The Actuarial Profession
making financial sense of the future

GIRO Conference and Exhibition 2012

What lies beneath –
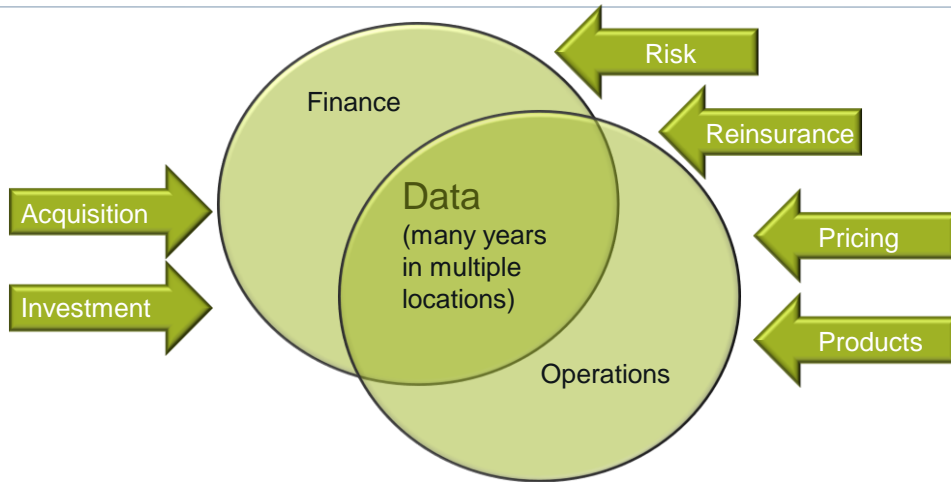# the unseen risk in our data

Ralph Baxter, CEO, ClusterSeven

Themes

- Data, data, data
- Corporate systems vs 'dark matter'
- Regulatory comment
- Why internal audit will be chasing you
- Satisfying internal audit without stalling your business
- Upside benefits

1

No other sector manipulates historical data so extensively

The Old World
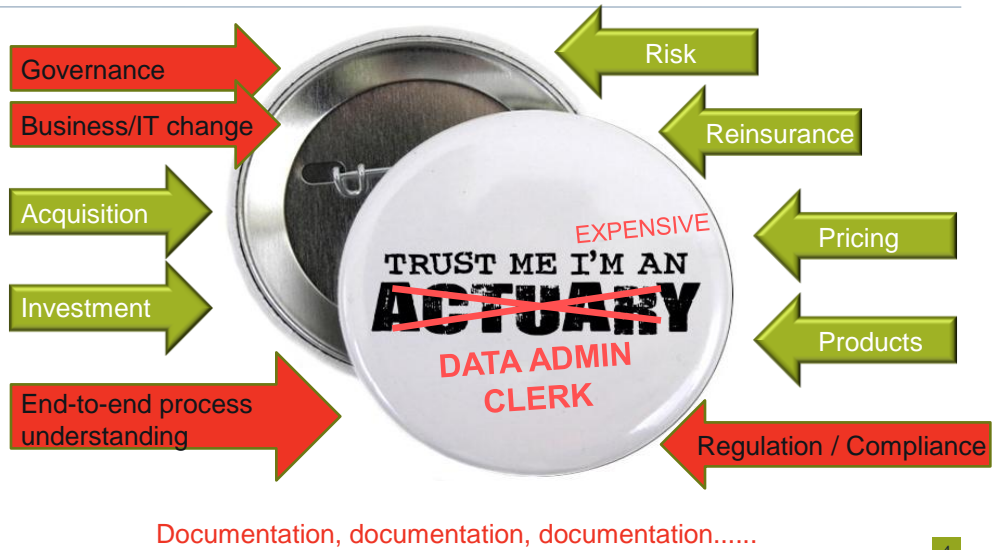
The Old World **+ Solvency II**

Governance
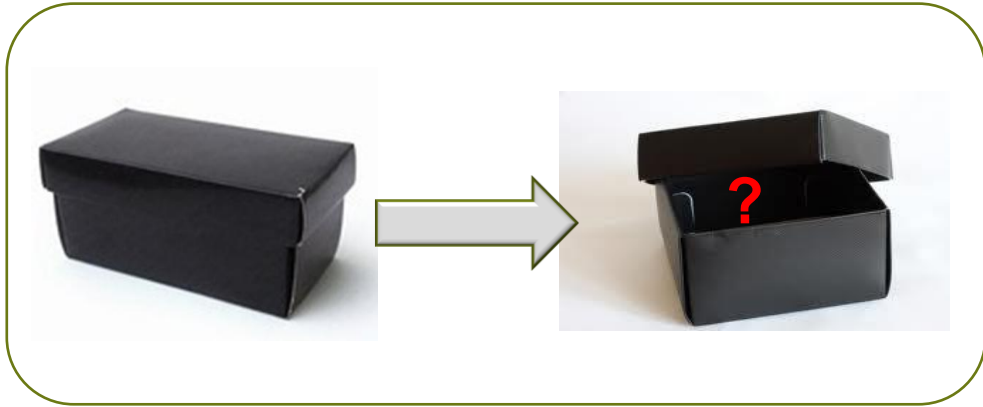
Business/IT change

Acquisition

Investment

End-to-end process understanding

Risk

Reinsurance

EXPENSIVE

TRUST ME I'M AN
~~ACTUARY~~
DATA ADMIN CLERK

Pricing

Products

Regulation / Compliance

Documentation, documentation, documentation......

