End-to-End
Proactive Talent Retention Capability using Machine Learning and Advanced Analytics

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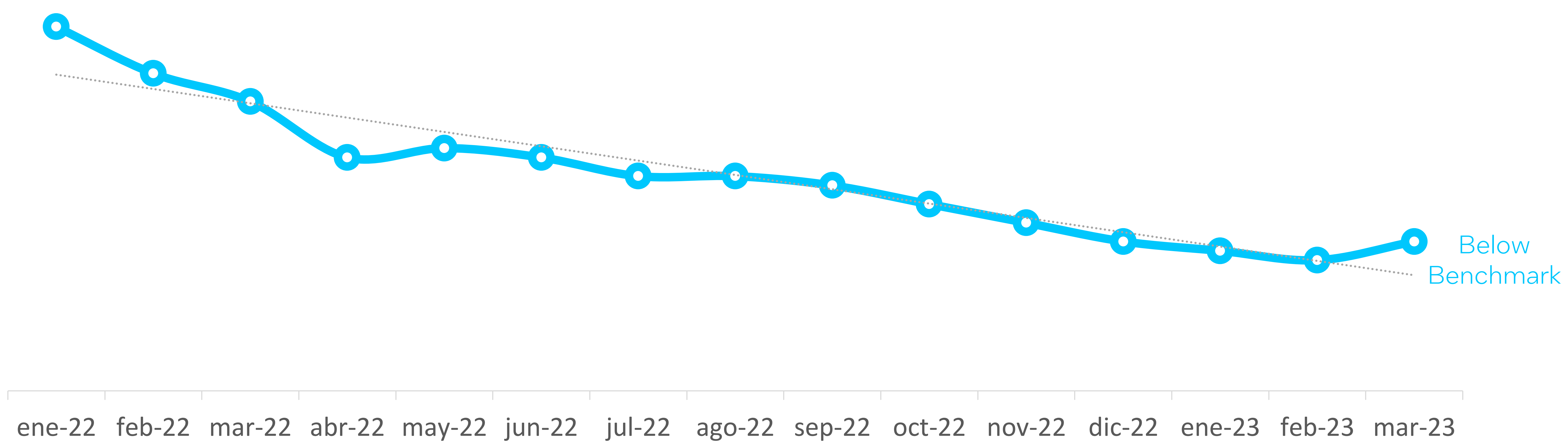
What this session is about

- General thoughts and observations
- Predictive Turnover Capability Architecture
- Methodologies
- Concepts
- Business Examples
- Key Takeaways

Cost of employee replacement?

“Direct replacement can cost companies up to [50%-60% of a worker’s annual salary], and that is without the indirect costs associated with losing an employee
These include missed or delayed revenue, and loss of productivity and knowledge”
Source: *Society for Human Resource Management*

The Journey: Year-over-Year Undesired Turnover Decrease



The opportunity

The problem
Reactive

- HR is equipped for reactive talent retention measures and these “dive and catches” are time consuming and generally ineffective

Our solution
Proactive

- Empower HR to support managers with **real-time risk signals** to determine if **proactive** measures are needed**.**
If **acting,** utilize a library of content to generate a targeted approach

Why?

- Planned actions can be most effective by considering various data inputs and focusing on highest priority populations

