Leveraging Machine Learning for IA Risk Assessments

Dr. Vivek Shivram | Experienced IT Auditor and Data Analytics Professional | Data Scientist

Risk Assessments Today

Key person dependencies

Lots of recurring manual efforts expended for a risk assessment cycle

Point-in-time

Quarterly / Six-monthly risk assessment cycles may not cut it.

Subjective

Expert auditors make the calls, but are they biased?

What if your audit function could highlight emerging risks before they surface?

Why Machine Learning?

Increasing Complexity of Business Operations

Organisations face a **growing number of risks** due to rapidly evolving business landscapes, technological advancements, and regulatory changes.

Limitations of Traditional Risk Assessment Approaches

Reliance on **subjective judgements** on residual risk can result in ineffective audit planning, prioritisation and delivery.

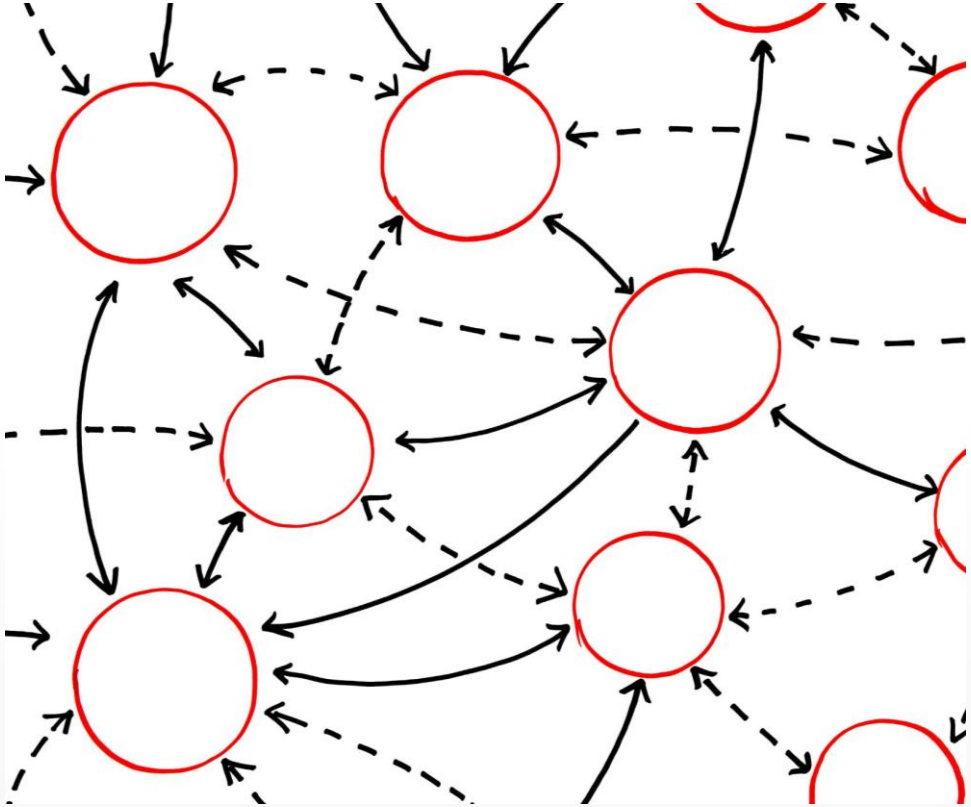
Need for Data-Driven, Adaptive Risk Assessments

Internal audit teams require more **robust, data-driven risk assessment** methodologies to provide reliable assurance and effectively guide assurance efforts.

Adopting a data-driven, Machine Learning-powered approach to internal audit risk assessments can help Internal Audit Functions enhance their assurance capabilities and transform into a genuine change agent for the organisation.

Today’s agenda

Options on the table: Asking the right questions!



Supervised Machine Learning

- Supervised learning uses **labeled data** to train models, making it ideal for predictive analytics in risk assessments.
- “What is the inherent risk of an audit entity based on the features analysed?”
- Use historical risk assessments as a starting point.

