



Data Integrity in Financial Services

Data Integrity in Superannuation Services

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Summary

"Data Integrity in Financial Services" was firmly put in the spotlight by The Australian Prudential Regulation Authority [APRA] as a key industry issue in a recent Insight publication¹ (Issue One, 2013). The article emphasised the poor data quality current in parts of the industry, and highlighted the consequences of this to the industry's stakeholders and beneficiaries.

The article urges the sector to improve their efforts to "validate, correct, cleanse and assess the ongoing quality of data" in order to improve data integrity, which it summarises as "the accuracy, completeness, consistency, timeliness, availability, confidentiality and fit-for-purpose nature of data items."

This message was formalised in the September 2013 release of the Prudential Practice Guide 'CPG235 – Managing Data Risk'². CPG-235 provides APRA's view of what constitutes sound practice with respect to managing data risk and should be of interest to all financial market participants, especially their auditors, data experts, actuaries, policy owners and analysts, and risk managers (to all of whom this White Paper is primarily addressed).

IDIOM has developed a comprehensive platform that provides a ready to implement capability that meets and exceeds APRA's expectations. This platform, the **IDIOM** Data Management Solution (DMS), was designed for the financial services industry, and is operational in key reference sites. DMS is an industrial scale platform that is able to independently audit account databases and generate user defined 'alerts' to notify data exceptions and anomalies. These alerts can then be used to drive cause analysis and remediation workflows. DMS can also simulate, apply, and assess changes in business policy, including regulatory, market, and product driven changes.

The speed and efficiency of the platform is such that daily runs of large audit and business policy rule-sets are plausible for any scale of database. This allows cause analysis and remediation verification to be undertaken immediately following alert notification. Because of the efficiency of the platform, verification of data remediation can be left in place permanently to ensure no future degradation in data quality. When used as proposed, the DMS platform supports an independent 'data quality cycle' as anticipated by CPM-235.

The audit and business policy rules used by the platform are captured using the **IDIOM** Decision Manager, the industry's most powerful policy automation tool. It allows policy analysts and other subject matter experts to quickly specify data integrity tests using a drag + drop GUI that is 'more fun than playing golf' according to one **IDIOM** client; the captured tests can then be fully tested within the tool prior to single click deployment to the DMS platform. The rules, and all aspects of the DMS platform, are themselves fully auditable for complete peace of mind.

While DMS provides a complete solution, it is not turnkey, so that an **IDIOM** consulting engagement is required. **IDIOM** uses a highly agile approach that can be summarised as a series of small, low risk engagements, progressively moving towards a defined target that meets the broader objectives of the client in the context of CPG-235. The extent of the **IDIOM** engagement should be from 1-3 months, depending on the scale of the initial audit required. At the conclusion of this initial engagement, the Client's data quality team will be able to continue unassisted. A one day pre-engagement on-site consultancy is offered free of charge to allow clients to review the **IDIOM** tools and approach, and to assess the client's needs and potential implementation strategies.

Introduction

“Data Integrity in Financial Services” was firmly put in the spotlight by The Australian Prudential Regulation Authority [APRA] as a key industry issue in a recent Insight publication³ (Issue One, 2013). The article emphasised the poor data quality current in parts of the industry, and highlighted the consequences of this to the industry’s stakeholders and beneficiaries.

The article urges the sector to improve their efforts to “validate, correct, cleanse and assess the ongoing quality of data” in order to improve data integrity, which it summarises as “the accuracy, completeness, consistency, timeliness, availability, confidentiality and fit-for-purpose nature of data items.”

This message was formalised in the September 2013 release of the Prudential Practice Guide ‘CPG-235 – Managing Data Risk’⁴. CPG-235 provides APRA’s view of what constitutes sound practice with respect to managing data integrity and should be of interest to all stakeholders in financial institutions governed by APRA (banks, credit unions, building societies, general insurance and reinsurance companies, life insurance, friendly societies, and members of the superannuation industry).

This White Paper is particularly addressed to the executives, policy administrators, auditors, and actuaries of these organisations.

For ease of reference, relevant portions of CPG-235 have been included in the Appendix section of this document.

IDIOM’s experience in the market endorses APRA’s assertions that data integrity issues are widespread. Data integrity is a perennial IT problem affecting most industries with similar profiles: to wit, large and complex legacy systems subject to a high rate of market induced change, compounded by ongoing regulatory changes, and mergers and acquisitions.

