	Editing and proof-reading	147
5.4.3.1	Reviewing the work of another translator	147
5.4.3.2	General hints for editing and reviewing translations	148
5.5	When in doubt	148
6.	Pitfalls, Problems and How to Deal with Them	152
6.1	Introduction	152
6.2	Abbreviations and acronyms	152
6.3	Formulae and Equations	154
6.4	Quantities and units of measure	155
6.5	Currencies	158
6.6	Culture and Familiarity	159
6.7	Errors in the Source Text	161
6.8	Sample text and computer code	162
6.9	Graphics, screenshots and menus	165
6.10	Product names	167
6.11	Contact details	168
6.12	Scenarios and examples	170
6.13	Giving warnings and advice	171
6.14	References to other documents	174
6.15	Partially translated source texts	174
6.16	Latinisms and scientific nomenclatures	175
6.17	Instructions that do not make sense	180
6.18	Tables of contents and indices	182
6.19	Formatting and layout	183
6.20	Managing and naming files	184
6.21	Using the Internet	185
	Bibliography	190
	Appendix 1. Glossary of Terms	196
	Appendix 2. Scientific Notation & Units of Measure	202
	Appendix 3. Hazard, Risk and Safety Phrases	206
	Appendix 4. Sample Document Profiles	212
	Index	226

List of Figures

Figure 1: Sample reader roles and their needs	32
Figure 2: High and Low Context Cultures (Katan 1999:183)	40
Figure 3: Worksheet for profiling a target audience (Hoft 1995:61)	41
Figure 4: Example of a screenshot for a software application	54
Figure 5: Technical diagram with labels	55
Figure 6: Examples of equations	57
Figure 7: Schematic diagram with labels and measurements	58
Figure 8: Document Profile Sheet	90
Figure 9: Example of a table of contents modified for two different audiences	130
Figure 10: Sample translation brief form	139
Figure 11: Example of a style rule from the <i>Apple Publications Style Guide</i> (Apple 2003:103)	143
Figure 12: Sample assessment criteria for evaluating texts	151
Figure 13: Menu bar from a software interface with hotkeys underlined	163
Figure 14: Postcard with hidden message	170
Figure 15: European hazard warning symbols and accompanying indications	173
Figure 16: Directional terms for human anatomy	176
Figure 17: Part 1 of Table of the Animal Kingdom (<i>Regnum Animale</i>) from Carolus Linnaeus's first edition of <i>Systema Naturae</i> (1735)	177
Figure 18: Part 2 of Table of the Animal Kingdom (<i>Regnum Animale</i>) from Carolus Linnaeus's first edition of <i>Systema Naturae</i> (1735)	178
Figure 19: Confusing instructions for a child's toy (Michael O'Mara Books 2004:87)	180
Figure 20: Diagram for Practical Exercise 25	189

Acknowledgements

This book is based on my experience over many years as a technical translator, technical writer, trainer and researcher and it draws on various aspects of my work with numerous translation agencies, localization vendors, translators and academics to provide what is, hopefully, a useful and accessible resource on scientific and technical translation. In particular, the many students I have taught at Dublin City University and the University of Sheffield as well as the people who asked insightful questions at conferences and guest lectures have played a vital role in determining which information is included in this book and how it should be presented.

I am particularly grateful to the series editors who provided helpful comments on the various drafts of this book. My sincerest thanks go to John Kearns and to Kerry and Rick Gilchrist who, despite their heavy workloads, read sections of this book and provided invaluable comments, suggestions and feedback. I would also like to acknowledge and thank the SCIdgen group, Oxford University Press, Henkel Ltd., Avocent and Elaine McAndrew at Merrill Brink International for their kind support for reproducing some of the texts used in [Chapter 4](#).

My undying gratitude goes to my wife, Janice, for her eternal patience, support and love during this project. Thank you (again)!

About this book

The purpose of this book is to introduce you to the issues involved in translating scientific and technical texts and to provide you with the skills and knowledge to deal with them. Despite varying estimates as to the true monetary value of scientific and technical translation, few people could deny that it is one of the most important areas of translation, both from a professional and, increasingly, from a training point of view. In this book, you will gain an overview of scientific and technical translation, explore its origins and its professional context and develop the knowledge and skills necessary to deal with a wide range of texts.

One of the main difficulties for anyone interested in scientific and technical translation has always been the chronic lack of resources on the subject. This has been an issue since I was an undergraduate translation student and unfortunately, if comments from students and trainers are anything to go by, the situation has improved very little since then. This book is aimed, therefore, at students who are interested in scientific and technical translation, both as a career choice and as a research area, but who have found it difficult to find sufficient information to help them get started. This book is also aimed at anyone who simply wants to learn more about the area.

In writing this book, I had three main aims. The first was to provide as broad and holistic an introduction to scientific and technical translation as possible so as to give a better understanding of this complex interdisciplinary area. By positioning scientific and technical translation within the field of technical communication, it will be apparent that communicating technical information between languages requires more than just a good dictionary and an ability to write clearly. This approach will also highlight areas of common interest between translation and other aspects of communication, and hopefully stimulate ideas for further research.

My second aim was to provide practical advice to help those starting out or intending to work as technical translators. While it is not possible to prepare translators for every eventuality, it is possible to highlight some of the more common scenarios and provide suggestions on how to deal with them. This means novice translators will not find themselves completely unprepared for the reality of professional scientific and technical translation.

Finally, I wanted to provide a range of practical activities to help students practise their skills and to familiarize them with the processes in scientific and technical translation. These activities can be found at various points in each chapter.

By presenting typical translation strategies drawn from professional practice and from various other sources, this book will help you to explore scientific and technical translation in more detail and develop your own translation strategies. The learning activities in particular are intended to inspire and encourage trainers and students to develop their own learning and teaching methods.

Using this book

This book is designed to provide knowledge and skills that can be applied in practical translation scenarios. It is not intended solely as a theoretical exercise, although it does draw, where necessary, on theory to provide a context for the practical strategies proposed. It also explains that scientific and technical translation is highly interdisciplinary, both as an activity and as a field of study.

This book can be used in a number of ways. It can be used in conjunction with classroom-based practical translation courses with individual sections and chapters being referred to as necessary. [Chapters 1 to 3](#) can also be used as initial reading at the start of a semester. Individual students will also find that the various activities are useful as self-study strategies as part of their independent learning.

[Chapter 1](#) begins by identifying scientific and technical translation and by describing what it is and, more importantly, what it is not. We will then examine the professional, organizational and theoretical context within which scientific and technical translation operates.

[Chapter 2](#) introduces the idea that scientific and technical translation should not be regarded just as a type of translation but as part of the broader field of technical communication. This is necessary not simply because technical communication is the traditional source of the texts which we will translate, but because of the shared interests and, in many respects, the overlap in activities and skills. This chapter introduces you to technical communication and emphasizes the role of scientific and technical translation as a communicative process that is aimed at specific audiences. Given the overwhelming importance of the audience in the translation process, it is important to understand their needs, their expectations and even their idiosyncrasies so that we can tailor our translations accordingly. The chapter concludes with some suggestions on how to go about gaining a better understanding of audiences.

[Chapter 3](#) examines the typical features of scientific and technical language before examining several main categories of texts. This is important if we are to understand the ways in which audiences' needs are met by particular types of text. For each main category, a discussion of the main features and content is provided with observations as to how some of these factors may affect the translation process. The chapter concludes by looking at how Translation Studies can help us to categorize and make sense of the various text types we will encounter.

After the preparatory background information provided in the previous chapters, [Chapter 4](#) looks at some of the main types of text you may be asked to translate. The first two examples are accompanied by document profiles, which highlight the main features of the text as well as a list of problems you are likely to face and how to deal with them. To help develop your text analysis skills, you will need to produce profiles for the remaining text types yourself, although [Appendix 4](#) contains sample profiles, which you can consult if you need to.

Chapter 5 looks at some of the general translation approaches, which may come in useful when translating scientific and technical texts. Starting with generic translation strategies with which most translators are familiar, the book looks at how strategies such as modulation, recategorization (which was once known as transposition) and borrowing are used in the context of scientific and technical translation.

We will also look at other more radical strategies such as restructuring, recycling information, expansion and contraction, again illustrating how they are applied to the translation of technical documentation. Next, we look at the different types of translation you may be expected to produce. Understanding what each type of translation involves will help you decide which translation macrostrategy is the most appropriate for a given project. This chapter also draws on the idea of the translation brief proposed by Skopos theory as a way of identifying what it is your translation is supposed to achieve. Again, this will help you decide how you need to tackle a particular translation.

Chapter 6 is perhaps the most practice-orientated chapter and in it we look at specific aspects of scientific and technical texts and the challenges they can pose for translators. These aspects cover a range of areas such as culture-specific features, errors in the source text, authoritative translations, and formatting issues that will require either a cautious approach, direct action or even no action at all. Finally, a glossary of key terms and other useful resources are also provided as appendices at the end of the book.

I hope that the topics covered in this book, together with the practical strategies and learning activities will do justice to what is an interesting, rewarding and demanding field of translation.

Jody Byrne

Dublin, May 2011
www.jodybyrne.com

Find out more on Facebook
[facebook.com/ScitechExplained](https://www.facebook.com/ScitechExplained)

1. Scientific and Technical Translation

In this chapter

This chapter introduces you to scientific and technical translation and explains its origins and its importance both from a historical perspective and in terms of its current position within the language and other industries. This chapter will also show that while scientific translation and technical translation are closely related fields, they are not identical and the terms scientific and technical cannot be used interchangeably. We will discuss the significance of this type of translation before examining how theories of translation can help the translator. You will also learn about who is involved in scientific and technical translation and gain an overview of the typical tools you will need to use as a translator. This chapter will discuss your responsibility as a scientific and technical translator from a legal and ethical point of view before presenting some practical activities to help you practise what you have learned.

1.1 Introduction

Scientific and technical translation is part of the process of disseminating information on an international scale, which is indispensable for the functioning of our modern society.

(Pinchuck 1977:13)

Translation is an important driving force of modern society. It facilitates the flow of ideas, expertise, values and other information between different cultures. It is also essential for scientific and technological advancement. In today's information age, the role of scientific and technical translation is more important than ever. It has facilitated some of the most significant scientific and technological advances of recent decades. These advances have transformed our daily lives to the extent that the world around us is virtually unrecognizable from fifty, or even twenty, years ago. Virtually every aspect of our lives from education and work to entertainment, shopping and travel has been swept along by a seemingly unstoppable wave of new inventions and technological advances. What many people do not realize is that these inventions and advances are accompanied at almost every step of the way by translation in its capacity as a vehicle for disseminating scientific and technical knowledge.