Unsupervised Machine Learning

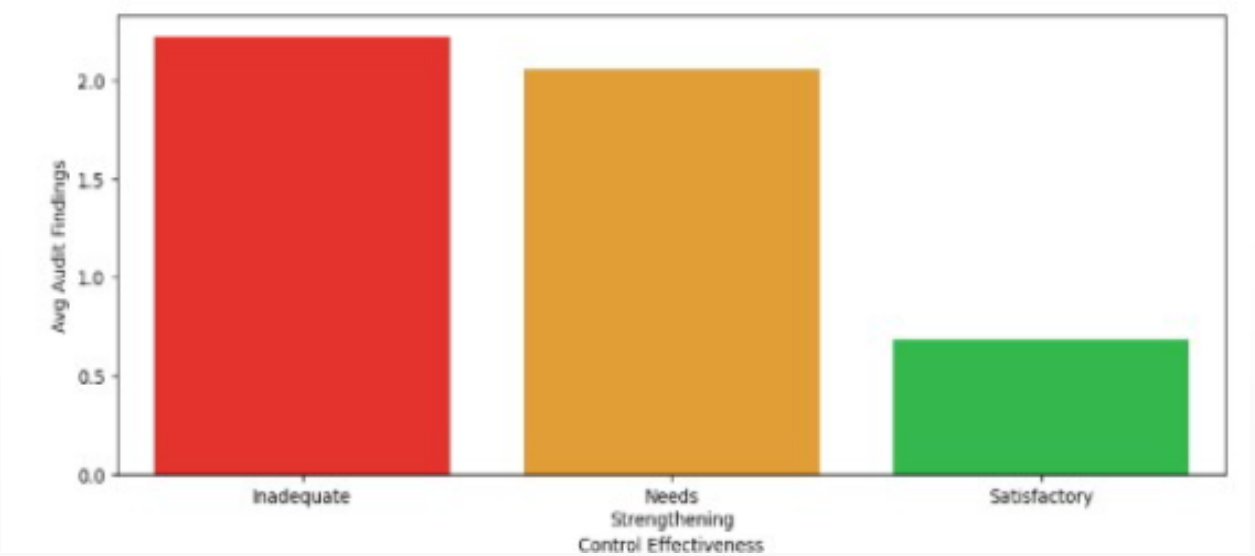
- Unsupervised learning **discovers hidden patterns in unlabeled data**, useful for detecting “outliers” within a population.
- “What are the audit entities that “stand out” based on the features?”
- Start afresh – green field!

Supervised Machine Learning: Getting Started

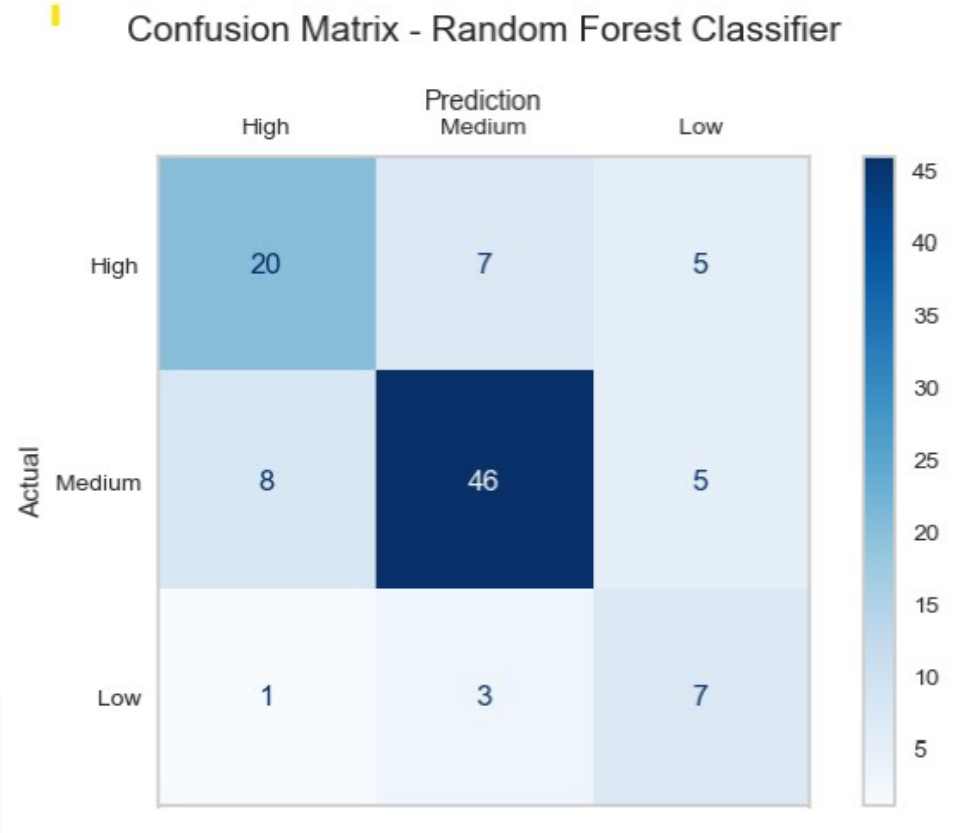
Step 1: Define the features and target variables
These will need to be carefully selected, cleaned and refined.

