Journal of Information & Knowledge Management, Vol. 9, No. 4 (2010) 365−375
© World Scientific Publishing Co.
DOI: 10.1142/S0219649210002747

Technology Transfer Mediations of Technical Writers: Perspectives from the Philippine Software Industry

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Abstract. In their attempts to communicate innovation, technical writers produce what Everett Rogers calls "technology-embodied information," per the Diffusion of Innovations theory. This study focuses on technical writers working for multinational software firms in the Philippines and seeks to explain their function as gatekeepers in the information traffic between development centres and software users. The practices of technical writers — representative of eight software companies — are collected, described, and analysed according to qualitative design. The study uses the focus group discussion as its primary research tool, triangulated by portfolio and process documentation analyses. Key themes are presented in step-flow. The study illustrates technical communication tasks such as user profiling, knowledge capture, and information delivery within the framework of technology transfer.

Keywords: Technology transfer; technical communication; information system.

1. Introduction

In today's wirelessly networked world, technology crosses national boundaries with great ease and few restrictions. Technology, in its intangible form, flows across not only national boundaries but also between industries, departments, and individuals (Khalil, 1999). In the Philippines, the provisions for technological imports in support of industrialisation serve as the starting points for technology transfers (Posadas, 1995). Indeed, the trajectory of technology transfers in knowledge-based economies seems boundless, powered by global deregulation and advances in infrastructures for convergence (Bell and Housel, 2001).

Often overlooked in the middle of this traffic is communication's central role in the successful adoption and assimilation of technology. Rogers (2002) regards the transfer of technology as "essentially a communication process through which the results of scientific research are put into use," and he argues that technology does not diffuse spontaneously and on its own (p. 323). Technology transfers must then be communication-driven, requiring mediators who will define approaches and strategies for a particular innovation to be introduced. Scientific and technological advancements must be properly relayed to their intended users, especially under the premise that "technology is essentially information" (Rogers, 2002, p. 326). Technical writers are at the forefront in the communication of innovation because they are involved in reporting research, managing knowledge base content, and producing end-user documentation (Jeyaraj, 2004). Without their intervention in producing what Rogers calls "technology-embodied information," adopters of an innovation would have no starting point for the information and instructions necessary to understand and comfortably use a particular technology.

This research examines the experiences of technical writers working for multinational software development firms in the Philippines who often precariously attempt to bridge continentally and techno-culturally distant engineers and end-users. Taking a cue from the rhetorical nature of communicating innovation, this research aims to resolve the following question: How do technical writers in the Philippines serve as mediators in the transfer of software technology? It focuses on the production of information products that accompany technology products, and the channels with which it is transmitted to intended audiences. Due to its role-oriented focus on technical writers and their processes, it does not cover the communication interventions done in implementing or evaluating technology, which may require the physical presence of agents other than technical writers.

The rest of the paper is organised as follows: Section 2 explains the theories and concepts that underpin the study; Section 3 describes the approach and methodology used in implementing the research; Sections 4 to 10 discuss the key themes (in step-flow) and review the findings in relation to existing literature; and finally, Section 11 summarises and concludes the study, as well as identifies opportunities for future research.

2. Communication Model of Technology Transfer

In assessing the technology transfer mediations of technical writers, it is presumed that technology is primarily information, and that every technological activity that is introduced, negotiated, and applied within specific socio-cultural contexts contains a core communication system. The diffusion of innovations theory seeks to explain how an innovation — an idea, a practice, or an item that is perceived as new — is assimilated by individuals or other units of adoption. In an update of his seminal work, *Diffusion of Innovations*, Rogers (2002) accommodates technology transfers as necessarily subsumed under diffusions studies.

> "Most of the innovations that have been investigated by diffusion scholars are technological innovations. Thus, one might expect a close correspondence between the diffusion of innovations and technology transfer" (p. 328).

The emergence of the Information Age puts technology at the center of diffusion/transfer. The transfer of technology is concerned with the chronological flow of information from agents of change to potential adopters. Rogers (2002) defines the nature of this transfer as "the application of information into use" (p. 338). In effect, transfer is the communication of technology as information. Rogers (1995) distinguishes between information concerning that of the software and that of innovation-evaluation. The former is "embodied in a technology," (p. 14) which refers to the concepts and procedures provided by technical communication, while the latter is concerned with the expected outcomes of the innovation. Rogers (2002) also brings in the challenge of "heterophily," or the competence-based difference between two or more individuals who communicate in a technology transfer situation (p. 331), as an important factor.

