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# AHIA Fraud Forum

## Medical claims investigation

9 November 2010

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# Agenda

- Introduction
- Case studies
- A robust medical investigations approach
  - Rules based data analysis
  - Data driven data analysis
  - Consistent approach to file reviews
- Key takeaways
- Questions

# Introduction

# Your presenters

## Justin Giuliano

Justin is an Account Director in Deloitte Forensic in Melbourne and has over a decade of experience in data analysis. Utilising technology and his Chartered Accountant qualification, he has been able to bridge the gap between technology and the requirements of business to provide valuable insight to 80 organisations during his time with Deloitte.

Justin has been the project director on a long term major forensic review for a large public sector agency, involving health care claims file review and data analysis of related billing practices. He gained a thorough understanding of more than 13 million lines of hospital billing data across seven years and used analytics to successfully identify unusual billing behaviour to target for further review.

## Jessica Mead

Jessica is a Senior Analyst in Deloitte Forensic in Melbourne. Since joining Deloitte in 2008, Jessica has worked on a number of complex matters relating to the examination of financial transactions and accounts and a number investigations with respect to employee misconduct and inappropriate activities.

Recently, Jessica assisted on a long-term project assisting a large public sector agency investigate and review provider billing. Jessica's role included investigation into suspected fraudulent billing of providers and determining the extent, reasons and methods by which this occurred.

# Background

**Why are we here?**

- To share Deloitte's recent experience in medical investigations

**Our areas of expertise**

- Life Sciences and Health Care industry
- Forensic investigations
- Deloitte Analytics

# Case studies

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# Where have we done this before?

## Government agency

- Data analysis: source and optimise data
  - Identify sources of data
  - Obtain relevant data: ~13 million records across 7 years
  - Source and optimise data for analysis: combine all data received and add descriptive information
- Data analysis: identification of providers and services for review
  - Refined review of specific provider items billed from almost 24,000 in total to around 9,000 with specific issues identified
  - Identified other providers exhibiting similar behaviour to specific provider (rules-based approach and data driven)
  - Peer to peer analysis to determine whether potential inappropriate behaviour was the 'norm'
  - Provider relationship analysis to direct enquiries regarding potential collusion
- File review outcomes
  - Developed a review tool to capture findings of investigation team and enable rapid reporting on status and potential recovery.
  - Identified exceptions for 15% of the surgeon population. In relation to these providers, 13% of their services were identified as exceptions. Through conducting extensive file reviews, the actual average of services with exceptions was approximately 40% for selected high risk providers
  - Provided information to the agency and related bodies as part of investigative briefs for a number of providers