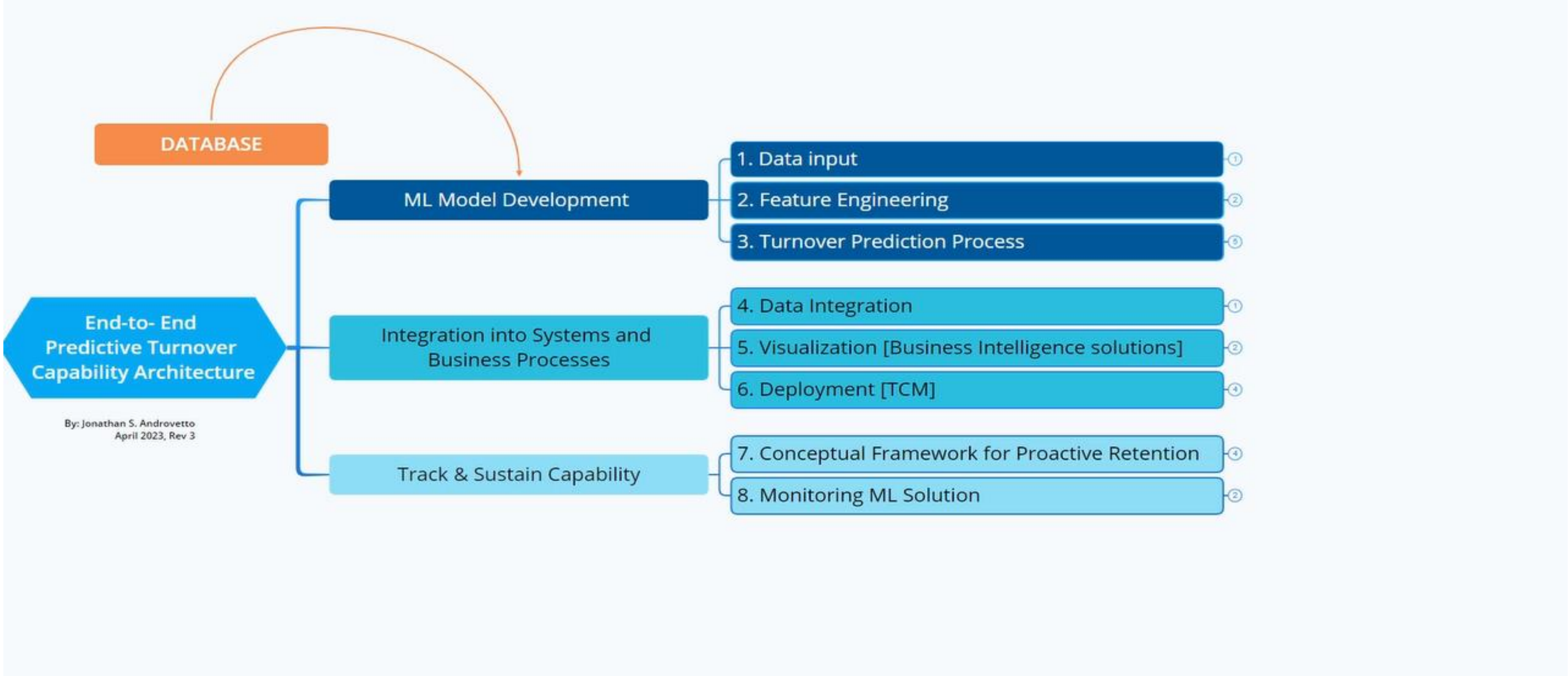
Success Metrics

- Undesired Turnover decrease vs Benchmark
Employee sensing participation and YoY improvement.

