# Scientific and Technical Translation

*Routledge Translation Guides* cover the key translation text types and genres and equip translators and students of translation with the skills needed to translate them. Concise, accessible and written by leading authorities, they include examples from existing translations, activities, further reading suggestions and a glossary of key terms.

*Scientific and Technical Translation* focuses on texts that are typically translated in scientific and technical domains, such as technical instructions, data sheets and brochures, patents, scientific research articles and abstracts, popular science press releases and news reports. In seven chapters, this practical textbook:

- introduces readers to the typical contexts in which scientific and technical translators work;
- shows how corpus resources can be used for terminological and phraseological research;
- considers how translation technologies are employed in technical and scientific translation;
- explains a range of technical and scientific genres and their translation.

Including a wide range of relevant tasks and activities, examples from the most commonly taught language pairs and a glossary of key terms, this is the essential textbook for modules on scientific and technical translation and specialized translation.

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# Scientific and Technical Translation

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# Abbreviations

| | |
|---|---|
| ARIPO | African Regional Intellectual Property Organization |
| ASTM | American Society for Testing and Materials |
| BootCaT | bootstrapping corpus and terms |
| BNC | British National Corpus |
| BT | back translation |
| CARS | Create a Research Space |
| CAT | computer-assisted translation |
| CIoL | Chartered Institute of Linguists |
| CLIR | Cross Lingual Information Retrieval |
| CNRS | Centre National de la Recherche Scientifique |
| COCA | Corpus of Contemporary American English |
| CQL | Contextual Query Language |
| DGT | Directorate-General for Translation (of the European Commission) |
| DTP | desktop publishing |
| EAP | English for academic purposes |
| EAPO | Eurasian Patent Office |
| ELF | English as lingua franca |
| EMT | European Masters in Translation (Network) |
| EPO | European Patent Office |
| ESA | European Space Agency |
| ESP | English for specific purposes or English for specialized purposes |
| EU | European Union |
| GHS | Globally Harmonized System (of Classification and Labelling of Chemicals) |
| IMRAD | introduction, methods, results and discussion |
| INID | Internationally agreed Numbers for the Identification of (bibliographic) Data |
| IP | intellectual property |
| IPC | International Patent Classification |
| IPRP | International Preliminary Reports on Patentability |
| ISR | international search report |
| ITI | Institute of Translation and Interpreting |
| JRC | Joint Research Centre (of the European Union) |

| | |
|---|---|
| LSP | language service provider |
| MSDS | material data safety sheet |
| MT | machine translation |
| OAPI | African Intellectual Property Organization |
| PCT | Patent Cooperation Treaty |
| PDF | Portable Document Format |
| REACH | Registration, Evaluation, Authorization and Restriction of Chemicals |
| SaaS | software as a service |
| SDS | safety data sheet |
| SI | Système Internationale (d'Unités) |
| SL | source language |
| SMT | statistical machine translation |
| ST | source text |
| STS | science and technology studies |
| TBX | TermBase eXchange |
| TDS | technical data sheet |
| TEP | translation, editing, proofreading |
| TESOL | teaching English to speakers of other languages |
| TL | target language |
| TM | translation memory |
| TMX | Translation Memory eXchange |
| TT | target text |
| UN | United Nations |
| URL | uniform resource locator |
| USPTO | United States Patent and Trademark Office |
| WIPO | World Intellectual Property Organization |

# Introduction

## The intellectual challenge

It's springtime in Life Before Internet. I pick up the large brown package from my mailbox and open it excitedly to discover that it contains a hefty volume of technical papers published by a German research centre. I'd written a letter to the centre, in the best formal German and the neatest handwriting I could muster (it's also Life Before PCs and Desktop Printers), and they'd replied by sending me this most impressive tome!

I'm working on my undergraduate translation dissertation on the topic of superconductivity. Superconductivity is the property of some materials to conduct electricity with no resistance when they're cooled to extremely low temperatures. In 1986 ceramics were discovered that superconducted at temperatures somewhat higher than before, that is, above 90 K, which is equivalent to –183°C. That was a significant breakthrough, because liquid nitrogen boils at 77K. So liquid nitrogen could now be used to cool superconductors for experiments and applications, making both suddenly much more practical and affordable than before. Since superconductors also repel magnetic fields, they have many possible applications. Superconductors are what makes the maglev trains levitate and they're a crucial component in the magnetic resonance imaging (MRI) machines now widely used in hospitals around the world.

Two scientists, Bednorz and Müller, were awarded the Nobel Prize for Physics in 1987 for their discovery of these high-temperature superconductors. The excitement around superconductivity was infectious, even touching a young undergraduate translation student working on her translation project. The enormous potential of the new materials led to extensive coverage in the popular press, usually accompanied by a photograph of a small magnet hovering, as if by magic, above a piece of superconducting ceramic immersed in liquid nitrogen. Scientists and engineers were also working hard on applications to exploit some of that promised potential.

I had chosen to translate a report on high-temperature superconductors for my project and was busy gathering material for my

research. So letters had been posted and lots of bulging packages received. No websites, no online journals, no Google, no Wikipedia!