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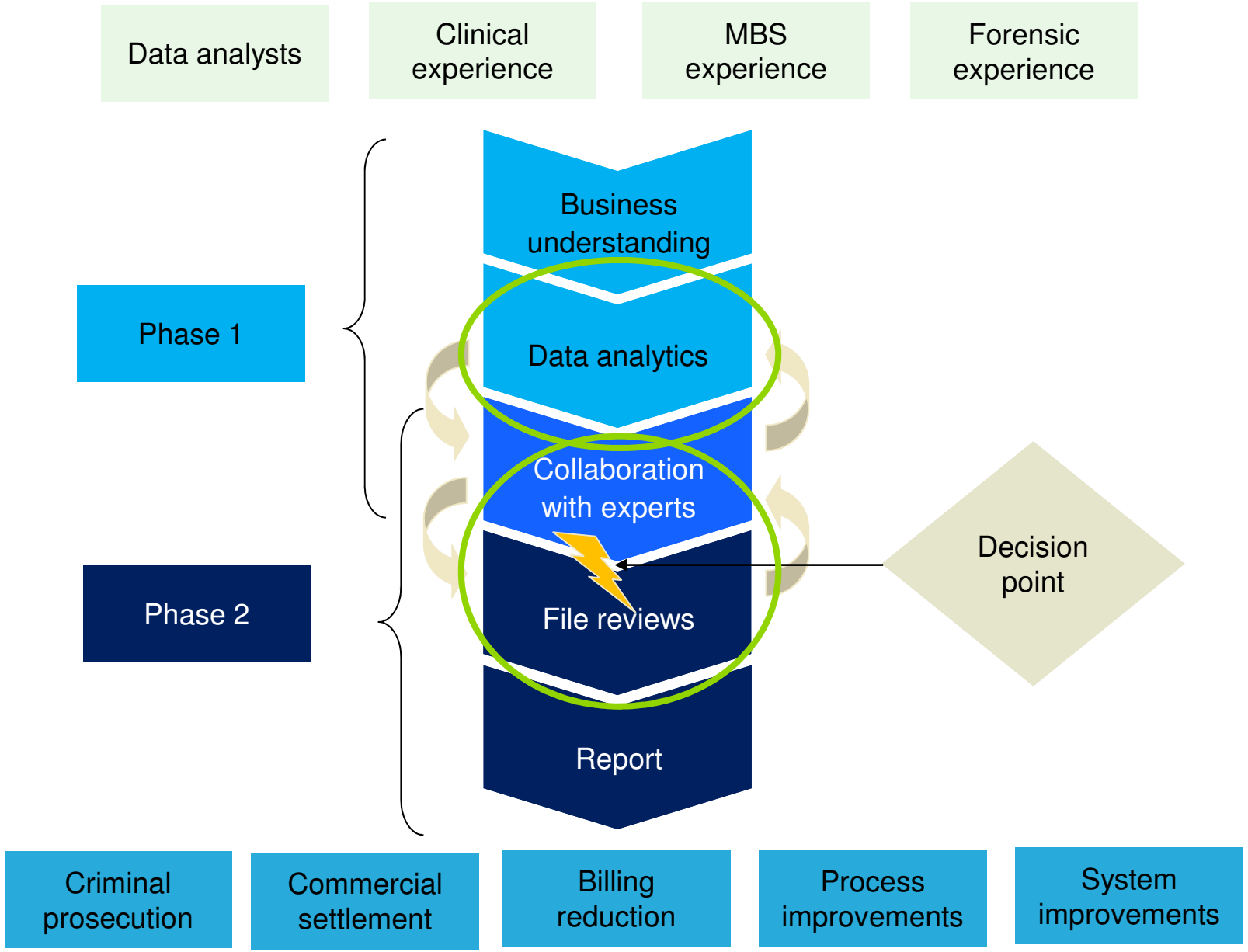
# Where have we done this before?

## Private health insurer

- Data analysis: source and optimise data
  - Identify sources of data
  - Obtain relevant data: ~1.5 million records for the 2008 calendar year
  - Combine all data received and add descriptive information
- Data analysis: identification of providers and services for review
  - Identifying exceptions based on mutually exclusive item combinations, multiple billing and complete medical services
- Findings
  - Identified 3% of items as potential exceptions for further validation
  - The main outcomes of the analysis were:
    - preventative measures including working more closely with senior Medicare people on mutually exclusive multiple billing
    - the ongoing identification of some claims to be pushed through a clinical advisory panel to review their adherence to the organisation's policy.

# Our Approach:
# How we do it…

# Deloitte's medical investigations approach



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# Approaches to data analysis

- Expertise to data ➔ expert rule sets based on domain knowledge and experience
  - Traditional analytic techniques using data analysis tools such Excel, ACL, SAS, SQL to identify exceptions based on **known** risk profiles (rules)

- Data to expertise ➔ data driven insights explained by domain knowledge and experience
  - Recently developed analytic techniques using machine learning to organise complex data in a manner that helps identify previously **unknown** risk profiles.

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# Hospital and medical rules

- Development of rules based on **experience** in unusual billing behaviour for the organisation
- Development of rules database to identify potential billing anomalies based on review of the **MBS**
  - Mutually exclusive item usage
  - Complete medical service
  - Mutually exclusive multiple items as defined in the MBS (i.e. the use of more than 2 knee items on the same claim on the same day)
  - Duplicate billing of the same item numbers.

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# Hospital and medical rules – Examples

- Surgery with no associated costs
  - Identify where providers have claimed **surgical items** (other than specifically identified surgical items that are not severe enough to warrant anaesthesia, radiology, inpatient stays, theatre costs) where there is **no associated service** (anaesthetic, radiology, inpatient stays, theatre costs) on the claim by a different provider

- Aftercare anomalies
  - Identify aftercare consultations (item number 105) within 14 days of surgery date (including on same day) billed by the same provider for the same claim. Assume 105 applies to most recent previous surgery.

- Compare theatre items billed vs provider items billed.

