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PRINCIPLES AND CHALLENGES IN TRANSLATING IT TEXTS AND TERMINOLOGY

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Annotation: This article examines the main principles and challenges involved in translating information technology (IT) texts from English into other languages. It highlights the distinction between equivalence and adequacy in translation, and identifies key issues such as the lack of established target-language equivalents for new technical terms, the handling of abbreviations and acronyms, polysemy (multiple meanings) of IT terminology, and the need for consistency and standardization of terms. The analysis draws on examples from English-Uzbek and English–Russian translation to illustrate challenges in achieving functional equivalence. The findings show that translators must balance literal accuracy with necessary adaptation, using a mix of strategies – borrowing, calque, coinage, explicative translation – to convey meaning effectively. It is emphasized that maintaining clarity, accuracy, and functional equivalence often requires adherence to certain guidelines and the use of tools like glossaries and translation memory. Ultimately, the translator's subject matter knowledge and careful strategy selection are crucial for overcoming the challenges and producing a high-quality technical translation.

Keywords: technical translation, IT terminology, translation equivalence, adequacy, neologisms, acronyms, functional equivalence, localization.

Annotatsiya: Ushbu maqolada ingliz tilidan boshqa tillarga axborot texnologiyalari (AT) matnlarini tarjima qilishning asosiy tamoyillari va qiyinchiliklari tahlil qilinadi. Unda tarjimada ekvivalentlik va adekvatlik tushunchalari farqlanib, yangi texnik atamalar uchun maqsadli tilda mavjud muqobil terminlarning yo'qligi, qisqartmalar va akronimlarni tarjima qilish, AT terminlarining ko'p ma'noliligi hamda terminologik bir xillik va standartlashtirish zarurligi kabi masalalar yoritiladi. Tahlil davomida inglizcha-o'zbekcha va inglizcha-ruscha tarjima misollari keltirilib, funksional ekvivalentlikka erishishdagi muammolar ko'rsatib berilgan. Natijalar shuni ko'rsatadiki, tarjimonlar so'zma-so'z aniqlik va kerakli moslashuv o'rtasida muvozanat saqlashi lozim; ma'no-mohiyatni samarali yetkazish uchun turli strategiyalar (qarz olish, kalka tarjima, neologizm yaratish, izohli tarjima) majmuasidan foydalaniladi. Xulosa qilib aytganda, tarjimon mazmuniy aniqlik, ravonlik va funksional ekvivalentlikni ta'minlash uchun ma'lum qoidalarga amal qilishi, soha bo'yicha chuqur bilimga ega bo'lishi hamda terminologik lug'atlar, tarjima xotirasi kabi vositalardan foydalangan holda tarjima jarayonida uchraydigan qiyinchiliklarni yengib o'tishi zarur.

Kalit so'zlar: texnik tarjima, AT terminologiyasi, tarjimada ekvivalentlik, adekvatlik, neologizmlar, qisqartmalar, madaniy moslashuv, funksional ekvivalentlik.

Аннотация: В данной статье рассматриваются основные принципы и трудности перевода текстов в сфере информационных технологий. Особое внимание уделяется таким вопросам, как эквивалентность и адекватность перевода, перевод новых терминов и неологизмов при отсутствии утвердившихся эквивалентов в языке перевода, передача аббревиатур и акронимов, полисемия терминов (многозначность), а также обеспечение терминологической последовательности и стандартизации. Приводятся примеры перевода с английского на узбекский и русский языки, подчеркивающие проблемы достижения функциональной эквивалентности. Результаты анализа показывают, что переводчику необходимо балансировать между буквальной точностью и необходимой адаптацией; для эффективной передачи смысла он использует комбинацию стратегий, таких как заимствование, калькирование, создание новых слов (неологизмов) или описательный перевод. Наконец, делается вывод, что для преодоления указанных трудностей и обеспечения качественного технического перевода переводчику необходимы глубокие знания предмета, соблюдение определённых правил и использование специальных инструментов (терминологические глоссарии, память переводов и др.).