To the extent that the problem exists but its exact dimensions are unknown, data integrity issues are difficult to quantify and resolve. By definition neither the subject data nor its current production system can be fully trusted, therefore there is no yardstick by which a simple assessment of integrity can be made. An independent integrity assessment is required. This assessment must be able to be tested independently of both the current data and the current process, and progressively expanded and applied to areas of risk until data integrity is ensured across the complete system.

IDIOM has worked with clients who have needed to remediate data going back decades, so that in our experience there is often no prior period of certainty to which we can retreat and use as a reference point. Unless an independent validation and assessment is made over the full extent of the data, past lapses can remain undiscovered, potentially to surface in the future. Because of this potential, many of our clients have spent a great deal of effort using more traditional approaches like SQL queries and bespoke reports to validate existing data. These approaches have proven to be both expensive and unreliable – they cannot easily be pre-tested, and are limited in both capability and scope. In practice, we have found errors in up to a third of the data validation tests themselves when they were eventually replaced by the **IDIOM** Data Management Solution.

¹ http://www.apra.gov.au/Insight/Documents/WEB_Insight_2013_Issue%201_FINAL.pdf

² http://www.apra.gov.au/MediaReleases/Pages/13_31.aspx

³ http://www.apra.gov.au/Insight/Documents/WEB_Insight_2013_Issue%201_FINAL.pdf

⁴ http://www.apra.gov.au/MediaReleases/Pages/13_31.aspx



CPG-235 – IDIOM's view

It is **IDIOM's** view that CPG-235 goes beyond mere validation; it explicitly requires “the assessment of the data against business rules to determine its fitness for use prior to further processing. It constitutes a key set of controls for ensuring that data meets quality requirements.” [see Appendix clause 51]

This implies more subjective tests – tests that might generate a ‘quality grading’ rather than a simple pass/fail assessment. For instance, as per clauses 51-54 of CPG-235 [see Appendix], judgment based tests might include:

- Taking into account the age of each datum.
- Assessing the quality of the data as implied by its original capture process and its source.
- Reconciling against similar/related data.
- Benchmarking against existing and/or purpose built benchmarks to highlight anomalies and/or outliers.
- ‘Reasonableness’ checks as a proxy for expert judgment.

All of these tests should be supported by an extended process that captures and records the details of the tests made and errors/anomalies found. Furthermore, having found errors and anomalies, CPG-235 suggests that the process must also be capable of supporting cause analysis and remediation. Taking all of this together, CPG-235 is implying a complete data ‘quality cycle’ that not only identifies and remediates issues, but which follows through and identifies and remediates the cause of each issue. And it must do so in a demonstrable, verifiable process in which issues are tracked, recorded, and reported.

Extended requirements

In setting the requirements for the **IDIOM** Data Management Solution, **IDIOM** and its industry partners have extended the requirements as implied by CPG-235 to include what we believe are logical extensions as follows:

Independent Platform

The solution should be able to be separated from both operational and development IT; that is, it should be operable by auditors and others who have an independent data integrity management function. This implies that it resides on a distinct operational platform under independent control. To achieve this requirement the platform requires the ability to access data from enterprise data sources (albeit in system controlled read-only mode). It must also have its own database to hold data management ‘meta-data’, including verification process data, and integrity alerts raised and their status. The platform needs explicit logical pointers not only to the operational system being audited, but to each and every entity in that system that is subject to any form of alert.

Immediate Rules Development and Deployment

The development and deployment cycle time for integrity checks and related rules should be measured in hours. If data errors are discovered, the further extent, cause, and effect of the errors should be able to be quickly located and assessed by new rules, so that remediation can be prioritised in accordance with the severity and extent of the effect as determined by these new rules.

‘Big-Data’ Processing Speed

The solution must process quickly and independently. While not mandated in the Guideline, daily verification of data integrity is desirable. This may mean auditing millions of accounts using hundreds of discrete rules per account on a daily basis. The results of the audit should be available for expert assessment and remediation activities by the start of the working day. Since the audit should follow the previous day's closing activities, this can mean a window of only a few hours. Furthermore, the audit suite should be free to grow over the long term, to make sure that ‘what gets fixed stays fixed’ (why would you ever remove an integrity test, even if you believe that the root cause has been remedied?). By implementing a daily approach, degradation in data quality can be quickly identified and remedied.

Backward Looking/Forward Looking

The priority is to ensure that the current data stock has integrity and can be trusted. We refer to this backward looking activity as data audit. When clean data has been achieved, the organisation can focus on future risks and opportunities. For instance, “does the new business policy that I am about to implement represent a business risk?”

