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Legacy to Agile: A Case Study in Data Innovation

Driving change at UC Investments, a $125 Billion Pension and Endowment

Powered by Solovis

About UC Investments

UC Investments oversees the University of California's investment portfolio, including its endowment, pension, retirement savings plan and working capital, totaling $125 billion AUM. The portfolio spans both private and public assets, with a glide path to grow the proportion invested in alternatives. UC Investments manages seven unique products which include:

- 10 university campuses, five medical centers and three national labs
- An Endowment serving 280,00 students with 6,044 funds
- A Retirement savings plan with 320,000 individuals
- A Pension plan with 241,450 members
- Short-term investments with $84 billion in cash flows annually
- A captive insurance plan with $466 million in annual premiums and 44 coverages
- A Blue and Gold Pool with over $1.3 billion contributed by campuses and foundations

Executive Summary

Rapid transformation within a large institutional investor is complex and some believe unattainable. Two organizations came together to prove otherwise. UC Investments oversees a $125 billion multi-asset class portfolio for the University of California's various investment products, including its endowment, pension, retirement savings plan and working capital.

Solovis is a leading fintech innovator, providing institutional investors with a powerful cloud-based platform for multi-asset class portfolio management, reporting and analytics uniquely designed for limited partners. This paper presents key learnings, insights and fundamental considerations that other asset allocators can benefit from as both inspiration and justification for undertaking a technology, data and process transformation journey.

THE PROBLEM

This piece aims to address a rising challenge facing the pension, endowment and foundation industries – how to transition from the legacy technologies that suited the market of the past to a more holistic, agile technology framework that will meet current and future demands. Most industry participants believe that you build or buy software or a service to solve for a specific problem. If another problem arises within a different area of the business, you obtain more software or services to resolve that new problem. This perception is no longer reality – hence continued frustration on the part of those who attempt to apply old solutions to new problems.

THE JOURNEY

The continued proliferation of escalating market complexities related to investment data, regulation, servicing needs, alternative forms of investing, outsourced manager relationships and other dynamics mandates innovation for long-term agility and viability.

Concepts covered in this paper include:

- How internal stakeholders must collectively recognize and gain consensus that the status quo is hindering growth and achievement of the organizational mission.
- How and why current industry solutions fall short, including those in three categories: service providers with a technology layer, accounting platforms and performance systems.
- True innovation requires a revolutionary perspective, one that isn't just a modified version of past mistakes. It must align people, business processes and technology.
- Innovation can be achieved relatively quickly, even within the largest institutions.

THE SOLUTION

A successful approach isn't about finding a single application or single service provider that "does it all." It's about an organization's ability to clearly envision and agree to the desired end state; and then finding a framework that can quickly and accurately pull investment data and processes together, across all asset classes and across all teams, in an intuitive way for all constituents to leverage. With a commitment and dedication to change from both organizations, UC Investments and Solovis were able to accomplish this in one year, proving that even a $125 billion pension and endowment can transform quickly.

Introduction

There is a mounting challenge facing the pension, endowment and foundation industries – how to transition from the legacy technologies that suited the past to a more holistic and agile platform that will meet current and future demands.

Combine the demands of increasingly sophisticated stakeholders, the growing need to blend outsourced and in-house investments, and the complexities of managing alternative investments such as private equity and hedge funds – and you have a perfect storm of forces propelling the industry to change. In this paper, we outline some fundamental considerations pensions and endowments must be aware of in order transform their technology, data and process infrastructure to address these forces head-on.

The reflections and findings shared in this paper are the result of a one-year effort by the Regents of the University of California Office of the President, Office of the Chief Investment Officer, hereafter referred to as UC Investments, to

1. Create a data platform for all private assets (private equity, absolute return, real estate and real assets) that rolls up, along with public assets, to the total fund view.
2. Streamline communication and information sharing across departments from front to back offices including risk, compliance, and reporting.
3. Overhaul a legacy technology infrastructure that was costly and insufficient.

UC Investments oversees a $125 billion (at the time of this writing) multi-asset class portfolio for the University of California's various investment products, including its endowment, pension, retirement savings plan and working capital. The portfolio spans both private and public assets, with a glide path to grow the proportion invested in alternatives.