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# Hospital and medical rules – Examples

- Mutually exclusive MBS surgical item combinations, e.g.:
  - 47924 Buried Wire

    Buried wire, pin or screw, 1 or more of, which were inserted for internal fixation purposes, removal of requiring incision and suture, not being a service to which item 47927 or 47930 applies - per bone (Anaes.)
  - Thousands of combinations tested

- Other inappropriate use of MBS item combinations - complete medical service (additional item usage)
  - e.g. both primary such as fracture AND 'add-on' item numbers such as debridement, neurolysis are billed

- Other inappropriate use of MBS item combinations - complete medical service (unbundling)
  - e.g. billing of an amputation procedure using individual items (flap, bone graft, great veins, etc) rather than the 'over-arching' item (amputation). Unbundling usually results in greater remuneration for a procedure.

# Hospital and medical rules – Examples

- Mutually exclusive multiple billing (items billed more than defined)
  - 40301 INTERVERTEBRAL DISC OR DISCS, microsurgical partial or total discectomy of (Anaes.) (Assist.)
  - 49863 Foot, synovectomy of metatarso-phalangeal joint, 2 or more joints (Anaes.) (Assist.)

- Duplicate billing
  - Two providers bill the same patient for the same item on the same day

- Misuse of MBS
  - Halo items billed for soft collar application.

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# Hospital and medical results – Provider ranking

| Provider ID | Name | Provider type | Exception value | Annualised total | Average items per surgery | Average value per service | Average value per surgery | Average claim value | Rank | Review rank |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Neurosurgical | $17,902.65 | $188,080.63 | 1.61 | $651.66 | $1,180.55 | $1,679.55 | Medium | High |
| 2 | B | Plastic and Reconstructive | $36,139.29 | $111,016.03 | 2.17 | $464.41 | $1,511.85 | $1,813.34 | High | High |
| 3 | C | Orthopaedic | $3,904.43 | $112,025.18 | 2.78 | $1,251.48 | $3,986.19 | $6,063.49 | Medium | High |
| 4 | D | Neurosurgical | $0.00 | $34,875.93 | 3.00 | $1,268.93 | $6,979.10 | $6,979.10 | Low | High |
| 5 | E | Plastic and Reconstructive | $56,835.24 | $87,600.07 | 2.38 | $534.02 | $1,735.58 | $2,692.78 | High | High |
| 6 | F | Plastic and Reconstructive | $32,223.07 | $59,917.74 | 2.08 | $487.15 | $1,491.34 | $2,929.80 | High | High |
| 7 | G | Orthopaedic | $21,757.16 | $228,033.35 | 3.16 | $1,492.64 | $4,868.04 | $5,563.48 | High | High |
| 8 | H | Orthopaedic | $34,686.71 | $268,920.83 | 1.00 | $420.94 | $420.94 | $420.94 | High | High |
| 9 | I | Neurosurgical | $26,751.66 | $74,088.07 | 2.04 | $782.32 | $1,811.91 | $2,571.32 | High | High |
| 10 | J | Orthopaedic | $77,082.34 | $433,251.82 | 2.31 | $604.44 | $1,645.95 | $3,704.56 | High | High |
| 11 | K | Orthopaedic | $30,901.44 | $219,243.60 | 1.82 | $969.37 | $1,964.59 | $2,646.90 | High | High |
| 12 | L | Plastic and Reconstructive | $48,829.51 | $102,598.73 | 2.14 | $573.32 | $1,986.49 | $2,744.97 | High | High |
| 13 | M | Orthopaedic | $74,238.21 | $473,415.55 | 4.14 | $607.61 | $2,975.70 | $5,506.93 | High | High |
| 14 | N | Plastic and Reconstructive | $33,391.30 | $64,954.78 | 2.55 | $355.89 | $1,570.70 | $2,014.94 | High | High |
| 15 | O | Orthopaedic | $61,208.15 | $131,921.11 | 2.86 | $657.75 | $2,227.40 | $3,251.36 | High | High |
| 16 | P | Orthopaedic | $47,217.06 | $158,099.60 | 2.41 | $1,087.39 | $2,735.05 | $3,513.71 | High | High |
| 17 | Q | Orthopaedic | $112,686.26 | $570,831.31 | 2.89 | $646.94 | $2,221.04 | $5,310.85 | High | High |
| 18 | R | Orthopaedic | $4,822.14 | $91,408.52 | 4.79 | $639.74 | $3,559.49 | $5,101.93 | Medium | High |
| 19 | S | Orthopaedic | $74,040.39 | $92,462.75 | 3.24 | $430.43 | $1,559.03 | $2,200.98 | High | High |
| 20 | T | Orthopaedic | $42,851.06 | $165,861.07 | 4.57 | $613.13 | $3,457.49 | $4,998.33 | High | High |
| 21 | U | Plastic and Reconstructive | $58,749.72 | $141,550.21 | 1.98 | $496.86 | $1,360.13 | $2,287.49 | High | High |
| 22 | V | Orthopaedic | $36,301.43 | $127,964.95 | 2.81 | $1,613.17 | $4,666.33 | $5,433.82 | High | High |
| 23 | W | Neurosurgical | $71,500.92 | $166,963.30 | 1.97 | $753.01 | $1,753.51 | $2,667.58 | High | High |
| 24 | X | Orthopaedic | $51,721.28 | $65,357.19 | 3.18 | $407.93 | $1,760.24 | $3,352.10 | High | High |

