

Knowledge Mobilization through Interdisciplinary Professional Communication

Bob Lawlor*

Department of Electronic Engineering, National University of Ireland, Ireland

An often quoted riddle among the entrepreneurship community reads as follows:

Question: What is the difference between research and innovation?

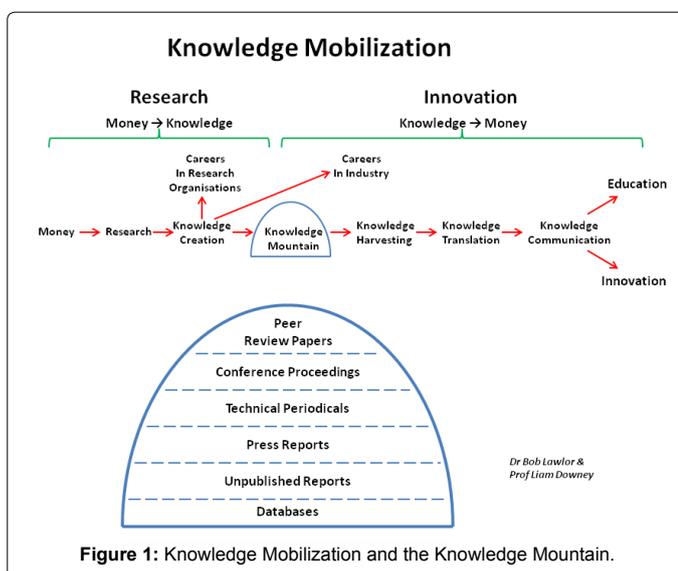
Answer: Research converts money into knowledge whereas innovation converts knowledge into money!

The fundamental objective of academic research is the creation of new knowledge. The primary objective of this Journal is the dissemination of new knowledge in the field of Electrical and Electronic Systems. Like other quality journals, the editorial team ensures that the content undergoes rigorous peer-review by engaging well-informed experts in the field. Quality peer-review by appropriate experts is the optimum way to ensure that the journal content does indeed make a worthwhile contribution to the existing body of knowledge. The importance of quality peer-review policies and procedures should never be underestimated or undervalued.

Many developed countries invest billions of dollars of tax-payers money annually in funding research and innovation. Despite such investment, researchers and research administrators tend to be unclear as to the fundamental difference between research and innovation. The universities and research institutes which compete for research funds play a vital role in their economies and societies by producing highly skilled graduates through 'research-informed' teaching and learning. Further, most modern universities also host a commercialisation office tasked with the goal of engaging with industry and finding applications for the knowledge created on campus. Despite such knowledge-transfer efforts, the primary focus of the academic community on the creation of new knowledge has resulted in what may be termed a 'knowledge mountain' (Figure 1), and all too often the inherent value of this knowledge goes unrealized due to the inability of experts from other disciplines to harness it [1].

If the full potential of the knowledge resulting from research and accumulated in the mountain is to be realised, then a new knowledge mobilization process is needed which attaches particular importance to promoting innovation (Figure 1). Innovation is rarely discipline-specific and often involves collaboration between experts from a range of disciplines. In this regard, however, the challenge of interdisciplinary communication should not be underestimated and is compounded by the fact that each discipline 'is a distinct 'community', a network of communication, a tradition, a particular set of values and beliefs, a domain, a mode of inquiry, and a conceptual structure' [2]. Why should we in the Electrical and Electronic Systems community try to address this difficult challenge? Why should we in the Journal of Electrical and Electronic Systems provide and resource a vehicle to address this difficult challenge? Could it be left to the 'Science Communication' community? The problem with that approach is that the Science Communication community cannot be expected to develop the level of in-depth understanding of our discipline-specific knowledge needed to successfully harvest and translate such knowledge for communication to diverse interdisciplinary audiences.

For more than 200 years enabling technologies have been developed within our community to find applications in many walks of life. For example, the pioneering work of Michael Faraday in the 1830's on electromagnetic induction marked the development of the fundamental enabling technology behind many global industries including power generation systems, induction motor-driven systems such as power tools, electrical transformers used in the transmission of electrical power to mention but a few applications. Even now this same enabling technology is beginning to revolutionize the automotive industry as we are forced to look again at the viability of electric vehicles having practically exhausted the earth of fossil fuels as a source of power while damaging the global climate with gaseous emissions. Another significant and more recent development, again from within our community and close to my own professional interest, namely, digital signal processing (DSP) was the enabling technology behind the mobile phone revolution and is now the primary engine driving many smart-phone developments. Of course bringing such technologies to market requires major interdisciplinary collaborative innovation efforts on the part of the development teams involved. The Journal of Electrical and Electronic Systems recognizes this challenge as an opportunity to take



*Corresponding author: Bob Lawlor, Department of Electronic Engineering, National University of Ireland, Ireland, Tel: +353-1-708-6199; Fax: +353-1-708-6057; E-mail: bob.lawlor@eeng.nuim.ie

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the lead in implementing an interdisciplinary communication initiative aimed at harvesting, translating and communicating our knowledge with a view to promoting interdisciplinary collaborative innovation. If we tackle this well, then other communities may in time recognize the value of such efforts in addressing this widely recognized but poorly understood challenge and introduce related initiatives within their own communities.

