The theory of risk has been discussed eloquently in numerous texts throughout the ages. Yet most institutional investment practitioners seem to have been sensitized to risk and its ill effects only since the perfect pension storm in 2009, which led to increasing liabilities (due to falling interest rates) combined with decreasing asset valuations. The theory and practice of risk management seldom are seen in concert.

For this reason—good risk management—case studies can be a major boon to fellow investors. This article outlines such a risk-management case study. The fact that the subject of this article is a long-time client and well-known Canadian pension plan that substantially reduced risk in 2015 makes it even more relevant.

A Brief History of Investment Risk Management
The evolution of risk management has been a long and often painful experience for many investment plan sponsors. It’s been trial by fire and learning important lessons the hard way, generally from past mistakes. Sure, the basic theory has been around for years, but its actual practice and effective implementation are only now gradually being adopted and better utilized in the investment world.

When it comes to risk management there are three noticeable periods:

1. Pre-2000: Acceptance, where risk was largely ignored
2. 2000–2008: Acknowledgment, where plan sponsors discovered the real meaning of risk
3. Post-2009: Action, which started a risk revolution

Before 2000, modern portfolio theory (MPT), which was developed in the 1950s and 1960s, was firmly entrenched in orthodox theory. But it had its limitations (simplifying assumptions, etc.) that were not well understood by practitioners, whose focus was largely on optimizing return and peer comparisons. Perhaps no one made this point better than Benoit Mandelbrot, a Yale mathematician who used statistics to poke legitimate holes in modern financial theory (see sidebar). For example, in “Ten Heresies of Finance,” Mandelbrot challenged the notions that market prices are normally distributed and that they move continuously, assumptions that form the foundation of then-conventional risk models. He asserted that markets are much riskier than most people realize, and that current models are used not because they work well but because the simplicity of the mathematical assumptions behind them is not disputed.

The tools within the investment industry were somewhat basic when MPT was first developed—the personal computer was just coming into vogue, and standard deviation and correlation were the key measures of risk. Yes, most funds later used asset-liability modeling and some Monte Carlo theory in their annual or tri-annual asset allocation exercises. That said, the focus by sponsors was clearly on their assets (not the liabilities), with the spotlight centering on the average forecasted return and perhaps anticipating a one- or at most a two-standard-deviation event. Tail events were largely ignored, with most additional effort concentrated on adding value, through active management and monitoring tracking error. Capital markets were nevertheless favorable and equities were well-rewarded throughout this time, with only brief periodic setbacks. As such you often saw articles with titles like “Why Not 100 percent Equities?”
Diversification meant simply expanding the portfolio beyond domestic markets into foreign securities, without a true understanding of factor risk.

In short, the crux of the problem was the inequitable amount of time and resources that investors spent on return over risk—a return orientation.

The wake-up call came during 2000–2008, when returns moved back toward their historical average (mean reversion) and all investment funds shuddered under the weight of three consecutive disasters within a decade: the Tech Wreck, the Global Financial Crisis, and the European Debt Crisis. As equities fell by about 50 percent and most assets with any credit exposure were negatively impacted, investors had few places to hide to avoid the market downdraft other than government bonds and gold. Standard deviation and correlation were fully exposed as unstable and of limited value in a stressed environment. In fairness some funds, after the first calamity, tried to diversify into alternatives (hedge funds, private equity, etc.), but they usually forgot about three deadly portfolio sins: leverage, illiquidity, and lack of transparency. Only a few mega funds escaped by successfully recognizing their real risk and lengthening or diversifying into alternatives (hedge funds, private equity, etc.).

Since 2008 and the perfect investment storm, a plethora of books have been written about risk management, detailing the lessons learned and a wide variety of new and interesting investment solutions (risk parity, dynamic asset allocation, defensive equity, liability responsive asset allocation, goal-oriented investing, etc.) and more reliable tools (conditional Value-at-Risk, multi-factor analysis, liquidity analysis, stress testing, scenario analysis, etc.). However, the dominant theme demonstrated in most of the literature is that good risk-management policies and effective fund governance are intricately intertwined and that risk is a multi-dimensional process requiring various diagnostics.

