MIT's Approach to Innovation Applied to Insurance: Process of Innovation, Part 4

By Dr. Phil Budden

Herein I set out MIT's general approach to (and definition of) innovation, explore why it is hard to deliver innovation in large organizations, and briefly conclude with some observations about this time of crisis, with insights into how those with actuarial training can help their colleagues achieve some best practices in innovation.

Innovation has long been a hallmark of insurance. Historically, both Edmund Halley's life table for pricing annuities based on Breslaw mortality statistics, and Edward Lloyd's making of a market for ship captains and marine insurers in a coffeehouse, were innovations which gave life to the modern insurance sector.

As I have taught "corporate innovation" to executives over time,[1] I have increasingly focused on innovation for the insurance sector, and to that end I am delighted to be a board member of Innovation Underwriters, which is a new non-profit collaborative.[2] Together, we are developing a tailored executive education offering on innovation for those engaged in the insurance sector, especially developing leadership for innovation.[3] This has become increasingly important to the whole sector, as insurance ratings agency AM Best released a new procedure in March 2020 for "scoring and assessing innovation" for all insurance companies going forwards.[4]

INNOVATION: MIT'S GENERAL APPROACH (AND DEFINITION)

As Eric Sondergeld rightly said in his opening article in the "Process of Innovation" series, the term "innovation" is now used so widely—and often so loosely—that it risks becoming just another buzzword.[5] That is dangerous, as innovation is a real-world phenomenon which has real-world consequences, especially for those who end up on the wrong side of it and get disrupted.

There is no monopoly on wisdom about, or on defining, innovation.[6] In fact, one of the key leadership tasks is to achieve a shared understanding of what innovation means. For many executives, that will also mean working out what their boss, or board chair, or ratings analyst, means by innovation, what its best practices might therefore be and how they assess efforts to achieve it. One of my key tenets in executive education is to make sure I do not give career-limiting advice: it is therefore wise to look dispassionately at innovation (in ways I suggest below), but also to recognize any buzzwords that the boss uses about it!

At MIT, our cross-campus Innovation Initiative (MITii) had to produce a working definition of innovation that captured the essence of this multi-faceted phenomenon and prove useful to practitioners in the wider world.[7] The resulting MIT definition of innovation is simply the:

"process of taking ideas from inception to impact."

The use of a **process** definition of innovation, takes us beyond a single moment of invention. It is then possible to look at all of the elements involved to bring it to realization. As a process, innovation should no longer be seen as an anarchic or solo activity, but one that requires management—and measurement—if it is to be successful (especially in large organizations).

In this MIT context, an **idea** is a match (initially hypothetical) between a problem and a solution. As Maria Thomson said in the second article in this series, "generating ideas is relatively simple, but generating ideas that show real promise is more challenging."[8] A key part of the challenge is telling the difference. For MIT, one of the initial parts of the innovation process is rapidly exploring that proposed problem/solution match: you do not need to be the problem-owner or the solution-inventor to undertake and manage such innovation.

Finally, MIT's definition concludes with the word **impact** which goes beyond just commercial profits. MIT's broader and more inclusive definition allows for a wider variety of other outcomes for innovation, such as environmental, social, or governance (ESG) or diversity and inclusion (D&I) benefits, which also accrue to the double/triple bottom-line. Whatever the desired impact, it is important to be clear about this up-front, both to justify the portfolio of investments required to achieve it, and to confirm that the return of investment (ROI) on innovation is ultimately achieved.

DELIVERING INNOVATION: WHY'S IT SO HARD?

Having defined innovation, it is important to see why achieving this is often so hard. While an organizations' internal culture is often a key factor (or scapegoat), such culture varies by company, so is best addressed on a customized basis, usually using MIT's "3 lenses" approach.[9] More common across a variety of organizations are the following basic failure modes.

First, we find various types of innovation activities that are often raised but need to be more clearly distinguished: these can be regarded as being on the ends of a spectrum and are best placed within a problem/solution matrix. At one, far end of the spectrum, there is formal Innovation (with a big "I") meaning either the processes of taking novel research and development outputs (usually novel technological solutions to existing problems), or transformational innovations (matching novel solutions to novel problems), from inception through to impact. Such '10x' impact is often described as being out on the frontier (or McKinsey's "horizon 3") in the transformation category and is usually where one finds the innovation practitioners of large companies, or start-ups (e.g., in InsurTech) with a more venture-backed approach to risk/reward.

At the other end, closer to business-as-usual (BAU), there is a more modest form of innovation that covers the innovative adoption or adaptation of existing technologies, practices and resulting capabilities. This innovation (with a little "i") would fall into more of a 10 percent category, and is of less interest to venture funders, but is often more appropriate—and achievable—in business units across large organizations. As such, this form of innovation signifies a more widely applicable set of innovative behaviors.