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The New World (UK)

Chartered Institute of
Internal Auditors

Documentation

ACTUARIAL DEPARTMENT

• Transparency
• Understanding
• Control

Chartered Institute
Internal Auditors

FSA.

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Regulators want to use Internal Audit to open the actuarial process

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Use of spreadsheets in the actuarial profession
(2011 Survey by Actuarial Post)

- Spreadsheet usage (for modelling, data management and reporting)
  - 40% use spreadsheets more than any other software for these activities
  - 9% only use spreadsheets for these activities.
  - 16% either do not use spreadsheets at all or less than other applications
- Business continuity
  - 52% said a qualified actuary could work out what was happening in their absence but they would have to rely on experience as documentation is not sufficient.
  - 18% warned that a qualified actuary would probably have to rebuild spreadsheets in their absence.
  - 30% said that there is sufficient documentation in place in case of their absence
- Security/integrity
  - 46% said that between four and 10+ people could change critical spreadsheets.
  - 12% did not know how many people have access to their spreadsheets.

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Leads to regulatory concerns

"Few firms provided sufficient evidence to show the *data* *used in their internal model was* *accurate*, *complete* *and* *appropriate**"*

FSA's 2011 IMAP review February 2011

"How quickly can you spot that something has gone wrong and how quickly can you locate the problem and do something about it"

Regulatory control conversation

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EIOPA data quality requirements

- Embed a system of data quality management across the entity
- Compile a directory of data attributes used in the internal model, stating each attribute's true source, characteristics and usage
- Define and monitor processes for identification, collection, transmission, processing and retention of data
- Ensure data processing from source to model is transparent and demonstrable
- Define objective metrics for completeness, accuracy and appropriateness of data
- Establish a data policy which set out the entity's approach to managing data quality
- Perform periodic data quality assessments and implement a process for identifying and resolving data deficiencies
- Document where data quality may be compromised including implications and mitigating actions
- Provide and audit trail and rationale for data updates when applying expert judgment in lieu of reliable internal or external data
- Agree with the role of internal and external auditors in assessing data quality
- Establish a process to manage changes or data updates which materially impact model outputs
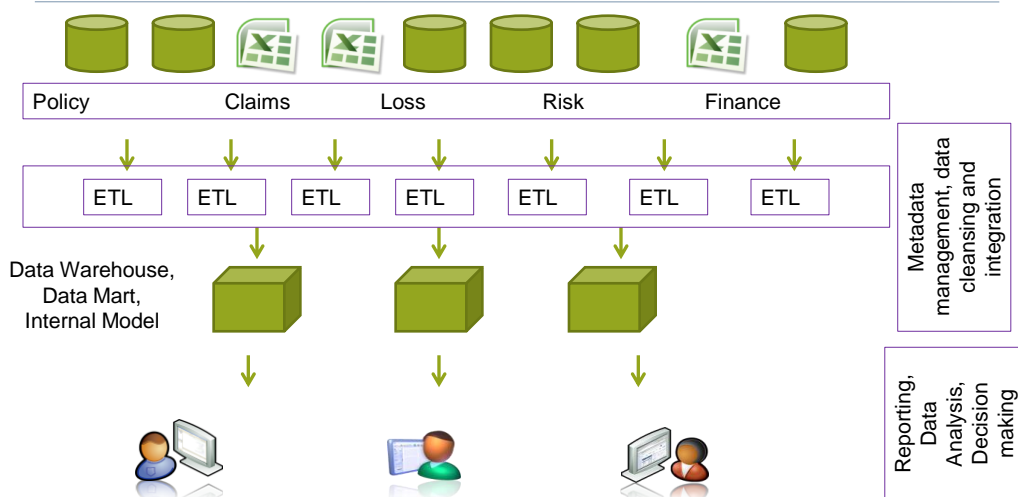
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FSA Data Audit (August 2011) – Scope & Content