Strategic Intent – Hire, Progress and Retain the best talent of the world

End-to-End Predictive Capability | **Model Architecture**

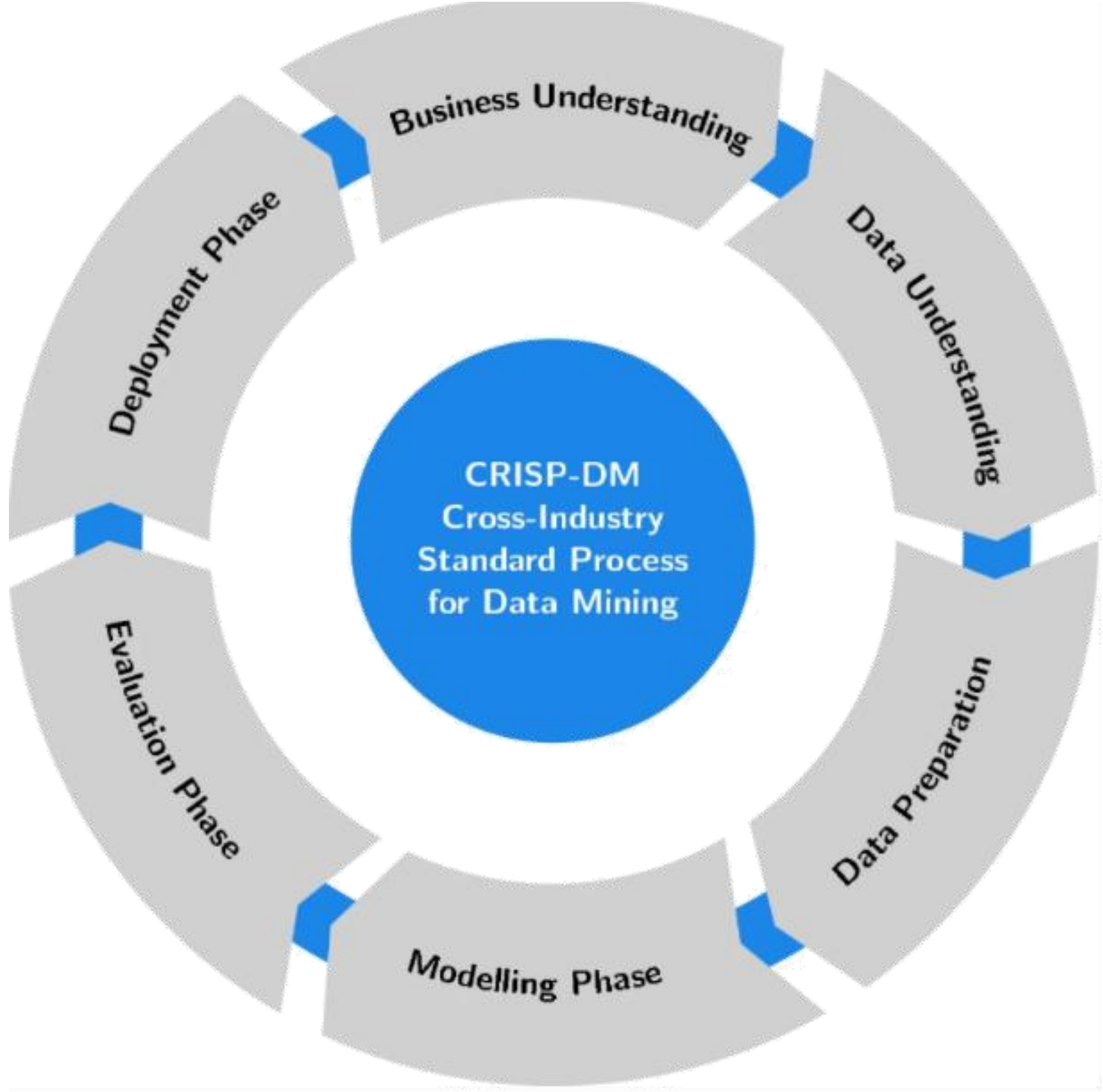
- The AI Life Cycle & My Formula



* Model architecture is based on my own experience as a consultant

Turnover Prediction Methodology

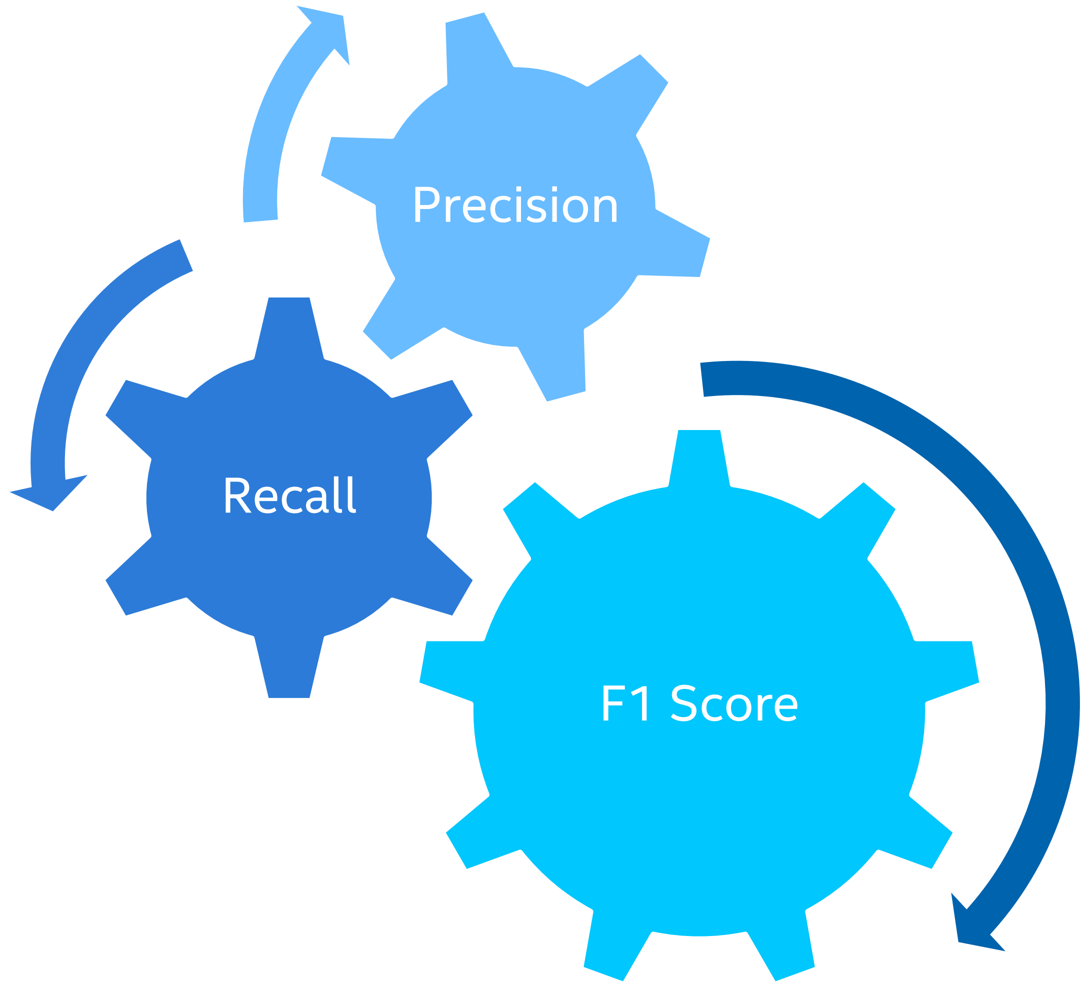
Industry Methodology



The CRoss Industry Standard Process for Data Mining (CRISP-DM) is a methodology that serves as the standard for a data science process