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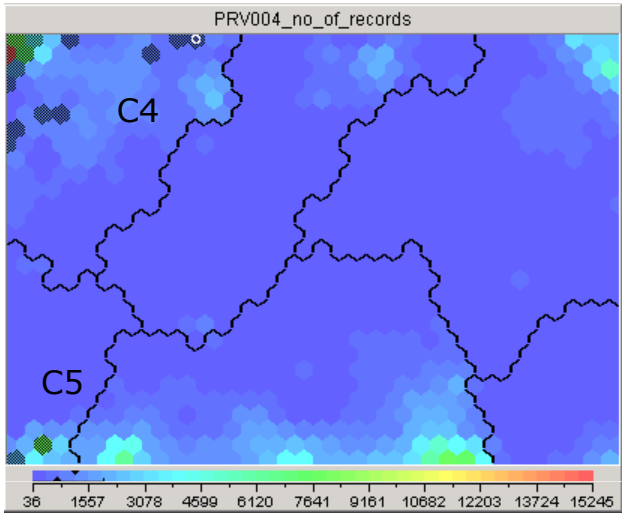
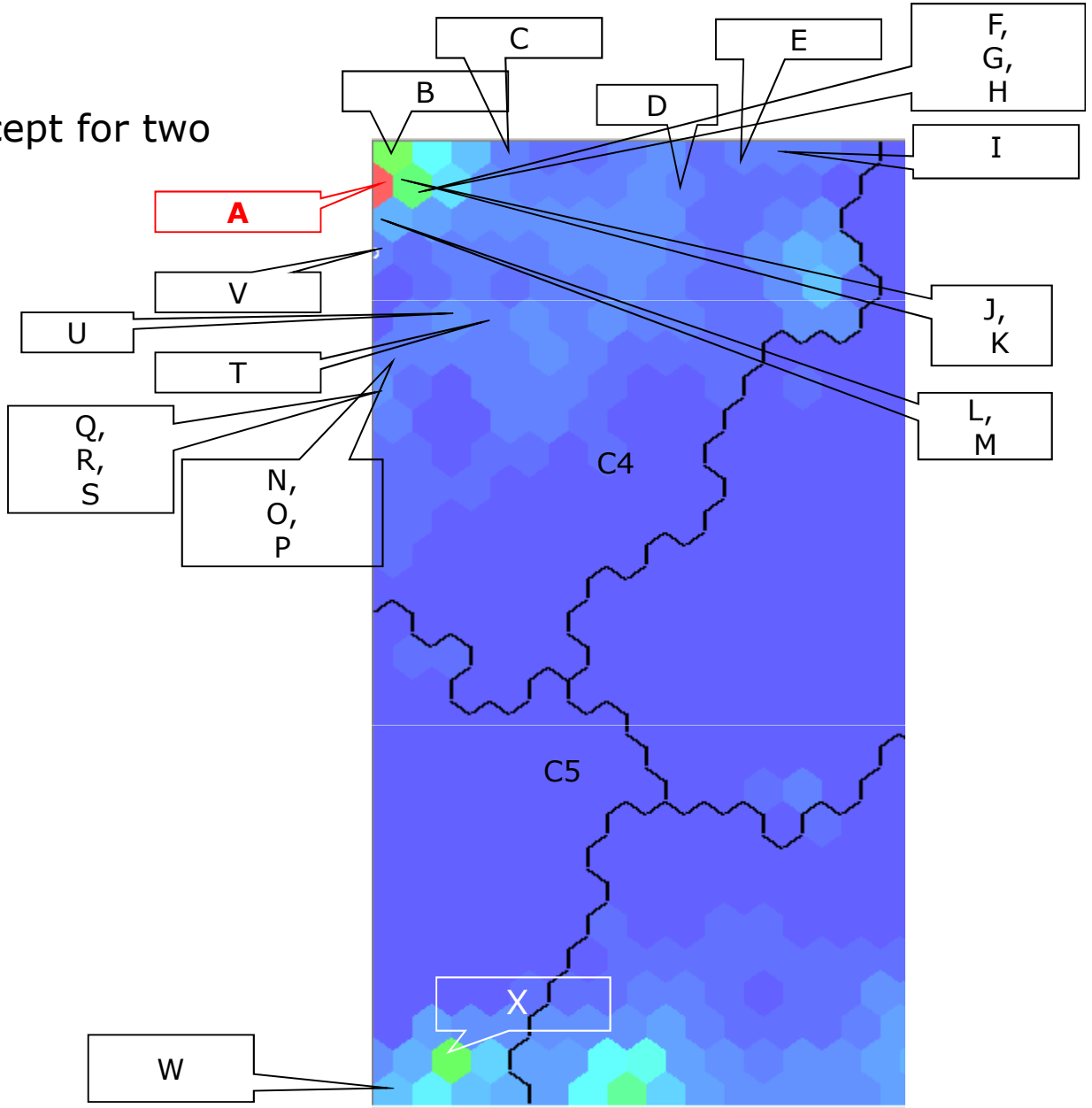
# Data driven insights – Self Organising Maps (SOMs)