Although in terms of translation studies, scientific and technical translation is just one of a number of fascinating areas of study, it is, however, an area of translation which has had a profound impact on society. Furthermore, as a field of translation activity, it is one which will have most impact on the vast majority of translation students, as it is here that many translators find a sizeable amount of their income.

1.1.1 *Some distinctions*

Despite their similarities, technical and scientific translation are not interchangeable terms.

The aim of this book is to introduce the fundamental features of scientific and technical translation and the skills needed to engage in this type of activity. It is important to realize, however, that the terms *scientific* and *technical* are not identical and that the expression *scientific and technical* is not a tautological reference to the same type of translation. Part of the decision to group these areas together has to do with the way in which these subjects are traditionally taught, rather than any similarity between the two. The majority of translator training institutions offer modules with titles such as “Scientific & Technical Translation” or “Advanced Translation – Scientific & Technical” and presumably, this is a convenient way of organizing teaching provision.

Another reason is that the lines separating scientific and **technical texts** are becoming increasingly blurred. As we will discuss later, it is not uncommon for texts to combine elements of both scientific and technical texts and all of the issues that this entails. So, while the two areas are separate in many ways, the ways in which they appear in the real world mean that they need to be considered together.

Pinchuck (1977:13) identifies three key categories of information, which provide the materials for scientific and technical translation:

1. The results of pure science;
2. The results of applied scientific research carried out in order to solve a particular problem; and
3. The work of technologists, which is intended to result in an industrial product or process, which can be sold.

Pinchuck quite rightly points out, though, that there is always a significant amount of overlap between these categories and that the work of today’s scientists, i.e. theoretical scientific information, is likely to become tomorrow’s technology and as such give us various tangible products, devices, services and so on. From this perspective, it is worth remembering this relationship as we examine scientific and technical translation in this book; while the texts may differ and the information may take different forms, their foundations are ultimately built upon largely the same information. However, the way in which this information is presented and used varies quite significantly between scientific and technical translation. So, while a **technical text** is designed to *convey* information as clearly and effectively as possible, a **scientific text** will *discuss, analyze and synthesize* information with a view to *explaining* ideas, *proposing* new theories or *evaluating* methods. Due to these differing aims, the language used in each type of text, and consequently the strategies needed to translate them, may vary significantly.

It could even be said that scientific translation has just as much to do with literary translation as it does with technical translation. While the common view of scientific writing is that it is dry, highly objective and impartial, with all traces of

style and linguistic creativity chased from the discourse like a fox from a chicken coop, the reality is quite different. Locke (1992) comprehensively dismantles the idea that there is no place for individualism, style, metaphor and creativity in scientific discourse. Indeed, he argues that the very nature of science means that individual style and creativity are intrinsic parts of the scientific process. He cites, for example, the use of metaphors as a foundation of scientific language with terms such as the *Big Bang* and the *Greenhouse Effect* owing their existence to the creativity of scientists and writers. The implication of this for translators, then, is that they must be able to recognize and negotiate culture-bound metaphors in much the same way as literary translators must.

1.1.2 Historical significance

Technical translation's long and colourful history helps us understand its importance today.

Translation is practically as old as writing itself and for almost as long as humans have been writing they have been translating. Indeed, evidence of this can be found in ancient clay tablets containing bilingual Sumerian-Eblaite glossaries (Deslisle & Cloutier 1995:7). Some have gone so far as to say, rather humorously, that translation is the “second oldest profession” known to humanity (Baer & Koby 2003:vii). To many, translating sacred texts such as the Bible or Koran immediately springs to mind when we speak of translation in historical terms. However, the translation of scientific and technical texts has a history, which is as long as that of religious translation, if not longer. That translation has accompanied virtually every significant scientific and technological discovery throughout the ages is well documented and it is difficult, if not impossible, to find a single example of an invention or discovery which was not exported to another language and culture by means of translation.

While translation has always facilitated the dissemination of knowledge, it was not until the 15th century that it really came into its own. In 1447, Johannes Gutenberg developed what is widely credited as being the first moveable type printing system which revolutionized printing and made it much easier to produce and, indeed, own books. That this invention had such an impact on translation and the dissemination of scientific and technical knowledge is due to the ensuing explosion in the number of books produced in Europe. Tebeaux (1997:14-30) describes how, during the English Renaissance, countless books were written on topics such as medicine, farming methods, animal husbandry, fishing, gardening, household management, horse riding, falconry, fencing, military science, navigation, road building, carpentry, stained glass making and so on. Gutenberg's press permitted unprecedented levels of distribution for these books thanks to the relative ease and cost-effectiveness with which they could be produced. Not only did this make it easier to distribute original language texts, it also made it easier to disseminate information in translation.

And so, translation, newly empowered by widespread printing, continued to play a central role in the dissemination of scientific and technical information for centuries. However, it was only during the last 100 or so years that translation

really made its mark on science and technology. This was a time when scientists were making countless new discoveries and writing about their findings in their own native languages. With other researchers eager to acquire new knowledge and learn new techniques, the demand for translations of these scientific texts was unprecedented. This translation activity in turn fuelled new research, which resulted in even more new discoveries. Imagine how under-developed science would be, were it not for translation; each language area would be intellectually isolated and each language community would have to discover the entire body of scientific and technical knowledge for itself. This would not simply be a case of reinventing the wheel, but of reinventing the wheel dozens, if not hundreds, of times.

The following are just a few examples of significant scientific pioneers and the languages in which they published their work:

- **Physics:** Max Planck and Albert Einstein (German), Nils Bohr (Danish), Robert Boyle (English), Hideki Yukawa (Japanese);
- **Biology and genetics:** Camillo Golgi (Italian), Tang Dizhou (Chinese);
- **Radiology and medical diagnostics:** Pierre and Marie Curie (French), Wilhelm Conrad Röntgen (German);
- **Bacteriology:** Alexander Fleming (English), Louis Pasteur (French);
- **Psychiatry:** Sigmund Freud (German).

The advent of printing also marked the start of a new era in translation itself, which, it could be argued, saw the way in which translation was viewed and carried out change quite significantly. In the centuries before printing, there existed a manuscript culture with texts being handwritten, fragile and almost ephemeral objects. Texts, usually of a scientific or technical nature, were copied by scribes and were often modified, whether intentionally or unintentionally, through the addition, omission or modification of information. This resulted in variability and uncertainty with regard to texts and the problem became even more pronounced when translation was added to the mix. At the time, translating lacked the standards of accuracy and quality that we expect today with the result that mistranslations or even omissions of difficult passages were common (Montgomery 2002:178).

Indeed, such was the extent of the problem it was not uncommon for copies of the same work held, for example, in libraries in Paris and Oxford to differ quite significantly in terms of content (Grant 1992:367). As Grant points out: “knowledge was as likely to disappear as to be acquired” as a result of the translation process. This was made all the more problematic when we consider that there might only have been one copy of the source text and this would have been written on fragile vellum or papyrus. This trend can be traced back to ancient Rome and Greece where the concept of intellectual property as we currently know it simply did not exist. In Greece, for example, the demand for knowledge, particularly of a scientific and technical nature, gave rise to what we now call compilers. These compilers, whose name comes from the Latin “to plunder”, effectively “misappropriated” whole chunks of texts, usually through translation and presented them as their own work (Stahl 1962:55). Translators at the time

used source texts as the basis for new books and combined the ideas of the original with their own ideas, opinions and suggestions.

Consequently, many of the great works by some of the most important scholars such as Posidonius or Ptolomy have effectively been lost; despite numerous publications purporting to contain the writings of these scholars, there is no trace of their actual writings left as a result of countless publications which combined, modified, assimilated or falsified their work. Roman translators were no less cavalier in their approach to scavenging knowledge and passing it off as their own. Indeed, the Romans described these practices as **inventio** (invention), which involved the rewriting or rewording of the original during translation, and **contaminare** (contamination), which involved combining translations together from different sources to form an entirely new work.

This changed quite significantly, however, with the advent of relatively high volume printing as facilitated by Gutenberg's invention. Texts became fixed – objects to be respected rather than ragged scraps of vellum, which could be written and copied by anyone. The process of printing texts on paper and binding them gave the knowledge they contained a legitimacy and permanency which had rarely existed previously. In the case of translation, the existence of a fixed and standardized source text made translators more accountable for omissions and mistranslations because it was easier to consult the original source text. We could argue that printing raised standards within scientific and technical translation and that, ultimately, it was instrumental in the emergence of various translation theories and concepts such as equivalence, faithfulness or **loyalty** and later concepts such as adequacy.

Practical Exercise 1: The language of science

Think of three major scientific discoveries and find out who are the main scientists associated with them. What is the nationality and working language of each scientist? Now identify three products or inventions that make use of one or more of these discoveries and find out in which country they were made.

1.1.3 Modern scientific and technical translation

Various factors over the centuries have changed the way we look at technical translation today.

In today's globalized economy, scientific and technical translation in many respects represents the backbone of international trade and the scientific endeavour which fuels it. Virtually every product sold or specialized service provided – whether MP3 players, telephone conferencing systems, luxury cars, flame retardant cladding for use in the construction industry, online shopping websites, mobile phone services or designing a steel mill – will require the involvement of scientific and technical translators at some point in its lifecycle. This involvement may come as early on as the design and consulting phase, during development and manufacture, as part of sales and marketing activities or to provide support to customers and users.

It has been estimated that scientific and technical translation now accounts for some 90% of global translation output (Kingscott 2002:247). Of course, this figure is unlikely to be completely accurate for a number of reasons – one of which relates to how we define scientific and technical translation (see Byrne 2006:3). However, even assuming that the figure is exaggerated due to various confounding variables, this figure is unlikely to be too far off the mark. This is all the more likely when we consider that the localization industry, which traditionally makes extensive use of scientific and technical translators, is estimated to be worth around US\$12 billion (DePalma & Beninatto 2006:4).

Indeed, scientific and technical translation forms such a crucial part of modern industry and society that it is the subject of numerous laws, regulations and directives and many international scholarly scientific journals, even those which publish papers in various languages, require translations of abstracts at the very least.

Practical Exercise 2: Exporting languages

Make a list of the electrical appliances you have in your home and note the countries in which they were designed and/or built. With your national language at the centre, draw a diagram illustrating the languages from which documents relating to your appliances have been translated.