- Requirement
  - *A review should be performed by a suitably qualified person who is independent of model design, build and operation (e.g. Internal Audit)*
- Purpose
  - *To assist the FSA in its assessment of whether a firm's data management complies with the standards set out in the Solvency II directive*
- Scope
  - *All data (internal and external) that could materially impact the Internal Model*
- Guidance
  - *Reviewer may make use of previous independent reviews (e.g. SOX compliance, External/Internal Audit) so long as assumptions have not changed significantly.*
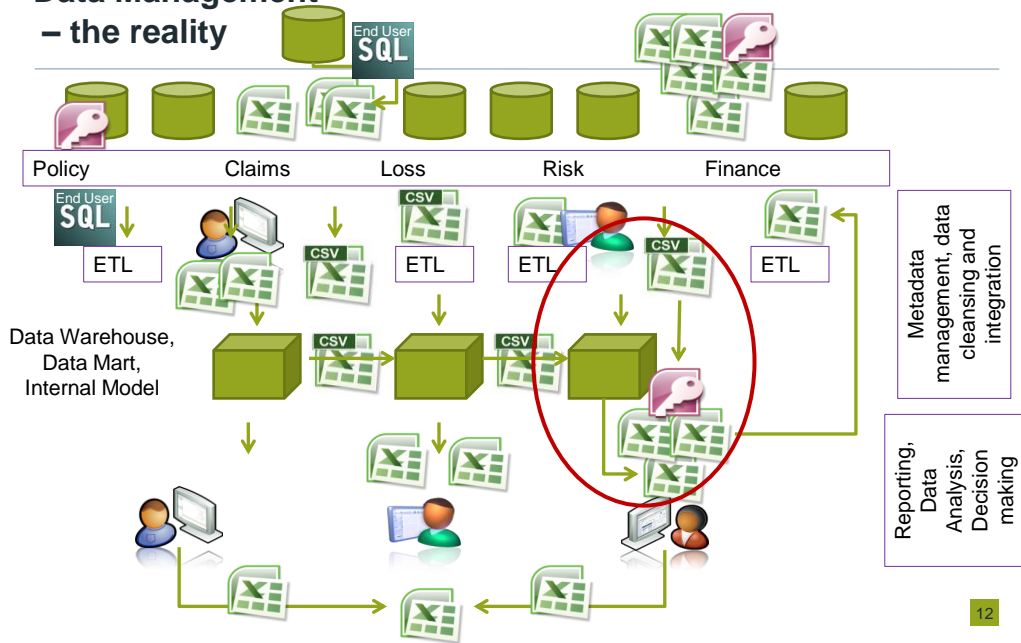
10

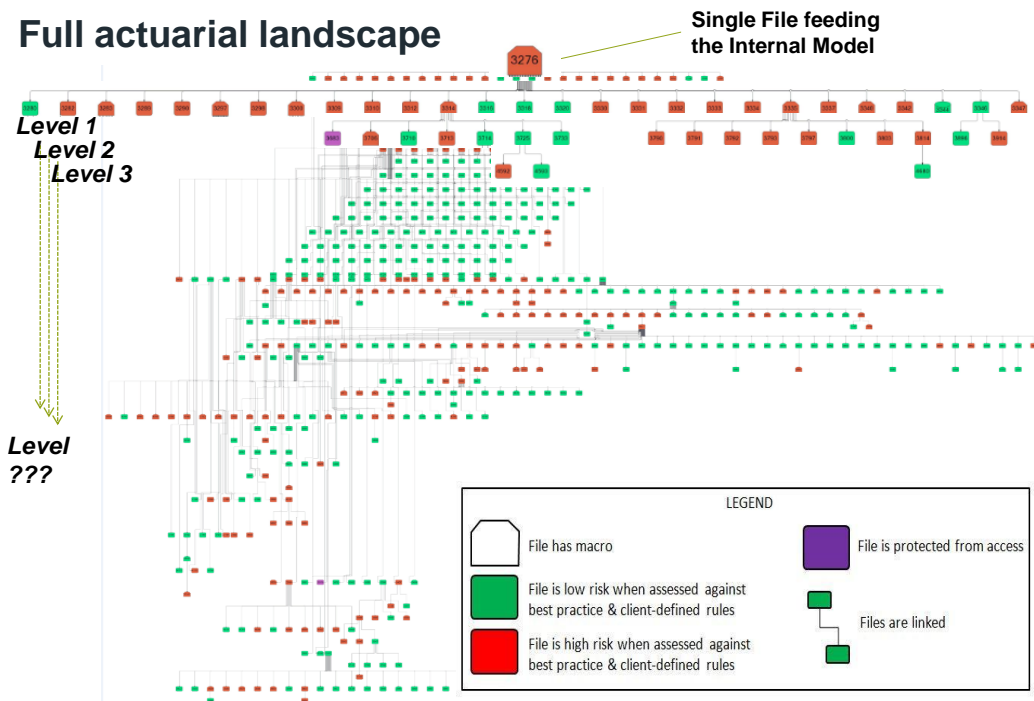## Data Management – the high level (IT?) view

| Policy | Claims | Loss | Risk | Finance |

ETL ETL ETL ETL ETL ETL ETL

Data Warehouse,
Data Mart,
Internal Model

Metadata management, data cleansing and integration

Reporting, Data Analysis, Decision making

After Aviva, IIAG, 2011

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Data Management – the reality

End User SQL

Policy   Claims   Loss   Risk   Finance

End User SQL

ETL   CSV   ETL   ETL   CSV   ETL

Data Warehouse,
Data Mart,
Internal Model

CSV   CSV

Metadata management, data cleansing and integration

Reporting, Data Analysis, Decision making

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Full actuarial landscape

Single File feeding the Internal Model

3276

Level 1
Level 2
Level 3

Level ???

LEGEND

File has macro		File is protected from access
File is low risk when assessed against best practice & client-defined rules		Files are linked
File is high risk when assessed against best practice & client-defined rules		

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Management or extermination?
Two perspectives – both in agreement

Come the apocalypse two things will survive, the spreadsheet and the cockroach – they deserve each other.

Gartner analyst, 2005

FSA, Spreadsheets & Solvency II, 2010

Solution
- I still see audit reports or project plans that recommend replacing spreadsheets and manual processes with 'IT solution'
- This will never happen
  - It is impractical to replace 2 or more fragmented systems with a single system
  - Replacing the spreadsheet operations with 'IT designed' ones only compounds the problem and removes any ability of users to address problems
- The only 'solution' is to eliminate the worst processes and to apply appropriate controls to the ones that remain.