CRoss **I**ndustry **S**tandard **P**rocess for **D**ata **M**ining
[CRISP-DM Guide]

Performance Indicators



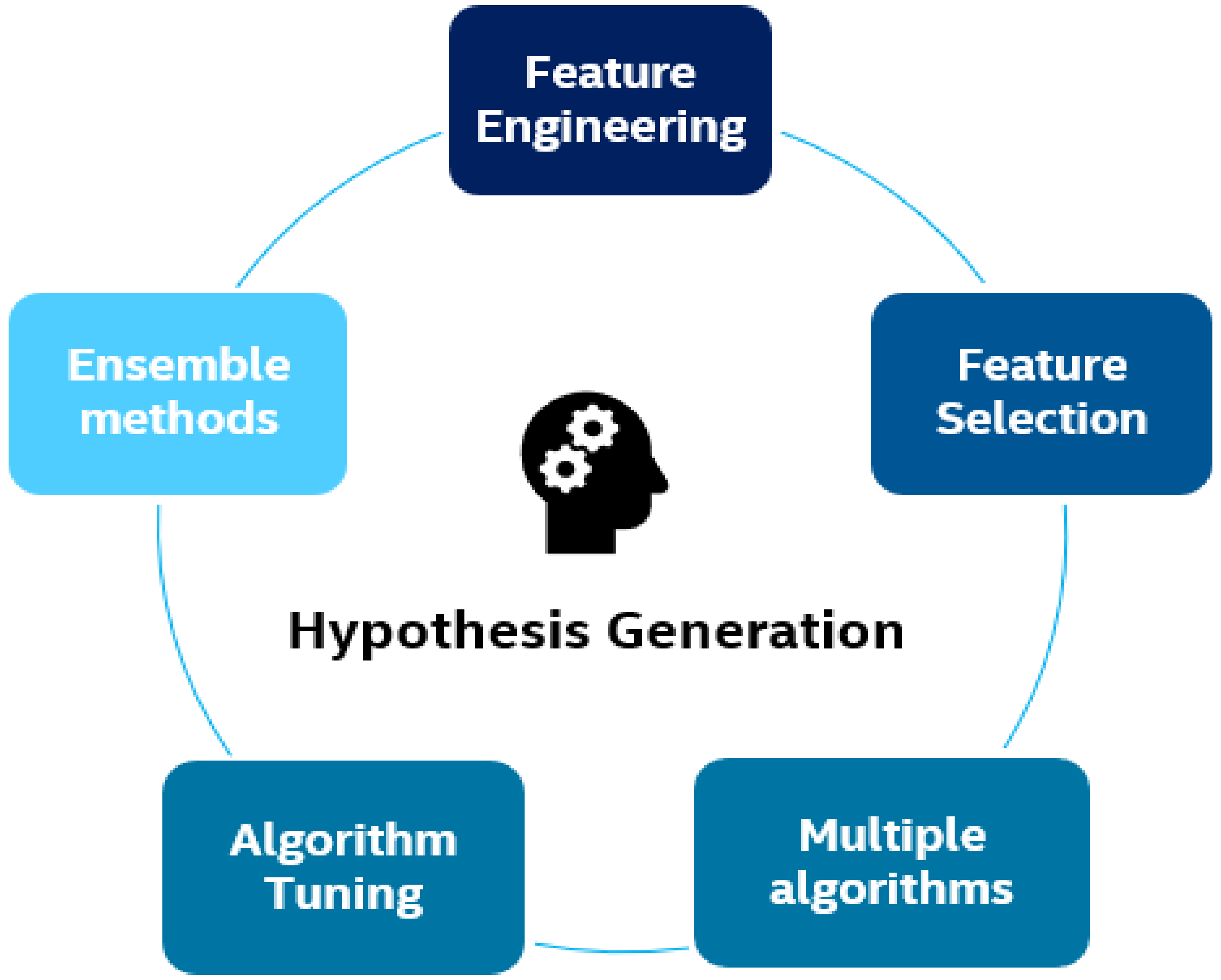
Model Performance
80% F1 Score

F1 score is a measure of a model's accuracy that combines two metrics, Recall and Precision.

***Recall: ~69%** (the percentage of employees who leave that are correctly identified as a turnover risk by the model. This means the model predicted 69% of actual turnover.)

