A limited but growing literature exists on the application of real options methodology to the information and communications technology (ICT) industries. The methodology has been applied to examining the sunk costs of assets and the regulator's impact on the distribution of returns; economic depreciation; an analysis of capacity in long distance data service, and optimization of wireless capacity and other network optimizations. In addition, the approach has been used to examine strategic investments in technology standards. While the methodology has existed almost as long as the development and refinement of financial option theory and applications, it has had a much slower acceptance as an analytical tool. Perhaps, because of its complexities; maybe because of lack of a market for real options and associated data with which to apply the technique, as opposed to financial options which are traded daily. Perhaps because it has not been critically assessed and its benefits have not been demonstrated in the same manner as financial options 1. This dossier will clarify and address these issues associated with real options. Although it cannot promise to clarify all of them, we hope to shed more light on the topic.

This Dossier has specific applications of the real options methodology in ICT industries. The first paper "Real Option Applications to Information Security" by Pythagoras PETRATOS provides a brief introduction to the applications of real options and then analyses the impact of the methodology on the intangible asset of data security. The author spares us the complex mathematics of the real options, while providing a narrative understanding of the application.

The second paper "Real Options Methodology Applied to the Information and Communications Technology Sector: A Survey," by James ALLEMAN, Gary MADDEN and Hak KIM explores the framework of the real options

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1 Thanks to an anonymous referee for this insight.
methodology and provides a brief overview of the theory and practice. It then critiques and summarizes the articles that apply the methodology to the ICT sector. While the applications are diverse and innovative, more room exists for additional research, particularly empirical studies, on the topic.

The third paper, by Hirofumi SUTO, James ALLEMAN and Paul RAPPORPORT – "An Investment Criterion Incorporating Real Options" – develops a decision criterion by which one can determine whether to invest, delay or not invest. The methodology incorporates the delay option into the traditional discounted present value technique to provide a simple criterion for evaluating an investment. While the criterion is simple, the mathematics to derive the criterion becomes more complex. If applied in practice, it allows a practitioner a simple method to evaluate the value of the delay option. The first section of the paper develops the framework of the theory of the real options methodology.

In contrast to most papers in this area which address the theoretical considerations, Charlotte KRYCHOWSKI's paper, "Investment Decision in a Broadband Internet Network: A Real Options Approach," concentrates on the application of the methodology to an actual investment analysis. It evaluates the option value of delaying broadband investments in rural areas and the optimal timing of the investment, if undertaken. It offers practical guidelines in a real-life environment. These first three papers in the Dossier, inter alia, explain real options methodology and its applications. Hopefully, they are sufficient to arouse the reader's appetite to explore the technique further.

In their paper "Invest Today or... Tomorrow?", Laurent BENZONI, Nicolas GRESSER and Cuong Hung VUONG examine a real option approach to the French DSL market from the point of view of a new entrant. It demonstrates the power of real options thinking, in particular the invest or delay approach. They indicated how the price of the wholesale offering of the incumbent should include a mark-up for the value of the real option.

"From Experimentation to Citywide Rollout: Real Options for a Municipal WiMax Network in the Netherlands." by Bert M. SADOWSKI, Mathijs VERHEIJEN and Alberto NUCCIARELLI continues to address actual application of the methodology in the WiMax environment. In the context of WiMax as possible substitution for the fixed line network, the authors use real options analysis to examine the uncertainties of implementation of a municipal WiMax network. The unlicensed and licensed bands cast doubt on
the viability of municipal WiMax networks. Moreover, their results have serious implications for public policy considerations.

We have two interviews for this issue. Our first interview is with Mr. Pierre DANON, Chairman of Eircom. The application of real options might seem perfect for Eircom which requires significant investment to deliver mobile and fixed communications services in the Republic of Ireland. However, it should be noted that Eircom does not use the real options technique, demonstrating the infancy of the methodology. Nevertheless, Mr Danon's extensive background, not only in ICT, but in the private sector provides a unique perspective on investment issues facing telephone companies. He reveals how regulators and regulatory policy impact investment issues, sometimes negatively for the telecos.

The second interview is with Mr. Peter CULHAM of Ofcom, the regulator of the ICT sector in the United Kingdom. Mr. Culham, Chief Economist of Ofcom, is ideal for this interview since Ofcom considered utilizing the real options methodology, but rejected it for the time being. Mr. Culham's views on the practical application of real options in the regulatory arena are insightful.

Overall, lack of consideration of the dynamics of investment has distorted investment timing and magnitude, and regulated prices. Getting the investment decision right becomes ever more critical in light of the disruption created by fiber to the curb/home/office (FTTx); competition from alternatives such as cable TV providers, and use of wireless networks such as WiFi and WiMax as a replacement for the traditional infrastructure. Finally, evidence exists to show that ignoring the dynamics of investment incentives may lead policymakers to underestimate entry barriers, thus overestimating the ability of a competitive market structure to function. The real options methodology offers a possible tool to address these issues.

We hope you not only enjoy reading this issue, but that it opens your eyes to a new and innovative technique in investment evaluation.