

Whitepaper Modern Engineering Practices in Finance

Introduction

Practices have emerged in technology organizations over the last two decades to assist in the management of portfolios of applications and data. These modern practices have significantly benefited productivity. Financial business processes, particularly financial modelling and operational reporting can benefit from similar practices.



Consulting Services Specialing in Actuarial and Financial Technology



The Status Quo is Suboptimal

There are many productive financial organizations whose status quo is suboptimal. Financial engineers develop sophisticated models and manage large amounts of data. However, these engineers often manage their models and data without the technology or process support taken for granted in modern technology organizations.

Sub-optimal practices include:

• Manual execution of financial models, and the use of Excel spreadsheets to fill in gaps in models and process

- Manual version control of financial models and data
- Management of any number of self-authored automation scripts that are run from individual development workstations
- Lack of change tracking to financial models or data, or the tracking is manual and relies on best-effort

- Manual manipulation and transfer of production data
- Manual coordination of computing resources and how they're shared across the organization
- No automated audit log of change across all aspects of a business process

These experts are simply unaware of better practices or believe that adoption of better practices would impact their productivity or result in a loss of control. Additionally, IT professionals are often seen as slow and expensive.



Modern Engineering Practices

There are many practices that have emerged from technology organizations that can benefit financial teams. Here are the practices we think are most important:

Automation platforms

Financial experts realize the benefits of automation, but automation is often one-off and poor quality. Automation platforms are available that can centralize the authoring, management, and execution of automation jobs. Automation platforms can serve as a focal point for team coordination and collaboration.

Version management

A broad approach to version management is an important first step that can create a platform for organizational improvement. Version management should encompass applications, models, automation scripts, configuration, and data. Good version management can be a powerful tool for model development, change control, and auditing.

Model Development Practices



Operational Practrices



Feature flags

Feature flags are switches added to an application or model to enable or disable features (or other changes). This is useful when adding capabilities that aren't ready to be used. This also allows you to enable or disable functionality for isolated testing of changes. Feature flags can be used synergistically with continuous integration, where application and model changes are hidden from others until ready for use.

Automated testing

Automated testing has perhaps had the biggest impact on software development in a generation (perhaps second only to cloud computing). In software, automated tests provide checks that the software is functioning as designed. These tests can be run at any stage in the development lifecycle and help

Change management

Change management can provide a single view of change across a business process. When workflow, financial modelling, and data management are included in change management, it can enable higher quality as well as serving as a source of information in problem investigation. Change management also supports regulatory requirements.

Continuous integration

This is a practice where parallel changes to software or models are continuously merged into a single primary "branch". Instead of having costly tasks at the end of projects in which multiple model changes need to be combined, continuous integration is the practice of continually combining changes that may still be in progress and immediately resolving conflicts. This results in individual changes being less risky and replaces large feature-size merges at the end of projects with many daily micro-merges. ensure high quality as well as decrease the risk of bugs being introduced from changes. When applied to financial modelling, automated tests can be authored that check the correctness of the financial model results. These tests can be run at a function level or can be run against the results of a full end-to-end financial reporting cycle. Automated tests can be integrated into the financial reporting cycle to provide early warnings of erroneous results. Also, because they are automated, they are inexpensive to run after each changev.



Modern Engineering Practices (cont.)

Health model

A health model is a model of the health of an application, service, or business process. Establishing a meaningful model of business process health can be a valuable tool for keeping a business process running smoothly. The health of a business process is determined by the health of its component parts.

Operations specialists

When the operation of a business process becomes complex, it makes sense to have operational specialists. This allows financial model engineers to focus on higher value activities.

Centralized Tracking and Management of Issues

There are effective ways of managing and tracking issues,

Each component that makes up a business process can be monitored to ensure it's working correctly. Together with a health model, monitoring can be a valuable function to ensure highly reliable business operations. Alerting is the automatic communication of potential problems

alerting



called incidents. An incident is any issue that potentially needs investigation. If an underlying problem is found, it is also tracked (often just called a bug). There are many applications available that support incident and problem management. These can be applied to model development and data management, with

in the process that should be investigated.

Secure development lifecycle

When security is important it should be included in all stages of the business process development lifecycle. The secure development lifecycle is an example of a framework for securely developing applications. Applied broadly, this can be brought to include changes to models and data management.