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Therefore treat spreadsheets like IT

FSA, Spreadsheets & the Regulator, 2007

In summary

- Spreadsheets are a form of IT system
- All business-critical IT systems must have adequate controls
- Firms must recognise that spreadsheet control should be part of their IT strategy

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Initial thoughts

FSA, Spreadsheets & the Regulator, 2007

Controls we expect to see

- Audit trail
  - 'Tamper proof' record of changes
- Version control + backup
- Segregation of duties
- Code checking / code reading
- Testing
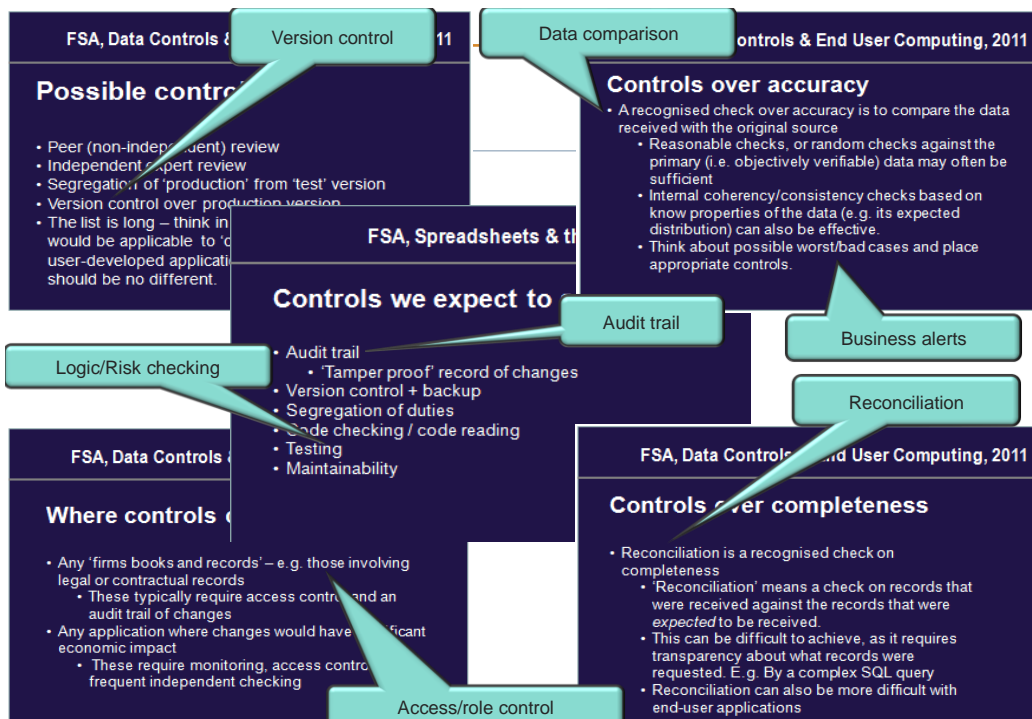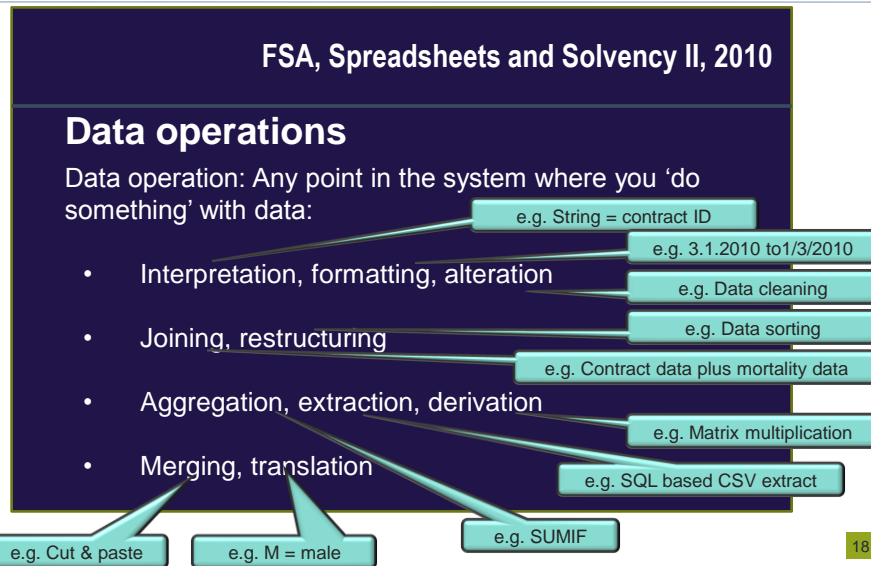- Maintainability

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Recent thoughts – model integrity

FSA, Data Controls & End User Computing, 2011

Possible controls

- Peer (non-independent) review
- Independent expert review
- Segregation of 'production' from 'test' version
- Version control over production version
- The list is long – think in terms of what controls would be applicable to 'corporate IT' application. A user-developed application, if business critical, should be no different.