Ключевые слова: технический перевод, ИТ-терминология, эквивалентность перевода, адекватность, неологизмы, аббревиатуры, культурная адаптация, функциональная эквивалентность.

INTRODUCTION. Translating IT texts is a specialized task that demands not only general linguistic proficiency but also adherence to specific translation principles tailored to technical content. As noted by Nasrullayeva and Kurbonova [2, p. 114–117], technical translation has distinct characteristics that set it apart from literary translation, requiring approaches that ensure precision and clarity. One key theoretical concept in this realm is the distinction between equivalence and adequacy. Equivalence generally means achieving the same meaning or effect in the target text as in the source text, often at the level of individual terms or phrases. Adequacy, on the other hand, implies that the translation fulfills its intended communicative purpose in the target context, even if it does not mirror the source text structure exactly. In IT translation, the primary goal is often functional equivalence – the target text should enable users to accomplish the same tasks and understand the same content as the source. Achieving this sometimes necessitates adapting the translation to the norms and expectations of the target language audience rather than adhering to a strictly literal rendering.

For example, an English software interface message like "File not found" might be rendered in Russian as “Fayl ne naiden” – a close, word-for-word translation that is perfectly adequate for conveying the meaning. However, if an English technical text were to include a cultural reference or a pun (which is uncommon in purely instructional materials but possible in IT marketing or educational content), a translator would need to choose an analogous expression familiar to the target audience. This kind of adaptation prioritizes adequacy (naturalness and appropriateness) over strict linguistic equivalence. Generally, because IT texts belong to an informative and utilitarian genre, achieving content equivalence with precise terminology is crucial, while modest shifts in form are acceptable if they improve clarity or usability in the target language.

The present article aims to identify and discuss the major challenges that arise in translating IT-related texts and terminology, and to outline principles and strategies for addressing these challenges. A qualitative analysis of examples and a synthesis of insights from recent studies on technical translation [1–6] were conducted. The following sections present the methodology of the analysis, the key results in terms of identified challenges and best practices (Results), and a discussion of their implications for translators and translation practice (Discussion).

METHODS. This study employs a qualitative, descriptive approach to examine translation challenges in the IT domain. The research is based on a review of relevant literature and an analysis of examples of IT term translation between English and two target languages (Uzbek and Russian). In particular, six recent publications on technical translation and terminology [1–6] were analyzed to glean insights into common difficulties and recommended strategies. These sources include case studies of IT text translation, comparative analyses of human and machine translation output, and discussions of terminological issues in various languages. Key themes (such as handling of neologisms, acronyms, polysemous terms, etc.) were identified through content analysis of these references and are illustrated with real examples of translation decisions.

No experimental data were collected for this article; instead, the methodology consists of synthesizing expert observations and previously reported findings. Examples of English source terms and their translations into Uzbek or Russian have been drawn from the literature and existing translations to exemplify each challenge. For instance, translations of terms like “firewall” and “cloud computing” into Uzbek, or the handling of an English idiom for a user interface, are used as case illustrations as reported in prior studies [3][6]. By combining insights from published research with illustrative cases, the study delineates the prevalent challenges in IT translation and the principles by which translators address them. The results below are organized by the type of challenge identified.

RESULTS. Equivalence vs. Adequacy in Technical Translation. A foundational issue in IT translation is finding the right balance between **formal equivalence** (literal faithfulness) and **functional adequacy** (appropriateness for the communicative purpose). In technical contexts, outright literal translation may preserve all details but can sometimes reduce clarity or naturalness, whereas too free a translation might drift from the precise technical meaning. Translators must judge, case by case, how much adaptation is acceptable. For most straightforward technical statements (e.g., error messages or instructions), a close translation ensures **content equivalence** so that the user receives the same information. As an example, the English error message "File not found" is rendered in an almost identical form in many languages (as seen in the Russian “Fayl ne naiden” example above). Here, the literal translation is both clear and functionally adequate. On the other hand, if the source text uses idiomatic or culture-specific language (which is rare but possible in IT documentation or tutorials), translators lean towards **functional adequacy** – they may replace or rephrase the segment to better suit the target audience’s understanding. The overarching principle is that the translation should enable the target-language user to achieve the same outcome as the source-language user, even if some stylistic or nominal elements change. Achieving this often requires a deep understanding of both the subject matter and the target culture’s expectations [2, p. 114–117]. It sets the stage for many of the specific challenges discussed below.