By itself, the diffusion of innovations is a linear model which explains technology transfer in the information technology (IT) setting. It also does not fully address the interdependence of networks and other internal mechanisms of transfer. In this context, diffusion is directed to the idea of "change" more than the idea of systems and transactions. This concept is supplemented by the Actor-Network Theory, which attempts to explain the overlaps between exchange, power, and resource dependence and how networks reproduce such a set up (Auster, 1990). The theory encompasses the negotiations between both human and non-human actors as they interact in a network environment (Bardini, 2008). An actor is secondary to the action it performs, while a network is the relationship formed between actors — the bond between systems of alliances (Stalder, 1997). Within IT firms, the network is understood to be the contractual relationship among its constituents. This is instrumental in instituting the infrastructures for resource and information flows. By highlighting the agency-based communication model of exchange developed in a network, this theory informs that products of technical communication are a creation not only of writers, but of the network of subject matter experts and tools on which they depend.

Following the transactional model of communication, technology transfers initiate as an innovation (technology) originating from a source is transmitted by an agent to other units of adoption (receptors) via a communication channel. In the process, feedback is anticipated from technology receptors, which is important in trying to reduce uncertainty about technology use. Technology is usually modified as a response to clarifications, requests, or corrections gathered from its receptors. Applying it to the software lifecycle setting, technology is implied as software; the agent is a role assumed by technical writers; the communication channels that make technological information available are the technical publications and its delivery platforms (print, Web, CD, etc.); and technology receptors are understood to be software users, whose technical competence may vary (see Fig. 1).

3. Methodology

This research employed the qualitative design in explaining how technical writers mediate the transfer of technology, specifically software products. Research participants were required to have at least two years of experience in the technical communication profession, based on the assumption that a complete software lifecycle may take approximately two years. The professional directory of the Society for Technical Communication Philippine Chapter served as a starting point for sampling. Two technical writers from each identified axis of technology-oriented locators in Metro

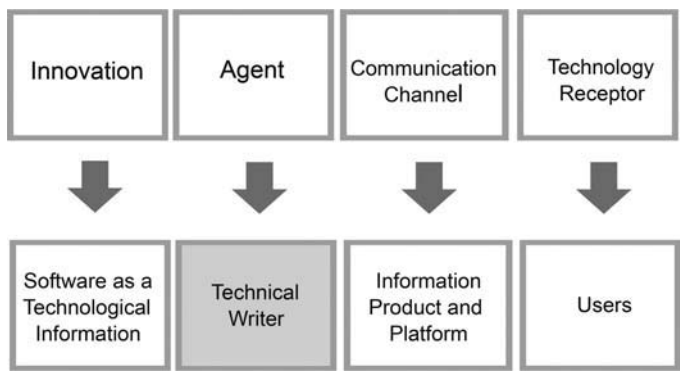

Fig. 1. Technology transfer conceptual diagram as applied to present study.

Manila (NeoIT Global Services, 2005) were invited to participate. A two-part, three hour focus group discussion (FGD) was held to engage the diversity and depth of the participants' professional experiences. Eight software companies were represented. Following the exploratory insights from the FGD, the participants were asked to provide process documents they used in their work environment and one to three items from their portfolio that they had produced from scratch. In total, 33 articles of process documents and portfolio samples were received.

The data sets were examined against a matrix of evaluative questions, which covered the technical writers' target audiences, resource needs, output quality measures, and delivery media. This was formulated in reference to the general software lifecycle stages identified by Lum (2003), which typically include the identification of functional requirements, the definition and scheduling of work elements, and the reconciliation of efforts with original estimates prior to the software release. In terms of technical communication workflow, these stages were tied to information scoping, content development, and medium development, respectively. Textual analysis was executed following key communication themes within software lifecycles, which also closely paralleled the conceptual approaches to technology transfer (see Fig. 2). The findings were presented in step-flow.

4. Assessing Profiles of Technology Users

When producing technical publications as their deliverables during the software lifecycle, the technical writers said their primary considerations were the requirements of technology users and the complexity of the software. As assistance to technology transfer, they ensured that information remained relevant to the level of skill and detail needed by users of the software product. To do this, they planned and created user documentation around perceived audience profiles. Two common FGD comments were:

> "The amount of information is dependent on your audience."

> "It's important to figure out how much the audience needs to know. Our audience doesn't need to know everything, so explain what is only useful."

The participants agreed on two broad audience types: general and technical. General audiences are technology consumers who regularly use the software and are considered to be the global, mainstream audience. Technical audiences are consumers with advanced technology backgrounds and experience in complex automation tasks. Installers, system administrators, and business analysts are considered members of the technical audience. A participant pointed out that, depending on company resources, there may be previous in-house user studies that could provide a more defined profiling, such as the job functions of software users.