We start with the issues and internal value proposition of making a change, as this is the foundation any organization will need in building a business case for process innovation and technology transformation.

THE ISSUE

Many people believe that software in and of itself is a panacea. License a platform explicitly for an issue and all your problems float away. While marketing departments around the world want you to believe it's that simple, it never is. The word "technology" itself is defined on Wikipedia as "the collection of techniques, skills, methods and processes used in the production of goods or services or in the accomplishment of objectives."

The on-demand world of today views technology as software applications that deliver instant gratification. But the reality in the institutional investing world is that, while software does solve a host of issues, there are many other considerations at play. In this paper, we will break down the necessary techniques, skills and processes that are critical to evolving an investment organization from an ad hoc data consumer to a high-value capital innovator on behalf of their investors. We will do this in context of the UC Investments technology implementation.

The start of UC Investments' innovative technology modernization journey was the fundamental need to streamline the complexities of managing a multi-asset class portfolio

while also addressing the perspectives and needs of multiple constituencies. For the sake of brevity, we will group these constituencies into three personas – investments (asset class and total portfolio separately), operations and risk. Each persona has sub-personas, and each has a unique way of leveraging the same core investment information.

What makes the world of asset owners so complex is the lifeblood of any technological endeavor – data. Unlike a trader leveraging Bloomberg or an equity analyst using FactSet, asset owners have no single, standard data source. As a result, they are continuously faced with poor data quality from third party systems or spreadsheets that lack standardization within and across asset classes. This results in a constant effort to modify and shuffle data from one application to another depending on the need or desired view(s).

In addition, asset owners are victims of convoluted, outdated manual processes – resulting in endless frustration. This is because the starting point for most data requests is data from the custody system(s), which has proven, over and over, to be insufficient for investment decision making. The global investment custodians have an oligopoly on the institutional asset owner market. The majority stuck in this loop share the conjecture that "this is just the way it is." Asset owners beware – if data is the lifeblood, you are starting with anemia.

However, in its quest to modernize, UC Investments discovered that, in fact, the status quo is no longer necessary. By seeking out an innovative technology partner willing to disrupt existing paradigms, UC was able to make data inconsistencies, irregularities, undocumented assumptions and just flat-out-wrong data, things of the past. While at the same time streamlining processes and providing a holistic portfolio view uniting investments, operations and risk teams.

VALUE PROPOSITION

Recognizing that the status quo was not going to enable the growth and sustainability desired, key operations and risk personnel for UC Investments took a unique and arguably, revolutionary perspective to their information problem. Arthur Guimaraes, COO of UC Investments, posed the question: *"If we started from scratch today, given everything we know about computing, the cloud, calculations, business intelligence and other modernizations available to us, how would we build the operational backbone of a $125 billion investment office that would best support the investment and philanthropic mission of the organization?"*

Joining Guimaraes in this quest was Albert Yong, the head of data and analytics for UC Investments. The two had previously worked together at a large pension in Canada. There, the team implemented a large consortium of the who's who of legacy technology providers – at the cost of a multi-million-dollar annual fee and tens-of-millions in implementation costs.

Determined to truly live the UC Investments 'Investment Beliefs' way of "Innovation Counts and Costs Matter," Guimaraes and Yong debated the core challenge: how to address the need for timely, accurate data combined with flexibility. They concluded that a single, consolidated, reconciled, and transparent dataset was needed. Additionally, they needed the ability to pull data just as easily they can push it into the system.

The innovative value proposition that drove the ultimate business case for UC Investments' transformation included the following needs:

1. A single source of truth for "core data." Here, we define core data as the combination of internal and external flows and exposure data that serve as the foundation for the accounting books of record (ABOR) and investment books of record (IBOR).
2. The ability to support the needs of each persona across asset classes, products, as well as the CIO and board-level constituents.
3. The fundamental need to trust risk assessments. How could you accurately assess risk if assumptions, processes and data are constantly being questioned?
4. An efficient way to manage multiple pools of capital. UC Investments needed to solve asset allocation problems based on a defined benefit plan, defined contribution plan, endowment portfolio, captive insurer and other pools of capital all investing in many of the same assets, independently and uniquely.
5. The need to overcome poor historical data. By UC's own admission, the last "spring cleaning" of investment information had been in 2002; when they on-boarded a new custody accounting system.