***Precision: ~90%** (the ratio of people identified as a turnover risk by the model who end up leaving vs. those who are identified as a turnover risk but do not leave. This means that 90% of people predicted to leave actually turned over)

Model Improvement Methodology

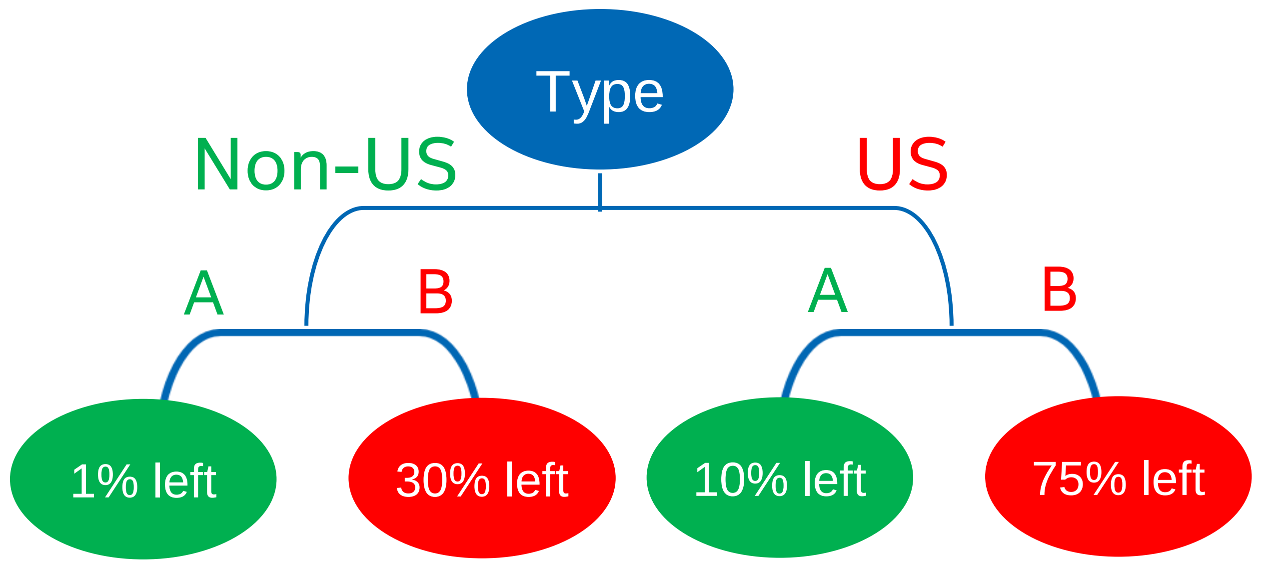


Learning Models such as the Turnover predictor model are not 100% accurate. However, a methodology was designed to support continuous improvement of the model

How the prediction model works | Hypothetical example

To answer these questions, the model runs 1000s of decision trees with 100s of demographic variables against data sets of terminated employees…

Sample Decision Tree



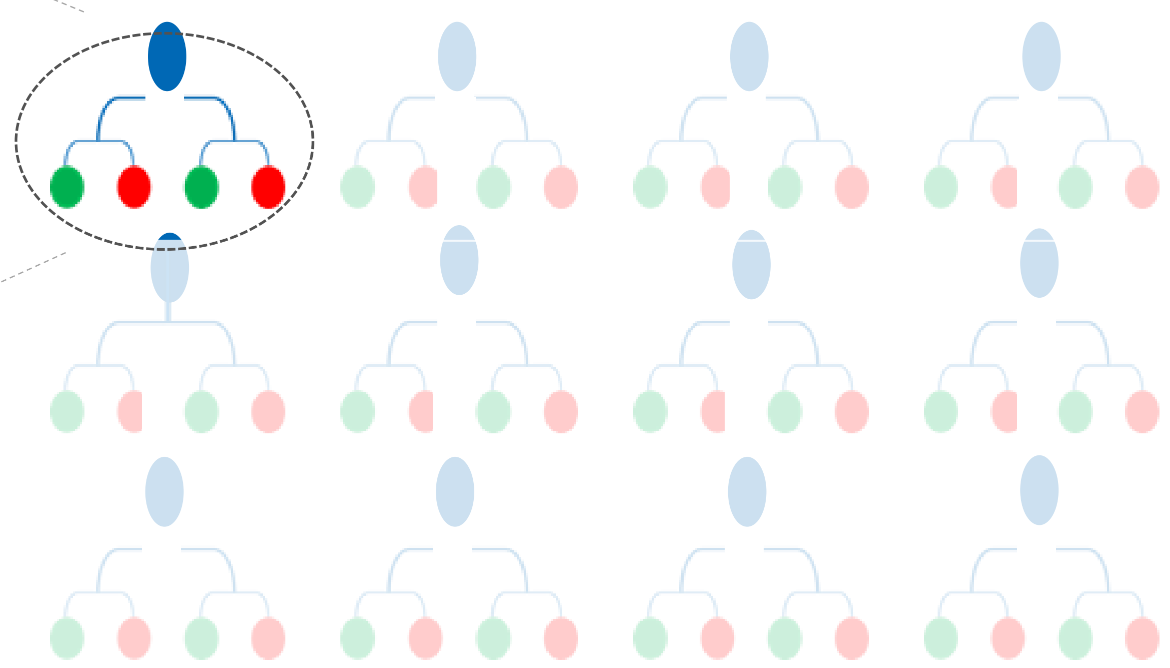
In this example, **US B EEs** have the highest chance of leaving.