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Solvency II – Focus on data quality

FSA, Spreadsheets and Solvency II, 2010
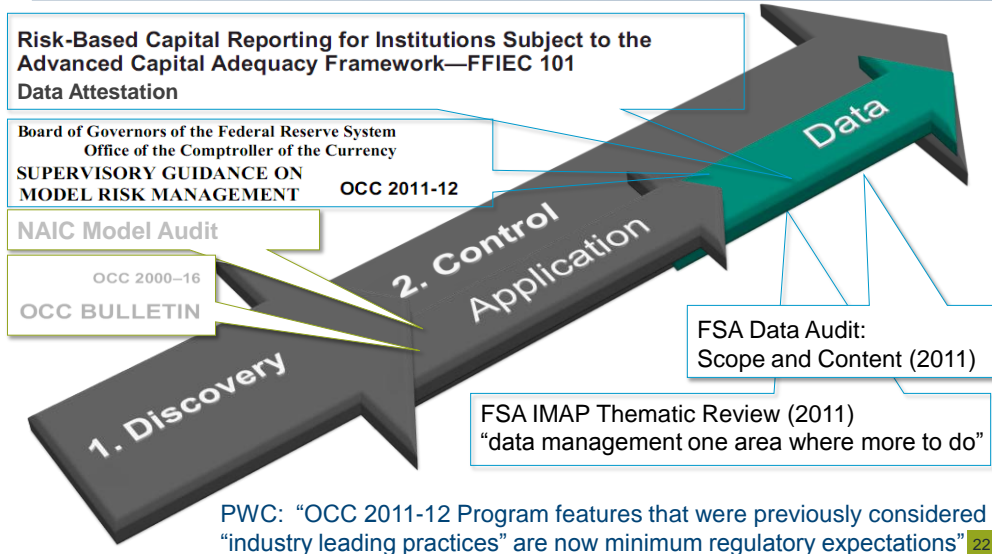
Data operations

Data operation: Any point in the system where you 'do something' with data:

- Interpretation, formatting, alteration
- Joining, restructuring
- Aggregation, extraction, derivation
- Merging, translation

e.g. String = contract ID

e.g. 3.1.2010 to1/3/2010

e.g. Data cleaning

e.g. Data sorting

e.g. Contract data plus mortality data

e.g. Matrix multiplication

e.g. SQL based CSV extract

e.g. SUMIF

e.g. Cut & paste

e.g. M = male

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Version control

Data comparison

FSA, Data Controls & [...] 11   [...]ontrols & End User Computing, 2011

Possible contro[...]

- Peer (non-independent) review
- Independent expert review
- Segregation of 'production' from 'test' version
- Version control over production version
- The list is long – think in [...] would be applicable to 'o[...] user-developed applicati[...] should be no different.

Controls over accuracy

- A recognised check over accuracy is to compare the data received with the original source
  - Reasonable checks, or random checks against the primary (i.e. objectively verifiable) data may often be sufficient
  - Internal coherency/consistency checks based on know properties of the data (e.g. its expected distribution) can also be effective.
  - Think about possible worst/bad cases and place appropriate controls.

FSA, Spreadsheets & th[...]

Controls we expect to [...]

- Audit trail
  - 'Tamper proof' record of changes
- Version control + backup
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- Code checking / code reading
- Testing
- Maintainability

Audit trail

Business alerts

Reconciliation

Logic/Risk checking

FSA, Data Controls [...]   [...]d User Computing, 2011

Where controls [...]

- Any 'firms books and records' – e.g. those involving legal or contractual records
  - These typically require access contro[...] and an audit trail of changes
- Any application where changes would have [...]ficant economic impact
  - These require monitoring, access contro[...] frequent independent checking

Access/role control

Controls over completeness

- Reconciliation is a recognised check on completeness
  - 'Reconciliation' means a check on records that were received against the records that were *expected* to be received.
  - This can be difficult to achieve, as it requires transparency about what records were requested. E.g. By a complex SQL query
  - Reconciliation can also be more difficult with end-user applications

IMAP 2011 Review findings

- 6.9 In many firms, spreadsheets provide a key area of risk, because they are typically not owned by IT, but by other business or control areas, such as the actuarial function. They may not be subject to the same general IT controls as the firms' formal IT systems (i.e. Change controls, disaster recovery planning, security etc) and firms need to develop a control system around this.

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Meeting requirements
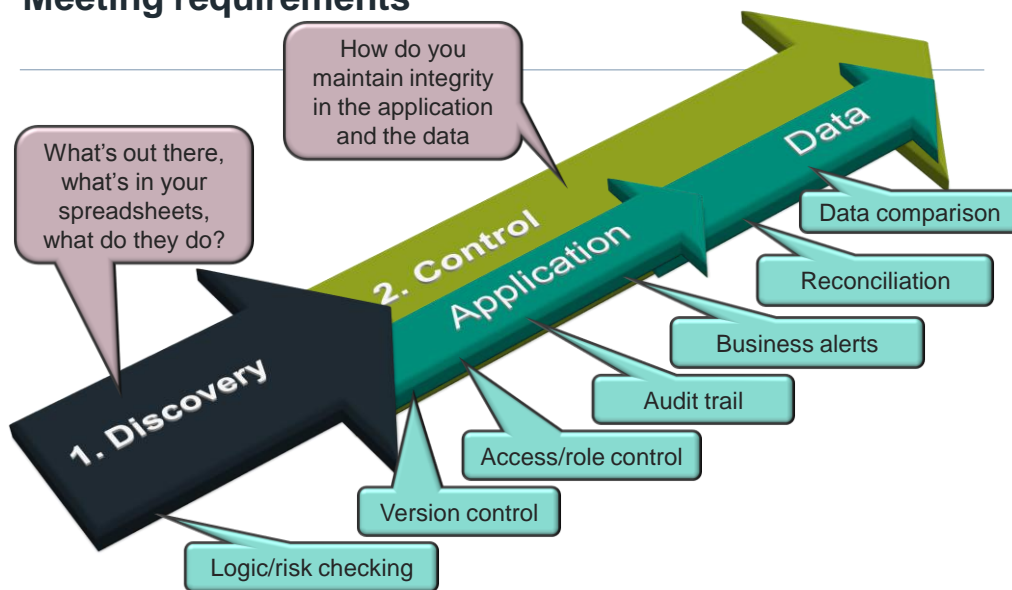
Data Focus Increasing
for Banking and Insurance Regulation