Other, more general benefit considerations included:

1. Agile, innovative technology – The need for a flexible framework to eliminate silos.
2. Lower cost structure – Budget constraints and rising costs that had to be addressed.
3. Ability to do more without adding staff – to scale and manage the market forces.
4. Increased flexibility and agility – The need for more timely information, formatted for a variety of stakeholders on demand.
5. Improved accuracy – The more the investment team uses the system, the more eyes on the data!

THE JOURNEY

As we previously alluded to, in the early 2010s, Guimaraes led the technology overhaul of a large Canadian pension plan, drawing on multiple technology providers who at the time represented the best of breed. The outcome was an expensive, almost three-year implementation that yielded accounting-oriented reporting, with limited access to data useful to investment decision makers.

Fast forward to today. This time around, Guimaraes and Yong took a different approach. They took a chance on the latest innovative technology and disrupted process paradigms. In doing so, UC Investments was able to implement an accurate accounting book of record and a near real-time investment book of record across all pools of capital, asset classes and stakeholders in just a little more than one year–including a complex data implementation and transformation of its risk system.

PART I: THE JOURNEY TO THE RIGHT TECHNOLOGY

The technology journey started in early 2017 when UC Investments decided to take a novel approach to selecting software / service providers to assist in delivering an accurate investment book of record. The evaluation of technology alternatives and service providers was not straight forward. It required an extensive evaluation of legacy players and a willingness to dig deep beyond marketing hype.

The team at UC Investments scoured the investment management landscape for systems, both legacy and modern. Names included eFront, Addepar, SimCorp, Eagle, custodial systems, Blackrock Aladdin, FactSet and many others. The goal of this initial evaluation was to understand the technology and services offered by the vendor landscape.

What became abundantly clear to the UC team was the fact you could bucket virtually every investment management system into one of three categories:

1. Service providers with a technology layer.
2. Accounting platforms.
3. Performance systems.

Service Providers with a Technology Layer

For years, the allocator industry has relied heavily on the service provider organizations (think custodians and administrators) for assistance with data aggregation, accounting and performance. It is a logical transition. Before 1990, most institutions were oriented around custodied stock and bond portfolios. But as a result of the industry's gradual transition to external managers in commingled limited partnerships and the rise of alternatives, the large service providers have been caught flat footed. Outdated technologies, bolted on software per asset class and reconciliation processes that are, quite frankly, terrifying to the well-educated, are all the norm. None of these represented the agile solution UC Investments sought.

Accounting Systems

Next, UC evaluated accounting systems. These systems have dominated the global large pension, sovereign wealth and insurance industries for many years. They are, at their core, workhorses. There is little data you can throw at one of these heavyweight accounting platforms and not get an answer. Unfortunately, if you don't have a multi-million-dollar annual budget, including millions to dedicate to professional services, a large IT development force and a desire to work with massive data warehouses with limited flexibility, you are out of luck. These systems also fail to consider that the modern world of multi-asset class investments is very different from an accounting world; Investment teams, for example, don't operate on accounting paradigms (think restatements, valuation timings, and operational workflows).

Performance Systems

Performance systems are the old IBORs. They are typically cash flow-based applications as opposed to ledger-based applications. Most modern "investech" applications fall into this bucket; however, most of these applications are asset class-specific point solutions. These points solutions target private equity, direct security, fund of funds, wealth management and

other niche targets. In keeping with their niche focus, many of these systems are "vertical-specific" application sets, which espouse "portfolio management and relationship management" components. While asset class-specific systems have valuable capabilities, they are, by objective and by process, dislocated from the more holistic view that is the reality of a multi-asset class portfolio. Generally speaking, asset-class systems are oriented around due diligence, asset tracking and GP-specific numbers. They rarely consider the reality of performance and actual outcomes for investors and do not support decision attribution, overall risk, CIO views or cohesive reporting. In addition, performance systems are almost always either significantly or exclusively software-only solutions. They provide limited or no data assistance and do not offer reconciliation services of any magnitude.

