

New Product Development: Delivering Evidence of What Works

Jennifer L. Flagg, Joseph P. Lane, Michelle Lockett
University at Buffalo

Center on Knowledge Translation for Technology Transfer
100 Sylvan Parkway, Suite 400, Amherst, NY 14228
(Phone) 716-204-8606, (Fax) 716-204-8610, jflagg@buffalo.edu

***Abstract* - New product developers are required to understand and apply a wide variety of processes and tools as they produce new devices or services. Individuals who are seeking alternative or new methods for their process may often be overwhelmed by the amount of academic and practice literature documenting “best practices.” Unfortunately, new product developers may not have sufficient time to invest in exploring alternative strategies, resulting in the repetition of old - possibly outdated - practices. This paper presents the method and preliminary results of a scoping review designed to consolidate information on effective new product development practices into a comprehensive knowledge base. New product developers will enjoy the ease of finding alternative effective practices, while researchers will find value in the consolidated presentation of new product development practices and study methodologies that lend themselves to systematic reviews.**

I. BACKGROUND

Researchers, technology developers, and manufacturers can benefit from an improved understanding of effective new product development (NPD) practices. However, people implementing such practices are often too busy to spend time sifting through mountains of data to find appropriate new and effective tools and processes. In addition, researchers may find the sheer volume of data prevents them from identifying meaningful systematic review topics without first conducting a time-consuming scoping review. Further, applied researchers may have difficulty understanding their role in the NPD process - at times valuing their inputs

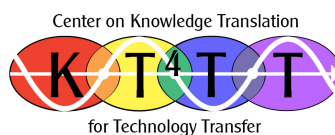
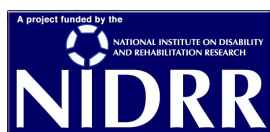
too highly in relation to the small contribution that a research discovery lends to the entire NPD process.

In response to these needs, the Center on Knowledge Translation for Technology Transfer (KT4TT) has developed the Need to Knowledge (NTK) Model [1] and an accompanying knowledge base. The NTK model for new product development was specifically crafted to act as a framework for the classification of NPD literature. The model also offers a comprehensive view of the steps involved in the continuum of research, development, and production to offer those unfamiliar with NPD a greater understanding of the rigors involved throughout the process.

The model combines principles from the Product Development and Management Association’s handbook [2] and toolbooks [3, 4, 5] for NPD with Ian Graham’s knowledge to action concepts [6] for knowledge translation. The addition of a formal research process to the NPD stages enables applied researchers working to improve technology-based products and services to see how their work fits into the bigger picture. In parallel, it helps manufacturers identify critical steps where researchers can add value to the process. The model demonstrates the activities involved in moving from conceptual discoveries to prototype inventions and out to commercially available innovations.

II. NTK MODEL COMPONENTS

The NTK model employs a stage-gate structure comprised of three phases of activity - discovery, invention, and innovation. Each phase contains three discrete stages, which are further refined into steps. Each stage



is followed by a decision gate where an evaluation is performed to determine the most appropriate course of continuing action. Opportunities for knowledge translation are embedded throughout the model, and are also highlighted at the completion of each phase - where handoffs from researchers to developers or manufacturers may take place.

The model is substantiated with findings from academic and practice literature. The findings are stored in the KT4TT's knowledge base, which is accessible by clicking on links for findings within the model. Alternatively, users can retrieve customized results applicable to their contextual factors via the knowledge base search page [7].

III. KNOWLEDGE BASE DEVELOPMENT

The knowledge base was born from a comprehensive literature search and preliminary analysis. Keyword searches were performed in a range of databases including Business Source Complete, Science Direct, and Web of Science. The review team also scoured a number of websites for relevant literature citations, and employed a snowballing technique- searching reference lists of publications - to enhance completeness of the results.