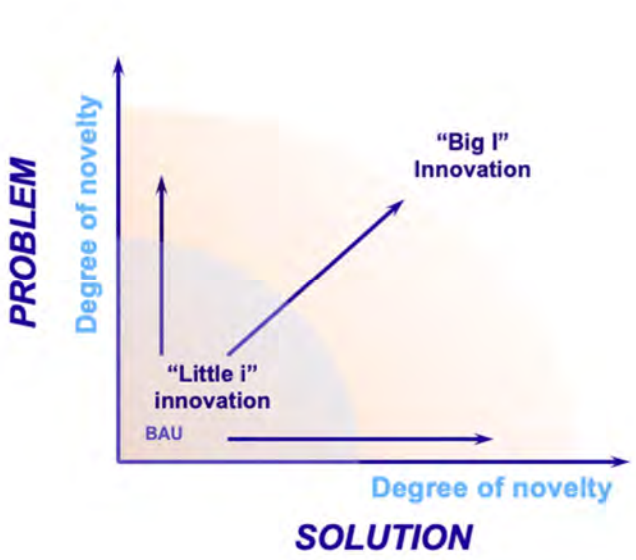
A first failure mode in innovation therefore comes from this basic category error. If the boss is calling for big "I" innovation, but the organization is working on the little "i" version, then the resulting process is likely to lead to disappointment, discrediting of innovation efforts and possibly managerial disruption (as careers may get limited).

Another failure mode arises from seeing innovation as only one version of the match between a problem and a solution. For many organizations, innovation is primarily seen as creating or inventing new solutions to the existing business problems. Given that the enterprise is probably organized around efficiently delivering the current solution to today's business problem (i.e., BAU), it is rational to seek new solutions—from internal strategists, a product development team or even outside consultants—but all of these can take time (and money).

That approach is rational, but incomplete: there is clearly a second axis of innovation, in which existing solutions to others' problems are explored as ways to address innovation in a business. It may be that another company, perhaps in another sector, has invented a solution for their problem, which could be adopted or perhaps adapted to yours. As such, the new solution is just novel to you and your business, rather than being completely novel to the world, as Thomson put it.[10] Between these two axes of varying novelty lies a range of other vectors for problem/solution matches that can be explored, and where all could still result in valuable forms of innovation that deliver impact.

Bringing together these two concepts about innovation—i.e., the little "i" (10 percent) to big "I" (10x) spectrum, with the problem/solution space—the resulting MIT graphic (Figure 1) makes clear that there are various ways to innovate beyond today's BAU. The most common failure modes are not being clear about what sort of innovation is being required (e.g., on the little i/big I spectrum), and in what direction of novelty such efforts are going (either along the problem axis, more usually the solution axis, or somewhere between).

Figure 1
Innovation Beyond Business-As-Usual



Of course, along all of these vectors, more informal little "i" innovation is closer to (but still a step beyond) BAU which itself includes incremental improvement. Such little i innovation is a more modest, but practical, form of innovation and draws on similar techniques as those for achieving big "I". One of the key innovation approaches is experimentation through the small steps that Kevin Pledge identified in the third article in this SOA series.[11] Such experiments are how innovative organizations—whether large corporates proceeding cautiously (matching slightly novel problems and solutions together), or start-up entrepreneurs swinging for the '10x' fences—manage the inherent risks of innovation.

CONCLUDING OBSERVATIONS: CRISIS INNOVATION AND SOME AM BEST PRACTICES

COVID-19 now brings new industry challenges, for which the insights of the actuarial community may be especially important. Innovation in insurance often requires data-driven judgments about risk management, with the complex interaction within a portfolio of experimental projects and assessing the likely rewards from integrating innovation back into the BAU. Thus, those with actuarial training and experience may have much to offer their colleagues as they endeavor to bring innovation AM Best practices to bear on the wider insurance sector.

As the current planet-wide pandemic is unlikely to be the last (as one might have realized with SARS, MERS and H5N1), it reminds us that low frequency but high severity crises can emerge and will have a wide-spread impact.

Given the need to innovate, it is important that those in insurance—alongside their actuarial colleagues—know what the AM Best practices are for effective innovation; recognize that innovation can be planned, managed and measured; appreciate the specific challenges of innovating in large organizations (and how partners like universities and InsurTech start-ups can help); share insights across the sector (e.g., through the Innovation Underwriters collaborative); and develop the leadership and sectoral talent to compete effectively.[12] Not only the insurance sector but our wider societies need such innovation.