New Terminology and Neologisms. One significant challenge in translating IT texts is the constant influx of new or highly specialized terms for which no established target-language equivalents exist. The IT field evolves rapidly with new concepts (e.g., cloud services, blockchain, containerization) often being introduced under English names. Translators working into languages like Uzbek or Russian frequently encounter English technical terms that lack entries in dictionaries or standard glossaries. In such cases, they must decide on the best translation strategy: **borrowing the term**, **calquing** (i.e. translating literally part-by-part), or **coining a neologism** in the target language.

For instance, the term “firewall” initially had no native equivalent in Uzbek. Early translators faced a dilemma: some chose to borrow/transliterate it, yielding fayervol in Uzbek (rendering the English pronunciation in Uzbek phonetics), while others attempted a descriptive translation (“tarmoq to‘sig‘i”, meaning "network barrier"). The borrowed form ultimately proved more popular among IT specialists, whereas the calque did not gain wide usage. Similarly, “cloud computing” was first translated directly as bulutli hisoblash (literally “cloud-based computing”) in Uzbek. This literal calque is semantically correct, but at the time of introduction it was a novel phrase, not immediately transparent to all users unfamiliar with the concept. Only over time, as the concept of cloud computing became familiar, did bulutli hisoblash gain acceptance. These examples illustrate the **trade-off between understandability and faithfulness** that translators often navigate. A borrowed term (left in English or adapted slightly) might be instantly recognized by specialists due to the dominance of English in IT, whereas a

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newly coined term in Uzbek could adhere to native linguistic norms but require additional explanation until it becomes established.

Newly emerging terms – true neologisms – pose a particularly difficult problem. A recent study by Awadh and Khan [6, p. 1987–2002] on translating English neologisms into Arabic found that both human translators and machine translation systems struggle with brand-new IT terms. Human translators in the study often could not readily coin adequate Arabic equivalents for terms that had only just appeared in English, resorting instead to awkward descriptive paraphrases or even omitting the terms. Machine translation, lacking any established glossary or context for these new terms, often produced incorrect or nonsensical results. This underscores a broader principle: strict one-to-one equivalence at the word level may not exist for new inventions or concepts, so translators must improvise solutions that achieve adequacy. Such solutions include borrowing the term as-is (sometimes with a brief explanation in parentheses on first use), or constructing a longer phrase that captures the meaning. When the term "phablet" (for a phone–tablet hybrid device) first entered English, many languages had no ready equivalent; some languages simply adopted phablet phonetically, while others created descriptive phrases (for example, French smartphone à grand écran, "smartphone with a big screen"). Over time, if the concept remains relevant, a consensus translation may emerge in the target language community. Until then, the translator's task is to convey the meaning clearly – even if that means using a more verbose explanation – rather than force a concise equivalent that might be opaque. In other words, **adequacy in translation of neologisms often trumps brevity**: it is better for the target reader to understand the concept fully, even if the translation is not elegantly succinct.

Abbreviations and Acronyms. IT texts are replete with abbreviations and acronyms (e.g., CPU, API, FAQ, SQL, HTTP). These shortened forms present a unique set of challenges to the translator. Not all acronyms have well-known or any established expansions in the target language. Some acronyms are treated as internationalisms and left untranslated (for instance, HTTP remains HTTP in Uzbek, Russian, and most other languages). Others can be translated or explained. For example, the abbreviation FAQ ("Frequently Asked Questions") has no direct equivalent in Uzbek. A translator working into Uzbek might therefore leave it as FAQ for brevity, and perhaps add an explanatory phrase on first mention. Alternatively, one could translate it descriptively as "Koʻp soʻraladigan savollar roʻyxati" (literally, "list of questions that are asked frequently") to convey the meaning. Each approach has pros and cons: an untranslated FAQ might be recognized by bilingual readers but not by others, whereas the descriptive translation is clear but lengthy.