In conclusion, fiduciaries need to adopt better, more prudent, risk-management processes (i.e., a risk orientation) and to consider the impact of human behavior on investment decision-making. However, this requires an entirely new approach to risk management, combined with the proper tools, resources, and a governance focus on goal attainment. We’re not talking about structural tweaks but the hard work of building a better risk-management framework and culture. In uncertain markets, the limitations of models and mathematics all too often are revealed by history. This is why we are seeing a total transformation in our industry as a more comprehensive and systematic approach to risk management (see figure 1) takes hold, including enterprise risk management. The mega funds already are committed to this risk-managed approach, with often upward of 20 professional specialists devoted to risk management alone. Those with fewer staff and resources need to improve their governance process, make the important risk decisions (risk tolerance, asset

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**Figure 1: The Risk Management Process became More Sophisticated—with Five Parts**

Sources of risks: fiduciary, asset/liability, market, structural, enterprise, operational

**Risk measurement**
1. Surplus, total fund, assets, liabilities
2. Downside, factor, scenario, ...
3. Decompositions, drivers, time horizon, ...

**Risk assessment**
1. What is the value of the risk?
2. What does it cost to hedge?
3. What does it cost to eliminate?

**Risk governance**
1. Develop risk governance structure
2. Determine risk & return objective
3. Develop risk aware culture

**Risk management**
1. Risk budgeting & asset allocation
2. Tail risk hedges inc. derivatives
3. Dynamic strategies

**Risk compliance**
1. Risk of fund within mandates?
2. Risk of managers within mandates?
3. Other risks: counter-party, operational, audit...
allocation, guidelines, etc.), and then outsource to providers with the necessary expertise, experience, risk tools, and economies of scale to implement effectively, as noted in the case study below.

**A Canadian Case Study**

**Background on the Plans and the Fund**

These multiple union plans are best-average-earnings contributory Canadian defined benefit pensions with a common employer. The commingled total fund has assets of more than $8 billion Canadian. Three of the five plans within the common fund, however, are deeply underfunded on a going-concern basis, with the largest plan (about $5 billion) only about 60-percent funded for the calendar year ending 2014. With a limited one-person investment team, the fund has been utilizing its consultant in a full-retainer capacity for more than 20 years. The consulting services entail the full gamut of advice including governance, asset allocation, manager search, reporting, etc.

In 2004, an asset-liability study showed that the funded status of the largest plan within the fund was about 46 percent on a going-concern basis, and the smaller plans were less well-funded. The recommendation at that time was that, unless large contributions were to be made by the employer in short order (which did not appear likely), the only possible way to make up the funding gap was through an aggressive return-seeking asset allocation with additional added value through successful active management. Although various asset-class scenarios were analyzed, including alternatives, the client felt most comfortable with a conventional asset mix of 70-percent equities (of which 57 percent were global and 43 percent were domestic), 25-percent domestic universe bonds, and 5-percent domestic real estate. This asset mix was reviewed and validated by the investment committee on numerous occasions thereafter, but it remained largely the same throughout. Over time, the direct real estate component never quite achieved policy weight but was within range and the additional monies usually were invested in equities. In short, to meet the objective of full funding over the long term, the employer felt compelled to accept higher equity risk (i.e., a return orientation with a higher equity risk tolerance).

Over the next 10 years, the total fund performed well and the funding gap was indeed reduced, as noted for the largest plan above, and was better than the 52-percent median, 10-year forecast from the asset-liability study of 2004. The actual 10-year compound asset rate of return was 7.74 percent. This was first-quartile peer performance, about 0.6 percent above median. But more importantly, it was about 1 percent above the liability discount rate. That 1-percent excess return was largely the result of good active management. Given the timeframe (2005–2014), these results also came with considerable volatility—the fund peer performance vacillated between first and fourth quartile on a quarterly basis, depending on how well equities performed. But the investment committee and board were rightly resolute and kept largely to the prescribed asset mix throughout that 10-year timeframe.

With these favorable results in hand, a further asset mix review was conducted in 2014, which recommended increased asset-mix diversification, including the use of more alternatives. After a five-year bull market and with interest rates at record lows, the consultant suggested that the employers consider borrowing to increase contributions and take some risk off the table. Consultants don’t always know what’s happening behind the scenes, however, and in this case various individuals and organizations were hard at work determining a different outcome.