The collected process documents from instituted technical publications departments contained provisions for analysing those who will benefit from the content. Audience assessment typically happened during user documentation planning, in conjunction with the last sprints of the development team's software requirements gathering. The goal was to target product information to the right audience. These profiles guided technical writers in scoping and analysing topics to be included in technical publications. This practice agreed with Hovde's (2000) findings that since technical writers have limited contact with their typical audiences, they relied on perceptions of user tasks in producing their deliverables.

A review of the participants' portfolios revealed that explicit statements pertaining to the intended audience were contained in the preface of most samples. This practice set the initial expectation of describing for whom the document was prepared for and cited any prerequisite knowledge or skill that must be met by its readers. The technical writers said that since software catered to a wide range of users, producing technical publications that accommodated all profiles may prove to be challenging. Highly technical information was said to restrain mainstream end-users, while incomplete information might disappoint technical users. Indeed, technology transfer participants form information needs based on their past knowledge and experience (Doheny-Farina, 1992, p. 10).

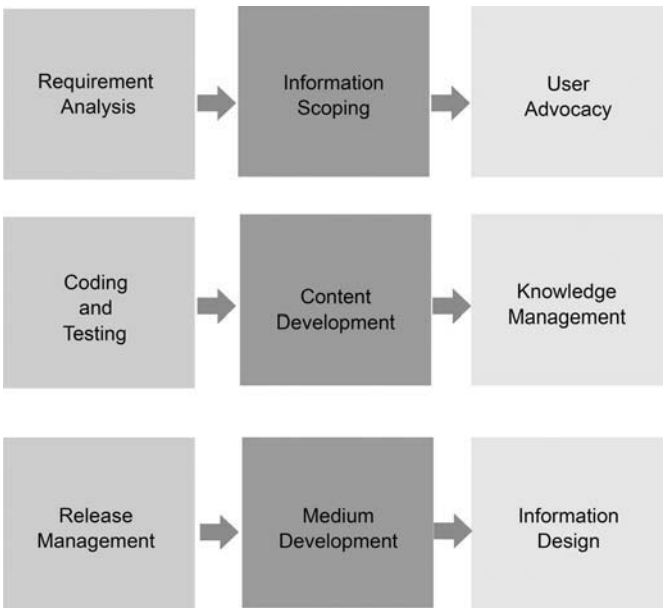

Fig. 2. Software lifecycle/technical communication process alignment.

As further evidenced by explicit description of target audiences in sample portfolios, different profiles have different information needs and expectations. An attempt to remedy this was for technical writers to segment information specific to particular users. This technique answered to the concept of "heterophily" as understood to be the dissimilarity of audience backgrounds that Rogers (2002) underscored to be the fundamental difficulty in technology transfer. Maintaining a set of profiles helped the participants in determining how to group content. This followed Martz's (2005) proposition that as the instrument of technology transfer, language or the communication system "grows and expands as necessary to reflect the needs of its users" (p. 65). Along this line, a single software feature could require different topics which were only usable to certain audiences. One FGD comment was:

> "Put yourself in your audience's shoes. Communicate well what you want to say and what you want to explain."

The portfolio items also demonstrated that apart from the depth of information provided, the style of writing also differed depending on the intended audience. For general audiences, technical writers used the second person point of view and referred to their readers as "you." For technical audiences, they used the third-person, which was direct and highly functional in tone. Notably, this type of action-centred style of writing is Western-oriented (Ding, 2003). Another participant commented that US-based editors were in charge of standards and template decisions. Since most of the participants worked for multinational companies, the style guides they followed were created to incorporate internationalisation. As Evia (2008) noted, the audience of technical publications might be geographically-dispersed, but they are largely Western-oriented customers.

5. Modelling Information Products

Aside from audience considerations, the technical writers said that the choice to organise content into a specific format of technical publication was based on topic types. Some types of information, such as installation and administration procedures, were required to be understood by users before setting up the software. Conversely, some types of information were sought by users as they performed particular software tasks. Content that served common purposes were packaged into a specific set. Technical publication formats such as online help systems, manuals, and tutorial articles were designed to support particular software tasks. Information was commonly taxonomised as belonging to User Guides (containing basic concepts and instructions for tasks performed by the daily user of the product), Installation Guides (containing information required to take the product from its delivery medium to the customer's computer environment), and Administration Guides (containing information on tasks performed on a regular basis or performed in a limited fashion following software installation).

Process-wise, the determination of format was said to take place between information scoping and content development (when coding of the software features has begun). The need to produce or modify content was determined during the documentation planning process, a time when technical writers reviewed how a new or changed product feature will impact technical publications. The documentation planning process also addressed whether a single volume or an entire suite of technical publications would accompany software releases. The information models provided as examples by the participants were normative, which limited the technical writers from producing materials (for example, the illustrated comics mentioned by Velasco (2005) in popularising scientific literature) that were not required by corporate or legal requirements, despite potentially benefitting audiences.