Answering this question requires a forward looking view of the data; that is, what will the data look like following the implementation of new or changed business policy. The solution should allow forward looking views of the data as it would look under these future policy scenarios. We refer to this forward looking activity as policy simulation.

The IDIOM Data Management Solution

IDIOM has worked with its industry clients and partners to develop the IDIOM Data Management Solution to enable administrators and auditors to comprehensively and efficiently meet the challenge presented by CPG-235. Then we added simulation capabilities to allow policy owners, actuaries and analysts to undertake forward looking risk assessments.

The IDIOM Data Management Solution combines IDIOM's industry leading Decision Management technologies with an industrial strength Workbench and high performance Runtime engines to provide organizations with a large scale, secure platform that can be used to assist with Data Management on any database.

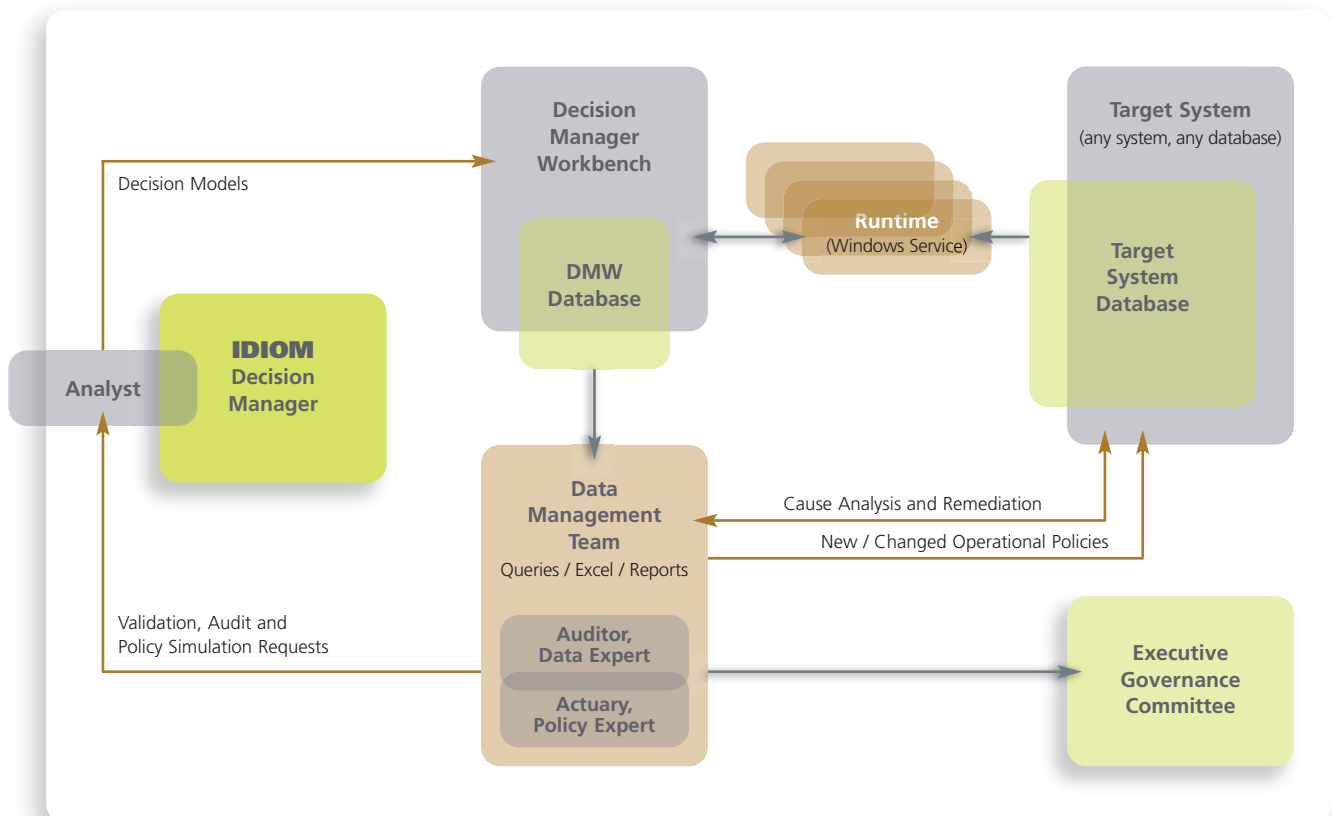


Figure 1. IDIOM Data Management Solution Overview

An overview of the IDIOM Data Management Solution is provided in Figure 1:

- The Workbench platform (shown in green) is able to be installed and operated quite independently of any traditional IT environment.
- The Runtime(s) (shown in blue) allow any number of data audit and policy simulation streams to run in parallel.
- The IDIOM Decision Models, which codify the audit and future simulation policies and tests, are built by an analyst using the IDIOM Decision Manager.
- The auditors, data quality experts, actuaries and policy experts in the data management team directly access the Workbench 'meta data', to drive the remediation and cause analysis on the target system (on the right-hand), and to drive successive updates to the audit and simulation models (on the left hand).
- The data management team should report directly to the appropriate executive governance committee.