The point of this account is not to fill you with sheer incomprehension as to how anyone could have existed in such a state of technological deprivation. Rather, it is to say that researching and learning about a scientific or technical topic in preparation for translation is exciting and intellectually challenging, whatever the tools and ways of working. It involves identifying and accessing relevant texts in both languages, and reading them to gain an understanding of the topic and its terminology. It involves gaining familiarity with the ways specialists communicate, whether they're producing technical data sheets, patent specifications or scientific research articles. It involves developing familiarity with genres that lots of people never have occasion to experience but that are essential in doing science and developing and exploiting technologies. Translation is also an essential part of scientific and technological activities.

I had a lot more time to work on my student project than anyone does for a professional translation job, where the specialized information has to be processed and assimilated very quickly. But encountering technical and scientific concepts, as a linguist, and learning something about them can be immensely interesting and satisfying. That intellectual challenge may be one of the main reasons why the activity of technical or scientific translation interests you. You may have heard of the two-cultures debate initiated in 1959 by C.P. Snow (1959, 1963), criticizing the gulf between the arts and the sciences. Many say the gulf has narrowed or been bridged somewhat since then, though it's often still socially acceptable for someone to proclaim that they're no good at mathematics or that they don't understand something technical (while they may be more reluctant to admit ignorance of Shakespeare or the literary canon). As technical and scientific translators, we aspire to be inquisitive and knowledgeable in a broad range of disciplines, spanning languages, sciences and technologies. That is the challenge to be relished.



## Purpose of the book

Many of the world's translators work on scientific or technical texts, and many translator-training programmes deliver some tuition in scientific or technical translation. In spite of this, there are relatively few pedagogical resources in English for students and teachers of scientific and technical translation. This book is designed to fill that gap by providing a coursebook for a postgraduate (Masters level) course unit or module on scientific and technical translation. It is structured so that you can work through it, chapter by chapter, accumulating knowledge and skills and practising relevant tasks, thus

becoming increasingly adept in analysing and translating scientific and technical texts. It assumes no prior specialized translation experience. Used as a learning resource, the book will help you to achieve a set of learning aims, enabling you to develop the knowledge and skills you need for the activities of scientific and technical translation. Specifically, you will be able to

- understand some of the specific situations in which scientific and technical specialists communicate;
- recognize discursive and rhetorical purposes of scientific and technical texts;
- understand how professional translators operate in scientific and technical domains;
- analyse texts in your source and target languages using concepts and metalanguage of the field, in preparation for translation;
- apply a range of resources in your scientific and technical translation practice;
- generate your own translations of scientific and technical texts;
- justify your own translation decisions, using the metalanguage of the field;
- evaluate your own translations and the translations of others.

The book should be a useful resource for any higher-education programme in which technical or scientific translation is taught, as core or optional course units, between English and any other language, but it can also function well as a self-study resource for translators who have not had training or experience in scientific or technical translation.

## Rationale and approach

In many countries entry barriers to the translation profession are low, that is to say, anyone can say they are a translator and can offer their services as a translator. In the past translators often entered the profession with degree-level language competence but little formal education in translation. Their effectiveness as translators was developed on the job; over time they developed their own approaches to translation and their own personal theories of translation, perhaps without knowledge of existing formal theories. Now in the UK and in many other countries there is a proliferation of translator-training programmes that formalize the acquisition of knowledge and skills for translation, and it is increasingly expected by employers that their translators will have undergone some postgraduate training in translation. Without replacing the on-the-job experiences and learning, academic training programmes can offer you theoretical and conceptual tools to help you to develop your knowledge and skills more efficiently than if you had

to discover everything through trial and error on the job, as your predecessors often had to do. Academic programmes also develop your analytical and reflective abilities. These form an important part of professionalism and allow you to have a rational and analytical understanding of your translation activities, so that you will be able to respond to previously unencountered situations and will be able adapt to new practices as they emerge. This is particularly pertinent in the case of the increasing technologization of translation activities. Therefore, these higher-level thinking skills will be a tremendous asset to you in the professional workplace. Those are the benefits of targeted training in scientific and technical translation that underlie this book and inform its approach.

The book does not reduce translation to a set of prescriptions or formulae. Rather, it focuses on familiarizing you with texts that are typically translated in scientific and technical domains. On many occasions you may be aiming to produce a text that is accepted as belonging to the scientific or technical domain in the target culture, so knowing what is typical or characteristic of the target language and culture will provide a useful guide as to what translation options to choose. However, you will also be guided in your decision making by what you know or assume about the expectations and needs of your translation commissioner and the end users of the text; and of course having such in-depth knowledge, understanding and awareness also enables you to decide whether to conform to or challenge conventions or expectations.

Throughout the book you are encouraged to research the texts and practices that you are learning about, so that you can relate the book's perspectives to the local, regional, national or international practices that are of particular relevance to you. You are also encouraged to familiarize yourself with published research on relevant topics to help you to inform and justify your own judgements and decisions. Emphasis is placed on developing higher-order thinking skills of analysing, evaluating and creating (see Krathwohl 2002 for a discussion of Bloom's revised taxonomy of educational objectives). These skills help you to become reflective professionals who can behave responsibly towards clients, apply specialist knowledge and exercise autonomous thought and judgement in your work.

## Material, languages and structure

The coursebook focuses on scientific and technical genres for which translations are likely to be commissioned. There are two main areas of focus, mapping onto technical and scientific translation domains respectively. The first area pertains to the design, delivery and use of technical products. Here, you learn about technical material aimed at

end users, that is, instruction manuals (Chapter 3), product data sheets and technical brochures (Chapter 4), as well as technical documentation written by specialists for specialists, in the genre of patent specifications (Chapter 5). The second area of focus is the communication of scientific knowledge. Here, you learn about specialized scientific research (Chapter 6) and popular science reporting (Chapter 7).