6. Sourcing and Obtaining Information

The technical writers were in consensus that developing content depended on access to diverse information sources. The content of technical publications originated from researching available information and identifying topics that needed information. The most commonly cited information sources were:

- The software prototype
- Interviews with engineers and subject matter experts
- Functional specifications and design documents
- Planning and status meetings
- Project tracking systems
- Engineering and quality assurance problem logs
- Customer feedback
- Background research on competitors

The entry criteria to prompt the preparation of technical publications was a defined list of new or changed software features by the development team, which typically took the form of functional specifications and design documents. To confirm the expected behaviour of the software, the technical writers referred to these development documents, which were available via requested emails, copies in shared network drives, or posts to project libraries or collaboration tools. During information scoping, the participants said that they identified resource

dependencies, such as access to software prototypes and subject matter experts, and they logged on to the software prototype to experience and use the product first hand. They simulated common user tasks, and in the process learnt concepts and procedures in operating the software.

The technical writers stated that their most important information source was their interaction with members of the development team. In the Philippine context, the participants balanced their work schedules to meet the time zones of their predominantly US-based stakeholders. This interaction afforded them the opportunity to ask questions, seek quick product demonstrations, and confirm if changes planned for a particular release were on schedule. They also interviewed members of the quality assurance and support teams to obtain information on problem logs reported by customers. Interviewing as an information gathering strategy was consistent with Hughes' (2002) assertion that technical writers facilitate the communication of subject matter experts' otherwise individual, unarticulated knowledge about the software to other stakeholders by means of technical publications. This role positions technical writers as vital links in the transmission of technological information from the individual to the organisational level.

However, depending on company practices, it was not always easy for the participants to obtain information resources. Availability constraints of subject matter experts, incomplete information on the development progress, or obsolete files hindered them from fully comprehending technical information. Some participants said that in certain cases, designated subject matter experts may not be very accommodating due to time constraints and other workload issues. This is a primary concern because the consistency and accuracy of information sources depended on reviews by other stakeholders. Goldberg's study (2006) proposed that without communal agreement regarding the perceived value of technical publications in the development of a software product, the required participation by engineers and other subject matter experts would be difficult to obtain.

To gain additional information, the technical writers monitored email communications from customers who requested or corrected information included in technical publications, especially during the early adoption or beta phase of the software. Contact information for comments or inquiries regarding published content was included in most portfolio samples. Depending on the priority level, the customer communications would be addressed with either immediate publication (especially for online help topics) or a revision for the next release. The participants said that the scale of complaints they received range from critical (errors in instructions that prevent successful software installation), high impact (inadequate information about a product feature), to low priority (grammatical/spelling mistakes). Though limited to comments on dissatisfaction, as confirmed in Hovde's (2000) study, this feedback mechanism gave customers a direct contribution to correcting and maintaining product documentation quality.

7. Synthesising Technical Information

Once the technical writers gathered the information needed (typically after the coding of software features has entered further development and unit testing) to begin their content development, they checked if information from different sources was consistent or in alignment. If not, they investigated whether the information was outdated or changed due to a new direction for the product. One FGD participant gave an example wherein the feature specifications document prepared by engineers did not reflect on the prototype of the software interface.

The participants were divided between the content strategies that they subscribed to when composing content. Some said that they structured content following three general types: procedure, reference, or concept. They categorised information into small modules so that readers could accomplish a task or understand a concept in a short time span. These modules provided the content from which they assembled larger technical publications. The participants who practiced this content strategy said that writing modular, task-oriented topics made it easier to share and reuse content among several types of technical publications. Content sharing allows the reuse of information which, as described by a process document, avoids duplicates, trims down translation costs, and makes it easier to update content in multiple technical publications. A participant stressed that content sharing and reuse should be done as a team effort. One FGD comment was:

> "We function not just as individual technical writers but as part of an information development team. We have user guides, online help but on top of that we have printed set-up sheets. The graphics that are used in the set-up sheet are repurposed in the user's guide, installation guides."

The sample portfolio items that followed modular writing had content grouped into related topics under descriptive headings. For example, information about system reports and logs were grouped under "Generating Reports." Moreover, procedural topics were organised chronologically and collected under one heading so that users of the software product may complete related

tasks without skipping around pages of the technical publication.