**The Crossroads**

In January 2015, the employees and employer of the largest plan (hereafter called Plan A), negotiated and announced a watershed decision wherein the employer would pay several billion dollars, amortized over 30 years, to address the funded liabilities. In return, the unions agreed to plan changes and contribution increases. The agreement was contingent upon implementing joint trusteeship, meaning that both employer and unions would be responsible for the sustainability of the plan into the future and share equally in surpluses and deficits. This was indeed a defining moment for Plan A and its fiduciaries.

First and foremost, Plan A had to be segregated, but would it still be required to take the same measure of risk to attain full funding? Liquidity would not be an issue for the foreseeable future, with regular monthly contributions from the employer. However, it also meant that Plan A would shortly be in a totally different situation than the other plans (B, C, D, and E), if the common fund were maintained. When most plans in the fund are vastly underfunded and not receiving employer contributions, a common aggressive asset mix might be viable for all. But now, Plan A would have a novel governance structure, additional contributions, and perhaps a different objective and risk tolerance. Finally, the segregation of the largest plan’s assets (Fund A) and its new governance structure meant a heck of a lot of work in a very short amount of time for staff and the consultant.

Beyond a complex custodial transfer, which was expected to happen upon incorporation at the end of April 2015, just three months after the new organizational structure was announced, was the necessity of completing all new service agreements for the largest plan’s agents. Yes, staff had to have all of its 13 managers and other service providers sign separate agreements for the newly segregated organization. This was a huge undertaking, particularly because it had to be reviewed by the internal legal department and many existing contracts were outdated. A new joint (employer/employee) board and investment committee also needed to be appointed to make ongoing decisions and effectively manage Fund A.

One first order of business, after all the documentation and assets were segregated, was to set a date to conduct a one-and-a-half-day education session with the new fiduciaries to assist them in their decision-making. The rest of the second day would be allocated to actually making the key
The consulting team immediately recognized that a new board needed essential facts and research about their plan and insight about investment finance basics to make effective decisions—but that the presentation shouldn’t be overly technical. Preparing a 200-page presentation about investment management, which discussed everything from good governance to appropriate oversight, provided investment insights, and kept fiduciaries engaged, was not considered lightly by the consulting team. The underlying theme throughout the first day’s presentation would therefore be good governance and prudent risk management. The session would be interactive to have the new fiduciaries fully involved. The second morning would focus on the specifics of Plan A’s current circumstances and try to apply the broader concepts from the first day’s more-general education session. For this, an asset-liability study (a Monte Carlo analysis with 5,000 paths forecasted over 10- and 20-year time horizons, etc.) and a detailed risk analysis (including historical simulations, stress tests, factor analysis, etc.) with a focus on downside protection needed to be completed in short order so the essential elements, results, and recommendations could be considered by the new board and investment committee that afternoon. Luckily, liquidity was not an issue—but time was of the essence in preparing for the two-day early June 2015 meeting.

The Strategy Decisions and Challenges
Although various solutions were considered, the board and investment committee for Fund A agreed that their primary objective was to ensure that projected assets would continue to meet liabilities (i.e., a focus on surplus management as opposed to asset management). Now that the fund was nearly funded on a discounted basis, due to the guaranteed employer contributions, the new fiduciaries did not wish to see the plan returned to deficit. To be curtail, they wished to ensure that the projected surplus would be less-exposed to market whims and poor equity performance by limiting downside risk. In summary, their risk tolerance had changed significantly. As such, they wanted to:

1. Immediately de-risk the fund by reducing equity exposure by 20 percent and correspondingly increasing fixed income, which better matched the forecasted liabilities and cash flows.
2. Refresh the return-seeking portfolio to improve diversification and provide a more-stable cash flow:
   - Allocate up to 10 percent over time to direct alternative investments (e.g., infrastructure).
   - Shift some public equity exposure (10 percent of equities) to defensive equity.
3. Increase the allocation to risk-reducing assets with fixed income at 40 percent, diversify into core plus bonds at 20 percent (opportunistically adding foreign bonds, mostly hedged, to a core domestic bond portfolio), and global credit at 5 percent (foreign corporate bonds), leaving pure domestic bonds at only 15 percent.
4. Refine the existing domestic fixed income manager structure, including decreasing the number of managers for the reduced allocation.