Risk-Based Capital Reporting for Institutions Subject to the Advanced Capital Adequacy Framework—FFIEC 101
Data Attestation

Board of Governors of the Federal Reserve System
Office of the Comptroller of the Currency
SUPERVISORY GUIDANCE ON
MODEL RISK MANAGEMENT   **OCC 2011-12**

NAIC Model Audit

OCC 2000–16
OCC BULLETIN

Data

2. Control

Application

1. Discovery

FSA Data Audit:
Scope and Content (2011)

FSA IMAP Thematic Review (2011)
"data management one area where more to do"

PWC: "OCC 2011-12 Program features that were previously considered "industry leading practices" are now minimum regulatory expectations" 22

New Basel consultation document on Risk Data Aggregation in Banks

….and other institutions at local regulator discretion

- Principle 1.23 "A bank's board and senior management should be fully aware of any limitations that prevent full risk data aggregation in terms of…..reliance on manual processes."
- Principle 3.28(b) "Where a bank relies on manual processes and desktop applications (e.g. spreadsheets, databases) and has specific risk units that use these applications for software development, it should have effective mitigants in place (e.g. end-user computing policies and procedures) and other effective controls that are consistently applied across the bank's processes.
- Principle 3.31 "…banks to document and explain all of their risk data aggregation processes, whether automated or manual. Documentation should include an explanation of the appropriateness of any manual workarounds

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The Data Supply Chain

Internal model / data warehouse

*?! Looking odd

What has gone wrong?
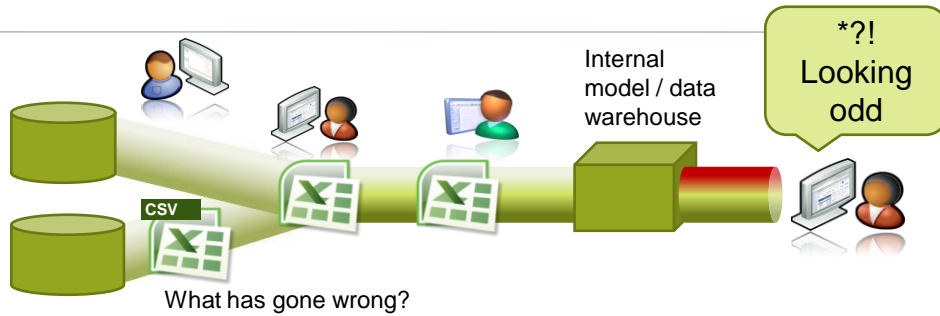
- It could be a real business issue
- It could be a spreadsheet model
- Or it could be the data
  - Data source
  - Data extract
  - Data update

And how do you even know there is a problem?

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The Data Supply Chain (Monitored)

Internal model / data warehouse

Dashboards, Alerting & Reporting on:
- **Models**
- **Data**
- **Processes**

Enables rapid location of problem

Database:

- File version history
- Cell/data history
- Validation history

Scheduled processing of files enabling automatic transformation and detection of exceptions
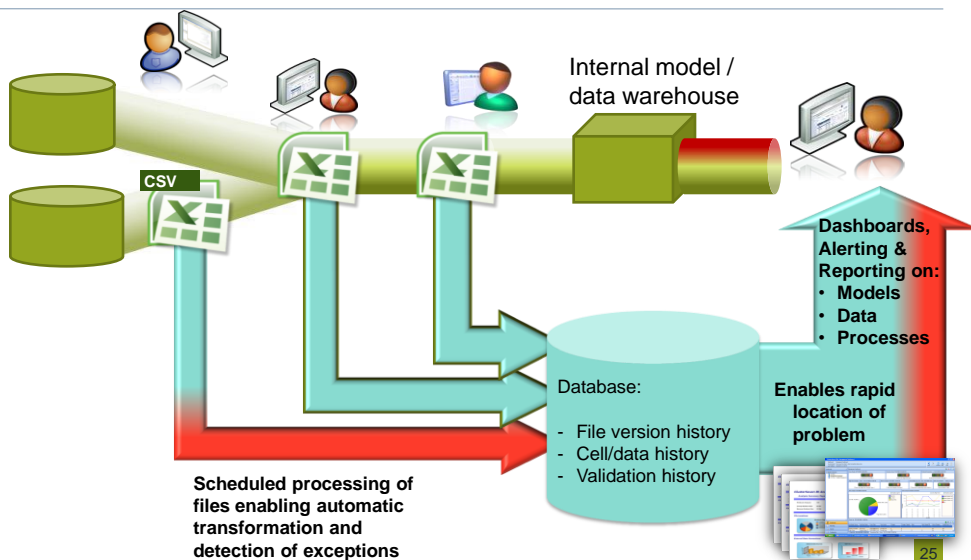
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The Data Supply Chain (Automated)