Furthermore, different languages (and even different documentation standards) have varied conventions for introducing and handling acronyms. For instance, some style guides require spelling out an acronym on first occurrence, others do not; English technical texts themselves differ in British vs. American usage of periods in abbreviations, etc. Ulitkin et al. observe that such differing standards in source texts can "pose additional difficulties in the work of a translator," often necessitating **normalization** and **explicitation** in translation [4, p. 1–12]. Normalization means choosing one format and applying it consistently in the translation (e.g., if the source text inconsistently uses both USB and U.S.B., the translator might normalize to one form). Explicitation means spelling out or clarifying an abbreviated term for the benefit of the target reader (for example, adding the full form of an acronym in parentheses). The translator must decide, for each acronym or abbreviation, the best treatment: translate it (if an established localized term exists, like translating GUI as a local-language acronym), explain it, or retain the English original. The decision may depend on the target audience's familiarity with the term. For a general user manual aimed at laypersons, it may be advisable to avoid unexplained English abbreviations and either translate or explain them. In contrast, for a specialist text (such as a research paper in IT aimed at professionals), using the standard English acronyms might be acceptable or even expected, since the readership is likely to know them. Consistency and clarity

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are the guiding principles: inconsistent handling of abbreviations can cause confusion, and failure to clarify an unfamiliar acronym can leave some readers in the dark.

Polysemy and Context-Dependent Meanings. Many IT terms are polysemous – they originate from everyday language but have acquired specific technical meanings in context. This can complicate translation because a direct literal translation of the term's general meaning might not convey the intended technical concept. For example, the English word "mouse" in computing refers to a hardware pointing device, not the animal. A naive translation into Uzbek might use sichqon (which literally means the rodent "mouse"), but this could come across as odd or confusing. Instead, Uzbek usage has adopted sichqoncha (literally "little mouse"), a term that originally was a diminutive of the animal but is now specialized to mean a computer mouse. This small adaptation – adding a diminutive suffix – helps mark the word as a technical term, distinguishing it from the common animal name and thereby preserving clarity.

Another example is the term "cookie" in the context of web browsers (a piece of data stored by a website). Translating "cookie" using the everyday word (such as Russian pechenye or Uzbek pechene, meaning a biscuit) would fail to communicate the technical concept and might even create misunderstandings. Many languages simply use a phonetic borrowing for this term (Russian uses kuki, Uzbek might also say kuki or a similar adaptation), or they use a descriptive phrase if necessary. The challenge for the translator is to avoid translations that are **too literal** (which can cause misunderstandings by invoking the wrong concept) and also avoid those that are **too free** (which might lose the technical specificity). Often, the solution lies in subtle semantic adaptation: repurposing a related word or form. For instance, the English term "driver" (in IT, a software component that controls a hardware device) is translated into Russian commonly as draiver (a direct borrowing phonetically spelled in Cyrillic), because the general Russian word for driver (voditel', which means a person who drives) would obviously not convey the technical meaning. In some cases, a translator might choose a descriptive term in Russian like "ustroystvo programmnogo upravleniya" (literally "device of program control") to make the meaning explicit, but this is lengthy and seldom used in practice. The preferred solution is usually either a borrowing or a brief adaptation that signals the technical context. The principle illustrated here is that **translators must recognize when an IT term is a semantic extension or metaphor** of a common word and treat it as a technical term, not translating it as if it were the everyday word. Such awareness prevents mistranslations that could confuse the end user.

Terminology Consistency and Standardization. Another challenge in IT translation is maintaining consistency of terminology, especially when multiple translations or synonyms for a concept exist. In English IT texts, it is not uncommon to have multiple terms for the same or very similar concepts (for example, "internet access point" vs. "hotspot"). A translator encountering these might have distinct translations for each in the target language, but needs to verify if the source actually intends the same concept or not. Conversely, in the target language, there may be more than one possible translation for a given English term, especially if the term is relatively new or if different sources have used different equivalents.