The book also provides guidance on some of the resources that can help you in yourwork, with a particular focus on corpora (Chapter 2). Throughout the book examples give you insights into professional translation practices, to help prepare you for aspects of professional life.

In many cases English-language examples are used as a basis for discussion in the book, but you are encouraged to use similar analytical approaches to deal with texts in other languages, making the coursebook language-independent and of use for translator training and education in any language pair. Examples from other languages are integrated where practicable. Exercises at the end of each chapter aim to extend your experience further by encouraging you to find and work with additional examples for analysis and translation. They also prompt you to engage in discussions about your own linguistic and cultural contexts and your own translation work. Depending on organizational factors and the time and resources available, the exercises can be used for self-study or classroom activities. Many of them lend themselves well to group work, thus encouraging you to develop your team-working, collaborative and interpersonal skills too.

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# 1 Scientific and technical translation as a professional activity

This chapter provides an introduction to scientific and technical translation as a situated activity, by outlining some of the typical workplace configurations for translators and other professionals in the sector. It also notes the kinds of competences that may be expected of scientific or technical translators. It explains the notion of genre, as a way of understanding how the texts you translate are part of communicative events and fulfil communicative purposes. The translation brief and the translation project specification are introduced as tools that can be used to help you in your translation preparation and production.



## Introducing science and technology

Science and technology are often paired together in general language usage, as well as when we talk about translation. However, science and technology designate different, though related knowledge domains. A simple indication of this is found in dictionary definitions, for example in the online *Oxford Dictionaries*, where science is defined as 'the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment' and technology as 'the application of scientific knowledge for practical purposes, especially in industry' (www.oxforddictionaries.com). As if to emphasize the close relationship between the two domains, the first contextual example of usage of the word 'science' offered by the *Oxford Dictionaries* is 'the world of science and technology'. As well as reflecting the close relationship between them, these definitions seem to imply that technology emerges from science and gives priority to the ends rather than the means ('application . . . for practical purposes'). Science, on the other hand, seems to value the means by which knowledge is obtained, that is, through the scientific method of 'observation and experiment'. Although perhaps simplistically formulated here, this perspective on both activities is common throughout pre-modern and modern eras, particularly in anglophone contexts. However, like the well-known conundrum of the chicken and the egg,

the primacy of science and the subordination of technology is now disputed by some scholars. Forman (2010), for example, argues that this relationship has been reversed in the postmodern era, claiming that, from around the late 1970s or early 1980s, we have become more interested in ends than means, and technology has become the 'principal model for all our social and cultural activities' (ibid.: 162). This means, he continues, that resourcefulness, risk-taking and utilitarian entrepreneurship are now more highly valued in society than scientific means and methods.

The question of the standings of science and technology in society is a fascinating but complex one, explored in sociological disciplines, including science and technology studies (STS). It is beyond the scope of this book to pursue it much further, but Sismondo (2010) offers an accessible overview for those who are interested. A key point to be made here, and borne in mind throughout this book, is that traditional views of science as a neutral, objective, value-free activity carried out by disinterested scientists is heavily challenged by much of that scholarship. On the contrary, it is argued that science is a culturally and socially contingent activity, which can be ideologically and politically driven. Likewise, technology, often portrayed as the means by which many of the world's problems and our human imperfections can be fixed, must also be examined closely for its motivations, influences and effects. On that topic, Morozov (2013) offers a thought-provoking and polemical challenge to what he calls solutionist and Internet-centrist mindsets.

In the chapters that follow, we can adopt the convenience of grouping science and technology together, while recognizing that the nature of the domains and the dynamic relationships between them can be understood in different ways. Bringing them together in this book implies that they share some features, challenges or approaches. Rather than reflecting on how some things might be labelled as scientific and others as technical, we will focus on the ways in which texts and language are used to perform specific communicative functions in technical and scientific contexts. The analytical concept of genre, discussed in more detail below, will be helpful to us in highlighting those aspects. Before that, the next section introduces the translation landscape, to give you an insight into the settings in which scientific and technical translators work and the key competences they acquire and exercise.

## The translation landscape

Apart from the enticing intellectual challenge that scientific and technical translation presents, there are other factors that may motivate you to pursue a career in this area. Firstly, the language services sector

is a growing one (MarketWatch 2014). Secondly, a large proportion of professional translation work is technical or scientific; the sectors of industry that spend most on translation globally include manufacturing, software and healthcare, alongside defence in the USA (Kelly 2012). Thirdly, some surveys of professional translators (Aparacio et al. 2001) show that translators who offer a specialization can command higher rates of pay for their work. In addition, commissions from direct clients, rather than translation agencies, are also more lucrative (CIoL and ITI 2011) and are perhaps easier to secure in a specialized domain. The next sections outline some of the typical configurations in which scientific and technical translators work professionally.



## Freelance translation

Many or most translators work freelance, in many parts of the world (Kelly 2012). This means they are self-employed – they are not employees of the companies who give them commissions. This is an important distinction when it comes to financial matters like paying income tax (you should consult relevant information for your national or regional situation regarding self-employed status), but it also has implications for finding work and keeping a steady supply of work. Freelance translators generally only get paid for the translation work they do, but they also have to set aside time for marketing themselves, networking, doing test translations for prospective clients, kitting out their office with the necessary equipment and resources and maintaining it, learning about new developments, keeping their own financial records, and lots of tasks that employees of a company might take for granted. For example, unless they work in a very small company, employees can often call on someone in the IT support department or elsewhere when they have technical problems with their computer or their internet access; freelancers have to sort this out themselves or commission and pay someone to work on the problem.