IDIOM Decision Manager Workbench

The **IDIOM** Mapper tool is used to build high performance data mappings that extract a 100% comprehensive view of each account (or other transactional data) from the operational database in system controlled read-only mode; or, accounts can be extracted by an IT supplied process and delivered as discrete XML documents. The data mappings are built by technical data specialists (either internal IT and/or **IDIOM** Consultants) granted the required permissions to read the target database. With the mappings in place, the subject matter experts can then operate the entire DMS platform quite independently from IT.

In building the Workbench, **IDIOM** has been careful to consider the special needs of the financial services industry and has included the following enterprise class features:

- Enquiries – a comprehensive Alert management subsystem, including entity keys for all alerted database entities and optionally, complete supporting entity data.
- Full authorization and audit controls down to the field level for all users of the **IDIOM** Workbench.
- Seamless operation across multiple user definable environments (e.g. Development, UAT, Simulation, Production).
- Comprehensive scheduler for 24/7 operation.
- High performance, including parallel processing on a large scale across multiple devices each logging back to the **IDIOM** Workbench for centralized management.
- Optionally, complete separation and management of the development/testing and production environments using dual, synchronized instances of the **IDIOM** Workbench.

This platform is operational in some of Australasia's largest financial organisations.

IDIOM Decision Manager

The **IDIOM** Data Management Solution leverages the **IDIOM** Decision Manager for development of the audit and business policies. The **IDIOM** Decision Manager is a generic and widely used policy automation tool that is ideal for development, testing, and automation of audit and general business policies.

The **IDIOM** Decision Manager can be used to quickly replicate the calculations and related processing currently provided by production systems, so that existing processing can be re-validated at the most basic level [example: recalculate insurances, fees, interest, taxes, and entitlements and verify against the operational system equivalents]. To these validations we can easily add an array of similarly explicit and non-judgmental tests [example: end dates later than start dates]. These basic pass/fail tests work together to verify that the existing system data is valid and that the system is performing correctly at a fundamental level.

The higher levels of data quality anticipated by CPG-235 can then be addressed. The data management team can extend the audit models with more sophisticated tests derived from their knowledge and experience – for instance, assessments of reasonableness, quality and risk metrics, and comparison with benchmarks.

Using the **IDIOM** Decision Manager, all of these audit checks can be built, tested, and deployed very quickly, as the following approved quote from the NZ Customs Service attests:

“Within only a few days of formal training, NZ Customs Service personnel were able to take total responsibility for creating and maintaining business rules for their organization using **IDIOM**. An initial load of approximately 100 distinct business rules was completed in one day.”

This ease and speed of development is a result of the **IDIOM** Decision Manager's unique characteristics:

- **IDIOM** Decision Manager is a tool for graphically modeling and deploying business decisions - without programming!
- A tool for the policy maker, not the programmer.
- **IDIOM** automates complex policy based decision-making at the enterprise level, deployable as industrial strength stand-alone components.
- In day-to-day practice it is usually used by **IDIOM** trained analysts working interactively with SMEs. Together they model the business/policy domain in terms of both data and decisions (see Decision Model opposite) before moving on to define the underlying logic that binds them together (see Formula opposite).
- Deployment as software components is fully automated and 'without fingerprints'.