- SOMs are a powerful artificial intelligence technique used for making sense of high dimensional and complex data
  - **Investigation**
    - Understand what has happened in the past
  - **Classification**
    - Segment / classify / cluster what is happening now
  - **Prediction**
    - What will happen in the future
- **No assumptions** made about how data relates to each other and what is important
- Applied to many data records considering all variables in all records at the same time to represent all the relationships between all records
  - Unsupervised modelling technique
- Model places **high number of variables** (dimensions) into a map where similar observations are next to each other
  - Predominantly a visual interface to the models
- Visualisation concept is based on **PROXIMITY** and **SIMILARITY**
  - Two nodes close together are “similar” whilst two nodes further apart are “dissimilar”

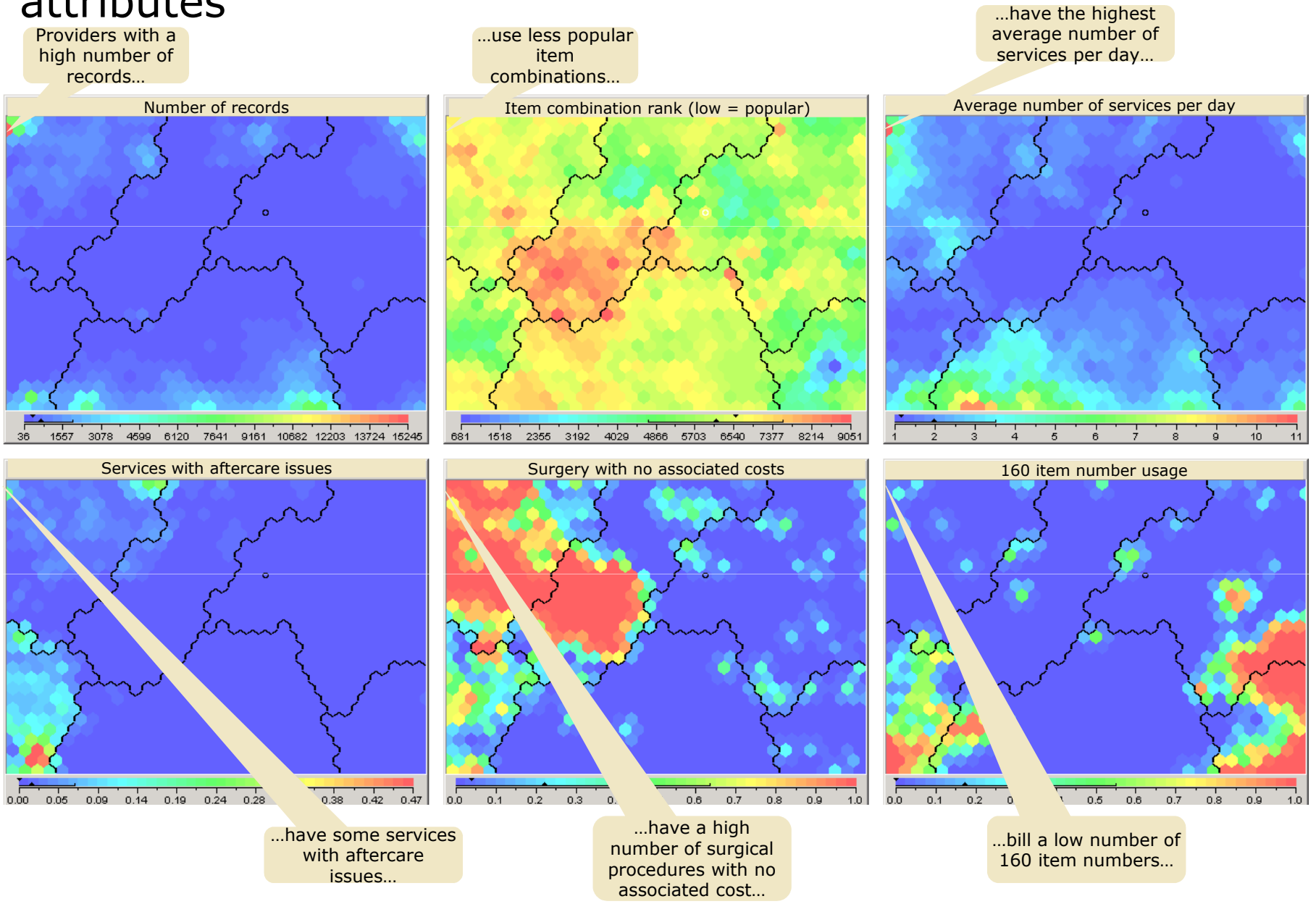
# How do rules-based high risk providers cluster using data driven techniques?