Try to find some of the documentation that came with these appliances. Are there any features, for example style, subject, language or formatting which you think would pose problems for a translator? If you had to translate one document yourself, how would you approach these features?

1.1.4 Some legal dimensions

Understanding how various legal factors affect how and why we do our work.

One of the most compelling reasons for studying scientific and technical translation is that in many cases the translation of documents in these domains is an activity which is required by law. In Europe, EU Council Resolution C411 specifically states that in order to be able to legally sell or distribute technical products and appliances, all **technical documentation** relating to the product must be translated into the language(s) of the country where the product is to be sold (Council of the European Union 1998). A result of the Directive is that products are only regarded as being complete when they are accompanied by full operating instructions in the users' own language; if there are problems or inaccuracies in the instructions, the whole product can be regarded as defective. To put this into perspective, any product that involves some form of technology, be it electronic, electrical, mechanical, chemical etc., must be accompanied by documentation in a variety of languages. Assuming that few companies have the resources to

employ **technical writers** to produce documentation in each of the languages concerned, it is fair to say that there is a huge demand for translators (usually **freelancers**) who can translate this documentation into different languages.

The translation of **technical documentation** is also subject to a range of other laws, regulations and directives. Another provision of Resolution C411 is that instructions must be clear, comprehensible and must provide clear warnings to prevent misuse of products and to advise users of possible risks and hazards. Since in practice these translations are not regarded as translations *per se*, but rather as original **target language** documents, the regulations regarding technical writing and documentation will apply.

Other pieces of legislation which affect scientific and technical translation include Directive 2001/95/EC, which deals with general product safety, and Directive 88/378/EEC, which deals with the safety of toys. Both state that clear warnings about possible risks must be given in the users' own language. Similarly, Directive 90/385/EEC, which deals with medical devices, and Directive 76/768/EEC, which relates to cosmetics, state that documentation must be translated and it must anticipate potential risks (Byrne 2007:16). But even after translations have been produced, the law still plays an important role because translators can be held liable for mistakes in their texts as a result of contractual obligations or as a result of other liabilities arising from tort law (*ibid.*).

Practical Exercise 3: Translation and liability

Consider the following scenario: When translating an installation manual for a gas heater, a translator notices that the source text contains a serious factual error. It says that the gas supply **must not be turned off** before starting work. It should have said that the gas supply **must be turned off**. However, the translator retains this incorrect information in the target text. An engineer installing a gas heater follows the instructions and as a result, the heater explodes, killing the engineer and three other people who were working nearby.

What are the key issues to be considered in this case? Who do you think is responsible for the deaths? Should the translator be found negligent and fined/imprisoned? Why? Are there any mitigating factors?

Practical Exercise 4: Finding legal resources

An important aspect of law is that in many jurisdictions it is constantly evolving as a result of new court rulings, laws and legislation. Websites such as EUR-Lex [<http://eur-lex.europa.eu>] provide a wealth of information on legislation in the EU.

Using the Internet, your local library or whatever information sources are available to you, find three sources of national case law and legislation for your own country and three sources of international legislation. Try to identify any cases or laws which relate to translation or the provision of specialized technical information.

1.2 A place for translation theory?

What can translation theory tell us about translating technical documentation?

Translation theory has always been a problematic area of study. Part of the problem is that it seeks to understand and explain translation, which is itself a complex and notoriously difficult concept to pin down. In the rush to explain the various facets of translation - and possibly to justify translation as a discrete field of study - a plethora of theories, models and approaches have emerged, some of which are extremely insightful and useful, but amidst the noise created by so much work it is sometimes difficult to make sense of it all.

An introductory book intended to explain the practice of scientific and technical translation is not the place for a lengthy discussion of translation theory, although it is necessary to mention briefly some of the more relevant theoretical approaches which relate to this area. The following paragraphs will provide a very brief outline of how translation theory can be applied to scientific and technical translation.

One of the most difficult aspects of translation theory is that scientific and technical translation have traditionally been neglected by scholars and none of the mainstream theories really addresses scientific and technical translation specifically. Some models have been developed as general theories of translation while others have emerged from particular types of translation, such as literary translation or bible translation. As a result, applying any of the available theories to scientific and technical translation is fraught with difficulty.

Difficulties also arise because, as Chesterman (2000:49) points out, many theories of translation adopt a binary approach to translation consisting of diametrically opposed extremes. Some examples of this include *formal vs. dynamic* equivalence (Nida & Taber 1964), *semantic vs. communicative* (Newmark 1977) and *covert vs. overt* (House 1977). While this approach certainly serves to make the theories neater and easier to describe, it represents a rather oversimplified vision of the translation process. Translation inevitably involves shades of grey – new scenarios, unusual combinations of factors and so on – which means that trying to shoe-horn a translation into one category or the other is often uncomfortable, if not impossible. Conversely, having too many categories or options can make classifying a particular translation scenario equally challenging.

While a lot of valuable work has been done in the field of **LSP** (Language for Special Purposes) and text typologies, which help us to understand why and how texts are produced in specific communicative contexts, there is still a lot to be done before we can comfortably apply a theoretical model to scientific and technical translation. Typologies are discussed in [Chapter 3](#) but for more information see, for example, Göpferich (1995) and Trosborg (1997).

1.2.1 *Recreating the source text*

Traditionally, the source text has been regarded as the most important element in translation, particularly as it is the starting point for the whole process and

the basis upon which **target texts** are produced. The prevailing view has been that, for a translation process to exist there has to be a source text, otherwise we would not be translators, we would be writers. In recent years, however, the focus of translation theory has, particularly in non-literary spheres, shifted away from frameworks based on the source text towards a more communicative approach. This means that translation is increasingly being regarded as a communicative process and, as such, the guiding factors are the message and recipient, i.e. the content and the target audience. This change of focus has made the study of translation clearer in that we can relate it to actual real-world events with real participants.

The emphasis on the source text is perhaps most apparent in the numerous definitions and types of **equivalence**, which all rely on one thing: a link or bond of some sort between the source text and the target text. It is this relationship that, according to Kenny (1998:77), allows the **target text** to be considered a translation of the **source text**. As Catford (1965:49) explains, “the TL text must be relatable to at least some of the situational features to which the SL text is relatable”.

The focus in equivalence theory on the need to have a strong link between the source and target texts is unfortunately taken to extremes, however, with the result that the source text can erroneously be regarded as the most important component in the translation process, with translators striving to create as close a replica of the source text as possible. Indeed, some would argue that it should be the sole guiding principle for translators. Taking this approach to its natural conclusion, we would have a situation where we could never separate the source text and target text; the target text could not function as a translation without the ever-present source text.

While this is clearly problematic in many ways, to deny that there must be at least some link would also be misguided. Quite simply, without the source text there can be no translation. While this relationship can, to a certain extent, be abused through, for example, an insistence on excessively literal translations motivated out of an unquestioning and sometimes misguided loyalty to the author, often to the detriment of the target language (**TL**) reader, the fact remains that the source text forms the basis for the translation.

Perhaps the most well known types of equivalence are *formal* and *dynamic equivalence* proposed by Nida in 1964. Formal equivalence is concerned with the message in terms of its form and content. With this type of equivalence the message in the TL should match the different elements in the source language as closely as possible, be they lexical, syntactic, stylistic, phonological or orthographic. According to Catford, a formal correspondent (or equivalent) is “any TL category (unit, class, structure, element of structure, etc.) which can be said to occupy, as nearly as possible, the ‘same’ place in the ‘economy’ of the TL as the given SL [source language] category occupies in the SL” (Catford 1965:27).

Dynamic equivalence, on the other hand, is based on the notion that the **TT** should have the same effect on its audience as the **ST** had on its own audience. With dynamic equivalence, the emphasis is not so much on finding a TL match for

an SL message but rather on creating the same relationship between the target audience and the message as that which existed between the SL audience and the message (Nida 1964:159). The aim here is to produce a target text which is natural and idiomatic and which focuses on the TL culture. According to dynamic equivalence, a successful translation needs to capture the sense of the ST and not just the words. As such, it can only be regarded as a successful piece of communication if the message is successfully transmitted to the target audience.

Nida & Taber make the point, however, that eliciting the same response from two different groups of people can be difficult, particularly when we consider that no two people from the same language group will understand words in exactly the same way (1969:4). This sentiment is also expressed by Steiner (1975:28). What we are left with, therefore, is an approach which is theoretically quite desirable but difficult to implement and imprecise in practice. Applying the idea of formal and dynamic equivalence to any type of translation, not just to scientific and technical translation, rarely produces anything tangible or specific for a translator to make use of because they are such vague and subjective concepts.

There are a number of systems, which have been put forward to examine the levels of equivalence (see, for example, Komissarov 1977, Koller 1979, Baker 1992). One of the most enduring of these is the scheme proposed by Koller (1979:188-189), according to which equivalence can occur on the following levels:

- **Denotational meaning**, namely the object or concept being referred to;
- **Connotational meaning**, which is, according to Koller divided into language level, sociolect, dialect, medium, style, frequency, domain, value and emotional tone;
- **Textual norms**, which are typical language features of texts such as legal documents, business letters etc.;
- **Pragmatic meaning**, which includes reader expectations;
- **Linguistic form**, namely devices such as metaphors, rhyme and so on.

Each of these levels then gives rise to a particular type of equivalence, which can be used to describe the relationship between the ST and TT. In scientific and technical texts, achieving equivalence on any of these levels might require the translator to focus more on the information being communicated (denotational meaning) in the case of an instruction manual, on the *way* in which information is expressed (linguistic form) in a popular science article or on set phrases and document conventions (textual norms) in the case of a certificate of conformity (see [Chapter 4](#)). In order to emphasize equivalence on one of these levels, translators may find themselves having to settle for lower levels of equivalence on one or more of the remaining levels.

It has become rather fashionable to dismiss equivalence when discussing professional translation (Pym 1995 & 2010). The insistence of equivalence-based approaches on maintaining what some would regard as excessively close links between the target text and the source text and its original audience seems incongruous when the point of translation is to communicate to a new audi-

ence. Equivalence can also be criticized for its general difficulty in incorporating real-world, extratextual issues such as time constraints, preferred terminology and style, reader expectations, etc. However, to dismiss equivalence out of hand because it appears old-fashioned, excessively concerned with the source text and isolated from the world in which translation takes place is like saying that walking is not as useful as running and should be banned. In reality, both running and walking have their advantages and their disadvantages, it all depends on what it is you are trying to achieve.