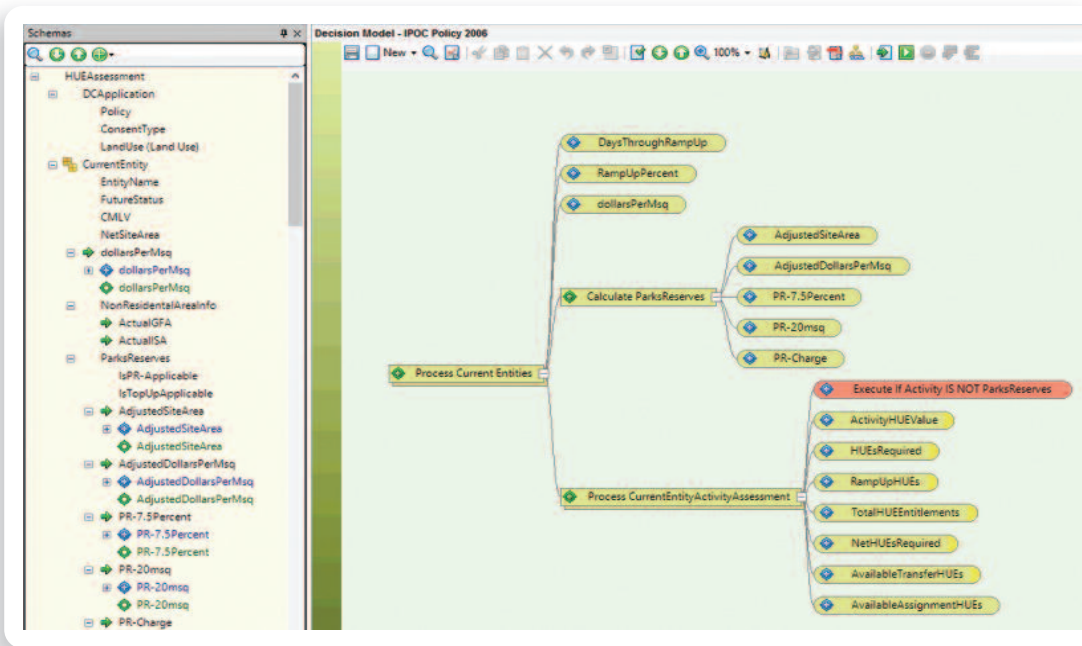


Figure 2.
IDIOM
Decision Manager
– decision palette

The 'Decision Model'

- This example is a real model drawn from a City Council implementation of policy that calculates financial contributions to be paid by property developers.
- The policy is decomposed using a 'mind mapping' approach until we reach the atomic units that we call decisions (rounded boxes).
- This 'decision model' is demonstrably aligned and integrated with the adjacent data model (left hand panel above) – validating and strengthening both.
- The atomic 'decisions' provide an easy entry point for specification of the underlying rule details via the Formulas (see next).

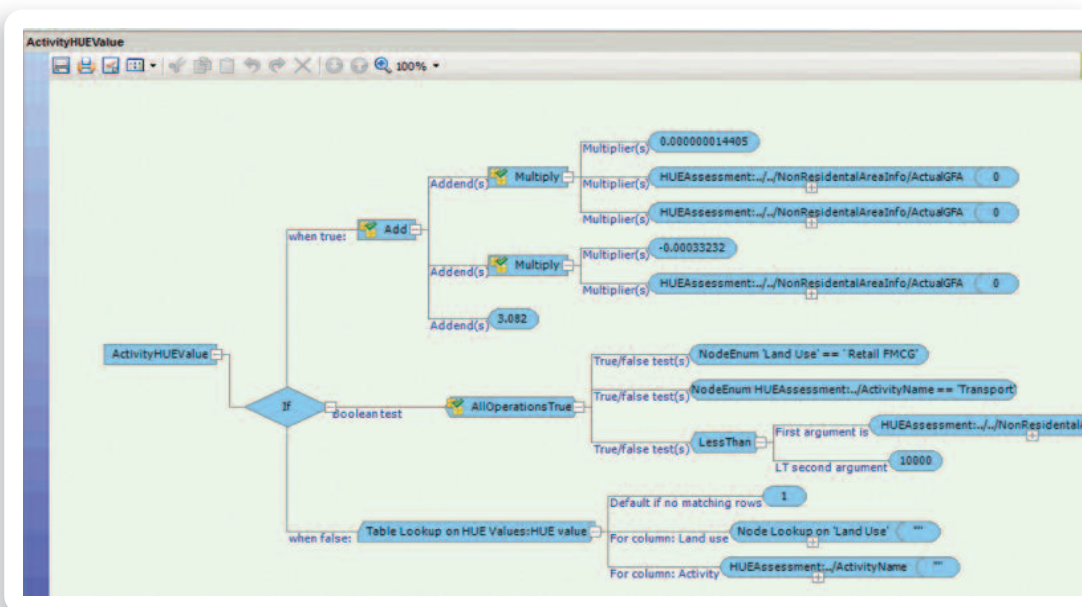


Figure 3.
IDIOM
Decision Manager
– formula palette

The 'Formula Palette'

- The underlying rules details are easily captured using a 'Lego' like drag-and-drop development approach that is 'more fun than playing golf' according to the CEO of one of our largest customers – there is no scripting or coding required to build these formulas.
- The rules can be tested immediately within the IDIOM Decision Manager palettes.
- When finished, IDIOM Decision Manager generates computer source code (C# or Java) with a single button click, to be published directly into the IDIOM Decision Manager Workbench, and/or to be called by any application at run-time using any of a wide variety of simple interfaces and wrappers (in-line, dll, web service, queue service, many more).
- And at the same time it generates the model into business readable documentation (PDF).