Auditing

Maintaining an audit trail of all production activity throughout the delivery lifecycle has become standard practice in all critical information systems. This can support regulatory compliance and is often required by security policy. Most information platforms support auditing capabilities out of the box.

strong synergies with version and change management.

Metadata management

Data management will be increasingly important and may today be the most important function of many financial teams. Metadata management is the management of the structure and other attributes of this data, such as the provenance and version. Effectively managing metadata is a valuable capability.

Modern project management

Agile methodologies have transformed software development and influenced many industries. Agile emerged as a reaction to the waste typical in traditional project planning. However, agile does not fit every business problem, especially when requirements are well-known, or there are fixed budget and time constraints. Balancing the practices of agile and traditional methodologies is critical to modern project management.



Synergies and Dependencies

There are many synergies between these practices. For example: version management, change management, and incident and problem management are a strong combination and there are tooling to support these practices together. Attempting to introduce change management without version control is difficult. There are many such synergies and dependencies in these practices. Adoption plans should take these into account.

Partnership and Cross-Functional Teams

These practices are not singularly financial or technical but require partnership between subject matter experts with different backgrounds. Cross-functional teams with different skillsets can help foster this innovation, where financial engineers, automation experts, and data experts work alongside each other towards common objectives. Foster an organizational structure and culture that encourages collaboration between disciplines.

Path to Adoption

Develop an adoption roadmap specific to each team. Each roadmap should be based the team's current capabilities and practice maturity. For each practice, set a target level of maturity and an incremental improvement plan. Each incremental improvement should be justified by an incremental benefit. A dedicated modernization team can support multiple teams and help develop these roadmaps, train and evangelize practices, establish common tooling, and provide expert services to other teams.





Benefits

There are many benefits to these practices. Direct benefits include more effective development, more efficient and reliable operations, greater security, and regulatory compliance. Indirect benefits include freeing up your financial experts from managing technology and data and focusing on higher value activities.

Technology Investments

In addition to these practices, the following technology trends are impacting finance:

- · Cloud and hybrid-cloud architectures
- Big data platforms
- Data factory, data warehouses, data marts, and data lakes
- Event-oriented architectures and application integration
- Service-oriented architectures and microservices

These investments can increase productivity, but we recommend establishing modern technology practices first. This will put you on a good foundation for organizational change and increase your probability of success with larger technology initiatives.

Challenges

There are challenges to the adoption of these practices. For one, the complexity of the financial domain is a barrier for experienced IT professionals. Unless you have relevant experience, the complexity of a financial modelling organization can be overwhelming. This is frustrating to financial engineers and leads many to a do-it-yourself approach to technology. This is itself a challenge. Financial experts are highly intelligent and able to approach many technology problems; however, they often develop sub-optimal solutions that function but are not maintainable or scalable due to lack of consideration of modern engineering practices.

There are additional challenges with engaging in-house IT staff who can be slow to respond and may not be as up to date on these practices compared to their counterparts in technology companies.

A last problem is that there are truly difficult technical challenges that are uncommon outside the financial domain, such as rapidly changing regulatory and reporting requirements, and large computational and data needs.

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Low-Hanging Fruit

Here are some straightforward quick wins. Adoption of these practices is well-established, and a rich ecosystem of tools is available to support them.

Version Control – Version control key assets (model, configuration, data).

Change Tracking and Bug Management – Start using an application for tracking changes to models, configuration, automation scripts, and data. The same application can be used to track incidents and bugs.

Automation Platform – You don't need to rewrite your automation to take it to the next level of maturity. Moving your existing automation scripts to an automation platform where the scripts are centrally executed can be a big step up in reliability and collaboration.

These three practices are simple and can result in significant increases in productivity and quality and serve as a first step towards more sophisticated work habits.

Risks of Non-Adoption

We see the risks of non-adoption in two main areas: operational risk, and the risk of missing future opportunities. Operational risk is simply the risk of errors in financial results. A potentially larger risk will be the risk of not being able to realize future waves of disruption. Technology will undoubtedly continue to become more essential to all business. The benefits of emerging technologies such as artificial intelligence (AI) will be realized by those organizations best positioned with their applications, data, processes, and skillsets to take advantage of them.



About The Authors

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About Lenalysis

Lenalysis is a technology consultancy specializing in financial and actuarial software. In addition to application development services, Lenalysis can provide cloud, data, and process expertise to help transform your financial team.

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