These levels of equivalence give us, in theory at least, the ability to compare source and target texts, once a translation has been produced. However, we need to be wary of trying to use the various types of equivalence to *dictate* how a translation should be produced and how the ST and TT should relate to one another. They are simply not designed to do this; equivalence cannot tell us which of its various levels should be used, primarily because it has difficulty taking account of the fact that, as Toury (1995:26) says, a translation is a fact of the target language that hosts it. This means that scientific and technical translations will be governed and judged in the context of the norms, expectations and rules of the target text. In other words, they will be treated as if they were originally produced in the target language and not as translations. Moreover, equivalence does not take into account those real-world issues which play as much a role in shaping the translation process as the source and target languages, the text and its content etc. All that we can realistically expect to achieve using the various levels of equivalence is describe how the source and target texts relate to one another after the translation has been completed. A more helpful way of using equivalence is to employ its levels and types during the translation process as a set of tools or policies which can be selected in order to achieve some translation goal. In practice, this might mean that when translating an instruction manual, for instance, we would decide that denotational equivalence is more important than equivalence of linguistic form or connotational equivalence and that we would concentrate on conveying the information rather than on recreating the particular stylistic features of the source text.

The difficulty in adopting this type of approach, as hinted at above, is that we do not know which of the various levels of equivalence and, by extension, which aspects of the source text, are the most appropriate for a particular context. Simply knowing the different ways in which a source text and target text *can* be equivalent does not mean that a translator will choose the most appropriate one for a particular project. As a result, translators are usually left to their own devices in choosing the most appropriate translation strategy and may or may not choose the right one.

1.2.2 Focusing on the target text

Skopos theory was developed by Hans Vermeer in 1978 and was the first theory to fully recognize the professional reality of translation and that, unlike equivalence, the target text, or more precisely the **purpose** of the target text, is the

most important in determining the way we should translate texts (Vermeer 1982; 1987a). This theory is based on the principle that translation is a communicative activity, which is performed for a specific reason; a text is written for a specific purpose and it is translated for a specific purpose. It is this purpose, which is known as the **Skopos**, which governs the translation process, unlike equivalence, where the ST and its effects on the SL audience determine the translation process, or for that matter **functionalism**, where the ST function defines the TT function and the translation process.

Skopos theory maintains that the translation process is determined by the Skopos of the TT as specified by the commissioner and the translator. A text, according to Skopos theory, is an *offer of information*, i.e. the raw materials from which any number of possible translations can be produced (Vermeer 1987b). The way in which a translator selects the “correct” translation depends on the intended purpose of the translation being known. While this may seem rather vague, it does in fact reflect the reality of translation. For example, the way in which we translate a document will depend on who is going to read it, how they are going to use it, the way in which the text will be distributed and so on. These factors do not necessarily remain constant between source and target text and they are particularly important in scientific and technical translation.

Take, for example, a situation where we are asked to translate the user guide for a toaster. In both languages, such texts are expected to have an informative function so the primary function will not change. In the original source language culture, it is normal for such documents to adopt a tone which emulates an expert “speaking down” to a layperson who is instructed to follow certain procedures. However, target language readers would react quite badly to what they would perceive as a patronizing and demeaning, almost insulting, tone. If this document were being translated for distribution in the target country, the appropriate course of action would be to translate the text in such a way that this expert-layperson register is replaced by a peer-to-peer register where the reader is *advised* to follow certain procedures. A translator would be entirely justified in making such changes, as the translation would fail in its purpose otherwise.

However, if the user guide is simply being translated for use by a service engineer, the emphasis will be on the information and the reader is unlikely to be “offended” by harsh orders and will not need to have the translator explain every concept in simple terms. Ultimately, we would have two quite different translations originating from the same source text. But if, according to Vermeer, an ST is an offer of information and can give rise to any number of potential translations (Nord 1991:23), how is the translator to know which one is the most appropriate one? If it were left to chance, there is the risk that the translator may pick the wrong one, i.e. translate the text in a way that does not meet the client’s requirements.

Rather than leave such an important strategic decision to chance, Skopos theory introduces the notion of the **translation brief**, which is defined as a form of project specification which sets out the requirements for the translation (Byrne 2006:39). This brief is intended to form the basis for identifying the Skopos of the translation and is supposed to, among other things, clearly define what the trans-

lation is to be used for and who will use it. In his definition of translation, Sager (1993:116) acknowledges the need for some form of brief or instructions “from a third party” on the basis of which the translation is carried out. Unfortunately however, producing a translation brief is quite a hit and miss affair with clients rarely able to provide anything more relevant or specific than “I have a 7,500 word document that I need translated. It’s got something to do with electronics and I need it by the end of the week.”¹ In such cases, the translator generally needs to ask certain probing questions such as “is the text for publication?” etc. and on this basis construct some form of translation brief. This unfortunately weakens the effectiveness of Skopos theory somewhat.

This problem is compounded by the fact that nobody seems to know exactly what should go into a translation brief although the general consensus seems to be that it should provide some form of information about the target audience, intended purpose of the text and any stylistic or terminological requirements. Sunwoo (2007), in her paper “Operationalizing the translation purpose (Skopos)”, seeks to address this problem and presents a detailed “model for constituting the translation purpose from the translation commission” and a way of situating the text. The result is a very detailed analysis although it is probably much too complex for practical use.

Skopos theory can be tricky to use in practice because of the vagueness of the notion of the translation brief and also because it does not actually say how we are to fulfil a particular Skopos. But it does help us to concentrate on the most important aspects of the translation process.

From this very brief description, we can see certain limitations which are also indicative of other theoretical approaches to translation. For example, while equivalence gives us theoretical criteria with which to compare translations against their originals and which can be used as strategies if needed, it cannot account for the numerous factors which exist outside texts but which nonetheless play a crucial role in translation. Nor for that matter does equivalence tell us which of the various levels and types of equivalence is the most appropriate for a given translation scenario. Equivalence frequently places too much emphasis on the role of the source text to the detriment of all other factors.

While the introduction of **functionalism** (see House 1977, for example) was a groundbreaking step in that it lessened the emphasis of translation on purely textual factors, it still, unfortunately, maintained the excessive importance attached to the source text. Skopos theory, on the other hand, is valuable in that it explicitly addresses the professional context of translation and takes a more holistic approach.

Unfortunately, it can be problematic from the point of view that the Skopos of a translation is based on the undefined notion of the translation brief, which is open to interpretation and may, in some cases, be very difficult to formulate

¹ I once received an email asking whether I would be available to translate a medical text. Before agreeing to take the job I asked to see the text first, whereupon it emerged that the text was actually about guns, not medicine. The company for whom the text was to be translated normally made medical devices but had diversified into manufacturing accessories for guns.

because translators are rarely given meaningful translation briefs or commissions. Moreover, because Skopos is intended as a general theory of translation, it is not really in a position to offer explicit instructions or guidance on how to achieve specific Skopoi.

One method of reconciling the problems outlined above might be to combine the best features of Skopos theory, equivalence theory and work carried out on text typologies. This would involve using Skopos theory to determine what it is we need to achieve with our translation. This gives us our general overview of what type of translation is required.

When combined with a knowledge of text typologies we can then produce a clearer picture of what precisely our translation will look like in terms of features such as language, terminology and content, based on what we know about comparable texts in the target language. Then, with this knowledge, we can use the various levels of equivalence not as criteria for comparing texts, but as guidelines, informed by our understanding of the purpose of the target text which will aid us when translating.

However, there is much more to translation theory than the examples given above. There are numerous other models and approaches available such as relevance theory (Gutt 1991), translation norms (see Schäffner 1999), descriptive translation studies (Toury 1995) and functionalism (Reiß 1971), some of which may have something to offer scientific and technical translation. It is essential to realize however, that while none of the existing theories of translation on their own can provide an infallible model of the translation process, particularly for scientific and technical translation, they do provide adequate raw materials with which we can develop an informed and acceptable working theoretical model to guide our practical work. The challenge here is to examine the various theoretical approaches and models and then cherry pick those aspects which appear to be most relevant. It is quite conceivable that all of the components for a robust and reliable theory of translation, not just scientific and technical translation, are available to us already. All that remains is to assemble the various pieces into a basic usable theoretical framework.

Practical Exercise 5: Skopos versus equivalence

Draw up a list of the advantages and disadvantages of using (1) just equivalence and (2) just Skopos theory to explain scientific and technical translation. Compare the results of both lists. If you had to choose just one theory, which would it be and why? How would *you* combine the two theories?

1.3 Tools of the trade

As well as linguistic skills, we also need to use a variety of software and tools as part of our work.

When we consider the long association between translation and various innovative technologies over the centuries it comes as no surprise to find that

technology plays a crucial role in scientific and, perhaps more so, technical translation. While for the most part translation has traditionally facilitated the dissemination of new scientific and technical knowledge, science and technology have also had a tremendous impact on translation.

Commercial translation (as distinct from interpreting), the point of which is to provide a written alternative to some foreign language, has always required the use of certain tools whether a clay tablet and stylus, quill and parchment or typewriter, telex and fax. Such tools, while requiring some acclimatization, more so in the case of typewriters and telexes, were unlikely to have any radical impact on the work of the translator; they were simply improvements on existing methods. The benefits to translators were modest and came in the form of slight improvements in the presentation of translations or faster delivery of texts. Translation only underwent a genuine metamorphosis as a result of technology with the advent of computers and the Internet.

Despite the fact that computers and the Internet have existed in one form or another for decades, their everyday use was virtually unheard of only thirty years ago. Computers at that time were bulky, room-sized contraptions which required teams of scientists to tend to their idiosyncratic and temperamental needs. The modern PC, as we know it, was at that time but a distant glimmer on the horizon. The Internet, too, was at an embryonic stage, consisting of a dozen or so computers located at military bases, research laboratories and universities in the USA. It is only since around the mid-1990s that the Internet has truly made its mark on translation. In 1971, Sykes referred to typewriters as a staple part of any translator's office. Some 25 years later, O'Hagan's (1996:5) reference to the fax as the most popular form of communication shows that the Internet had yet to establish itself as a core component of the translation landscape.

Computers and the Internet have changed business models throughout the world, in all industries and business sectors and have gone hand in glove with globalization. In the translation industry, it has created new demands for translations and placed new demands on translators, requiring them to adopt new technologies and practices as part of their day-to-day work. Indeed, technology has almost created its own demand by facilitating global business; it creates a demand for new processes which inevitably involve the use of technology. This process which has seen translation become a computer-based activity (Austermühl 2001:1) has transformed both the type of work we do and the way in which we perform this work. Nowhere has this impact been more pronounced than in the fields of scientific and technical translation.