Step 2: Feature analysis

Before diving into modelling, examine and challenge your selected features.



Supervised Machine Learning: Development



Step 3: Choose (and build!) robust models
Decision trees and **random forests** are common techniques used in supervised learning for classifying risk labels.

Step 4: Seek explainability
The model supplements and informs but **does not replace** auditor expertise.

Supervised Machine Learning: Integration

Power BI Front-end

- Share model results using **Power BI** / Tableau / Micro SaaS options.
- Incorporate **interactive visualisation** of model outcomes (e.g. confusion matrices) as well as feature insights.

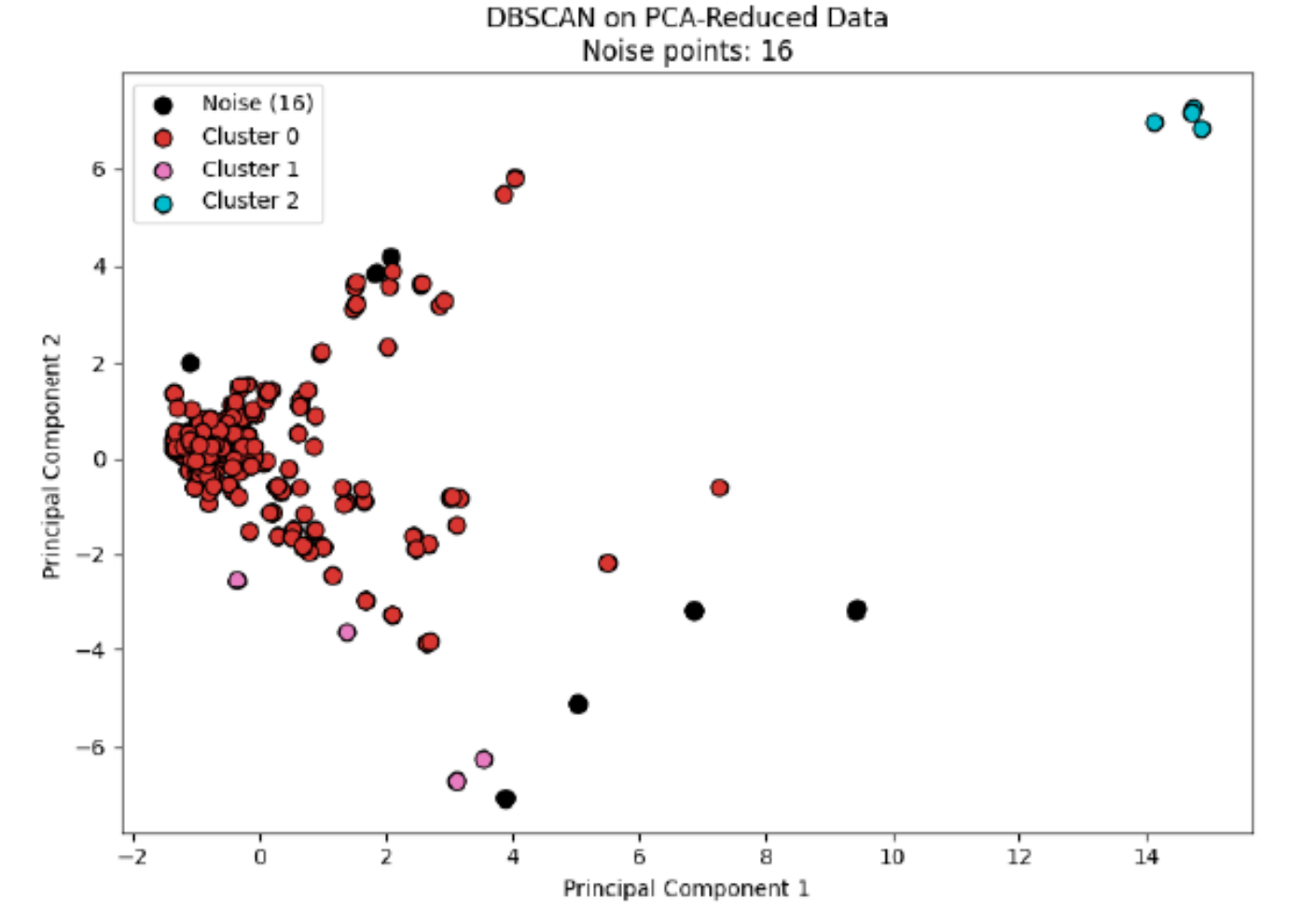
Integrate into audit methodology

- It's not "one and done" – keep it **agile**!
- Determine **how results will be used**.