The crucial question is: what can the Journal of Electrical and Electronic Systems and its community do to address the interdisciplinary communication challenge? The one thing which we must absolutely not do is to interfere in any way with the existing high-quality peer-review policies and procedures described above. We're not looking to down grade the knowledge accumulated in the mountain but rather to harvest, translate and communicate it with a view to enabling collaborative innovation involving interdisciplinary teams. In this regard we can promote the development of a new structured 'technical digest' periodical aimed at disseminating peer-reviewed knowledge to an interdisciplinary audience. The purpose of such a technical digest is to communicate the most relevant information contained in an existing peer-reviewed journal paper (not necessarily limited to the Journal of Electrical and Electronic Systems) to researchers from other disciplines and especially to potential end-users of the inherent knowledge within the paper. Ideally the production of a technical digest should be undertaken by the author(s) of the original peer-reviewed paper to ensure that important points are not 'lost in translation'. However, where this is not feasible, another knowledgeable expert in the field could also produce a quality technical digest. Clearly the original peer-reviewed paper should always be referenced in a technical digest publication.

Over the past six years I and my colleague Prof Liam Downey D.Sc. have delivered a postgraduate transferable skills module titled: 'Interdisciplinary Communication Skills' within the Faculty of Science and Engineering at the National University of Ireland, Maynooth. A key-point overview of this module is shown in Figure 2.

Interdisciplinary Communication Skills – Module Overview

- Each participant produces a draft technical digest based on a peer-review paper of their choice and relevant to their research interests.
- Detailed interim feedback on these technical digests is offered by module facilitators and by interdisciplinary peers.
- Participants use this feedback to finalise their technical digests.
- Each participant prepares and delivers a short multimedia presentation based on their technical digest.
- Detailed feedback on these presentations is offered by module facilitators and by interdisciplinary peers.

Figure 2: Key features of Interdisciplinary Communication Skills module at NUI Maynooth.

A central component of this module has been the production of a technical digest. During this time we have developed and refined the technical digest development guidelines presented below. Prospective authors of a technical digest should prepare their draft submission based on these guidelines. The Journal of Electrical and Electronic Systems will review any such technical digest submissions for compliance with these guidelines and in turn make these technical digests freely available on the journal website.

Technical Digest Development Guidelines

Note: It is extremely important to clearly communicate Why This Topic Is Important. This must be done as clearly as possible and as early as possible within the technical digest document. Ideally this

communication of importance should start in the title and then be further developed throughout. If this is done well, then the reader will be kept motivated to study the entire digest with interest. If done badly, then many readers will probably just skim through the digest. Try to work in market value estimates wherever appropriate. Absolutely no maths allowed in this explanation.

For a peer-review journal paper try the following:

- Read the paper, slowly and carefully, underlining keywords and points. Make your own notes relating to the most important parts.
- Compile a list of the most important keywords or phrases relating to the paper. Write a brief explanation of each of these keywords/phrases. If you can think of a CAI (see 5 below) to help communicate any of these keywords/phrases then draw it. Feel free to draw these by hand and scan them in.
- Decide on an appropriate communication title for the technical digest.
- The guideline section headings of the technical digest are as follows:
 - Introduction (why this research is important - see opening note above).
 - The Take Home Message. The single key message which you're trying to communicate. As clear as possible. Absolutely no maths allowed.
 - Main Recommendation(s). As clear as possible. Absolutely no maths allowed.
 - Implication(s) of this recommendation(s). As clear as possible. Preferably without maths if at all possible.
 - Background. Maths allowed but only as necessary.

Note: Try to keep the overall technical digest to a maximum of two pages excluding diagrams, appendices and references.

- An important conclusion of multimedia learning scientific research is that one of the most effective written learning interventions is a Concise Annotated Illustration (CAI). For example, a well labelled diagram. The reason a CAI is so effective is because it enables the cognitive knowledge construction process to make associations between information which is held momentarily in the visual working memory and the auditory working memory.

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