Perhaps it is because scientific and technical translation coexist so closely with technology that they have experienced such a drastic technological transformation, or perhaps it is because working with companies and organizations where technology plays such a crucial role in their activities has required translators to become part of the technical landscape. Whatever the reason, the nature of scientific and technical translation means that the basic word-processing skills, which would once have been sufficient and are still sufficient for most translators, are simply not enough any more, particularly for those working in scientific and technical domains.

Today's scientific and technical translator has to contend not only with word-processing and sending files by email or electronic file transfer, but receiving documents in a bewildering array of file types which often have to be handled using specialized software. This software is often so far removed from mainstream computer use that someone outside our profession would never even know about them, let alone be expected to use them. The translator, who translates documents produced in industries where such software is commonplace, needs firstly to be able to recognize such files and technologies, and secondly to know what to do with them.

Virtually all translators - irrespective of the types of texts they translate - have to contend with the increasing levels of technology necessary to do the job. Where once the translator's role was quite distinct from that of a graphic designer, desktop publishing (DTP) specialist or even programmer, the expectation now is that translators need to be able to deal with various technologies, file formats and tools.

To help us make sense of the vast array of technologies and tools with which the technical translator must contend it helps if we group them into three broad categories:

- General tools
- Text processing tools
- Translation tools

1.3.1 General tools

This category of tools is used by virtually everyone, not just translators. This category forms the basic level of IT competence which is needed to be able to function in any career and it consists of general PC skills such as basic maintenance, installation and deinstallation of software, data archival and backups, file compression, CD creation and PC security. Perhaps more importantly, this category also includes the increasingly important communicative functions of the Internet such as online research using search engines and databases and communications using email, Internet telephony, instant messaging and video conferencing as well as sending data using **FTP** servers etc. Nearly all translators have to deal with this level of technology as part of their day-to-day work.

1.3.2 Text processing tools

Text processing tools are the staple of any translator's toolkit; they are the very means by which we do our work. Again, all translators need to be proficient in the use of basic word-processing packages, regardless of the translator's specialism. For many translators, a solid understanding of Microsoft Word or possibly OpenOffice is more than enough to be able to work effectively as a translator. However, for certain groups of translators, most notably those of a scientific and technical persuasion, the situation can become much more complex indeed.

Most documents are produced using word processors such as Microsoft Word. But despite the rather impressive range of features offered by this type of software, word processors are actually at the lower end of the text processing spectrum in terms of complexity and the powerfulness of their features. Certain types of documents, such as those produced for highly technical products including software, machinery or vehicles are so large and complex as a result of formatting, cross-referencing and graphics that they cannot be produced using typical word processing software. Instead, they are produced using **DTP** software such as Adobe FrameMaker, InDesign or PageMaker.

These are complex professional applications which allow authors to combine text and graphics to produce documents with complex layouts for distribution either in traditional print format or in a number of electronic formats for distribution via the Internet or on disk. Indeed, a large proportion of documents, particularly in IT-related domains are never actually printed – they are intended to be distributed electronically and read on-screen. Consequently, technical translators may receive documents in **PDF** format or in a mark-up language such as **HTML** or **XML**. However, such electronic documents are not solely produced by DTP applications.

The emergence of what is commonly referred to as “Web 2.0” (O’Reilly 2005) has caused an explosion in the volume of information published online. In comparison to the static information traditionally produced by the people who operated websites, the “new” web has become a platform for dynamically and often, collaboratively, produced data which is shared by everyone in a more fluid and democratic way than previously possible thanks to online content management systems, social networking sites and blogs. The ubiquity of what can best be described as “Internet-related documents”, means that technical translators need to be comfortable with, although not necessarily expert at, using technologies such as HTML, XML, scripting and programming languages. This is so that they can identify the text to be translated in a file and translate it without damaging the technical parts of the file which make it work. Often, texts which are not even of a technical nature but which are in HTML format, for example, are sent to technical translators simply because, as a rule, they have more experience translating this type of file.

1.3.3 Translation tools

There are, of course, tools which are designed specifically for translators and which are therefore unique to translation. These tools are specifically aimed at assisting translators in performing their daily tasks. In many cases, a translator’s familiarity with such tools is a key deciding factor in whether the translator is actually awarded a project. Frequently referred to as **Computer-Assisted Translation** or **CAT** tools, they include **translation memory** systems, terminology management systems, electronic corpora and sometimes machine translation (see Austerlühl 2001 and Bowker 2002). When **CAT** tools initially emerged, it was widely believed (and indeed feared) that they would radically transform the

face of translation and change the role of the translator immeasurably.

To a certain extent, this is true but the impact of such technologies did not transform all areas of translation, primarily because CAT tools are only suited to particular types of texts in particular subject areas. As such, they do not feature as prominently in the work of all translators. Taking translation memory tools as an example, it is clear that, because they can only reuse existing translations, they are only of use when translating texts which contain a lot of repetition or which will be updated frequently. It is unlikely that such tools would be very useful when translating literary, marketing or **commercial texts**. In fact, they are most commonly used in technical translation where the nature of documents means that there is frequently a high proportion of repetition and where new product releases require existing documents to be updated.

Similarly, terminology management systems are at their most useful in situations where there is a large amount of terminology which must be used consistently. Admittedly, technical translators do not have the monopoly on such tools but they do represent perhaps the largest group of users.

For the technical translator, CAT tools require significant investment in the form of purchasing software, upgrading infrastructure and obtaining training. Initially, the expense and effort may seem counter-productive as the translator spends time learning how to use software which would otherwise be spent earning money. Translators also need to grapple with alternative payment schemes introduced as a result of translation memory systems (see Austerlühl 2001 for example). However, proficiency in translation tools opens up a much larger pool of potential work for translators for which they would otherwise not be considered.

Another benefit of translation memory tools, particularly for the technical translator is that they can lessen the need to have experience of using the various DTP applications. Many translation memory tools provide filters which make it possible to extract the translatable text from files produced in different applications so that they can be translated in a single translation environment. So rather than having to learn how to use five or six different DTP applications, a translator simply needs to learn how to use one translation memory tool.

1.4 Who's who in scientific and technical translation?

Translation involves more than just a translator, a text and a mysterious target audience.

As both Sykes (1971:1) and Byrne (2006:11) point out, scientific and technical translation is a service, a communicative service carried out for people, by people. Scientific and technical texts are produced in response to a demand for information of a scientific or technical nature; such texts are translated because someone in a different language community wants to access or use the information these texts contain.

But who are the people involved in this process? An extremely basic response would be to say that scientific and technical translation involves the author, the

translator and the reader, but this is much too simplistic, particularly in view of the vast global industry that has developed around the process of translating texts from one language into another (Byrne *ibid.*). The clear oversimplification notwithstanding, this basic categorization does provide a neat starting point for our examination of the people involved in scientific and technical translation.

Sager (1993:93-94) provides a relatively detailed breakdown of the participants in the translation process which is indicative of what happens in real life. He identifies the following participants:

- **Producers:** defined as the author of the source text whether a professional or subject-specialist who writes occasionally;
- **Mediators:** translators, editors, revisers; essentially anyone who modifies the text;
- **Communication agents:** the commissioner of a text or translation;
- **Recipients:** the intended end user or some person other than the addressee who may have different expectations.

A similar categorization of participants consists of the following (Byrne 2006:12-15):

- **Document initiator:** The person or entity responsible for setting in motion the production of a document. This is the person who wants to communicate something and “orders” the creation of a text. This may be a company that manufactures a product.
- **Writer:** The person or persons actually responsible for writing the document. In some cases, this might be a staff writer or a freelance writer.
- **Translation initiator:** This is the person responsible for initiating the translation process. It may be the same person as the document initiator or it may be a third party who “encounters” the document and wants to understand it.
- **Translator:** This is the person who actually produces the translation although strictly speaking it falls under Sager’s category of mediators.
- **User:** The intended recipient of the translation, this person is concerned with accessing the information contained in the text as effectively as possible. Users of scientific and technical translations expect translations to function as authentic target language texts.

As complex as this may seem, it gives only part of the story because there are numerous other people involved in the process of translating scientific and technical texts: agencies, localization vendors, vendor managers, translation technology specialists, experts, editors/proofreaders, project managers, in-country reviewers, DTP and graphic artists, software, website and computer game engineers etc.

Given the fundamental role played by the client, who initiates the translation process and the translator, who is responsible for carrying out the work, we should examine their roles in more detail.

1.4.1 The translator

At the very heart of the translation industry is the translator, performing a role that is both essential and extremely complex. In any discussion of translation, we often see references being made to translators as some faceless, anonymous, almost mythical creature. For the most part, however, the actual nature of the translator's work and the conditions under which this work is carried out receive little attention.

Just as there are different types of text and subject, so too are there different types of translators and the types of work they do can vary significantly. Bear in mind that in referring to types of translators we do not mean broad distinctions such as legal translator, financial translator or technical translator, but rather more practical organizational distinctions.

Some translators, known as *staff translators*, are employed by large companies and translate documents produced by the company. In many cases, staff translators work for engineering or IT companies although some legal firms, financial institutions, government bodies and international organizations (see Wagner *et al.* 2002, for example) employ their own translators directly. The motivation for employing staff translators is generally a matter of finances: companies with a large and sustained demand for translations will generally find it more cost effective to employ their own translators who are constantly available and who receive a salary instead of being paid per translation.

Other motivations include the need to develop a skilled and experienced in-house team to ensure consistency, accuracy and quality. Staff translators generally deal with specific subject areas and quite often, specific range of text types. For example, a staffer working for a chemicals producer may typically translate packaging and labels, chemical data sheets, lab reports, chemical assay reports, instructions for use, health and safety documentation and as well as regulatory documents such as declarations of conformity.

Similarly, a staff translator working for a manufacturer of agricultural machinery may translate **user guides**, repair and maintenance manuals, spare parts lists, conformity documentation and test reports from product authorization bodies as well as the odd press release or article for trade journals. What this type of translation job may lack in variety - depending on the company, the texts and subjects rarely change - it makes up for in the sheer detail and level of specialized knowledge translators gain. As they are working on the same subject virtually all of the time and dealing with new developments and innovations, staff translators gain highly specialized knowledge of the subject area and of the documents produced in that area. Such expertise is often difficult to rival.