Working freelance has both advantages and disadvantages. One of the key advantages is that it can give you the flexibility to organize your work around your own circumstances, location and preferences. One of the key disadvantages is the lack of a guaranteed regular income. Other pros and cons to consider may revolve around aspects such as contact with people during the working day, variety in translation work and range of other activities.

Most freelance translators (e.g. 82 per cent of the respondents in the last CIoL/ITI survey in 2011) receive their translation commissions from a translation company or agency, often referred to as a language service provider or LSP.

### Translator cooperatives and partnerships

A variation on individual freelance work may be seen in partnerships or cooperatives of translators; this is where translators group together, sometimes just to share translation work but sometimes to set up a joint approach to organizational matters too, for example they may hire a shared work premises or market themselves collectively.

An example can be seen on the website of the Swedish group called Lund Translation Team. They present themselves as a group of translators who market themselves under one name, share office space and meet once a week to share experiences and offer mutual advice. They present the advantages for them of working in this way as: 'greater resources, broader reach, greater expertise, more inspiration, more ideas, and of course more fun' (www.lundtranslationteam.se/what-is-lund-translation-team). They see the group as offering advantages to clients too, namely access to a variety of skills and entrepreneurial expertise.

### In-house translation

While the vast majority of today's translation work is done by freelance translators worldwide, some in-house/salaried positions for translators continue to exist. Some of the more common configurations are as follows.

#### *A translation company employs in-house translators*

'In-house' refers to something which happens within an organization, so in this case we are talking about translators who are employed or salaried. An LSP is more likely to employ in-house translators if it specializes in a specific set of languages or subject domains. For example, the UK-based Sandberg Translation Partners (stptrans.com) specializes in translation of Nordic languages, and around half of its employees are in-house translators for those languages. Fry & Bonthrone (www.fb-partners.com) is a German company specializing in translation for the financial services sector and they employ in-house translators for their most specialized work. For this set-up to make sense for an LSP, they usually have to be sure they have enough regular work for specific language pairs or specialisms to keep in-house staff occupied.

It is seldom the case that an LSP covers all its translation needs with in-house staff; they will usually commission freelancers too, as is also the case with the two companies just mentioned. It is also worth noting that 'in-house' does not necessarily mean that the translators work on the company premises; in some situations they may have the flexibility to work from home.

### *A company or organization whose core business is not translation has a translation department employing in-house translators*

This set-up makes sense for specialized companies which require very regular translation work, perhaps for a limited set of languages. A major advantage of having an in-house translation department is that there can be communication between the translators and technical writers, engineers or other specialists engaged in the company's core activities. Indeed this liaison may be a crucial part of the translator's role, and it is vital that translators have an appropriate set of interpersonal skills, as well as linguistic and technical ones. Another advantage of in-house translation is that the company can manage its own quality assurance and quality control more closely than when translation is outsourced. A potential disadvantage for translators is that the translation department can sometimes be seen within the company as less important than the core business and thus perhaps less valued as an ancillary support service.

A useful insight into running an in-house translation department is given by the then head of the translation department at SMA Solar Technology AG, Germany (Salisbury 2010) in an article in the online magazine *tcworld*. The company produces equipment for solar energy installations and distributes its products to numerous locations around the world. Salisbury describes in-house translation as 'the hard way', but also 'the better way'. He writes about some of the aspects of the work of the internal language services team that make it a successful configuration for that company. These aspects revolve around optimization of communication channels, terminology and project management. Some scientific research centres employ in-house translators, so can be included in this category.

### *An international organization employs in-house translators*

Among others, the European Union (EU) and the United Nations (UN) fall into this category. The ranges of languages and translation activities vary in accordance with the institutional remits. The translation services of the EU institutions are the largest in the world in terms of the number of languages and specialist fields covered. To illustrate the scale of activities, based on 2013 data (European Union 2013), the European Commission's Directorate-General for Translation (DGT) employs around 1,700 translators. The European Council and the Council of the European Union share a translation service employing over 600 translators. Another translation service is shared by the Court of Justice, the General Court and the Civil Service Tribunal, and this also employs around 600 translators, known as

lawyer–linguists because they have to be qualified lawyers as well as well as translators. The European Court of Auditors employs around 150 staff in its Translation Directorate. The Committee of the Regions and the European Economic and Social Committee have a joint Directorate for Translation, employing around 350 translators. Translators are employed by the European Central Bank and the European Investment Bank. Finally, the Translation Centre for the Bodies of the European Union is a service providing translation for 50 other EU agencies, institutions and bodies; it employs around 200 staff.

The work done by these translators is often described as institutional translation, and legislation is a core part of that. However, it is useful to note that the EU makes policy in domains of science and technology, among others, and this process requires the translation of scientific and technical reports and papers as well as legislative instruments.

It is common for international organizations to commission translation agencies or freelancers to provide translation services to supplement the translation work of their in-house staff; for example, of the 2 million pages of text handled annually by the DGT of the European Commission, around one-quarter is translated by external contractors (European Union 2013).

