



Darwin's Actuary

The current pace of technological advancement is unprecedented in the history of humanity. This brings with it a wealth of opportunities that can and should be exploited by actuaries. Taking advantage of developments within other subject matter areas is key to developing and enhancing the actuarial profession. As an example, significant advances in the tech industry have been made in the last decade, in both tools and techniques, that can be applied within actuarial work. By adopting some of the best practices from the tech industry we can optimize how actuarial teams operate and introduce a new way of modelling we call next-generation modelling, in which everything is carefully source controlled, continuously and automatically tested and integrated. In this article, we will discuss these best practices and how this new way of working will not only redefine how we build and test models, but ultimately how it will redefine the scope of our capabilities as actuaries. Actuaries should spend less time on inefficient processes and pure number production. Rather, we should spend more time on analysis, to discover insights and add more value, to become an Exponential Actuary™.

A clear shift has emerged within the insurance industry with investments in new technologies and a focus on cloud computing. This is driven by the need for increased scalability, as well as the need to shed fixed expenses. We consider cloud computing as the basis of the future modelling landscape, which is envisioned as follows:

1. A standardized data model set up, including clear cut data formats, discrete (calculation) processes and pre-defined data fields;
2. An API set up to facilitate connectivity between the components in the calculation process.

To ensure full value is extracted from the implementation of these new technologies, we firmly believe that any new development should be rooted in a strong foundational framework. This asks for a change in way of working and thinking, which is envisioned in the Exponential Actuary™ framework.

THE EXPONENTIAL ACTUARY™ FRAMEWORK

We believe that a framework based on a set of core principles should form the base of future actuarial processes and systems. These principles are:

Scalability

Any new development or environment should be inherently scalable. The demands and pressures on actuarial teams have increased in recent years and we expect this to continue as businesses become more data driven.

Maintainability

New developments and environments should be easy to maintain and should have maintainability as a core requirement of their design.

Robust environment

The environment should be robust and can consistently stand up to the rigour of an audit review.

Improved processing and capabilities

The latest technology and methodologies should be embraced to accelerate the processes and capabilities within actuarial teams.

Agile environment

The target should be an agile actuarial environment that can adapt and thrive in a fast-paced world.

The purpose of this framework is to ensure all actuarial work is rooted in a stable and automated base. This will allow us to differentiate ourselves by adapting and accelerating our capabilities, working more efficiently and providing valuable business insights.

BEST PRACTICES

To achieve this, we have analysed core concepts that differentiate technologically mature companies from traditional insurers and how we should incorporate their core concepts into our work as actuaries.

One such concept identified is a DevOps¹ way of working. DevOps principles require that a team that is involved in both development and operational tasks. This is something that actuaries are all too familiar with in their traditional roles of model building and reporting. In the remainder of this section, we will discuss some of the core concepts relating to new DevOps practices and how they could be applied in an actuarial environment.

Source Code Management

A useful area of DevOps is Source Code Management (SCM). Several tools and techniques have been developed to enable the collaborative development of code. The framework includes structures to ensure a robust and auditable development process with checks and balances that improve the speed of delivery. This can be directly applied to model development within an actuarial environment. The following best practises are essential to maximise the impact of SCM in an organization:

- Use model branches and versioning to manage developments. SCM enables multiple actuaries to work in parallel on separate lines of development. When development is complete on a branch it is then merged into the master line of development.
- Creating a culture where developments are committed often. Increasing the frequency of commits creates a failsafe that allows the developer to revert or undo your work if required. It also forces updates to be smaller in size and thus easier to understand.
- Every commit must be completed with a descriptive, detailed explanatory log message to create a clear audit trail. The message should explain the 'why' and 'what' of the development being committed. These log messages become the canonical history of the project's development and leave a trail for future contributors to review.
- Always use the latest version of the model from the core branch before making updates. This ensures any developments are based off a stable and clean model version.
- Implement review points and continuous control management on model commits. This creates a structured development process that ensures model quality with a clear audit trail on developments.

Testing practice

Testing has always formed a big part of any model development. However, the new DevOps practices of continuous development and continuous integration have brought with them tools and techniques that enable the creation of a robust environment, with a strong audit trail. Comprehensive testing practices enables the long-term management of models and the creation of a responsible, but agile team culture. Best practices include:

- In an agile team, it is the collective responsibility of every team member to create and maintain tests.
- Code coverage metrics should be used to design tests to ensure critical components are thoroughly tested and test packages cover all relevant model functionality.
- Automated test packages are used to block commits of code to the latest version of the model if these would break the functionality of the model. This ensures that the code is always of the highest quality.
- There is a specific focus on functional and non-functional testing:
 - Functional testing includes Unit testing, Module testing, Integration testing and Regression testing.
 - Non-functional testing includes performance testing, security testing, data quality testing, scalability testing, (system) stress testing
- Each developer creates new tests as part of the test package when adding new functionality to the model. The 'acceptance criteria' or passing conditions of all necessary tests should be included in the definition and this will be used in all future developments to ensure the functionality works as expected.

CONCLUSION

The framework and the best practices discussed in this article can be used as a guide to transform the actuarial profession and our way of working. It is key that the actuarial profession is transformed to be more adaptable. We believe that in a world where the pace of innovation and development has increased and is still increasing, where uncertainty and volatility has become the order of the day, the actuary that adapts does not just survive but thrives. ■

¹ - DevOps is a set of cultures and practices that describe how we should deliver applications and platforms in a cloud-based world.

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