In-house translators, like staff translators, are employed by companies on a full-time basis but, unlike their staff translator colleagues, they work for translation companies or localization vendors. Working for a translation company can, depending on the individual company, provide scientific and technical translators with a greater variety of texts and subject areas and as such might appeal more to those who like the challenge of not knowing what project is around the corner. Of

course, to justify the expense of hiring in-house translators, agencies may require their translators to deal with more than just scientific and technical texts during quiet periods or where there is an urgent non-technical job. This often requires translators to work outside their comfort zones and while some translators may shy away from this, others may find this an appealing prospect. In certain large translation companies, teams of translators may be assigned to certain key clients, often forming a “virtual translation department” for that client. Such teams will deal exclusively with projects for a specific client and, in this respect, the job of the in-house translator closely resembles that of a staff translator.

However, the most significant group of translators are not employed by large multinationals or by translation companies. Instead, they work for themselves as freelancers. *Freelance translators* are self-employed and are responsible for finding their own work, whether directly from clients, through agencies or other translators or any combination of these sources. Some freelancers may also join an online **translator community** such as ProZ, Aquarius or Translators Café to find work but such practices are widely criticized by professional translators who blame sites like this for reducing rates of pay for translators and promoting the use of unqualified translators (Ricketts 2010).

Practical Exercise 6: Translation forums

Visit the Aquarius.net, ProZ.com and TranslatorsCafe.com websites and compare the features available to translators. What costs are involved? What types of projects are typically posted on these sites? Do projects offer a fixed price or do they ask translators to suggest a price?

Freelance translators pick their own subjects and decide which projects they want to take on. This gives them the potential to have as much or as little variety as they want. In reality, however, the need to achieve a reasonable level of income means that many freelancers will often need to take on work in several areas, sometimes outside their main specialisms. This is not necessarily a bad thing as it helps freelancers to expand their expertise and as such remain competitive. In some cases, freelancers may join forces with other freelancers in order to take on translation projects which are too large for one translator to handle within the time available. They may even group together to share rented office space in order to keep costs down while at the same time having access to a professional workspace which is separate from the translator’s own home.

Freelance translators represent the largest group of translators in the world. This may sound surprising, but the vast majority of all translation work is carried out by freelancers. Whereas thirty years ago most translators were staffers, nowadays around 80% of all translators work on a freelance basis in what is a highly fragmented industry (Boucau 2005:28). In the current economic climate, not just in individual countries but across the globe, this means that there are relatively few jobs available for full-time in-house or staff translators. Many companies cannot afford the expense of employing full-time translators and so

choose to outsource their work to agencies or directly to freelancers. This reality is something which deters many students from pursuing translation as a career altogether (Byrne 2003). Often students do not feel sufficiently ready for freelancing when they leave university. Others are deterred by the uncertainty of not having a regular, fixed income and the need to be completely self-sufficient.

While in many respects, the ideal career path would involve at least some in-house experience before setting up as a freelancer, sometimes there is no other option but to take the plunge and go straight into freelancing. As a career option, freelancing is demanding in that it requires motivation, determination and courage but the rewards make the effort worth it: choosing your own working hours, flexibility, variety and, quite often, higher levels of income than in-house or staff translators.

Regardless of the different types of job scientific and technical translators may find themselves doing, the actual work they do remains fairly constant. As a scientific and technical translator, your duties go beyond merely translating texts. Depending on your level of experience, you may well be called upon to edit or proof another translator's work or to revise the work of less experienced translators. Often, translation projects are so large and have such short turnaround times that it is simply not possible for one person to produce a translation. In such cases, several translators may work in a team, with each person translating a section of the text. Of course, there needs to be another translator who works as an editor to combine the various sections and ensure consistency in terms of style and terminology.

A client may not know whether or not to commit to the expense of having a document translated; this is especially true of larger documents. Rather than adopt a "wait and see" attitude, translators may be asked to provide a "gist" or indicative translation, which is a very rough form of translation giving the basic meaning of a text but without any stylistic "polishing" or finesse. The idea of such translations is simply to give the client an idea of what the text is about so that they can access key information, for example to see if a foreign patent constitutes an infringement of another patent, or decide to have a full translation produced.

Senior translators are often called upon to set and evaluate test translations which are given to job applicants. This is not quite the straightforward task it may seem. Test translations are typically quite short, i.e. in the region of 500 words, which means that it is vital to select a text which is suitably challenging, but fair at the same time, in order to select the right candidates. Evaluating test translations is made all the more challenging because, depending on the level of the position being applied for, the applicant may be permitted to make a certain amount of mistakes and still be considered for the job.

As cultural experts, translators may also be asked to provide reports on the cultural appropriateness of various types of communications. Examples might include assessing television or newspaper advertisements to determine whether they contain anything which is likely to cause offence in their own culture or indeed, whether the advertisement is likely to be effective. This cultural insight

also comes into play when translating or localizing websites: translators can and should advise customers if a website contains images, colours, language or content which is likely to prove problematic in the target culture. A variation of this type of cultural consulting involves assessing corporate brands, including company names, to ensure they are appropriate for the target market.

1.4.2 *The clients*

As mentioned previously, scientific and technical translation is a service provided to people who need either to communicate or access scientific or technical information. Such a broad definition inevitably means a vast range of potential clients for translators. Assuming that every organization involved in scientific research or the development and production of some form of product will need translated documents at some point, it is fair to say that clients are to be found in virtually every sector of industry and business.

Such general statements do little, however, to explain where a scientific and technical translator's work comes from. Although many translators deal almost exclusively with translation agencies, not least because agencies relieve translators of the effort of finding clients, translators are ultimately providing translations for individual clients. Agencies aside, obvious clients for scientific and technical translators include:

- **Engineering:** Usually manufacturing products or providing services related to some form of engineering, whether it is mechanical, electrical, electronic, chemical or medical. The texts involved generally relate to different fields and applications of chemistry, physics or biology.
- **Transport:** Companies involved in the aerospace or automotive industries, railway engineering, public transport, logistics, agricultural and works vehicles.
- **Information technology:** In its broadest sense this includes software and hardware companies, companies involved in some way with the Internet, either providing services, software or systems, and providers of telecommunications solutions including hardware, infrastructure, software, design and management.
- **Research organizations:** Government think tanks, standards institutions, safety organizations (e.g. product approval bodies or road safety agencies), public service bodies such as meteorology centres, universities, laboratories, regional development authorities and trade associations.

Other, less obvious, clients might include:

- **Commercial entities:** Insurance companies (e.g. technical reports on accidents or structural reports for buildings), banks and venture capitalists who may require detailed technical information in order to invest in new innovations or purchase new technologies, lawyers, business

consultants who advise various businesses on improving processes and systems, auditors, etc.

- **Service providers:** Training centres, technical consultants, architects, town planners (e.g. public transport, environmental engineering, etc.), car dealerships, consumer associations, estate agents, etc.
- **Individuals:** Anyone who, for whatever reason, needs to access scientific and technical information whether for personal reasons (e.g. translating an obscure maintenance document for a classic car) or for research reasons (e.g. academic research or deciding which electronic components to buy for a project).

In the next chapter, we will examine the context within which technical documentation, the raw materials for scientific and technical translators is produced. Building on the descriptions of the key stakeholders involved in the translation process, [Chapter 2](#) will also examine the recipients of our translations in more detail.

Suggested Reading

- Baer, Brian J. & Geoffrey S. Koby (2003) *Beyond the Ivory Tower: Rethinking Translation Pedagogy*, Amsterdam/Philadelphia: John Benjamins.
- Byrne, Jody (2006) *Technical Translation: Usability Strategies for Translating Technical Documentation*, Dordrecht: Springer.
- (2007) Caveat Translator: Understanding the Legal Consequences of Errors in Professional Translation. *Journal of Specialised Translation*, 2007 (7): 2-24.
- Delisle, Jean & Judith Woodsworth [eds] (1995) *Translators Through History*, Amsterdam: John Benjamins.
- Esselink, Bert (2000) *A Practical Guide to Localization*, Amsterdam/Philadelphia: John Benjamins, 2nd edition.
- Finlay, I.F. (1971) The Staff Translator. J.B. Sykes (ed.) *Technical Translator's Manual*, London: Aslib.
- Heyn, Matthias (1996) Translation Memories: Insights and Prospects, In L. Bowker et al. (eds) *Unity in Diversity? Current Trends in Translation Studies*, Manchester: St Jerome, 123-136.
- Sykes, J.B. [ed.] (1971) *Technical Translator's Manual*, London: Aslib.
- Tebeaux, Elizabeth (1997) *The Emergence of a Tradition: Technical Writing in the English Renaissance 1475-1640*, New York: Baywood Publishing Company.

Scientific and Technical Translation

- Baer, Brian J. & Geoffrey S. Koby (2003) *Beyond the Ivory Tower: Rethinking Translation Pedagogy*, Amsterdam/Philadelphia: John Benjamins.
- Byrne, Jody (2006) *Technical Translation: Usability Strategies for Translating Technical Documentation*, Dordrecht: Springer.
- Byrne, Jody (2007) *Caveat Translator: Understanding the Legal Consequences of Errors in Professional Translation*. *Journal of Specialised Translation*, 2007 (7): 224.
- Delisle, Jean & Judith Woodsworth [eds] (1995) *Translators Through History*, Amsterdam: John Benjamins.
- Esselink, Bert (2000) *A Practical Guide to Localization*, Amsterdam/Philadelphia: John Benjamins, 2nd edition.
- Finlay, I.F. (1971) *The Staff Translator*. J.B. Sykes (ed.) *Technical Translators Manual*, London: Aslib.
- Heyn, Matthias (1996) *Translation Memories: Insights and Prospects*, In L. Bowker et al. (eds) *Unity in Diversity? Current Trends in Translation Studies*, Manchester: St Jerome, 123136.
- Sykes, J.B. [ed.] (1971) *Technical Translators Manual*, London: Aslib.
- Tebeaux, Elizabeth (1997) *The Emergence of a Tradition: Technical Writing in the English Renaissance 1475-1640*, New York: Baywood Publishing Company.

Translation and Technical Communication

- Hoft, Nancy (1995) *International Technical Communication*, New York: Wiley.
- Herman, Mark (1993) *Technical Translation Style: Clarity, Concision, Correctness*, In S.E. Wright & L.D. Wright (eds) (1993) *Scientific and Technical Translation*. Amsterdam: Benjamins, 1120.
- Schubert, Klaus (2009) *Positioning translation in Technical Communication Studies*. *Journal of Specialised Translation*, 11: 1730.
- 46 Horton, William (1994) *Designing and Writing Online Documentation*. New York: John Wiley & Sons.
- Markel, Mike (2001) *Technical Communication*, Boston: Bedford/St. Martins, 6 th edition.