Inclusion and exclusion criteria were applied by the search team as a first screen to ensure that all studies were published in 1985 or more recently; written in the English language; and had relevance to the development of products and/or services. The search resulted in the collection of over 200 titles for review, which were passed onto the review team, where each piece of literature was read and coded. An online knowledge base form was used to standardize data extraction. The form recorded basic citation information, a short annotation, a description of the knowledge users and contexts to which the piece of literature was relevant, and a description of primary findings including models, methods, measures, barriers, carriers, or tips. Secondary findings that were not the subject of study in the pieces of literature were also captured along with their associated references. Both primary and secondary findings were classified by their ideal placement in the model.

IV. FUTURE WORK

The preliminary analysis has uncovered hundreds of individual models, methods, measures, barriers, carriers and tips. Therefore, upon completion of the scoping literature review, the knowledge base findings will undergo a secondary analysis to identify supported and unsupported steps, stages, tips, and gates. Any model, method, measure, barrier, carrier, or tip substantiated by two or more studies citing the same findings will be considered "supported." Any model, method, measure, barrier, carrier, or tip containing conflicting findings will be considered "refuted." Supported and refuted information will be tagged as such to further inform knowledge base users. Unsupported areas will also be flagged, so that future efforts can focus on filling such information gaps.

This project is intended to culminate with the availability of categorized findings from over 200 literature citations. The findings will provide detailed information on effective new product development practices. All individuals and organizations involved in the development of new products and services are encouraged to explore the model. It can be used prior to developing a business plan, new product development process, or grant proposal to enhance understanding of a concept's path to market; after research and development activities have begun to ensure appropriate checks are applied before moving forward with a project; and throughout a project's life cycle to confirm that all necessary actions have been taken. Policy makers and grant funding agencies are also offered an opportunity to utilize the model as a benchmarking checklist when evaluating research and development project proposals, commercialization plans, or technology transfer plans.

To facilitate future research in this area, this project has been conducted using the Campbell Collaboration's protocols for a systematic review [8]. Should a sufficient number of studies utilize rigorous data collection and analysis techniques to answer similar research questions, the possibility of conducting a meta analysis will be entertained. In this instance, the review would be submitted to the Campbell Collaboration in the hopes that they would accept the topic to be included in their peer-review process. Such status would enhance the credibility of the findings while making them available to a broader audience.

ACKNOWLEDGMENT

This paper is a publication of the Center on KT4TT, which is funded by the National Institute on Disability and Rehabilitation Research of the Department of Education under grant number H133A080050. The opinions contained in this publication are those of the grantee, and do not necessarily reflect those of the Department of Education.

REFERENCES

- [1] Center on KT4TT. (2009). The need to knowledge model for commercial devices and services. Retrieved March 5, 2010, from <http://kt4tt.buffalo.edu/knowledgebase/model.php>
- [2] Kahn, K. B., Castellion, G., & Griffin, A. (2005). *The PDMA handbook of new product development: Second edition*. Hoboken: John Wiley & Sons, Inc.
- [3] Belliveau, P., Griffin, A., & Somermeyer, S. (Eds.). (2002). *The PDMA toolbook 1 for new product development*. New York: John Wiley & Sons, Inc.
- [4] Belliveau, P., Griffin, A., & Somermeyer, S. (Eds.). (2004). *The PDMA toolbook 2 for new product development*. New York: John Wiley & Sons, Inc.
- [5] Griffin, A., & Somermeyer, S. (Eds.). (2007). *The PDMA toolbook 3 for new product development*. New York: John Wiley & Sons, Inc.
- [6] Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation? Time for a map. *The Journal of Continuing Education in Health Professions*. 26 (2), 13-24.
- [7] Center on KT4TT. (2009). Knowledge base of literature. Retrieved March 4, 2010, from <http://kt4tt.buffalo.edu/knowledgebase/search.php>
- [8] Campbell Collaboration. (2008). Producing a Campbell Systematic Review. Retrieved March 15, 2010, from http://www.campbellcollaboration.org/artman2/uploads/1/Review_Steps.pdf