Any of these choices promote significant additional staffing, heavyweight solutions surrounded by lighter weight solutions, inconsistencies and in the end, legacy function valuable only to a single constituency and not the entire organization. The team at UC realized this and searched further for a more innovative solution that would effectively create shared ownership, cross-org consistency and serve multiple masters. After ruling out these three legacy technology categories, the UC team looked to a new category of investment technology – emerging leaders in multi-asset class portfolio management technology. A very small group of technology vendors was gaining growing market share in the limited partner community as a result of a unique focus on the needs of asset allocators. These new players offered lighter weight platform footprints that leveraged modern cloud platforms and flexible software architectures.

One quickly rose to the top of the selection process – Solovis.

Solovis emerged to the top for a long list of "winning reasons" that can be grouped into the following:

- Depth of functionality for analyzing and reporting on all asset types and ability to house private and public assets on one platform
- Ability to deliver true IBOR capability, including direct performance calculations that proved to be more accurate than those supplied by the incumbent custodial and risk systems
- A powerful set tools that supported on-demand portfolio analysis from any angle
- An analyst services team that could serve as an extension of UC's data operations team centralize the collection, aggregation and reconciliation of data
- An attitude of true partnership!

At UC, Solovis became the core of that platform, with its open APIs enabling easy communication with other elements of the ecosystem. Make sure any vendor you choose can quickly and intuitively work with outside information and other technologies. Most importantly – remember you own your own data.

PART II: THE JOURNEY TO THE RIGHT PEOPLE & SKILLSET DEVELOPMENT

In addition to evaluating technology, UC Investments conducted a skills analysis across vendors and service providers, as well as evaluating internal skillsets.

One of the reasons software implementations inside of organizations in any industry fail is that software implementations are very similar to building out a team – you must have a vision for how and why software and services fit within your organization. There are always tradeoffs to build vs. buy or system vs. system. One of the key reasons UC Investments was successful in its transformation journey is that the internal team signed off on a charter led by the entire leadership team, including asset class heads and functional heads. Everyone was fully aligned with the go-forward plan, and there was a project charter document everyone could turn to if necessary.

Categories of skills to consider include leadership, messaging, business requirements, allocation of resources, quality assurance, communication, and training and user adoption.

Leadership

Change must be enforced from top down and with buy-in from the team. One of the key reasons UC Investments was successful in its transformation journey is the strong leadership and a signed project charter that governed the behavior, decision making process, and the general go-forward plan for the team. Guimaraes and Josh Smith, Solovis CEO, were the executive sponsors and drove project success, along with trusted subject matter experts (SMEs) by their sides.

Messaging

Once a decision has been made, it is critical messaging is handled appropriately. In the case of UC Investments, the operations team created a detailed project plan, with operations and investment go-live milestones across each of the individual asset classes. There was also a careful consideration on the 'Go-Live' strategy where simplest asset class with the shortest history went live first, to show value immediately.

Business Requirements

It is important to have a clear segregation of tasks between a) software, b) UC personnel, and c) outside personnel. It is also critical to not "pigeon-hole" or extend software and services beyond their intended purpose without significant conversation and involvement from the vendor and client stakeholders. Asset owner organizations must recognize the difference between custom development and configuration. It is important to avoid and reserve the former for only when necessary situations.

Allocation of Resources

There is no magic recipe for allocation of resources given point solution implementations can be very different from portfolio-wide implementations. What we have found to be most effective in implementations is a person dedicated to answering questions and emails directly, executive management time at least once a month, an internal client resource (who may be the same person answering questions) who has compensation (such as a bonus) tied to execution

of the project, and most importantly, someone who can make decisions on a case by case basis. What is abundantly clear is that depending on the size of the organization, these roles may change and are fluid, however; it is important to have consistency and the voice of an internal champion regularly present across the organization. We would consider the consistent presence of an empowered person who can make regular decisions to be the most important role in the success of an implementation. Them having a vested interest in the success of the project is a close second.

Quality Assurance

The most successful implementations are organizations who promote quality assurance, processes and controls around inputs and use of data and have a true "investment operations" function. A true investment ops function views their client as the investment personnel. The investment personnel on the flip side, respect the processes and controls necessary to ensure that data is correct not only mathematically, but economically as well. A key factor in Solovis' credibility with UC Investments was its ability to dig into the data and existing systems and uncover errors – flaws in data that had previously been taken at face value as the truth.