The remit of other international organizations may be more overtly scientific. The European Space Agency (ESA), for example, employs translators in-house to translate between English, French and German, and most of the work is of a scientific or technical nature. As noted in a recent recruitment advertisement, ESA translators are required to have an ability to understand scientific and technical concepts and to be able to translate source texts (STs) of considerable complexity, accurately and quickly under pressure.

### *A national governmental organization employs in-house translators*

Governmental organizations, bodies or agencies in countries or regions may employ translators in-house. Like companies with in-house translation departments, these organizations benefit from maximum control over their translation services, which can be important for achieving high levels of quality, but may also be crucial for ensuring confidentiality. Countries with more than one official language or where specific language policies apply may do a lot of translation at various levels of government, but perhaps mostly between the two (or more) official languages. This is the case in Canada, where the Translation Bureau provides translation and terminology services to the federal government and the parliament. Government bodies in non-bilingual countries may

also translate for the purposes of international exchange and employ translators in-house. Examples in Germany, with a strong focus on technical or scientific translation, include the language services of ministries such as the Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit).

### Other roles for trained translators

Your main interest may be to work as a translator, but it is useful to consider the range of other roles for which skilled linguists with translation competences are potentially suited.

#### *Translation project manager or account manager*

LSPs usually employ translation project managers in-house, but many prefer to appoint linguists with a translator profile to the role, since a detailed understanding of what translation involves is essential. Project managers liaise with clients and translators and often assume responsibility for the smooth running of the translation project from start to finish. The role usually does not involve translation, but may involve checking and proofreading translations, as well as many other tasks. In the UK context, the project management role is often considered as a graduate entry-level position. For an overview of translation project management, consult Dunne and Dunne (2011) or Rodríguez-Castro (2013).

#### *Terminologist*

Larger institutions or organizations may employ terminologists to research terminology and compile and maintain documentation and termbases (see Chapter 2) for use by translators and others. An example of an organization, discussed in Chapter 5, that employs terminologists in that capacity is the Language Division of the World Intellectual Property Organization (WIPO). The ESA, mentioned above, also employs in-house terminologists, recruiting people who have very good terminology research skills, as well as good organizational and communication skills. As for translation, the ability to grasp concepts in scientific and technical fields is also essential. Finally, an overview of the work of terminologists at the Canadian Translation Bureau can be read in Pavel and Nolet (2001).

#### *Reviser or proofreader*

Labels to designate processes of checking translations are used in the sector in diverse and potentially confusing ways. To be consistent, we

will use the labels set out by the European standard for translation services, EN15038:2006 Translation services – Service requirements (British Standards Institution 2006). In that standard, revision is a bilingual operation, defined as 'examin[ing] a translation for its suitability for the agreed purpose, compar[ing] the source and target texts, and recommend[ing] corrective measures' (ibid.: 6). Review is monolingual, defined as 'examin[ing] a target text for its suitability for the agreed purpose and respect for the conventions of the domain to which it belongs and recommend[ing] corrective measures' (ibid.: 5). Proofreading is then the final checking of proofs before publishing. All, any or none of these processes may be applied to a translation, depending on the circumstances of production, what the client requires and what the LSP has agreed to provide. Some translators choose to take on revising or reviewing tasks at times, or indeed to move into those roles more permanently. Although mostly outsourced, like translation, some LSPs employ people in-house for these activities.

To this category we could add post-editing, that is, editing the raw output of machine translation systems (see Chapter 2). This usually requires a combination of revising and reviewing, as defined above.

### Related roles requiring additional expertise

For those interested in the technicalities of document layout and production, there are roles in the translation sector for DTP (desktop publishing) specialists, freelance and in-house. Additionally, expertise in website design, web editing, search-engine optimization and other technical aspects of developing multilingual websites is often required as part of the translation project. The localization sector requires linguists for translation roles, but also those who have additional expertise, for example in testing software products. Translator training programmes may cover aspects of these activities, but you may also benefit from additional training as you move further into roles that focus less on language.

The focus on language is key to the role of the technical writer (also referred to as technical author), but it may be a monolingual rather than a multilingual focus. Technical writers deal with the production of technical documentation, which may then form the ST for the translation process. There is substantial convergence and similarity between technical writing and technical translating, so your expertise as technical communicator, gained through translation, may help you to change direction if you are interested in pursuing a career in technical writing.

Technical writers are usually responsible for creating, maintaining and managing documentation of various kinds, for example technical

specifications, product descriptions, service descriptions, instruction manuals, user guides, wikis and tutorials. Technical writers usually need to liaise closely with designers, manufacturers or developers in creating the documentation. Like translators, their focus is on assessing audience needs and producing documentation that addresses specific readerships; this can include adapting technical information for non-technical users. Employers of technical writers tend to look for people with excellent communication skills, preferably including some technical writing expertise, who can work independently or in teams, perhaps with experience of the product, service or sector. Technical writers, like translators, are also required to have an eye for detail and precision in writing, problem-solving skills, an ability to acquire knowledge quickly from various sources and familiarity with software used for document production and management.

Following earlier observations by Risku (2004), Gnecchi et al. (2011) draw on survey data from North America and Europe to explore the growing convergences between the two activities in the professional sphere and to make recommendations about cross-training. The interface between these activities is also discussed by Suojanen (2010).