In short, Fund A would need to shift 25 percent of its assets from equities into fixed income and alternatives to further diversify and reduce the risk profile. Naturally, the statement of investment policies and goals needed to be appropriately redesigned to incorporate these changes (history, risk tolerance, objective, policy asset mix, guidelines, etc.). A number of implementation issues, however, quickly were apparent:

**Challenge 1: Efficiently shifting the asset allocation.** The fund’s policy portfolio was changing almost immediately, but a number of governance and operational steps needed to be completed before the physical assets could reach the new policy targets. Manager searches needed to be conducted and specific manager allocations needed to be determined. This takes time and any delay represented significant risk relative to the policy portfolio.

**Challenge 2: Creating an interim exposure to infrastructure.** The fund had a goal of 5-percent allocation to private infrastructure investments, but the funding of this asset class would take years to complete. In the meantime, an interim exposure strategy for infrastructure assets was needed to mitigate opportunity costs relative to the policy portfolio.

**Challenge 3: Minimize transaction costs and manage operational burden.** With more than 25 percent of the plan turning over, transactional costs needed to be managed to help minimize the performance impact on the fund. A definitive strategy was imperative to limit execution costs and minimize the effect of the restructuring.

Upon recommendation from the consultant, the staff agreed to commence an independent, formal search for an implementation manager with transition and overlay capabilities to provide the required trading expertise and limit the burden on staff. A short list of three capable agents was identified and staff issued a formal request for proposal in June 2015 with responses to be received six weeks later. The selected implementation manager immediately evaluated the asset allocation needs of the fund. It was clear to this manager that an overlay program could provide immense value by immediately aligning asset classes with policy portfolio targets. The overlay program would use derivatives to adjust the asset allocation of the fund to policy without the need to trade physical assets. The overlay strategy would instantaneously shift the asset allocation and mitigate some opportunity costs. In effect, this approach provided a cost-effective and efficient solution to Challenge 1 and assisted in Challenge 3.

The allocation to private infrastructure (Challenge 2) would take years to complete and the fund needed an interim allocation.
with similar infrastructure investments, which could be quickly acquired and slowly liquidated, as the private-infrastructure capital calls were received. The consultant and implementation manager reviewed a number of different strategies including active, passive, and exchange-traded fund solutions. Staff then determined that an active public-markets commingled multi-manager infrastructure solution would be best for their situation, because they had previously favorably vetted such a manager who could perform proper oversight on their behalf. Although the passive strategies had lower management fees they were deemed inferior, because the index components could be heavily skewed by liquidity demands, sometimes significantly pushing prices away from fair value. The global listed infrastructure manager was chosen and funding (5-percent allocation) occurred by the end of September 2015. Additional monies (2.5 percent) were provided later in the same global listed infrastructure multi-manager in early 2016 to top up Fund A’s real asset component to policy until the domestic real estate manager would require the funds (likely in the distant future).

An effective transition by the implementation manager also would address Challenge 3, by minimizing trading costs, including brokerage, spread, and impact costs, while mitigating opportunity costs. A complete evaluation of the restructuring cost was therefore undertaken to understand its primary components and how best to minimize each. Further, the fund used this restructuring as an opportunity to reallocate its percentage asset allocations to target, between existing and new managers within fixed income and equity. A total of 15 managers were involved in the restructuring, which required close coordination among the implementation manager, staff, custodian, and managers.

In the interim, the consultant and staff identified suitable manager candidates for the new traditional asset mandates and refinements that would be necessary to the existing manager lineup. The defensive manager search was conducted in the late third quarter of 2015 and funded immediately, and the bond manager searches (two separate mandates, three managers in total) were completed in January 2016.

The Result
Within 11 months (see figure 2) of its formation, Plan A, with close coordination between staff and consultant, was completely transformed from a return-seeking fund (asset-oriented with a high risk tolerance, dominated by equities) to a more diversified, risk-oriented plan (focused on surplus management). A new organization, governance structure, and strategy were embraced, which had all the fiduciaries working on the same game plan with a common playbook. The statement of investment policies and goals (SIP&G) and policy asset mix had been successfully transitioned from 72.5-percent global equity/25-percent domestic fixed income/2.5-percent domestic real estate to 50-percent global equity with a defensive bias/40-percent diversified fixed income/10-percent alternatives (including 7.5-percent global listed infrastructure and 2.5-percent domestic private real estate). In short, the plan’s assets were successfully de-risked and further diversified in a timely manner through the use of education, research, various tools, products, and experts. Despite staff limitations, the fund effectively utilized the services of various outsourced service providers (consultant, implementation manager, and multi-manager) to efficiently and effectively realize its policy. The one-person staff had considerably enhanced capability by outsourcing.