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[1] On-line or in-person: https://executive.mit.edu/openenrollment/program/corporate-innovation-strategies-for-leveraging-ecosystems-self-paced-online/ and https://executive.mit.edu/openenrollment/program/innovation-ecosystems-a-new-approach-to-accelerating-corporate-innovation-and-entrepreneurship/
[1] https://www.innovationunderwriters.org
[1] https://www.innovationunderwriters.org/hr-and-talent-forum-charter
[1] https://www.businesswire.com/news/home/20200305005726/en/
[1] https://sections.soa.org/publication/?m=59599&i=649424&view=articleBrowser&article_id=3598364
[1] Interview for MIT Corporate Relations: https://ilp.mit.edu/node/48798
[1] https://innovation.mit.edu
[1] https://sections.soa.org/publication/?i=649446&article_id=3609062&view=articleBrowser&ver=html5
[1] Custom workshops with https://innovation.mit.edu/assets/BuddenMurray_MIT-3-lenses-and-innovation.pdf
[1] https://sections.soa.org/publication/?i=649446&article_id=3609062&view=articleBrowser&ver=html5
[1]https://sections.soa.org/publication/?i=654831&article_id=3632420&view=articleBrowser&ver=html5

[1] https://www.innovationunderwriters.org/hr-and-talent-forum-charter

Cambodian Insured Lives Mortality With Data Science

By Nicholas Yeo Chee Lek

Our firm has developed the first publicly available insured lives mortality table for Cambodia using data science methods. This essay provides a brief background, our approach and the impact of our work.

BACKGROUND

Our firm is actively serving the Cambodian market, performing actuarial work for several insurance companies as well as pension schemes. Prior to this, there are no published mortality tables for insured lives in Cambodia. This poses a significant challenge to performing actuarial work with high confidence in this market. The mortality assumptions to

price and reserve for life insurance products, as well as assess pension liabilities, could deviate significantly from actual experience.

The life insurance industry in Cambodia only started in 2012.[13] In 2018, the industry wrote USD 196 million gross premiums, with life insurance premiums totaling less than 1 percent of the country's GDP.[14] Whilst Cambodian population mortality statistics are publicly available, the expectation is that mortality for insured lives differs significantly with those of the general population due to socio-economic composition. The insured lives represent a small proportion of the highly affluent Cambodian population rather than the general population. As an example, the general population life expectancy of a Singaporean male is 81 years[15] whilst the general population life expectancy of a Cambodian male is 67 years.[16] Using general population rates, albeit with adjustments, is unlikely to yield accurate results.

In other countries around the region, it is common for the life insurance industry to pool together claims data to perform industry-wide mortality studies. However, in 2018, total death claims paid in the industry is around USD 2 million.[17] Hence industry-wide mortality studies would not yield any credible results. Furthermore, performing such a traditional mortality analysis requires significant resources, which does not economically commensurate with the current size of the life insurance industry in Cambodia.

OUR APPROACH

Our approach is to apply data science methods to derive a mortality table that would better reflect the expected mortality of insured lives in Cambodia. The starting point of our work is the published mortality tables for insured lives from around the region including Malaysia, Singapore, Philippines, and Indonesia, as well as various macroeconomic indicators including population life expectancy, life insurance penetration and GDP per capita which we hypothesize to be a useful predictor of mortality rates.

Having gathered insured lives mortality tables as well as macroeconomic factors from around the region, we began training several models utilizing data science methods. Eventually, we have decided that the most suitable model (based on the best fit as well as actuarial judgment) to be used is a cubic quasi-binomial regression. With this, we produced a mortality table for insured lives in Cambodia from ages 0 to 70, for males and females, which we label NCIB2020 (n-actuarial Cambodian Insured-Lives Base). We also perform pension work in Cambodia. Thus, we have augmented our mortality tables, and then used

the Coherent Kannisto[18]—a modification of the Kannisto method to extrapolate for older ages, to create a table that reflects the mortality rates of annuitants in Cambodia. We have labelled this annuitant mortality table as NCAB2020 (n-actuarial Cambodian Annuitant Base).

The results of our work are published on our website. The main reason we have decided to make our work publicly available, as opposed to keeping it proprietary, is that we are of the opinion that this will enhance public interest in the long term. Actuarial science and its applications are beginning to grow in Cambodia, making more actuarial work publicly available would go a long way to advance actuarial science in the market.

IMPACT OF OUR WORK

The NCIB2020 is currently used in setting and benchmarking pricing assumptions for life insurance, enabling life insurance to be transacted at a fair price. The existence of a mortality table for insured lives reduces the scope for deliberate and/or erroneous over- and under-pricing in the market, promoting strong and stable growth of the life insurance industry. Accurate reserving mortality assumptions would further support the strong and prudent financial management of life insurance companies. Using our mortality tables in pension valuation also helps to ensure that pension benefit promises are adequately funded and accurately accounted for.

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[1] On-line or in-person: https://executive.mit.edu/openenrollment/program/corporate-innovation-strategies-for-leveraging-ecosystems-self-paced-online/ and https://executive.mit.edu/openenrollment/program/innovation-ecosystems-a-new-approach-to-accelerating-corporate-innovation-and-entrepreneurship/
[2] https://www.innovationunderwriters.org
[3] https://www.innovationunderwriters.org/hr-and-talent-forum-charter
[4] https://www.businesswire.com/news/home/20200305005726/en/
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