On the other hand, context-sensitive organisation is another content strategy that some participants used when documenting a software product. In this strategy, a help system is directly accessible from a specific software window, form, or field. The participants who practiced this said that they only wrote about and explained what users see onscreen and mostly eliminated background information. Portfolio samples of context-sensitive organisation showed that this strategy followed the software's menu sequence. An advantage to this was that readers could conveniently go back and forth between the software and the technical publication to find specific information about the user interface. A disadvantage was that the organisation may only be ideal when the skill level of readers necessitated that they not be told why a particular task has to be done or what steps has to be performed next.

In both content strategies, the sample portfolio items showed that most of the technical publications were not intended for linear reading. The participants wrote using predetermined content strategies and expanded or limited content as they saw fit for their audiences. Overviews helped put software features in context, but users would have to locate specific information they needed by navigating the technical publications. This explains the interactivity inherent in technical publications as users act on context-based information needs to look for content.

8. Mapping out Information

The participants in this study were also concerned with the layout and visual effectiveness of technical publications. A review of the portfolio items showed they used layout conventions to primarily serve as navigational aids in their deliverables. Navigation aids are important for users as entry points to the content of technical publications, and some participants noted that since users are not expected to read from page one, navigational aids assist users in locating information. Some of these navigational aids were:

- Bookmark bars
- Cross-references
- Document maps
- Indexes
- Search bars
- Tables of content
- Topic lists

These navigation features also enabled the cross-referencing of a topic from one technical publication to another. A consistent information hierarchy created by applying font faces and font sizes according to content types (chapter, section, or topic) also made information easier to find. Sample portfolio items revealed that a three-level heading hierarchy was standard practice among technical writers, especially in technical publications that spanned hundreds of pages. Also common were headers and footers, which consisted of information and graphics at the top and bottom of the page to provide readers with a cue regarding what content section they were in (see Fig. 3).

Apart from layout work for technical publications, some participants also said that they contributed to ensuring that texts and other elements of the user interface will be easily understood by consumers. Since the technical writers were early users of software prototypes, the intuitiveness of software user interfaces became suspect if elements were difficult to explain. Some participants said that they checked for unclear field names and grammatical errors in the user interface. They also suggested wording changes to software-embedded texts, such as dialogue boxes or error messages. Ideally, their review of user interfaces uncovered hidden inefficiencies, including unnecessary screen elements or out-of-date forms. This role was recognised by Salvo (2004), who encouraged technical writers "to shape the medium and thereby affect the relationships between people in the world" (p. 41).

Some participants stressed that their involvement in refining the software user interface was dependent on the organisational structure of the company. Most did this as an ad hoc task as it was not documented in the department procedures. This echoed Irons' (1998) and Jablonki's (2005) contention that technical writers' job boundaries relied on the organisation they work in. The participant's involvement, regardless of how limited, in having an active decision on style sheets and interface text editing agreed with Smart and Whiting's (2002) study of how technical publications and software interfaces were integrally linked. However, it seemed that due to the prevailing organisational divisions in their companies, the participants were just beginning to understand that what they traditionally viewed as documentation was part of the interface, that "bridge between the application and the user" promoted by Smart and Whiting (p. 158).

9. Authorising and Versioning Content

Product knowledge captured by technical writers should not only be of quality, but also of authority. As they relied on multiple information sources, the technical writers had the burden of seeking validation of their deliverables through a review by other members of the development team. The consequent content revisions typified the collaborative