All Active US B EEs will be flagged as "at risk"

The rest of EEs will be flagged as "not at risk"

Gradient* Tree-based model

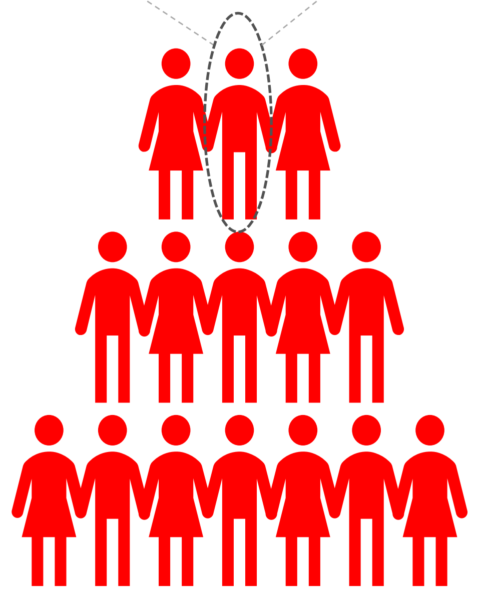
(e.g., LightGBM, CatBoost, Xgboos)



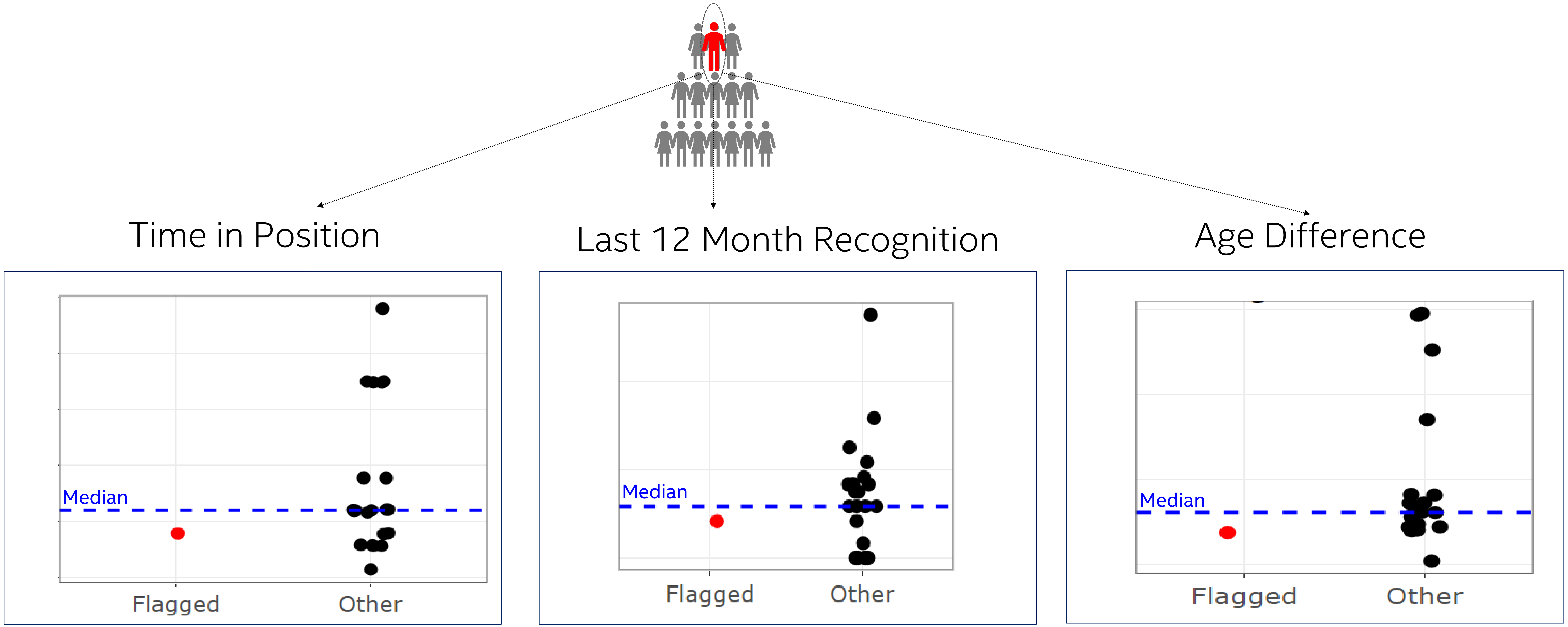
To be thorough, the model runs 1000s of decision trees of terminated EEs with 100s of demographic variables (e.g., seniority, team diversity, org changes, turnover, etc.) in different combinations. It keeps flagging as "at risk" all active EEs that have the same demographics as the terms, even if repeated