Key Points of Difference

- **IDIOM** decision models do for policy decisions what data models do for data – a powerful abstraction that makes the underlying complexity visible and manageable.
- The models allow internal data transformations and business rules to be intermingled within a single transaction. Business rules acting alone are severely limited in their ability to fully implement business policy – invariably, in-line data transformations are necessary to exactly match the data with the terminology used in policy statements.
- Decision models that incorporate both data and rules behavior enable a further critical capability that is unique to **IDIOM** Decision Manager – the models can be fully tested using real-world cases directly in the builder palettes. No external technology or application support is required to empirically prove the correctness, completeness, and consistency of the models.
- The decision models are converted into a form of ‘logical English’ and/or XML for complete transparency (in addition to the C# or Java program source code that fully automates the models).

The **IDIOM** Decision Manager is supported by the **IDIOM** Decision Tracker, which is a tool to map MS Word and Excel documents to **IDIOM** decision models for full bi-directional traceability between corporate policy definitions in the Microsoft documents and their actual implementation as **IDIOM** generated decision engines.

The Tracker can help provide traceability for audit defined data integrity checks, tests, and remediation.

Runtime Performance

The Workbench is designed to service the maximum data delivery rates found in the Australian financial services industry. For instance, on a large system, a late model IBM i series machine could deliver up to 2 million member accounts per hour, whereas a PC based system will deliver 1/10th of this volume.

The Workbench is typically used to audit at the member or client account level, enabling the account holders to be processed in multiple streams. If we assume a substantial audit load of several hundred distinct audit tests per account holder, then a single i7 class processor will process approximately 500,000 account holders per hour.

The number of machines available determines the ultimate throughput over time.

The DMS runtime process uses the centralized Workbench database, so that nothing is persisted on the Windows runtime machine. Therefore it is plausible to reuse any standard Windows machines (these do not need to be ‘Servers’) so that existing but otherwise idle desktop machines can be used for large audit runs prior to the normal start of the working day for a very cost effective and scalable solution.

Simulations

With the IDIOM Decision Manager Workbench fully installed with its attendant technologies, including the ability to read the full portfolio of production data, forward looking changes in business policy can also be simulated with relatively little additional effort.

Simulation allows proposed policy changes to be developed and tested, and then executed on real data with the results assessed on an account by account basis – without the need for any change to any system. Simulations can provide transaction level feedback on changes in business policies, regulations, taxes, and other anticipated changes prior to their implementation. Similarly, changes in the demographics of a portfolio can be simulated to provide a view of how each account in the portfolio will perform under different scenarios.

The combined audit and simulation capabilities can also be used in mergers and acquisitions to validate and screen the incoming data, and to assess the impact of current policies on the new data and vice versa.

Note that the decision models that are used to validate and simulate policy and other processing changes can also be integrated directly into the production processing environment so that the verified simulations can be easily injected directly into production systems ‘without fingerprints’.

Engagement

While the IDIOM Decision Manager Workbench and its attendant products provide a complete solution, it is not turnkey, so that an IDIOM consulting engagement is required.

As with all IDIOM engagements, a highly agile approach is preferred.

This can be summarised as a series of small, low risk engagements, progressively moving towards a defined target that meets the broader objectives of the client in the context of CPG-235.

The extent of the IDIOM engagement should be from 1-3 months, depending on the scope of the initial target problem and the client's appetite for speed of on-boarding the technology and approaches.

The starting point for an agile engagement is a one day pre-engagement workshop that includes key stakeholders from the client, including data and remediation specialists, auditors, policy owners and analysts, and/or risk managers as appropriate, plus a principal and a senior consultant from **IDIOM**. The purpose of this workshop is to form an initial evaluation of the scope of work and the plausibility of achieving it; specifically to:

- Understand the client's current approach towards data integrity monitoring and remediation, and the general health and status of the production data in the context of CPG-235;
- Understand the client's organisational approach to defining integrity rules and remediation approaches;
- Understand the data and technology topography, and how data can be made available to the platform to allow rules based integrity assessments and simulations;
- Reconcile the processes implied by the platform (and as implied by CPG-235) with the organisation's current approaches;
- Review the **IDIOM** toolset and approaches and assess alignment with the above;
- Propose explicit longer term data integrity goals, benchmarks, and approaches;
- Determine and agree next steps.