Understanding Technical Documentation

- Gpferich, Susanne (1995) *A Pragmatic Classification of LSP Texts in Science and Technology*, *Target*, 7(2): 305326.
- Hoft, Nancy (1995) *International Technical Communication*, New York: Wiley
- Markel, Mike (2001) *Technical Communication*, Boston: Bedford/St. Martins, 6 th edition.
- Rosenberg, Barry J. (2005) *Technical Writing for Engineers and Scientists*, New Jersey: Addison-Wesley.

Basic Translation Techniques

- Baker, Mona (1992) *In Other Words: Coursebook on Translation*, London: Routledge.
- Brunette, Louise (2000) *Toward a Terminology for Translation Quality Assessment, Evaluation and Translation*, *Special Issue of The Translator*, 6(2): 169182.
- Crabbe, Stephen (2010). *Controlled Languages for Technical Writing and Translation*. In I. Kemble (ed.), *The Changing Face of Translation: Proceedings of the Ninth Annual Portsmouth Translation Conference*, Portsmouth: University of Portsmouth, 4862.
- Harvey, Keith (2001) *Compensation*. In Mona Baker & Gabriela Saldanha (eds) *Routledge Encyclopedia of Translation Studies*, London: Routledge, 4751.
- Mossop, Brian (2007) *Revising and Editing for Translators*, Manchester: St. Jerome, 2 nd edition.

Pitfalls, Problems and How to Deal with Them

- Baker, Mona (1992) *In Other Words: Coursebook on Translation*. London: Routledge.
- Bird, Mary (2008) *Medical Terminology and Clinical Procedures Revised*, Dartford: National Services for Health Improvement, 3rd edition.
- Chesterman, Andrew (2005) *Problems with Strategies*, In Krisztina Kroly & gota Fris (eds) *New Trends in Translation Studies: In Honour of Kinga Klaudy*, Budapest: Akadmiái Kiad, 1728.
- Kearns, John (2009) *Strategies*, in Mona Baker & Gabriela Saldanha (eds) *Routledge Encyclopaedia of Translation Studies*, Abingdon: Routledge, 282285, 2 nd edition.
- Lrscher, Wolfgang (1991) *Translation Performance, Translation Process and Translation Strategies: A Psycholinguistic Investigation*, Tbingen: Gunter Narr.
- Muoz Martin, Ricardo (2000) *Translation Strategies: Somewhere Over the Rainbow*, In Allison Beeby , Doris Ensinger & Marisa Presas (eds) *Investigating Translation: Selected Papers from the 4th International Congress on*

Translation, Barcelona, 1998, Amsterdam & Philadelphia: John Benjamins, 129138.
188 Strunk, William & E.B. White (1999) *The Elements of Style*, Massachusetts: Longman.
University of Chicago (2003) *The Chicago Manual of Style*, London/Chicago: The University of Chicago Press.

References

- Apple (2003) *Apple Publications Style Guide* May 2003, California: Apple Computer, Inc.
- ASD Simplified Technical English (2005) AeroSpace and Defense Industries Association of Europe Specification ASD-STE100(tm).
- Austermhl, Frank (2001) *Electronic Tools for Translators*, Manchester: St Jerome.
- Baer, Brian J. and Geoffrey S. Koby (2003) *Beyond the Ivory Tower: Rethinking Translation Pedagogy*, Amsterdam/Philadelphia: John Benjamins.
- Baker, Mona (1992) *In Other Words: Coursebook on Translation*, London: Routledge.
- Bates, Daniel and Fred Plog (1990) *Cultural Anthropology*, New York: McGraw-Hill, 3rd edition.
- Bell, Roger T. (1991) *Translation and Translating*, London and New York: Longman.
- Bird, Mary (2008) *Medical Terminology and Clinical Procedures Revised*, Dartford: National Services for Health Improvement, 3rd edition.
- Boucau, Fernand (2005) *The European Translation Industry: Facing The Future*, Brussels: European Union of Associations of Translation Companies.
- Bowker, Lynne (2002) *Computer-Aided Translation Technology*, Ottawa: University of Ottawa Press.
- Bowker, Lynne, Michael Cronin, Dorothy Kenny and Jennifer Pearson [eds] (1996) *Unity in Diversity? Current Trends in Translation Studies*, Manchester: St Jerome.
- Brunette, Louise (2000) *Toward a Terminology for Translation Quality Assessment*. *Evaluation and Translation*, Special Issue of *The Translator*, 6(2): 169-182.
- Bryson, Bill (2003) *A Short History of Nearly Everything*, London: Black Swan.
- Byrne, Jody (2003) *Freelance Translation: Teaching Students to Create Their Own Jobs*. Daniel Gouadec and Daniel Toudic (eds) *Traduction, Terminologie, Rdaction*. Paris: La Maison du Dictionnaire, 161-174.
- Byrne, Jody (2005) *Evaluating The Effect of Iconic Linkage on the Usability of Software User Guides*. *The Journal of Technical Writing & Communication*. 35(2): 155-178.
- Byrne, Jody (2006) *Technical Translation: Usability Strategies for Translating Technical Documentation*. Dordrecht: Springer.
- Byrne, Jody (2007) *Caveat Translator: Understanding the Legal Consequences of Errors in Professional Translation*. *Journal of Specialised Translation*, 2007 (7): 224.
- Cardon, Peter W. (2008) *A Critique of Halls Contexting Model: A Meta-Analysis of Literature on Intercultural Business and Technical Communication*. *Journal of Business and technical Communication*, 22(4): 399-428.
- Cardoso de Camargo, Diva (2001) *Estudos Tradutol6gicos em Crpus de Textos Tcnicos, Corporativos e Jornalsticos*. *Traduo & Comuncao*, (10): 33-49.
- Catford, John (1965) *A Linguistic Theory of Translation: An Essay in Applied Linguistics*, London: Oxford University Press.
- Chandran, K. S. Ravi (2005) *Duality of fatigue failures of materials caused by Poisson defect statistics of competing failure modes*. *Nature Materials*, 4, April 2005: 303-308.
- Chesterman, Andrew (2000) *Translation Typology*, in A. Veisbergs and I. Zauberga (eds), *The Second Riga Symposium on Pragmatic Aspects of Translation*, Riga: University of Latvia, 496-2.
- 191 Commission Directive 2001/59/EC. *Official Journal of the European Communities* (O.J. L 225/1) [Online] Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:225:0001:0333:EN:PDF>
- Council of the European Union (1998) *Council Resolution of 17 December 1998 on operating instructions for technical consumer goods*. *Official Journal of the European Communities* (98/C 411/01).
- Crabbe, Stephen (2010). *Controlled Languages for Technical Writing and Translation*, in I. Kemble (ed.), *The Changing Face of Translation: Proceedings of the Ninth Annual Portsmouth Translation Conference*, Portsmouth: University of Portsmouth, 486-2.
- Delisle, Jean and Judith Woodsworth [eds] (1995) *Translators Through History*, Amsterdam: John Benjamins.
- DeMatteis, Bob, Andy Gibbs and Michael Neustel (2006) *The Patent Writer: How to Write Successful Patent Applications*, New York: Square One Publishers.
- DePalma, Donald and Renato Beninato (2006) *Ranking of Top 20 Translation Companies for 2005*. Common Sense Advisory, Inc. [online] Available from: http://www.commonsenseadvisory.com/Research/All_Users/060301_QT_top_20/tabid/1429/Default.aspx
- Desisle, Jean and Pierre Cloutier (1995) *The Invention of Alphabets*, in Delisle, Jean and Judith Woodsworth (eds) *Translators Through History*, Amsterdam: John Benjamins, 72-1.
- DIN (1998) *DIN 2345: 1998. bersetzungsauftrge [Translation Contracts]*, Berlin: Beuth Verlag.
- Esselink, Bert (1998) *A Practical Guide to Software Localization*, Amsterdam: Benjamins.
- Esselink, Bert (2000) *A Practical Guide to Localization*, Amsterdam/Philadelphia: John Benjamins.
- Finlay, I.F. (1971) *The Staff Translator*, in J.B. Sykes (ed.) *Technical Translators Manual*, London: Aslib, 304-1.
- Gerzymisch-Arbogast, Heidrun (1993) *Contrastive Scientific and Technical Register as a Translation Problem*, in S.E. Wright and L.D. Wright (eds) (1993) *Scientific and Technical Translation*, Amsterdam: Benjamins, 215-2.
- Gpferich, Susanne (1995) *A Pragmatic Classification of LSP Texts in Science and Technology*, *Target*, 7(2): 305-326.
- Gpferich, Susanne (2009) *Comprehensibility assessment using the Karlsruhe Comprehensibility Concept*. *Journal of Specialised Translation*, 11, 315-1.