…Ultimately, the model produces a final list of Active EE most frequently flagged as "at risk" and the demographic factors associated with them

Team Turnover
Team Size
Time in position
Length of Service
Team Age Dist.



Interpretation of signals | Symbolic Visualization

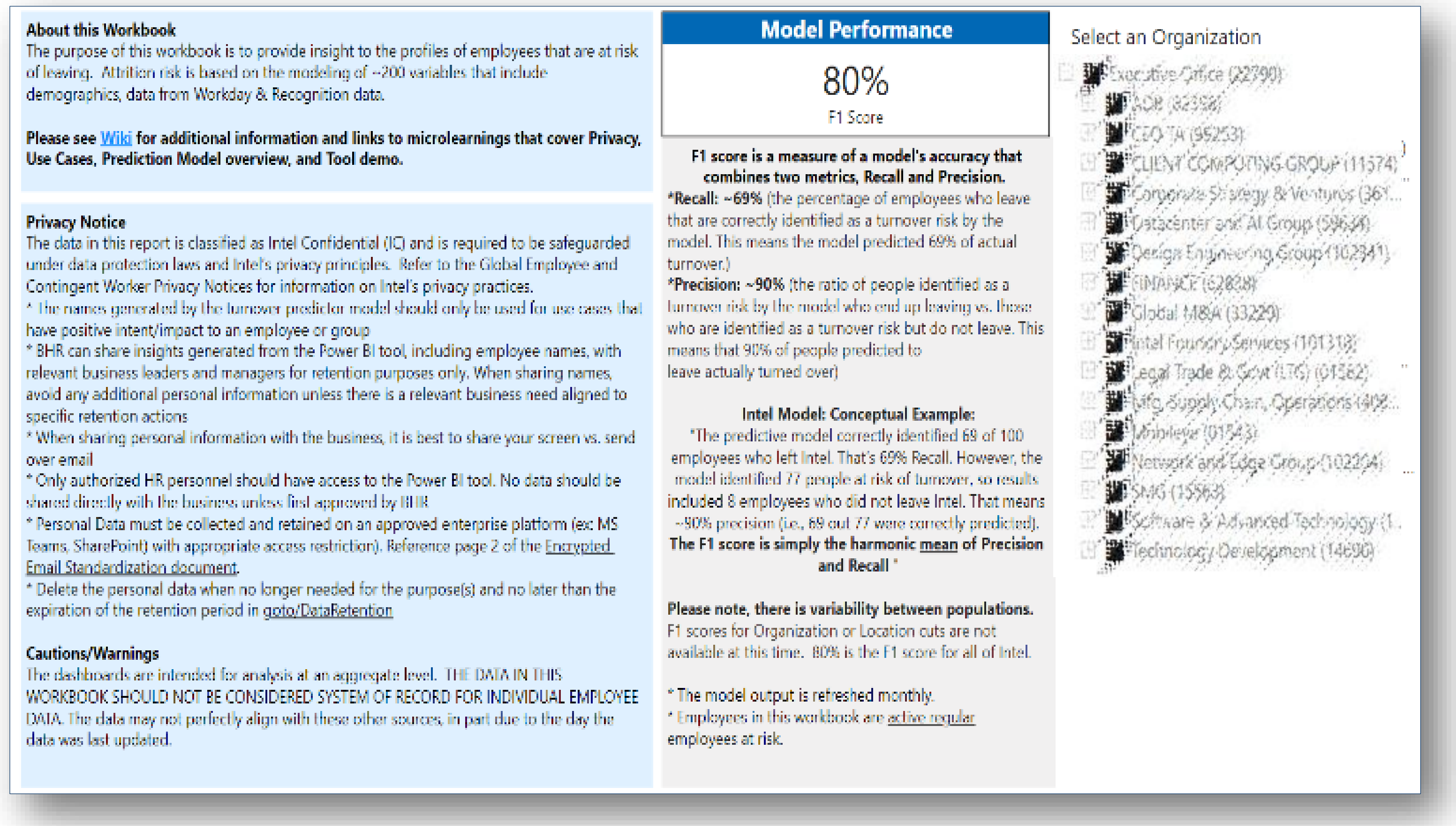


The model produces a series of signals based on demographic attributes identifying active employees that fit characteristics of the training data (employees who have left) and classified as High Risk. The employee identified as High Risk will have several different signals assigned to them (it could even be 5 or more). It is the combination of all the signals that determine the