Model retraining and knowledge sharing

- Model development is an art – **avoid KPD**.
- **Keep refining** features and retraining models.

Unsupervised Machine Learning: An example



Step 1 - Standardise and Scale

22 features have been standardised and scaled, and “compressed” on a 2D axis using **dimensionality reduction**.

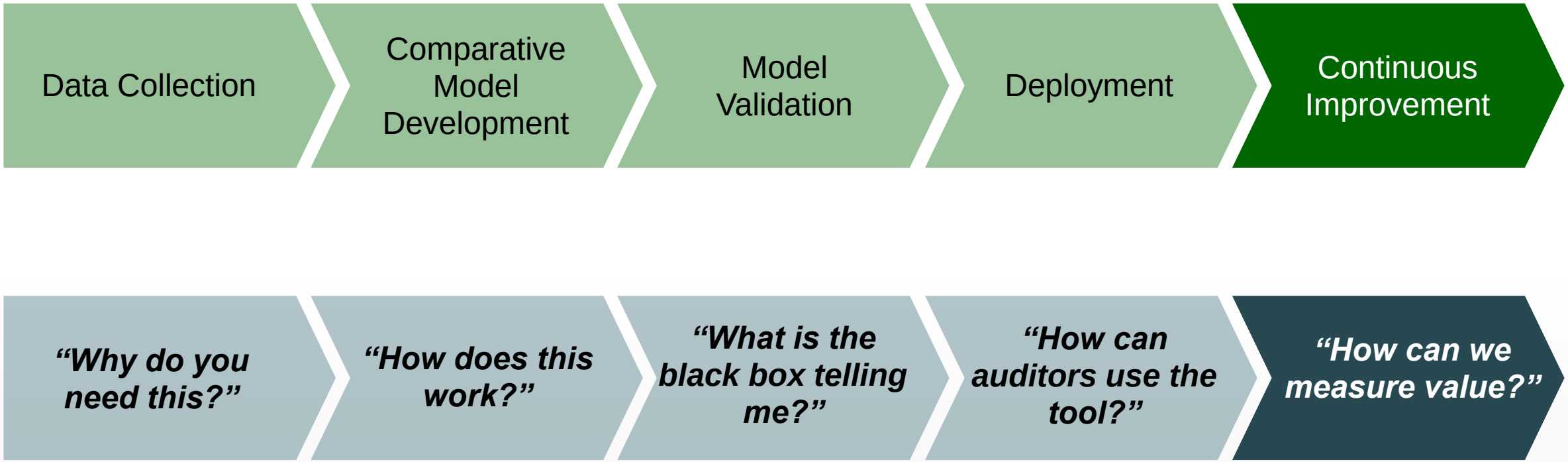
Step 2 - Density analysis

The model has identified and grouped the audit universe entities into “clusters” as seen in this figure – these are **natural groupings** of audit universe entities that emerge from the feature set provided.

Step 3 - Analyse insights

Auditors can unpick the individual clusters to determine whether these insights yield natural risk groupings, but this is easier said than done!

Implementation workflow – and key challenges!



Overcoming Challenges

"Why do you need this data?"	*"How does this work?"*	*"What is the black box telling me?"*	*"How can auditors use the tool?"*	*"How can we measure value?"*
Offer **curated and mapped datasets** to participating business and technology teams.	Experiment with **SHAP** visualisations and **expose underlying input** data alongside model results.	Use **confusion matrices** – specifically accuracy and class-specific precision.	**Drive updates to audit methodology**, requiring auditors to use ML results as a key input for finalising risk assessments.	Identify **individual champions** within audit teams to continually refine features and improve model robustness.

When implemented effectively - Machine Learning-based techniques for risk assessments challenge existing notions of risk within the audit function and introduce agility and efficiencies in the audit plan.

What can you expect?

How can you make this happen?

Get the basics right

- Machine Learning relies on **brilliant underlying data**.
- **Invest time and effort** in improving data quality.

Technical Foundations

- **Statistical validation** is important – leave it to the experts!
- **Choose robust models** that are relevant to your data.

Set the right expectations

- **ML supplements – does not replace**.
- An effective journey will take time – **do not rush it**.

Parting Notes

The future of audit is not in commenting on risks once they have materialised, but in predicting and helping prevent them!

Ongoing Refinement and Expansion