- Grant, Edward (1992) *Planets, Stars, and Orbs: The Medieval Cosmos, 1200-1687*, Cambridge: Cambridge University Press.
- Gutt, Ernst-August (1991) *Translation and Relevance: Cognition and Context*, Oxford: Basil Blackwell.
- Hall, Edward T. (1976) *Beyond Culture*, New York: Anchor Books.
- Harvey, Keith (2001) Compensation, in Mona Baker and Gabriela Saldanha (eds) *Routledge Encyclopedia of Translation Studies*, London: Routledge, 4751.
- Herman, Mark (1993) Technical Translation Style: Clarity, Concision, Correctness, in S.E. Wright and L.D. Wright (eds) *Scientific and Technical Translation*, Amsterdam: Benjamins, 1120.
- Hervey, Sandor, Ian Higgins and Louise Haywood (1995) *Thinking Spanish Translation*. London: Routledge.
- 192 Heyn, Matthias (1996) Translation Memories: Insights and Prospects, In L. Bowker et al. (eds) *Unity in Diversity? Current Trends in Translation Studies*, Manchester: St Jerome, 123136.
- Hofstede, Geert (1991) *Cultures and Organizations: Software of the Mind*. New York: McGraw-Hill.
- Hoft, Nancy (1995) *International Technical Communication*, New York: Wiley.
- Hnig, Hans G. (1998) Wissen bersetzer eigentlich, was sie tun? *Lebende Sprachen* 1, 1014.
- Horton, William (1994) *Designing and Writing Online Documentation*, New York: John Wiley & Sons.
- House, Juliane (1977) *A Model for Translation Quality Assessment*, Tübingen: Gunter Narr Verlag.
- Institute of Translating and Interpreting (2008) The thirty-nine steps: Questions you need to ask yourself when undertaking a translation. [online] Available from: [http://www.iti.org.uk/pdfs/newPDF/10FH_39Steps_\(0208\).pdf](http://www.iti.org.uk/pdfs/newPDF/10FH_39Steps_(0208).pdf) [Accessed: 01/10/2009].
- Kasner, Edward and James R. Newman (1940) *Mathematics and the Imagination*, New York: Simon & Schuster.
- Katan, D. (1999) *Translating Cultures: An Introduction for Translators, Interpreters, and Mediators*, Manchester, St. Jerome Publishing.
- Kenny, Dorothy (1998) Equivalence. Mona Baker (ed.) *Routledge Encyclopaedia of Translation Studies*, London and New York: Routledge, 7780.
- Kingscott, Geoffrey (2002) Technical Translation and Related Disciplines, in *Perspectives: Studies in Translatology*, 10(4): 247255.
- Koller, Werner (1979) The Concept of Equivalence and the Object of Translation Studies, *Target*, 7(2): 191222.
- Komissarov, Vilen (1977) Zur Theorie der linguistischen bersetzungsanalyse, In: Otto Kade (ed.) *Vermittelte Kommunikation, Sprachmittlung, Translation*, Leipzig: VEB Verlag, 4451.
- Lane, Nick (2004) *Oxygen: The Molecule That Made the World*, Oxford: Oxford University Press.
- Linnaeus, Carolus (1758) *Systema naturae per regna tria naturae: secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, Leipzig: Impensis Georg Emanuel Beer, 17881793, 10 th edition.
- Locke, David (1992) *Science as Writing*, New Haven, USA & London, England: Yale University Press.
- Macleane, Leonard, Alex Richman, Stig Larsson and Vincent Richman (2005) The Dynamics of Aircraft Degradation and Mechanical Failure, *Journal of Transportation and Statistics*, 8(1): 111
- Mancuso, J.C. (1990) *Mastering Technical Writing*, Menlo Park, USA: Addison-Wesley Publishing Company.
- Markel, Mike (2001) *Technical Communication*, Boston: Bedford/St. Martins, 6 th edition.
- Michael OMara Books (2004) *The Worlds Stupidest Instructions*, London: Michael OMara Books Ltd.
- Microsoft (1998) *Microsoft Manual of Style for Technical Publications*, Washington, US: Microsoft Press, 2 nd edition.
- 193 Montgomery, Scott L. (2002) *Science in Translation*, Chicago, London: The University of Chicago Press.
- Mossop, Brian (2007) *Revising and Editing for Translators*, Manchester: St. Jerome, 2 nd edition.
- Murray, Patrick R., Michael A. Pfaller, Ken S. Rosenthal (2005) *Medical Microbiology*, Philadelphia: Mosby, 5 th edition.
- Myers, Greg (2000) Powerpoints: Technology, Lectures, and Changing Genres, in Anna Trosborg (ed.) *Analysing Professional Genres*, Amsterdam: Benjamins, 177192.
- Newmark, Peter (1977) *Communicative and Semantic Translation*. *Babel*, 23(4): 163180.
- Newmark, Peter (1988) *A Textbook of Translation*, London: Prentice Hall.
- Nida, Eugene and Taber, Charles (1969) *The Theory and Practice of Translation*, Leiden: E.J. Brill.
- Nida, Eugene (1964) *Toward a science of translating*, Leiden: E.J. Brill.
- Nord, Christiane (1991) Scopus, Loyalty and Translational Conventions, *Target* 3(1): 91109.
- Nord, Christiane (1995) Text-Functions in Translation: Titles and Headings as a Case in Point, *Target* 7(2): 261284.
- O'Brien, Sharon (2003) Controlling Controlled English: An Analysis of Several Controlled Language Rule Sets, In *Proceedings of EAMT-CLAW-03*, Dublin City University, Dublin, Ireland, 1517 May 2003, 105114.
- O.J. L 225/1 : Commission Directive 2001/59/EC of 6 August 2001, *Official Journal of the European Communities*.
- OHagan, Minako (1996) *The Coming Industry of Teletranslation*, Clevedon, Philadelphia: Multilingual Matters.
- O'Reilly, Tim (2005) What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software. [online] Available from: <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html> [Accessed: 1st August 2007].
- Pinchuck, Isadore (1977) *Scientific and Technical Translation*, London: Andr Deutsch Ltd.
- Plate, Jrgen and Jrg Holzmann (2009) *Sicherheit in Netzen*, Munich: Netzmafia/Fachhochschule Mnchen.
- Price, Jonathan (1984) *How to Write a Computer Manual*, Menlo Park, CA: The Benjamin/Cummings Publishing Company.
- Pym, Anthony (1995) European Translation Studies, une science qui drange, and Why Equivalence Neednt Be a Dirty Word, *TTR* 8(1): 153176.
- Pym, Anthony (2010) Translation Theory Today and Tomorrow Responses to Equivalence, in Lew N. Zybatow (ed.) *Translationswissenschaft Stand und Perspektiven*, Frankfurt am Main: Peter Lang, 114.
- Radke, P.W., A. Kaisera, C. Frost and U. Sigwarta (2003) Outcome After Treatment of Coronary In-Stent Restenosis, *European Heart Journal* 24(3): 266273.
- Rei, Katharina (1971) *Mglichkeiten und grenzen der bersetzungskritik. Katagorien und Kriterien fr eine sachgerechte beurteilung von bersetzen*, Munich: Hueber.

- Ricketts, Wendell (2010) The Revolution of the Translators Its My Business, and Im Minding It. [online] Available from: <http://vitavagabonda.blogspot.com/2010/02/revolution-of-translators-its-my.html> [Accessed: 22 September 2010].
- 194 Rosenberg, Barry J. (2005) *Technical Writing for Engineers and Scientists*, New Jersey: Addison-Wesley.
- Sager, Juan (1993) *Language Engineering and Translation*, Amsterdam: John Benjamins.
- Schffner, Christine [ed.] (1999) *Translation and Norms*, Clevedon: Multilingual Matters.
- Schffner, Christine (2000) The Role of Genre for Translation, in Trosborg, Anna (ed.) *Analysing Professional Genres*, Amsterdam: Benjamins, 209224.
- Schatzman, E.L. and F. Praderie (1993) *The Stars*, trans. A.R. King , Berlin: Springer.
- Schrifer, Karen (1996) *Dynamics in Document Design*, New York: Wiley.
- Schubert, Klaus (2009) Positioning Translation in Technical Communication Studies. *Journal of Specialised Translation*, 11, 1730.
- Selfridge, R. J. and Sokolik, S. L. (1975). *A Comprehensive View of Organizational Development*. *Business Topics*, 47.
- Stahl, W.H. (1962) *Roman Science: Origins, Development, and Influence on the Later Middle Ages*, Madison: University of Wisconsin Press.
- Steiner, George (1975) *After Babel*, Oxford, England: Oxford University Press.
- Strunk, William and E.B. White (1999) *The Elements of Style*, Massachusetts: Longman.
- Sunwoo, Min (2007) Operationalizing the Translation Purpose (Skopos). Heidrun Gerzymisch-Arbogast and Gerhard Budin (eds) *Proceedings of the Marie Curie Euroconferences MuTra: LSP Translation Scenarios*. [online] Available from: http://www.euroconferences.info/proceedings/2007_Proceedings/2007_Sunwoo_Min.pdf [Accessed: 1st October 2009].
- Sykes, J.B. [ed.] (1971) *Technical Translators Manual*, London: Aslib.
- Tebeaux, Elizabeth (1997) *The Emergence of a Tradition: Technical Writing in the English Renaissance 1475-1640*, New York: Baywood Publishing Company.
- Toury, Gideon (1995) *Descriptive Translation Studies and Beyond*, Amsterdam: John Benjamins.
- Trompenaars, Fons (1993) *Riding the Waves of Culture: Understanding Cultural Diversity in Business*, London: Nicholas Brealey.
- Trosborg, Anna [ed.] (1997) *Text Typology and Translation*, Amsterdam: Benjamins.
- Trosborg, Anna [ed.] (2000) *Analysing Professional Genres*, Amsterdam: Benjamins.
- Ulijn, Jan (1995) Is Cultural Rewriting of American Technical Documents Needed for the European Market: Some Experimental Evidence from French and Dutch Technical Documents, *International Dimensions of Technical Communication*, Arlington, VA: Society for Technical Communication.
- University of Chicago (2003) *The Chicago Manual of Style*, London/Chicago: The University of Chicago Press.
- Van Laan, Krista and Catherine Julian (2001) *The Complete Idiots Guide to Technical Writing*, Indianapolis: Alpha Books.
- Vermeer, Hans J. (1978) Ein Rahmen fr eine allgemeine Translationstheorie, *Lebende Sprachen*, 3: 99102.
- Vermeer, Hans J. (1982) Translation als Informationsangebot. *Lebende Sprachen*, 27(2): 97101.
- Vermeer, Hans J. (1987a) What Does it Mean to translate? *Indian Journal of Applied Linguistics*, 13(2): 2533.
- 195 Vermeer, Hans J (1987b) Literarische bersetzung als Versuch interkultureller Kommunikation. Alois Wierlacher (ed.) *Perspektiven und Verfahren interkultureller Germanistik*, Munich: Iudicum, 541549.
- Victor, David A. (1992) *International Business Communication*, New York: Harper Collins.
- Vinay, Jean-Paul and Jean Darbelnet (1958) *Stylistique Comparee du Francais et de l'Anglais*, Paris: Didier.
- Vinay, Jean-Paul and Jean Darbelnet (1995) *Comparative stylistics of French and English: A Methodology for Translation*, trans. and ed. by Juan C. Sager and M.J. Hamel , Amsterdam/Philadelphia: John Benjamins.
- Wagner, Emma , Svend Bech and Jess M. Martnez (2002) *Translating for the European Institutions*, Manchester: St. Jerome.
- Wilmsen, David and Riham Osama Youssef (2009) Regional standards and local routes in adoption techniques for specialised terminologies in the dialects of written Arabic, *Journal of Specialised Translation*. 11: 191210.
- Wright, S.E. and L.D. Wright (eds) (1993) *Scientific and Technical Translation*, Amsterdam: Benjamins.
- Wright, Sue Ellen (2006) The Creation and Application of Language Industry Standards. In: Keiran J. Dunne (ed.) *Perspectives on Localization*, American Translators Association Scholarly Monograph, Series XIII, Amsterdam/Philadelphia: John Benjamins.