- Mostly fall in cluster C4 except for two
- W and X fall in cluster C5



# Data driven insights – An example demonstrating 6 attributes



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# File review approach

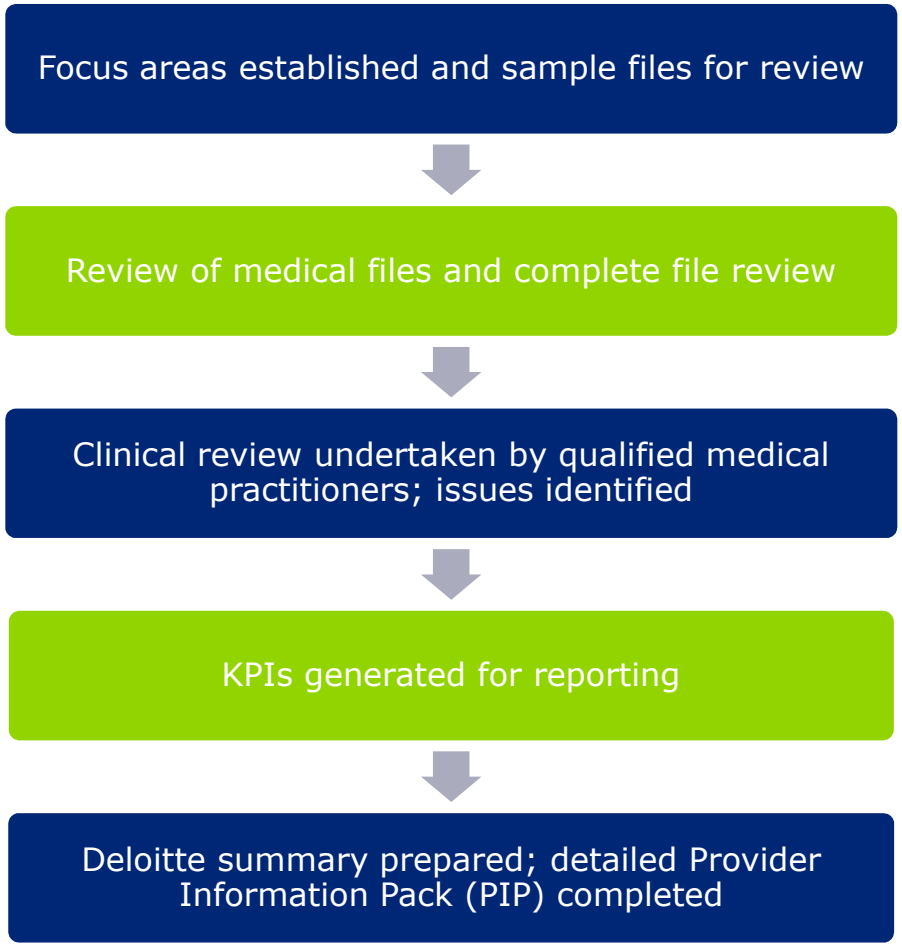
- Target high risk behaviour based on data analysis and customised criteria