De-risking was accomplished, largely through the overlay strategy, which was put in place at the end of September 2015, shortly after the relevant implementation documentation was signed. It remained in effect for six months, until the traditional managers had been selected. The overlay was removed at the end of March 2016, when all the active individual physical managers received their mandated policy cash flows and allocations.

Figure 2: Timeline of Events

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<tr>
<td>Employee/employer watershed agreement announced for Plan A</td>
<td>Custodial segregation of Fund A</td>
<td>Fiduciaries attend a two-day educational session and make key strategic decisions for Fund A</td>
<td>Draft the new SIP&amp;G</td>
<td>De-risk through overlays and engage defensive and infrastructure managers</td>
<td>Complete new bond manager searches</td>
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<tr>
<td>New service provider contracts executed following legal review, while A/L study and risk analysis conducted</td>
<td>Plan the fiduciary education session</td>
<td>Identify the challenges and conduct implementation manager RFP</td>
<td>Approve SIP&amp;G, do structural analysis, identify manager short list, and select defensive equity and global listed infrastructure managers</td>
<td>Allocate additional monies to global listed infrastructure</td>
<td>Effect physical transition and bond manager reconfiguration to attain asset policy mix</td>
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That's all fine and good, but you may ask, are there any measures to qualify that this implementation was a success? There are several:

1. First and foremost, the plan, as agreed by all fiduciaries, successfully reduced risk by:
   > substantially modifying the risk profile rapidly though overlays,
   > setting and achieving the new target strategic asset allocation within nine months, and
   > lowering tracking error to policy throughout the implementation process.
2. During the six-month overlay period, Fund A's total assets with the overlay outperformed Fund A's total assets without the overlay by $8 million (net).
3. The physical transition yielded a cost savings of $0.9 million or 19 basis points (gross).
4. The added value through active management from the global listed infrastructure multi-manager structure was $2.8 million gross (and the returns from real assets and bonds outperformed equities) over the six-month period.

In short, the new fiduciaries at Plan A made many good decisions in their first year together, with limited staff, augmented by several outsourcing agents. As an update, the remaining plans (B, C, D, and E) still are invested aggressively in the original commingled fund but are believed to be contemplating similar change.

Were any lessons learned or could this case have been handled better? Perhaps, but no major deficiencies stand out in the authors’ minds. That said, consider the following key takeaways, consistent with best practice:

1. The importance of accountable governance and good risk-management practices should be an imperative for every fund.
2. That said, effective implementation should never be underestimated.
3. To make timely decisions, efficient use of the skills, tools, research, and resources available—be they internal staff or outside providers—is paramount.
4. Having a good game plan (strategy) that all fiduciaries understand (education) and a specific common objective known to all is essential (teamwork counts).
5. Good quantitative tools should assist in the risk-management process, backed by a sensible qualitative review, but there is no substitute for common sense in any risk-management exercise.

**Conclusion**

Benoit Mandelbrot would have been proud of the effort put forth by all participants in this case study. Surely, lots of other quantitative risk tools could have been utilized. But at the end of the day, striking the right balance of education with the level of fiduciary understanding is just as important and often lends itself to a sensible result.

Risk management is not about precise accuracy, but rather being directionally correct and recognizing a catalyst for change. At any rate, it’s not the number of risk tools that count, but rather the insight provided. Having a sound rationale and timely implementation often win the day. Ultimately, good old-fashioned common sense should prevail, as it did in this decision by Plan A to de-risk and further diversify. The staff, in particular, should be congratulated for their exemplary efforts in bringing this planned metamorphosis to fruition under such tight time constraints.

Certainly every risk case is different, but hopefully this particular study and the key principles applied also can be useful to others.

**Disclaimer**

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**References**


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