## Knowledge and skills

Many contributions have been made to the translation-studies literature on topics of competences, skills, knowledge expertise and related notions. However, that is an area of scholarship where definitional clarity and empirical research are still lacking. It is well beyond the scope of this book to set out what has been done so far, but if you would like to read more, contributions by Kiraly (2000), Kelly (2005) and the PACTE group (Beeby et al. 2009) are useful places to start. Competence, broadly defined, is also a topic broached by initiatives such as the European Masters in Translation (EMT) Network that try to relate the professional profile to the curriculum by setting out a set of competences and subcompetences for translator training and education programmes to address. There are disadvantages to thinking about what translators do as a static, componential model that attempts to list and define competences and discrete subcompetences, but the EMT approach has become a convenient mapping used both within and beyond the EMT Network.

The main competence areas, as defined by the EMT (European Commission Directorate-General for Translation 2009), are:

- translation service provision competence
- language competence
- intercultural competence

- information mining competence
- thematic competence
- technological competence.

The subcompetences are too numerous to list, but can be consulted via the EMT section of the DGT website (European Commission Directorate-General for Translation 2009). They are not formulated specifically with scientific and technical translation in mind, but are broadly relevant for translation in any specialized domain.

For our purposes, it is useful to note that you certainly need to acquire knowledge and understanding beyond your command of your source language (SL) and target language (TL), that you need to be able to perform lots of different tasks as part of your translation process, with a good understanding of what you are doing and why. Domain-specific (thematic) knowledge is important; here this means understanding the technical or scientific ideas communicated through the texts you are translating. Knowledge and understanding of how professional translation activities are organized is also important. The practice of technical and scientific translation involves the ability to process information, often using technology (addressed in more detail in Chapter 2), so you need to develop your computational expertise alongside your linguistic and domain-specific knowledge. Translation, as communication, is inherently social and intercultural, thus also requiring you to acquire knowledge, understanding and skills to communicate and act as an intercultural specialist.

Training programmes certainly help you to develop some of these competences. As noted in the Introduction, they also offer you theoretical, conceptual, analytical or reflective tools to help you to develop your knowledge and skills more efficiently than if you had to discover everything on your own, through trial and error. Practice and professional experience will then deepen your knowledge and enhance your skills further, throughout your entire working life. However, your earlier academic training, particularly at postgraduate level, should have helped you to develop an analytical understanding of what you are doing. That can help you to know how to respond to situations you are confronted with for the first time or how to grasp new practices that have recently emerged. We can be certain that the translators of the future will encounter many new situations and new practices, presenting interesting challenges for those of you who embark on that path, and requiring you to exercise your flexibility and adaptability.

## Communicative purpose

Chapters 3–7 introduce you to various ways and settings in which technical or scientific communities communicate. Our focus is on

the purposes of their communications. For communication within the community to be successful, its communicative purpose must be recognized and understood by others. For example, a patent application would not fulfil the purpose of making claims for a novel invention if it was not accepted as such by patent offices, patent lawyers, etc. On the basis that the inventor is making those claims for novelty, others can then agree or challenge the claims. The parties involved have a shared understanding of the communicative purpose of the application. This is the basis on which the concept of genre is defined: 'a recognizable communicative event characterized by a set of communicative purpose(s) identified and mutually understood by the members of the professional or academic community in which it regularly occurs' (Bhatia 1993: 13, drawing on Swales' (1990) work).

For the members of the community to recognize and understand the communicative purpose, they have to be familiar with the structure that the communication normally or typically takes. They learn this through their training and their own recurrent experience of the genre in their professional lives. A genre is therefore described as 'a highly structured and conventionalized communicative event' (Bhatia 1993: 14). As we will see in Chapter 5, patent specifications are constructed in a certain way. The inventors writing them have some linguistic constraints to follow, as well as some freedom in how they formulate their ideas. But if they step far outside of the accepted rules and conventions of the genre, other members of the community are likely to not recognize the contribution as an example of the genre (Swales 2014: 313). It will not be accepted as belonging to the genre and it will fail to fulfil its communicative purpose. As we will see in Chapter 6, an author submitting an article to a prestigious scientific journal may have their article rejected if it does not conform to the journal's explicit rules, but also to a set of conventions that may not be explicitly stated but that are recognized by the established members of the community. Perhaps the author has used very colloquial language in the article. Established members will review the article; they themselves may be regular readers of the journal or they may have had their own articles accepted for publication. The journal editor also acts as gatekeeper and decides whether the genre conventions have been met. The colloquial language may result in rejection of the article or a request for revision before it can be published. However, similar instances of colloquial language may be acceptable to the audience listening to a conference presentation at a scientific conference or in a science lecture to students; the topics under discussion may be the same in each case, but they are different genres, with different communicative purposes and different conventions.

Translators often aim to translate a text in such a way that it will be accepted by the target discourse community as recognizably

belonging to a genre, conforming to the rules and conventions of the genre, fulfilling identifiable communicative purposes. To do that is far from straightforward. It means translators have to be as knowledgeable about the genre as the expert members of the discourse community, although they have not trained or worked as engineers or scientists. It requires an understanding of the socio-cultural context of the discourse community and its activities, the communicative purposes of the genre, and the conventionalized structure and the linguistic resources typically employed in the genre. While engineers and scientists pick up the genre conventions through their training or their own engineering and science work, translators can familiarize themselves with genre conventions through their ability to analyze texts, and to be expert and sensitive readers and authors themselves. Expert members of a discourse community may have the skill to push the genre boundaries and exploit the genre in ways that may be deemed creative but acceptable by the community, but novice members are less likely to be able to do that. As noted in Chapter 6, translators may also reach that level of genre expertise and may indeed be in a position to subvert genre conventions, in pursuit of other goals.