Internal model / data warehouse

CSV

Validated extracts replace direct extracts from input files

Dashboards, Alerting & Reporting on:
- **Models**
- **Data**
- **Processes**

Database:

- File version history
- Cell/data history
- Validation history

Enables rapid location of problem

Scheduled processing of files enabling automatic transformation and detection of exceptions

26
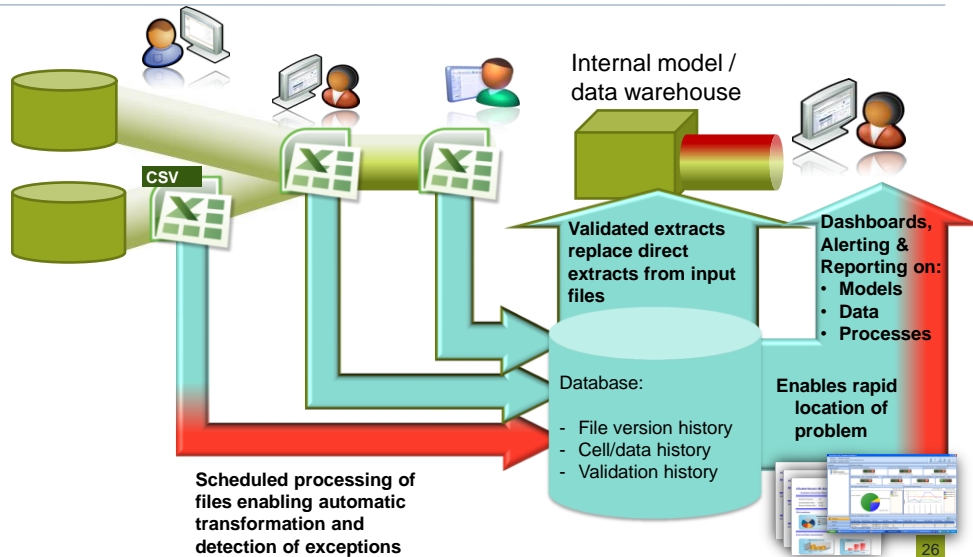
How do you know something unexpected has happened? - MI for historic spreadsheet data

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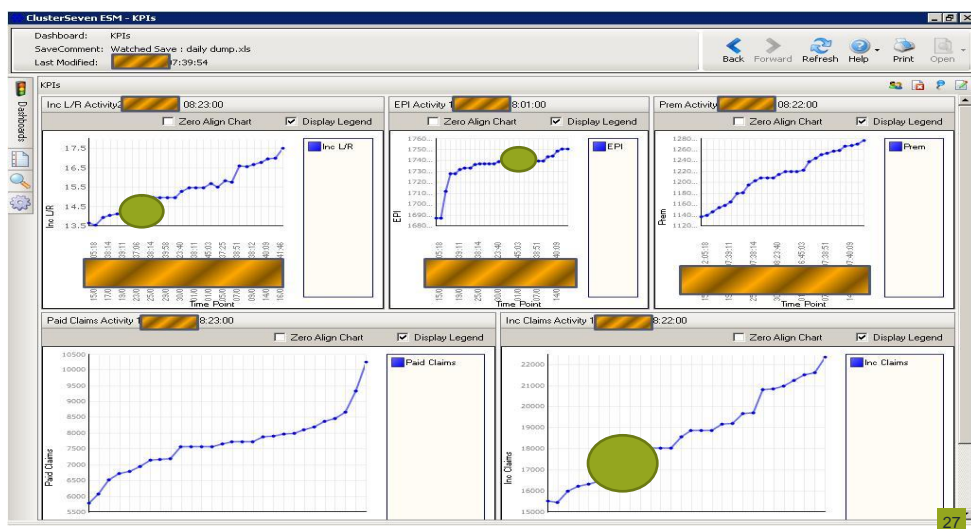
Solvency II – data detail (1)

FSA, Data Controls & End User Computing, 2011

Controls over completeness

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  - This can be difficult to achieve, as it requires transparency about what records were requested. E.g. By a complex SQL query
  - Reconciliation can also be more difficult with end-user applications

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Reconciliations for checks on *completeness*

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Solvency II – data detail (2)

FSA, Data Controls & End User Computing, 2011

Controls over accuracy

- A recognised check over accuracy is to compare the data received with the original source
  - Reasonable checks, or random checks against the primary (i.e. objectively verifiable) data may often be sufficient
  - Internal coherency/consistency checks based on know properties of the data (e.g. its expected distribution) can also be effective.
  - Think about possible worst/bad cases and place appropriate controls.