The next steps could include one or both of the following:

- Plan and execute a small pilot to improve understanding of the **IDIOM** tools and approach in the context of a particular scenario before further strategic goal and approach setting; and/or,
- Undertake further research and convene a formal workshop to more completely clarify and confirm the project objectives (for instance, as outlined for the Engagement Workshop above).

From a commercial perspective **IDIOM** does not charge for the Engagement Workshop. Any further involvement of **IDIOM** beyond the Engagement Workshop is chargeable at **IDIOM**'s standard daily rates, invoiced monthly. Invoicing for platform licensing is deferred until the rules are executing to the client's satisfaction in their environment.

In accordance with its risk averse and agile philosophy, any rules development activity by **IDIOM** is undertaken in small tranches, with frequent (usually daily) stand-up meetings with the client to assess progress, often accompanied by online demonstrations of progress made (for the sake of clarity, this means demonstrating the actual execution of rules).

Training and handover is best achieved by introducing subject matter experts into the rules development process at key points, so that by the end of the rules development process the client subject matter experts are able to take full ownership of the audit decision models.

This approach to 'buddy-assisted' training generally takes a few weeks, and is easily achieved within an IDIOM engagement cycle of 1-3 months.

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Appendix

Extract from CPG-235 'Managing Data Risk'

Start of extract

Assessment of fitness for use

51. Data validation is the assessment of the data against business rules to determine its fitness for use prior to further processing. It constitutes a key set of controls for ensuring that data meets quality requirements.
52. Regulated entities typically implement data validation controls (whether via manual or automated mechanisms) at the point of capture and at various points throughout the data's lifecycle. APRA envisages that the strength of the validation controls would be commensurate with the nature of the data and its classification.
53. Considerations when validating data include the level of trustworthiness (e.g. is the data from a provider with a known control environment and track record) and the extent to which data quality degrades over time. In APRA's view, regulated entities would design business processes to revalidate data on a periodic basis to minimise the degree of data quality degradation. The comprehensiveness of revalidation would normally be commensurate with the criticality of the data and the risk of degradation.
54. Common forms of data validation include verification of format, type, value range, currency, presence, consistency and completeness. Data validation can also be usefully conducted at a dataset level such as the use of:
 - (a) control totalling: aggregation techniques including hash totalling, amount totalling and record counts;
 - (b) reconciliation: comparing two sets of data and explaining variances;
 - (c) benchmarking: comparing two sets of data that would normally exhibit similar characteristics, in order to highlight material variations;
 - (d) data profiling: examination of a data set and the gathering of statistics and other relevant information for the purposes of analysis to highlight any data anomalies (e.g. missing data, outliers, unexpected variances); and
 - (e) a review of data for reasonableness using expert judgement.
55. In APRA's view, where other validation controls cannot be easily implemented, a review of data for reasonableness using expert judgement would be beneficial as a minimum.
56. A regulated entity would normally document data validation processes, including their nature, frequency and level of granularity, and provide clear allocation of accountabilities for the detection, investigation, reporting and escalation of data anomalies. In APRA's view, data validation processes can be a key consideration when designing data quality metrics.

Data cleansing

57. Data cleansing is the act of detecting and correcting erroneous data. Erroneous data is anything that does not meet the quality objectives of the regulated entity. Entities would be expected to periodically cleanse data (e.g. as part of key business events such as member rollovers, claims, policy renewal) to ensure data quality remains at or above the required level. Data cleansing could also be required where the quality level requirements change over time (e.g. as a result of new usages or changes to existing processes) or when undergoing material change such as a system migration.

Monitoring and Management of Data Issues

Monitoring processes

58. APRA expects that a regulated entity would have monitoring processes to identify potential data issues. The strength of monitoring controls would typically be commensurate with the criticality and sensitivity of the data. APRA envisages that alerts would be investigated in a timely manner with an appropriate response to address anomalies.
59. Clear allocation of responsibility for regular monitoring of data, with appropriate processes and tools in place to manage the volume of monitoring required, would assist in reducing the risk of a data issue not being detected.