For instance, consider the term "firewall" in Ukrainian IT literature. Different sources have used various translations: "міжмережевий екран" (which translates to "inter-network screen"), "брандмауер" (a loanword from the German Brandmauer, meaning a firewall or fire barrier), and "захисна система" ("protective system"). All of these have been used to denote a network firewall in Ukrainian. A translator working on an IT document must research and decide which term is most appropriate for their context and then use it consistently. Ideally, one chooses the term that is most widely recognized by the target audience (for example, if брандмауер is commonly understood by Ukrainian IT professionals, that might be preferred, whereas міжмережевий екран might appear in more formal or academic texts). Achieving **terminological consistency** is not just a matter of style, but of comprehension: if a manual uses

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two different words for the same concept, the user could suspect they mean two different things, leading to confusion.

Standardization resources can aid in this regard. Professional translators often consult standardized terminologies or databases (for example, Microsoft's Language Portal for official software terms, or national standard glossaries if available) to find if an "official" or at least prevalent translation for a term exists. If multiple variants exist, the translator either picks one and sticks to it, or, if appropriate, explains the equivalence (e.g., "X (also known as Y)"). Research in translation studies has highlighted that translators employ a variety of methods to render terms (using direct equivalents, descriptive translations, borrowings, etc.), but whichever method is chosen for a specific term, it should be applied uniformly throughout the text to maintain one-to-one correspondence between source and target terminology. In sum, **terminological equivalence** in technical translation includes not only finding correct counterparts for individual terms but also using those counterparts consistently so that the target text's terminology is internally coherent.

Cultural and Locale Adaptation. Compared to literary translation, cultural adaptation in technical IT translation is generally limited, but it can be necessary in certain respects. One area where adaptation comes into play is in units of measurement, date/time formats, and other locale-specific conventions. For example, an English technical document might use inches, feet, or Fahrenheit; if the target audience is in a country using the metric system and Celsius, the translator should convert these figures and units to the local standard (centimeters, meters, Celsius, etc.). Similarly, date formats differ (an American user interface might show dates as 04/30/2025 for April 30, 2025, whereas a European context might prefer 30/04/2025 or an ISO format). Adapting these elements is often considered part of localization – the broader process of tailoring a product or text to a specific locale – and it ensures functional equivalence of the information (the user in the target locale can use measurements or understand dates without confusion).

Another type of adaptation involves handling any mild cultural references, idioms, or rhetorical flourishes that occasionally appear even in technical or training materials. For instance, a tutorial might say something like "Deleting files is as easy as pie." This English idiom "easy as pie" would not be meaningful if translated word-for-word into many languages. The translator could replace it with an equivalent idiom in the target language that means "very easy," or simply convert it to a non-idiomatic phrase like "very easy" or "extremely simple" in the target language. The guiding principle here is often referred to as **cultural adequacy**: the translation should not feel alien to the target reader, nor should it introduce confusion by using unfamiliar references. In IT texts, overt cultural elements are rare, but the language can include colloquial elements or examples that need adjustment. Adapting such instances ensures the instructional or informative purpose of the text is preserved. In user-facing IT content (like software interfaces), this can extend to things like keyboard shortcuts (which might need changing if a certain key doesn't exist in another language keyboard layout) or even icons and symbols (though typically these remain standard).

In summary, while the core content of IT texts is universal, translators must make **locale-specific adjustments** to format, and occasionally phrasings, to preserve the usability and clarity of the text for the target audience. These adjustments support the overall goal of functional equivalence by ensuring that nothing in the translation feels so foreign that it hinders the user's understanding or ability to follow instructions.

Localization vs. Borrowing in Terminology: The Case of Uzbek. When translating IT terms into languages that have historically imported a lot of technical vocabulary (such as Uzbek, which has borrowed terms through Russian and directly from English), translators often face a strategic choice: **localize** (create or use a native-language equivalent) or **borrow** the term from English. Both approaches have advantages and drawbacks, and often the decision is influenced by current usage norms and the target audience's familiarity with English.