Communication

Overarching the entire process is communication. Effective communication at all levels of the organization and vendor/client relationship is critical. Ad hoc communication almost never works, and we've found that structured conversations with set meeting times, topics and at multiple levels of the organization are necessary for success. UC Investments introduced a very formal steering committee process to Solovis. Asset class heads, executive leadership from both organizations, and a formal board structure created a reporting and accountability relationship that held everyone accountable. These conversations took place once every two weeks, then once month and now every two months. Minutes are taken and are sent to everyone for approval. Intra-steering committee calls provide weekly check ins with project teams across the organization. These calls are not ad hoc. Failures, planning, cadence and tasks are laid out. Ad hoc meetings are regularly called for communicating blockers and issues with achieving weekly deliverables.

Training and User Adoption

Once an implementation is complete, it isn't. In every implementation you are re-training how people work. Arguably, the intensity of training and user adoption monitoring can be extensive the software implementation itself. It is critical to understand the vendor and client adoption and training program. How does it work? How is feedback responded to? Who is leading the training? How long is the vendor onsite? What are the expected costs associated with changes and additional services? Does the software allow you to track usage? Does my team just leave? This information is not only critical for return on investment, but it facilitates documentation of what questions are being asked and how are they being answered. This allows the organization to evolve and grow. Why? Because you uncover blind spots and focus points, leveraging and expanding this information creates better fiduciaries.

PART III: THE JOURNEY TO FLEXIBLE, SYNCHRONIZED PROCESSES

We've explored the technology and people skills aspects of the transformation journey. Now we discuss the importance of processes that leverage the power of technology, empower people and enable the full realization of strategic objectives.

For any organization that desires to disrupt the status quo and deliver meaningful, lasting change, it is necessary to start by understanding the starting point. UC Investments took the time to create two diagrams showing its historical state and desired future state. While the diagrams were simply high-level process and system flows, they provided a visual goal that everyone could rally behind.

After the implementation was complete, they served to illustrate the depths UC went to in order to deliver a holistic platform that included performance, aggregation, reporting, and exposure –all powered by Solovis. For every one of these high-level processes, there are numerous underlying processes.

The good news is, you are not alone in this challenge. Asset allocators across the country face similar inefficiencies. By Solovis' estimates and experience, the average organization could reduce process touch points, issues and reporting times by over 75%. **In the specific case of UC Investments, even with the investment in Solovis, the expected cost savings of the implementation over a decade is projected to be $2 million per year.**

There are several lessons learned and best practices to keep in mind on the process front:

1. **Fit processes to desired outcomes, not outcomes to processes.** We've all heard phrases like "process for the sake of process" or "technology for the sake of technology." These constructs are very real. Outcomes can be as simple as "we want an estimate of our total portfolio performance by the second business day of each month." That one statement begs the questions "what amount of information do we have access to on the second business day, do we have the staff to execute, how often do we restate performance?" It is critical that a solution vendor has the flexibility to support the right processes for your organization and not force you to conform to the technology.

2. **The five-yard line rule.** It is incredibly important to know what outcomes are acceptable and good enough from the five-yard line vs. the ones you must punch into the endzone. Others may know this as the 80/20 rule. A specific example of this at UC Investments is its revamped risk process. UC Investments has a fiduciary responsibility to provide risk reports by the end of every month. In order to do this, data must be collected from all investments, including custodied investments, commingled investments and everything in between. With exposure, NAV and positions updating on different timelines for different assets, acquiring consistent data updates to 100% of the portfolio is virtually impossible.

   For UC to perform its duty, the Solovis platform was required to deliver a risk file by the eleventh business day of every month for consummation by the Blackrock Aladdin system (an important part of UC Investments' ecosystem we referred to earlier). To enable

this, Solovis implemented processes that define data cutoff and roll forward periods with related reporting. This gives the risk team transparency to potential issues and qualifiers for further analysis. This is a great example of working towards an outcome and setting up processes that achieve that outcome, even when exceptions to rules arise. If exceptions are recognized and flagged, they are totally acceptable and quickly managed.