Data issue management

60. APRA envisages that a regulated entity would develop appropriate processes to manage all stages of a data issue including detection, identification, containment, investigation, evidence gathering, resolution, return to business as-usual and the adjustment of controls to reduce the risk of similar issues in the future. Common data issues include:
- (a) processing errors impacting on the accuracy and completeness of balances and transactions;
 - (b) lack of timeliness in updating data intended to reflect recent market conditions or assessments;
 - (c) inadequate data availability, accuracy or consistency resulting in pricing and valuation errors;
 - (d) data leakage leading to a breach of confidentiality;
 - (e) failure to accurately execute instructions in a timely manner;
 - (f) failure to maintain data quality when migrating data to another system; and
 - (g) data that is not fit-for-use, resulting in poor business decisions.
61. Subject to the nature of the data, a regulated entity would:
- (a) have clear accountability and communication strategies to limit the impact of data issues. This would typically include defined mechanisms and thresholds for escalation and reporting to the Board and senior management, and customer communication where appropriate. Issue management strategies would also typically assist in compliance with regulatory and legal requirements; and
 - (b) conduct root cause analysis of the data issue, where the underlying cause of the issue is identified and analysed, with controls adjusted to reduce the likelihood of a future occurrence.

Due to resource constraints, regulated entities would normally prioritise remediation of data issues. A combination of tactical and strategic solutions may be required, depending on the root cause, including containment of identified issues.

Data quality metrics

63. Data quality metrics are a useful mechanism for assessing data quality and the success of data risk management. Typically, the use of metrics would be targeted to areas:
- (a) where there are regulatory, legal and specific industry requirements; and
 - (b) that have the greatest sensitivity/criticality, as determined by the risk assessment process.
64. Each dimension of data quality could be measured by at least one metric to enable the monitoring of progress towards set targets and the identification of issues and trends. Effective metrics would be specific, measurable, business oriented, controllable and reportable, and preferably involve the inspection of data to determine if a control is effective in maintaining data quality. Examples of data management metrics could include error rates, timeliness measures, materiality thresholds and reconciliation exceptions over a specified period.

APRA envisages that data quality gaps would be addressed over time in a systematic way. This may involve the formulation of a data management plan that specifies target data management metrics.

Data Risk Management Assurance

Assurance program

66. APRA expects that a regulated entity would seek regular assurance that data quality is appropriate and data risk management is effective. This would normally be implemented through the broader assurance program and result in a systematic assessment of data risk and the control environment over time. Assurance responsibilities would typically be conducted by internal audit or another independent function.

Frequency of assurance

67. A regulated entity would benefit from a multiyear schedule of testing that incorporates both adequacy and compliance-type reviews, with the program of work determined on a risk basis. Additional assurance work may be triggered by changes to vulnerabilities/threats or material changes to the business/information technology environment. Such reviews may encompass:
- (a) inspection of data;
 - (b) data risk management;
 - (c) general information technology controls;
 - (d) data architecture;
 - (e) data governance; and
 - (f) data metrics and data quality plans.

The schedule of testing would typically ensure that all aspects of the data control environment are assessed over time, commensurate with the sensitivity and criticality of the data.

End of extract

About IDIOM

Established in 2001, **IDIOM** Limited is a private company based in Auckland, New Zealand.

IDIOM develops and licenses decision-making software that automates business policy on a large scale, making systems more transparent and agile, while reducing development cost, risk, and time. **IDIOM**'s innovative business oriented software is used by business users to graphically define, document, and verify corporate decision-making and related business rules; it then auto-generates these into small footprint, non-intrusive software components for use in systems of any type or scale.

IDIOM is a pioneer in the development and use of decision oriented concepts, and has applied these concepts in the development of "intelligent processes" for customers around the world in local/state/central government, insurance/superannuation/finance, health admin/clinical health, telecoms, logistics, and utilities.

IDIOM automated business policy and decision making extends far beyond mere business rules, so that ownership and control of larger and more complex decision making can be fully delegated to business experts. **IDIOM** enabled development and management of policy based decision making by policy owners creates a propitious 'business policy life-cycle' that significantly improves business agility and transparency.

IDIOM develops and licenses the IDIOM Decision Manager™, IDIOM Forms™, IDIOM Decision Tracker™ and the IDIOM Decision Manager Workbench™.

Contact details:

- Mark Norton +64 21 434669
mark.norton@idiomsoftware.com
- General enquiries please call +64 9 6308950
or email idiomsales@idiomsoftware.com

**For more information please see our website at
www.idiomsoftware.com**