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Many IT professionals and users in Uzbekistan are already accustomed to English terminology. Indeed, as Bozorova notes, English continues to "dominate the fields of science and technology," leading to numerous English IT terms being adopted directly into Uzbek [3, p. 50–52]. Common words like server, router, printer, or internet are frequently used in Uzbek IT contexts in their English form (sometimes adapted to Uzbek phonology/orthography, e.g. printer might be pronounced with a trilled 'r' at the end, internet is often written the same as English). The advantage of borrowing is that it allows specialists to communicate seamlessly with the international community and with documentation that is largely in English. It also tends to be the fastest way to introduce a term–no time is lost inventing a new word.

However, an over-reliance on borrowed terms can be seen as eroding the unique character of the Uzbek language in this domain and may pose comprehension issues for laypeople or students who do not know the English origin. Language purists and some educators argue for coining Uzbek equivalents to maintain linguistic integrity and independence. For example, for the term "software," Uzbek experts have created dasturiy ta'minot (literally "programmatic provision/support"), which is now quite widely used alongside or instead of the Anglicism softver (or just software in Latin script). Likewise, brauzer has been used for "browser" (a phonetic adaptation that fits Uzbek phonology), and fayl for "file". These localized terms often start as deliberate coinages by linguists or in academic literature.

Both strategies–borrowing vs. localizing–have challenges. Coined terms require widespread acceptance; if the community continues to prefer the English term, the local coinage may fall into disuse. Borrowed terms, on the other hand, may alienate those not familiar with the English and could slow down the development of native terminology. In practice, translators tend to follow prevailing usage. Early translations of documentation might introduce both the English term and a proposed translation (for instance, writing "локализация (mahalliylashtirish)" in a bilingual fashion, combining Russian term and Uzbek in parentheses, or English and Uzbek, etc.). Over time, whichever term gains currency will become the standard. For example, dasturiy ta'minot has now firmly taken root to mean software in many Uzbek materials, suggesting successful localization, whereas terms like printer and internet remain used in their borrowed form. Ultimately, achieving **adequate translation** of IT terms in Uzbek requires balancing international intelligibility with local clarity. Bozorova's observation [3] underlines that global trends heavily influence local terminology, but local initiative can still shape how concepts are expressed. The translator must gauge the audience: if writing for specialists, the English loanwords might be most efficient; if writing for schoolchildren or a general audience, the Uzbek equivalents (with possible explanations) might be preferable.

Ensuring Functional Equivalence and Clarity. An important overarching principle in translating IT texts is that the function and intended user experience of the source text be preserved in the target text. This goes beyond linguistic accuracy to include the **pragmatic effect** on the user. For instance, if a warning message in software is intended to prompt the user to take immediate action (e.g., "Low battery. Please connect to power."), the translation must be just as clear and urgent. If the warning is softened or mistranslated, the user might ignore it and suffer consequences (like the device shutting off). Therefore, translators often maintain the concise and direct structure of such messages. In an English-Uzbek context, an error message like "Error: Disk not found" would typically be translated in a very straightforward way ("Xatolik: Disk topilmadi", literally "Error: Disk not found"), closely mirroring the source text's construction. This ensures that a user who might be searching a knowledge base or troubleshooting guide using that error text will find consistent phrasing. It also avoids introducing any ambiguity–critical messages need to be unmistakable.

Another aspect of functional equivalence is preserving **keywords** or recognizable terms that users might look up. If an English manual says "Press the Enter key," translating Enter as a target-language word that doesn't appear on the keyboard could confuse the user. In many cases, interface terms like button labels or key names are left untranslated or standardized (for example,

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in Russian Windows, the "Start" menu is labeled "Пуск" meaning "Start", a translated term; but in some other locales the English word "Start" might be left due to branding). The translator must ensure that the user can easily map the instructions onto the interface they see.

Clarity and brevity are highly valued in technical texts, so while earlier we noted that translators sometimes need to be verbose (for adequacy with neologisms), in established contexts like user instructions they strive to be concise. Any hint of ambiguity introduced by the translation could lead to user error. Thus, translators usually err on the side of caution, translating technical instructions in a way that is **as close as possible to the source in form and terminology**, provided the result is grammatical and clear in the target language. This is where literal fidelity and functional adequacy meet: there is often little need to rephrase or embellish standard instructions, because the goal is clear communication of an action or status.