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Checks on *accuracy* – e.g. Heat Map

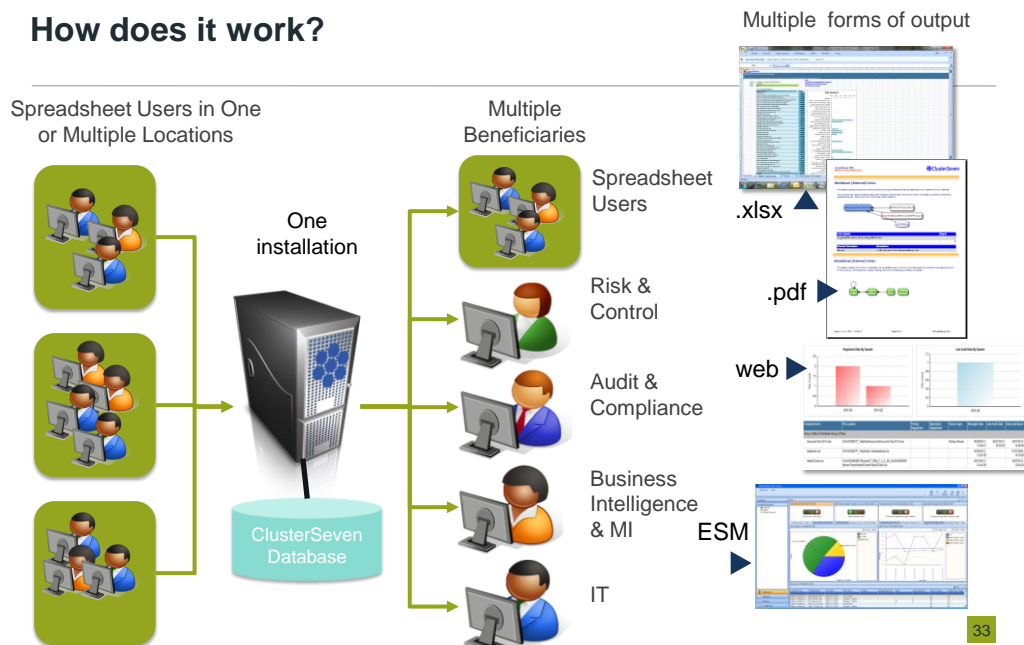**(e.g. shows values that have moved by more than 100%)**

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Control and evidence/documentation options

- Manual
  - time consuming (=expensive)
  - difficult to make reliable/repeatable
- Desktop utilities
  - inconsistent usage = no assurance
  - one file at a time - no enterprise perspective
  - no data analysis
- Centralised solution
  - can be done non-invasively to avoid disrupting users
  - ensures central tracking/reporting of all user activity and control processes for consistent, repeatable, accurate analysis
  - new data insight

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How does it work?

Multiple forms of output

Spreadsheet Users in One or Multiple Locations

Multiple Beneficiaries

One installation

ClusterSeven Database

Spreadsheet Users

Risk & Control

Audit & Compliance

Business Intelligence & MI

IT

.xlsx

.pdf

web

ESM

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Reassurance

- You don't change the user experience of Excel at all (performance, functionality)
- You won't impact your ability to get to your spreadsheets
- You wont get buried in useless information
- You don't have to move files to any new location
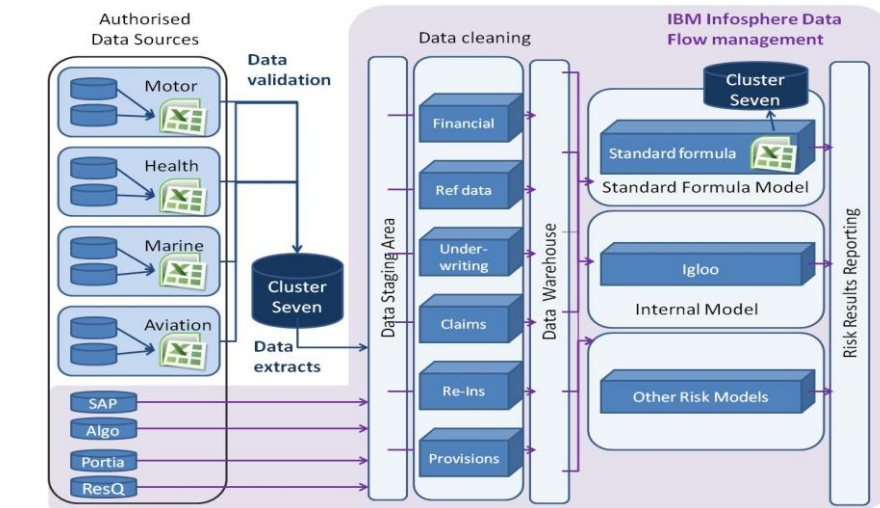- You don't have to install multiple components or any file server agents

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New World Operations

- Increased transparency
- Automated documentation
- Automated data tolerances/validation
- Reduced operational risk
- Regulatory confidence
- Informed decision process

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Bringing it all together

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Opening the box can deliver more than just compliance

- Reduced actuarial 'checking'
- Rapid insight into previously nearly inaccessible data
- Business agility with control
- Improved alignment between IT road map and business requirements

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Thank You

"Ensuring good quality data management is a fundamental requirement to support the continued success of Canopius. The real power of the software is its ability to embed appropriate data- and function-checks as part of our normal business practices. It is difficult to know how this could be done effectively without using this type of technology."

Mark Allen, Head of Business Information, Canopius, Lloyds Managing Agent

Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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FSA Data Audit White Paper
http://www.clusterseven.com/
white-papers/

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