However, we should remind ourselves that the key defining characteristic of genres is not their linguistic similarities, it is their shared character as 'communicative vehicles for the achievement of goals' (Swales 2014: 305). In thinking about genre in this way, we are paying attention not only to the participants in the discourse and the discourse itself, but also the environment in which the discourse is produced and received. As we explore genres in Chapters 3–7, certainly discussing linguistic choices, we will also bear in mind the discourse community, the socio-cultural contexts of the communicative event and the communicative purpose. It is also worth emphasizing that genres may have sets of communicative purposes (ibid.: 307). The main purpose of the conference presentation may be to communicate new research findings to the discourse community, but it may have other purposes too – to increase the visibility and profile of the speaker, to challenge or endorse research done by others and to entice collaborators to come forward for the next stage in the research, among others. The audience members, who are also members of the scientific community, will probably recognize these functions as they listen to the presentation. Students – as apprentices rather than fully fledged members of the community – may recognize some but not all of them, and people who are not part of the scientific community at all, for example the audio-visual technician who sets up the equipment for the lecture, may or may not recognize any of those purposes.

'Text type' is a concept that is closely related to 'genre'. Indeed, some researchers use these terms interchangeably. Although our main

focus is genre, to avoid terminological confusion we will make a distinction here between the communicative event and its purpose, external to the text (i.e. genre), and the rhetorical purpose fulfilled by texts in their context (i.e. text type). Text types therefore cut across genres. A longstanding classification of text types is Werlich's (1976), according to which texts can be descriptive, narrative, expository, argumentative or instructive. Numerous variations on this text typology can be found in the literature (Biber (1995) proposes eight text types for English). Most classifications are based on rhetorical purposes realized by internal linguistic features. Hatim and Mason's (1990) typology of argumentative, expository and instructional text types is among the best known in translation studies; Trosborg (1997) also provides further discussion and exemplification of text typology in translation.

This book deals with recognized communicative events in professional settings and therefore the notion of genre is most useful to us. We will also refer to rhetorical purposes served by texts in their contexts, where this serves our explanatory and analytical needs. A final point to be made about classifying purposes is that texts are often multifunctional and can therefore be described as hybrid. Hatim and Mason (ibid.: 146) point out that texts tend to have a dominant rhetorical purpose, with other purposes then assuming secondary importance. In analyzing STs and producing our translations, we will need to be aware of both dominant and secondary purposes, and to recognize this potential for hybridity and multifunctionality.

## The translation brief

Our translation practice can be informed by our ever-increasing familiarity with genre, and we can foreground the communicative purposes of the genre, as communicative event, and the knowledge and expectations of the discourse community for which our translation is destined, if we know it. Typically we are commissioned to translate by a client, either directly or via the intermediary of the LSP. There will be an explicit statement of what the client is commissioning. In its most basic form, this may simply be a purchase order specifying what texts are to be translated and by when, how many words they contain and the agreed payment. If we need to know more, we will have to ask. Depending on circumstances, we may learn something about the intended purpose, use and readership of the translation. We might receive some information about the context of production, for example explanation of a company brand or image. If we cannot glean more than the most basic information, we may have to make some assumptions or educated guesses about purpose and readership; our genre expertise will help us a lot in that situation. All of this

information can be considered as forming the translation assignment, the translation commission or the translation brief. In the 1970s translation scholars began to think about these aspects of translating, through Holz-Mänttäri's theory of translatorial action (1984) and Vermeer's skopos theory (1989). Nord (1997a: 47–8, see also 1997b) further developed the idea of the translation brief, particularly as a pedagogical tool. In her view, it should contain explicit or implicit information about:

- the target-text addressee(s)
- the prospective time and place of text reception
- the medium over which the text will be transmitted
- the motive for the production or reception of the text.

Mason's (2000) work on audience design for translation is also useful in that he encourages us to think about the target text in relation to the socio-textual practices of the target culture. This approach accommodates the notion that translators may design their texts for more than one possible receiver group as addressees, depending on the context of situation in which they are producing the translation.

### Translation project specification

As noted above, it varies very much from case to case how much information is specified to the translator as part of a translation brief. The UK's Institute for Translation and Interpreting, in advice to commissioners of translation, suggests that they provide information on the following 10 points, as part of a barebones commission (Durban and Melby 2007):

- audience
- purpose of the translation
- deadline
- price
- subject area and type of text
- source language and regional variation
- format
- volume (how many words, characters, etc.)
- target language and regional variation
- steps to be followed during the production phase (e.g. translation, bilingual checking, monolingual checking, and translation, editing, proofreading (TEP)).

In the international technical specification for translation projects, ISO/TS11669:2012 Translation Projects – General Guidance (British

Standards Institution 2012), an attempt is made to set out, in greater detail, what a professional translation project specification should look like, in an ideal case. Twenty-one parameters are used to define various aspects of the translation project. An explanatory version of these is reproduced in Table 1.1. If clients were to specify each of these parameters, translators would have a detailed translation brief to guide them.