- Develop consistent methodology to review high risk behaviour
  - Structured approach to reviewing behaviour
    - Summary of high level trends
    - Identification of relationships
    - Collection of operative notes and other supporting documentation to support review
    - Detailed review of exceptions.

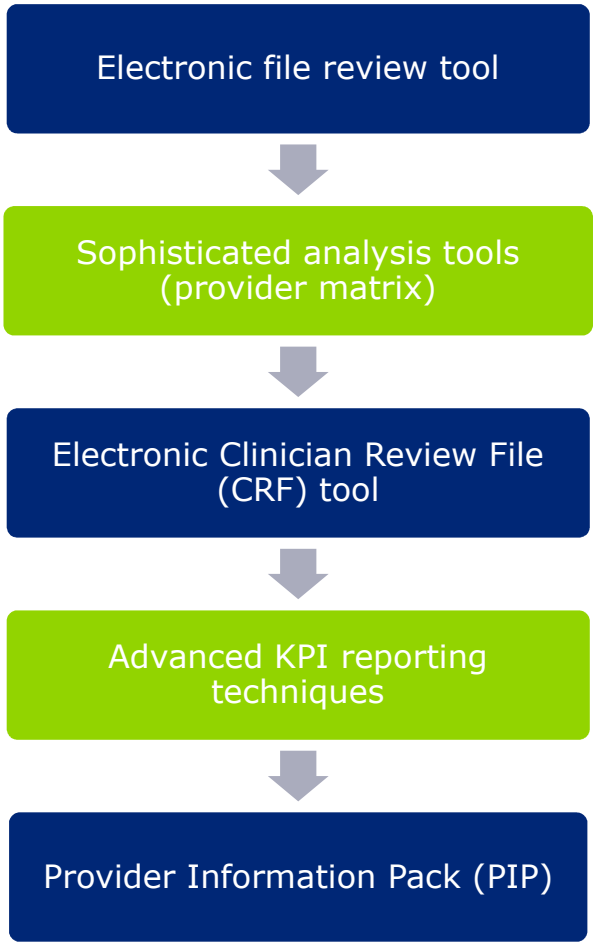
- Collaborative approach with key stakeholders and experts and a structured approach to file reviews.

# File review approach

*Sample of a tailored approach adopted for a recent project*




*Tools/techniques developed*



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# Outcomes

- Reduction in billing due to increased scrutiny of billing behaviour
- Process improvements – operationalise insights
- System improvements – implement validated rules to proactively identify unusual behaviour, ongoing automated analytics to build in previously unknown rules
- Commercial settlement – where inappropriate billing is confirmed determine a suitable arrangement with the provider to refund amounts
- Criminal prosecution/recovery – in serious matters there may be a need to liaise with police bodies to investigate criminal activity.

# Key takeaways

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# Key takeaways

- There is a great amount of experience in the industry regarding what is unusual billing behaviour
- There are unique components to billing behaviour for each organisation
- Use of data analysis to target unusual billing behaviour:
  - Rules based analysis for **known** profiles
  - Data driven analysis for **unknown** profiles and continuous improvement
- Success requires a joint approach with key stakeholders and experts and a structured approach to file reviews.

# Questions


**Justin Giuliano**
Account Director
Deloitte Forensic

Deloitte Touche Tohmatsu
550 Bourke Street
Melbourne VIC 3000
Australia

Tel: +61 (0) 3 9671 6906
Fax: +61 (0) 3 9691 8212
Mobile: +61 (0) 409 991 358
jgiuliano@deloitte.com.au
www.deloitte.com.au

Member of
Deloitte Touche Tohmatsu Limited

**Jessica Mead**
Senior Analyst
Deloitte Forensic

Deloitte Touche Tohmatsu
550 Bourke Street
Melbourne VIC 3000
Australia

Tel: +61 (0) 3 9671 6179
Mobile: +61 (0) 433 595 664

jmead@deloitte.com.au
www.deloitte.com.au

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