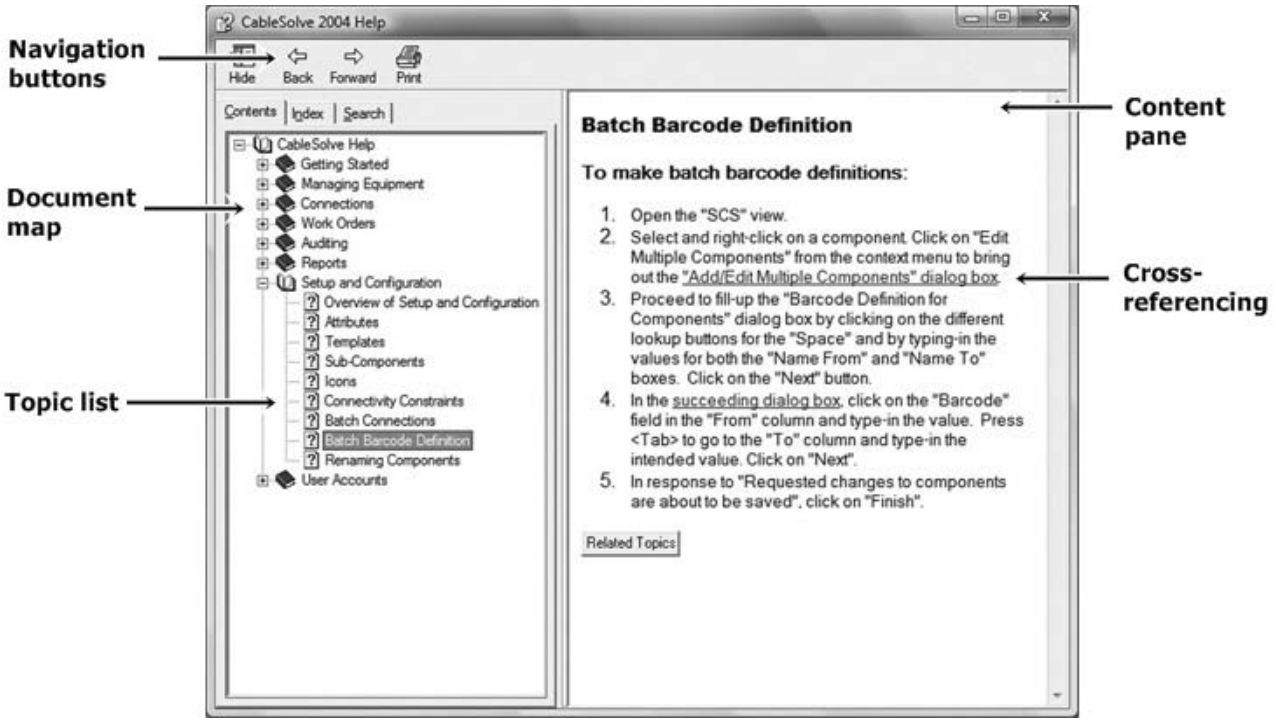

Fig. 3. Basic elements in a help system.

nature of communicating technology. Common among the participants were the editorial review and technical review processes. These types of reviews were embedded in the software lifecycle and typically paralleled the testing phase of the software. The technical writers directed the scope of the expected feedback from these reviews.

Under the editorial review process, they sent draft content for copyediting to an editor or a co-writer/peer reviewer according to a previously agreed schedule. Grammar, usage of product terms and trademarks, and other style guide conventions were checked. During documentation planning, subject matter experts possessing domain knowledge on new or changed software features were requested to participate in the technical review. As described by a representative process document, the expected comments from the technical review process validated how the software was operated, administered or installed. Reviewers could comment on the purpose of a task and its benefits for the user as well as describe business scenarios associated with the user tasks or important concepts that an end user would need to understand.

The process documents described the technical writer initiating with draft content sent to a reviewer, who would then check it according to quality standards. The review process may take several rounds of revising content, depending on the extent of comments received. Technical writers met with reviewers to resolve any differing opinions about the software behaviour. This consensus-building practice supported the assertion by Hughes (2002) that technical writers help development teams arrive at group knowledge about what the product is or does. Technical writers negotiated with reviewers when comments conflicted with department practices or other information sources. Occasionally, reviewers with a development or engineering perspective had a different mindset of what content should be relayed to end-users. When such issues cropped up, it was ideal to have a style guide to refer to. One FGD comment was:

> "Sometimes you might experience having trouble with the reviewers especially if they are engineers. They mostly like to have feature-based approach. As an organisation, you need to come up with guidelines, preferably included in the style and get management to buy in."

This remark countered Jeyaraj's (2004) observation that technical writers were mostly at the losing end of their power relationship with subject matter experts. With guidelines and standards properly put in place, technical writers can protect their deliverables from arbitrary changes and subjective demands requested by their technical reviewers. The editorial review process seemed similar with the author-centred collaboration model described by Jones (2005) wherein a technical writer did most of the content work and then sought either advice about the content or a review of it. This type of technical

review process was akin to stakeholder interaction focussed on document approval by other project members. These two models of document cycling showed that technical writers relied on reviews to validate the quality of their information claims.

The participants stated that they tested content with quality assurance analysts to determine whether context-sensitive help pages displayed correctly. They also sought comments from technical support personnel to check content against actual cases of customer complaints on the product. Some participants said that it was important to monitor feedback from early adopters during beta-testing and general product availability to reassess continuing support of product documentation. Customer feedback triggered major or minor software maintenance work (understood as "reinvention" by Rogers), which in turn also required updates of the technical publications.

At the end of the process flow, the official version number or edition of a technical publication is incremented. To ensure that only the most recent content was handed off to customers, a participant cited the importance of controlling technical publication archives by using repositories and versioning tools. The process documents also supported this observation by defining guidelines in implementing revision histories of any topics/modules that changed. Other detailed tasks, such as storing the source files into correct directory locations, were also described. Most portfolio items reflected the process by associating the software release number and the publication date in cover pages to differentiate between editions.