3. **Flexibility and scalability.** There are a lot of rigid systems out there, but modern, agile technology promotes flexibility and configurability on a user-by-user and organization-by-organization basis. This promotes conformance to your unique goals and investment views as opposed to conforming to rigid technology constructs. If a given technology cannot address your desired business and operational outcomes, don't buy it.
4. **Break up larger problems into manageable segments.** If UC tried to attack its entire investment and operational processes at once, or implement every asset class concurrently, it never would have worked. What are your key process drivers? Is your organization set up to be asset-class specific or generalist? Are you more investment- or operation-oriented today – and is that how you want to stay? What software do you already have in place, what do you want to keep and why? Do service providers currently facilitate some functions? Answering these questions can help you identify how to segment problems into more manageable solutions. This will ensure continuous progress is made, the team feels momentum and results are measurable; and you realize the benefits of the new system faster.
5. **Align your processes to the goals of the investment office.** Oftentimes, investment offices don't think like businesses. Their sole goals are to invest well and grow money. Investing in people, process and technology as part of this overall mandate should be as much a conversation for the trustees and investment offices as it is for boards of companies. Creating scale for outsized returns should be a top priority for all investment offices.

PART IV: INNOVATION AND WHAT IT MEANS

At the core of the decision for UC Investments was how to be innovative in a world where the status quo just wasn't good enough. Solovis entered discussion with UC Investments well after their evaluation process had started. As Guimaraes would say, *"the second I saw a drag and drop recalculation of an entire investment world with total asset class reclassifications and shifts, I knew that Solovis was not the status quo."*

Examples of questions to ask that will help you measure true innovation, include:

- Ask your custodian how a new performance composite is created. The largest players in the space will say they do it through technology. Don't take that response at face value. Ask to see it done live. What you will find is a "wizard behind the curtain" reality – there are people with spreadsheets or at the very best, a technical interface, that must manually add the new asset classes to a list of potentially hundreds of reporting constructs. The process therefore is, "pick up the phone and call," explain your needs, wait a few days, and then test the results. This is far from the drag and drop recalculation expected from above.
- Consider how other reports and portfolio insights are generated and how long it takes. In the case of UC Investments, across systems, generating the risk package resulted in a black hole of up to four days for processing and verifications. Ask for any changes (like adding a new fund manager) and it will take up to two weeks. This is not technology innovation – this is manual inefficiency.
- Ask private equity systems vendors to show the since inception transactions and valuations, and their impact to both IRR and TWR. Take out the stopwatch and measure how long it takes.

When asset owners deploy a large portion of the assets globally, why do they assume spreadsheets are the best option and rely on legacy banks as the predominant data sources and analytical engines? The reality is, that this paradigm is no longer sustainable. Large pension fund – and other asset owners – need better, more agile and innovative frameworks to ensure long-term viability.

It is time for asset owners to recognize the need for holistic change – innovation throughout all levels of the investment cycle, both externally and internally. Going back to our opening statement on technology – technology is not just a piece of software you can install to make everything better. The more pieces of software you install with uncontrolled processes and owners of data, the more siloed and difficult it will be to feel confident in answers at all levels of the organization. UC Investments knew software was a core piece of what they needed to be successful. They also knew from past experience that an agile, collaborative and process-oriented approach would reap the most benefits.

True innovation and a break from the status quo are paramount to being successful investors. The UC Investment Office is an early adopter of a holistic approach to technology – one that will reap tremendous ROI for years to come. And UC Investments has proven that even a $125 billion pension fund can transform quickly – within one year – when provided with the right technology framework and a unified commitment to change.

The Solovis institutional investment management technology platform enables detailed analysis and dynamic data modeling across multiple portfolios and pools of capital for actionable, transparent insights that empower both operations and investment teams.

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About Nasdaq Asset Owner Solutions:

Nasdaq Asset Owner Solutions offers the institutional market's only comprehensive data, analytics and decision-support platform ,pre- and post-investment, across public and private markets. Combining eVestment's due diligence capabilities for public and private markets with Solovis' multi-asset class portfolio analytics, Asset Owner Solutions delivers the power and insights asset owners need to effectively manage multi-asset portfolios while balancing strategic objectives related to performance, exposure, risk and liquidity.