*Table 1.1* Translation parameters for a translation project specification

| | |
|---|---|
| 1. Source characteristics | 1A. Source language |
| | 1B. Genre |
| | 1C. Audience(s) |
| | 1D. Communicative purpose(s) |
| 2. Specialized language | 2A. Subject field (e.g. chemical engineering) |
| | 2B. Terminology (here the client specifies if they want ST terms translated in a certain way, e.g. by providing a glossary of source terms) |
| 3. Volume | (The amount of translation, usually measured in words) |
| 4. Complexity | (Any factors that make the project difficult, e.g. special file formats, special use of graphics, particular linguistic difficulties of the ST) |
| 5. Origin | (Any details about the ST authoring or provenance) |
| 6. Target language information | 6A. Target language |
| | 6B. Target terminology (as 2B above, but also encompassing any particular TL terms that the client wants to use, e.g. as specified in a bilingual glossary or termbase) |
| 7. Target audience | |
| 8. Target purpose | |
| 9. Content correspondence | (How the target content is expected to match the source content, e.g. a complete or abridged translation, a full or summary translation, an overt or covert translation) |
| 10. Register | (Level of formality of language) |
| 11. File format | |
| 12. Style | 12A. Style guide (from client, if available) |
| | 12B. Style relevance (i.e. an indication of how relevant style is to the project) |

(*Continued*)

Institution in the UK) are normally expensive to purchase, but university or municipal libraries may have a subscription to your national standards organization. If you have subscription access, consult these standards and consider the extent to which they could be relevant to you as a freelance translator.

### Exercise 1.4: Developing a hypothetical translation brief and translation project specification

For a text and translation task of your choice, design (i) a basic translation brief and (ii) a detailed translation project specification.

### Further reading: Learning more about the study of scientific and technical translation

Read Olohan (2013) for an overview of approaches to the study of scientific and technical translation.

### Key points from this chapter

- Scientific and technical translators work in a variety of professional configurations – mostly freelance and for LSPs, but also in-house and in institutional contexts.
- Scientific and technical translators need to be knowledgeable and skilled in a range of domains; it is also essential to be intellectually curious, to have the capacity to learn and to be adaptable.
- Scientific and technical translation form part of the larger technical communication environment, and there are some parallels between technical writing and technical translation.
- Genre is a useful concept for understanding how texts are used in conventionalized ways in discourse communities to fulfil communicative purposes.
- Translation is facilitated by being defined by a translation brief or a translation project specification.

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### Further reading: Learning more about TM and SMT

Read Kenny and Doherty (2014) for an accessible overview of SMT technologies. Read Schjoldager and Christensen (2010) for a review of research on translation memory in the 2000s and Moorkens (2012) for an example of a study focusing on TM and consistency.

### Key points from this chapter

- An understanding of the nature of concepts and terms helps translators to deal with specialized texts, enabling them to ascertain what research is required to gain an understanding of the concepts and to become familiar with the relevant SL and TL terms.
- Scientific and technical translators need to be proficient in the use of a variety of technologies used during the translation process, including research or preparatory phases.
- *Ad-hoc* and reference corpora can be very useful resources for terminological and phraseological research in preparation for translation.
- It is important to develop good practices for storing and managing your terminology.
- TM is widely used for scientific and technical translation and can help with consistency and productivity.
- Machine translation is increasingly used in scientific and technical translation contexts, but works better when extensive resources are put into developing customized, domain-specific and/or genre-specific systems. In most cases, raw MT output is unlikely to meet professional standards for essential, external-facing documentation.



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The *Journal of Specialized Translation, JoSTrans* (www.jostrans.org), is an open-access resource with some articles related to technical translation.

## Key points from this chapter

- Instructions for use of products by consumers and specialists are produced in a variety of formats and forms and they are frequently translated between languages.
- Technical writers work to informal guidelines (as in the Dozuki Tech Writing Handbook) or more formal specifications (as in the ISO/IEC Guide 37: 2012) when producing instructions, and instructions can be judged in terms of their usability.
- A key purpose of instructions is to guide the reader through a set of procedures, but instructions can also perform informative and promotional functions, and procedural information can be accompanied by conceptual/declarative information and motivational information.
- Research comparing instructions in the SL and the TL will provide the translator with ample information about genre conventions, relating to aspects such as how directives are typically expressed and how procedures are organized in sections and logical progressions.
- Instructions may require cultural adaptation, not only in relation to cultural references, but also with regard to degree of explicitness and level of detail of stepwise instructions.



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## Key points from this chapter

- Patent applications and specifications are key genres in the context of IP protection in the commercial world.
- The distinctive features of the genre relate to the nature of the patenting process and the need for patentability criteria to be met, as well as the potential for patents to be challenged. Abstracts, titles, descriptions, claims and drawings are standard components of patent applications and specification, with conventionalized structures, organization and use of linguistic resources.
- Translation, by humans and machines, plays an important part at various stages of the patenting process, in preparing patent applications, in processing of applications by international organizations involved in the patenting process and in patent litigation, as well as in ensuring that patent information is disclosed to the public.
- Patent translation can be understood as a form of documentary translation and, as a result, involves translation strategies and practices that are distinct from those of many other technical genres.



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- Popular science is intertwined with other public discourses. There is significant scope for science news stories to be framed and reframed for different social and cultural contexts and agendas, and translators participate in this reframing.
- Most studies of popular science discourse and translation have focused on the textual components of news and magazine articles; increasingly popular science discourse takes other forms and modes, and there is much potential for further study of how other popular science genres are translated.

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