Distilling and controlling technical information to apply it to varied purposes supported Smith's (2006) expansion of technical communication into the territory of knowledge management especially on her note that technical writers encouraged internal stakeholders (such as development, management, and marketing personnel) to use information effectively to meet their organisation's goals. Technical writers contributed to ensuring efficient technology transfer by subjecting product assumptions to systematic verification by the development team of the expected software behaviour and user tasks as recorded in the technical publications. Because of the nature of their jobs, technical writers codified enterprise knowledge into accessible formats. Product specifications, software features, and otherwise unrecorded miscellaneous information from subject matter experts became centrally documented in specific types of technical publications.

10. Delivering Information

After organising content into a format and template that would present information in a meaningful way for readers, the next step in the technical writing process was publication. Following the entry of the software to the deployment phase, technical writers staged the delivery of their technical publications. The intention at this point was to render technical publications as a channel for communicating technology to end-users. The common channels for delivering content are paper-based, software-integrated or Web-based. When deciding on what delivery medium to use, the participants said that they considered the accessibility requirements of their users. This meant that the scenarios for when users likely search and retrieve information influenced the medium that the technical writers used to publish their deliverables. As supported by the portfolio samples, in situations where users will need to perform installation sequences and steps before having a working software system, the ideal formats to issue were paper-based manuals or online files that can easily print from a network printer. In situations where users will need a guide of the software interface and its elements, the context-sensitive help system (which launches by pressing F1 in the keyboard) was the favoured format.

The availability of resources also influenced how technical writers delivered their materials to consumers. Most preferred to deliver via online help and PDF formats because they are easy to package with software installation kits and post on websites. Printed materials were only used when the cost of paper was incorporated in the production budget. However, with regard to the production budget, the technical writers had limited decision-making on the matter. This had been observed by Evia (2008) who described the trend in technical publications departments to factor in market forces and business objectives around the roles and practices of technical writers — from competing with other employees for resources, to contending for billable project time. Evia viewed this from the perspective of mostly US-based technical writers who were losing their jobs to outsourcing and offshoring. To have noted this same concern from Filipino technical writers who work for software development centres outside of foreign headquarters, the comment resonated to a more wide-ranging phenomenon of cost-cutting documentation efforts than was commonly considered.

Information delivery and retrieval formed part of Hughes' (2002) proposition of technical writers' growing foray into knowledge management. By employing systems that made it possible for technical and product information contained in technical publications to be stored and indexed in a central repository, technical writers helped traffic the exchange and recapture of enterprise knowledge. A review of the process documents identified that technical publications were commonly posted in the following corporate intranet resources or websites: Product Licensing,