In summary, the result of a successful IT translation should be that the end-user experience is essentially the same as for the source text audience. The user should be able to follow the instructions, understand messages, and achieve the intended outcomes without confusion or additional help due to the translation. Achieving this functional equivalence involves the careful application of all the principles discussed above: correct terminology, consistency, appropriate adaptation, and awareness of the user's perspective.

DISCUSSION. Translating IT texts involves navigating a complex landscape of linguistic and technical issues. The results of this study, which synthesizes insights from multiple sources, show that effective IT translation is grounded in a few core principles: accuracy in terminology, clarity of expression, and functional equivalence in usage. The various challenges – ranging from finding equivalents for new terms and handling acronyms to dealing with polysemy and ensuring consistency – are all interrelated by the need to faithfully transmit technical meaning across languages and cultures.

A recurring theme in these findings is that the translator must often be both a linguist and a subject matter expert. Deep familiarity with the IT domain is necessary to recognize, for example, that "driver" or "cookie" are technical terms requiring special treatment, or that bulutli hisoblash might be a better choice in Uzbek after all for "cloud computing" once the audience understands it. Chernobrov and Yakovleva argue that high-quality technical translation is possible only with careful attention to such difficulties and by overcoming them through strong subject knowledge and the use of good reference resources [1, p. 102–107]. Indeed, translators commonly rely on technical dictionaries, bilingual glossaries, and terminological databases to cross-check terms. In today's environment, online resources and communities (for instance, forums where translators discuss troublesome terms) also form an essential support system.

Another consideration is the role of technology in assisting the human translator. The advent of Computer-Assisted Translation (CAT) tools and machine translation has provided significant help in managing some of the challenges outlined. Translation memory and glossary features in CAT tools can automatically ensure consistency of terminology and phrasing throughout a document, alerting the translator if a term was translated one way earlier and appears again. This directly aids in maintaining the one-to-one term correspondence discussed in the Results. Termbase integration can suggest approved translations for technical terms, reducing the guesswork when an established equivalent exists. These tools help adhere to the "certain rules" of consistency and standardization that experts emphasize [5, p. 114–117].

Machine Translation (MT), especially with recent neural MT systems, can quickly produce drafts that a translator post-edits. However, as the study by Awadh and Khan highlighted, MT still struggles with very new terminology and often lacks the nuance needed for full adequacy [6, p. 1987–2002]. It may mistranslate neologisms or fail to disambiguate polysemous terms without human insight. Therefore, while MT can speed up the translation of repetitive or simple segments, the human translator's role remains crucial for handling precisely the kind of challenges discussed in this article. In practice, professional IT translators often use a

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combination of tools: they let an MT engine do the heavy lifting on routine sections, but they carefully review and correct any term usage, clarify any ambiguous output, and ensure cultural and functional appropriateness. This hybrid approach leverages the efficiency of technology while applying human expertise where it's most needed.

Ultimately, the **implications** of the challenges and strategies discussed here extend to translator training and practice. Translators working in the IT field must continuously update their knowledge, both linguistically and technologically. New concepts in IT will keep emerging, and with them new terms–translators must stay tuned to industry developments (for instance, by reading IT news or standards) to anticipate how to handle upcoming terminology. They should also cultivate a habit of consistency and thoroughness: maintaining personal glossaries or style guides for projects, and double-checking prior translations of key terms. Collaboration with peers and seeking out existing translations (such as looking at how major software products are localized into the target language) can provide guidance and reduce inconsistency.

In conclusion, translating IT texts is a multi-faceted endeavor that requires balancing literal fidelity with necessary adaptation. By applying the principles of accuracy, clarity, and functional equivalence–and by utilizing both traditional strategies and modern tools–translators can overcome the challenges and produce target texts that meet the needs of users. The cases and studies referenced in this article demonstrate that while difficulties in technical translation are numerous, they are surmountable with a methodical and informed approach. As the IT industry and its lexicon continue to grow, the translator's role will remain vital in bridging language gaps, ensuring that technology's benefits are accessible to users across different languages and cultures.

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