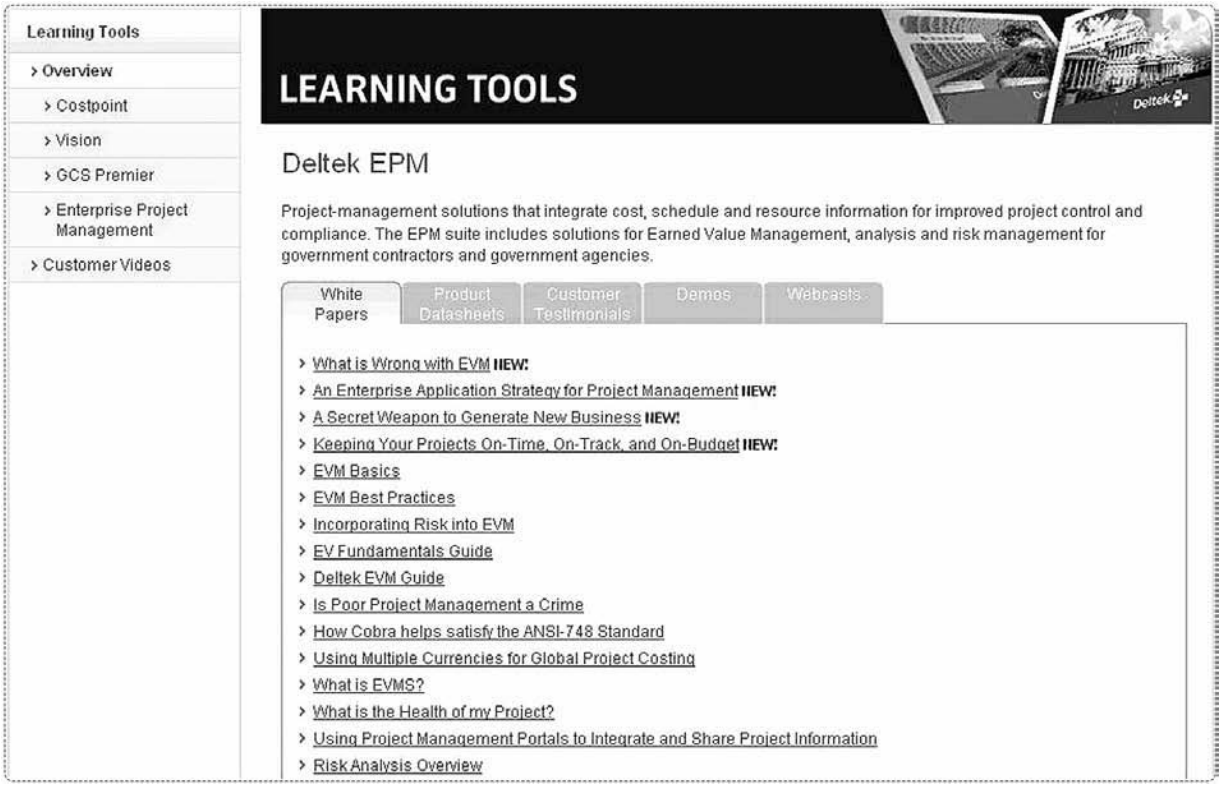

Fig. 4. A publicly available technical publications downloads area.

Customer Support, and Learning/Training Tools (see Fig. 4). Depending on access rights provided (publicly available or login required), these knowledge bases offered internal personnel or external stakeholders a place where they could search and download topics of interest and complete manuals.

A few participants highlighted that they delivered technical publications as an integral part of the software. They agreed that technical communication strengthens the brand and the product, and they claimed it makes a product experience worthwhile by setting user expectations and reducing uncertainty about an otherwise unfamiliar technology. As part of the service level agreement between the software company and its customers, technical publications accounted for the benefits and limitations of the software product, fencing the terrain of intellectual property. A representative statement from a process document reiterated this standard:

> "Keeping our documentation technically accurate is critical, because in the product warranty (provided in the license agreement), we state that each product substantially conforms to the documentation. Our commitment to customers is to keep the documentation accurate and easy to understand, as part of the product warranty."

Ensuring that technical publications were bundled with product releases was a mandate that technical writers subscribed to. The participants recognised that their work formed part of corporate and client expectations. Some strongly agreed that if products were to be delivered, they must be accompanied by the correct user documentation and a software product should not be treated as complete without the proper documentation. One FGD comment was:

> "Sometimes the documentation is used, sometimes not. But we have to consider that there's a responsibility other than that. We have to make the experience worthwhile."

The participants acknowledged that software consumers ultimately judge the utility of a technical publication once it has been delivered to the market. However, a consideration of the roles played by technical writers in aiding and influencing technology transfers proved to not stop at the printed page or online help. Their methodologies and practices for packaging information into technical publications — assessing audiences, gathering and verifying information, and delivering information — required not just skilled writing per se, but gate-keeping mediations to bridge the technology transfer interests of development teams and software users.

11. Gatekeeping Technical Information Flow: Synthesis and Conclusion

In the communication of technology, technical writers served as the gate-keepers whom Rogers (1995) identified to mediate information between innovation centers and society. In line with the product-centred orientation of technology transfer as described by Rogers (2002), it may be claimed that the output of technical writers were a planned and directed effort to answer particular information needs of heterophilous audiences (technology receptors) in assimilating software products (innovation). Technical writers aimed to achieve consensus among stakeholders in the organisation to validate their information claims, which was, for the most part, obtained from different and sometimes differing sources. From this configuration, technical writers "translated" and ascribed purposes to otherwise raw information by way of packaging it into technical publications.

Information that accompanies the software is the realm of technical communication. Returning to Rogers' (2002) formulation of technology-embodied information, technical publications allow the product knowledge base to provide a holistic understanding of the technology itself from installation and administration to general daily usage. It thereby enables the smooth adoption and transition to the new technology. Discarding information — which always takes time, effort, and resources to collect — was a necessary step that the technical writers had to do in order to effectively communicate with their audiences. Carefully drafted, verified, and tested information helps to prevent system and user errors that could make the organisation vulnerable to complaints and legal challenges.

Given the study's limitations, the descriptive analysis of technical writers' roles did not cover an all-encompassing investigation of their day-to-day communication styles with other stakeholders in the development organisation. Technical communication is still an emergent professional expertise in Philippine IT companies. Future researchers may further explore a more comprehensive accounting of technical writers in other sectors, an organisational critique of software companies and its accommodation of technical writers, and a quantitative evaluation of the business impact of efficient technical communication.

As demonstrated, technical communication should be understood as an important component of technology transfers. Technical writers perform a balancing act between managing internal information within development centers and assisting software users with understanding complex technology. As suggested by this study, technical communication is an exercise of collaboration between technical writers and their information sources, and between technical writers and the audiences who use technical publications. Technical writers bridge innovators and technology users.

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