risk. It is not clear if one is more important than another to an individual (e.g., they are not weighted per se). For example, employees on the same team could have very different factors and/or combination of factors. Some factors may appear to be more actionable than others, however they cannot necessarily prescribe what actions to take on their own. The factors should be analyzed with other Turnover data points (i.e., Undesired Turnover trends, External Market Threats, Employee Survey, Ground Intelligence, reg. TO, compensation, etc.) and linked with BHR Programs for actionability.

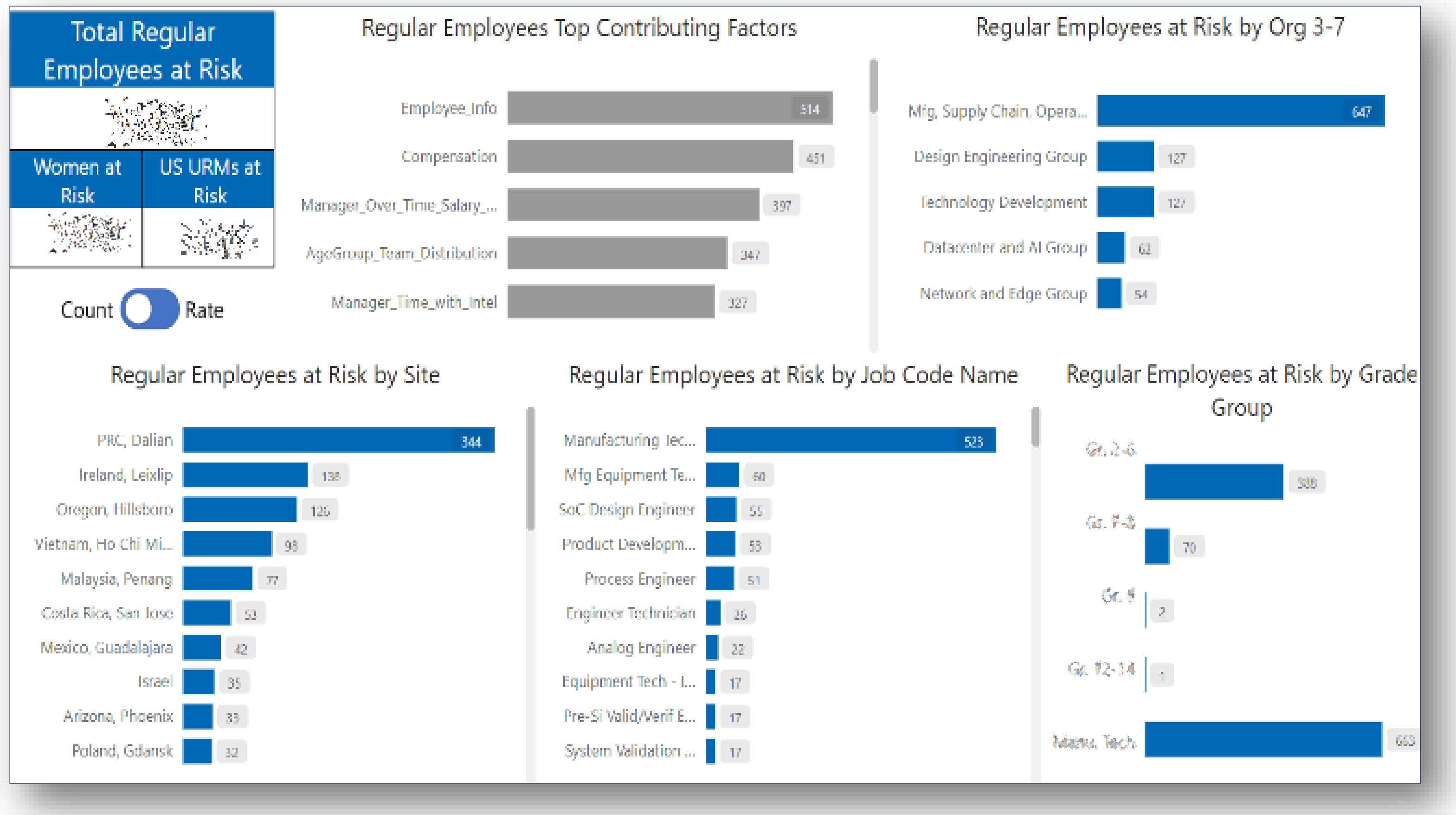
Keep it Simple!

Components to consider for | Customer view

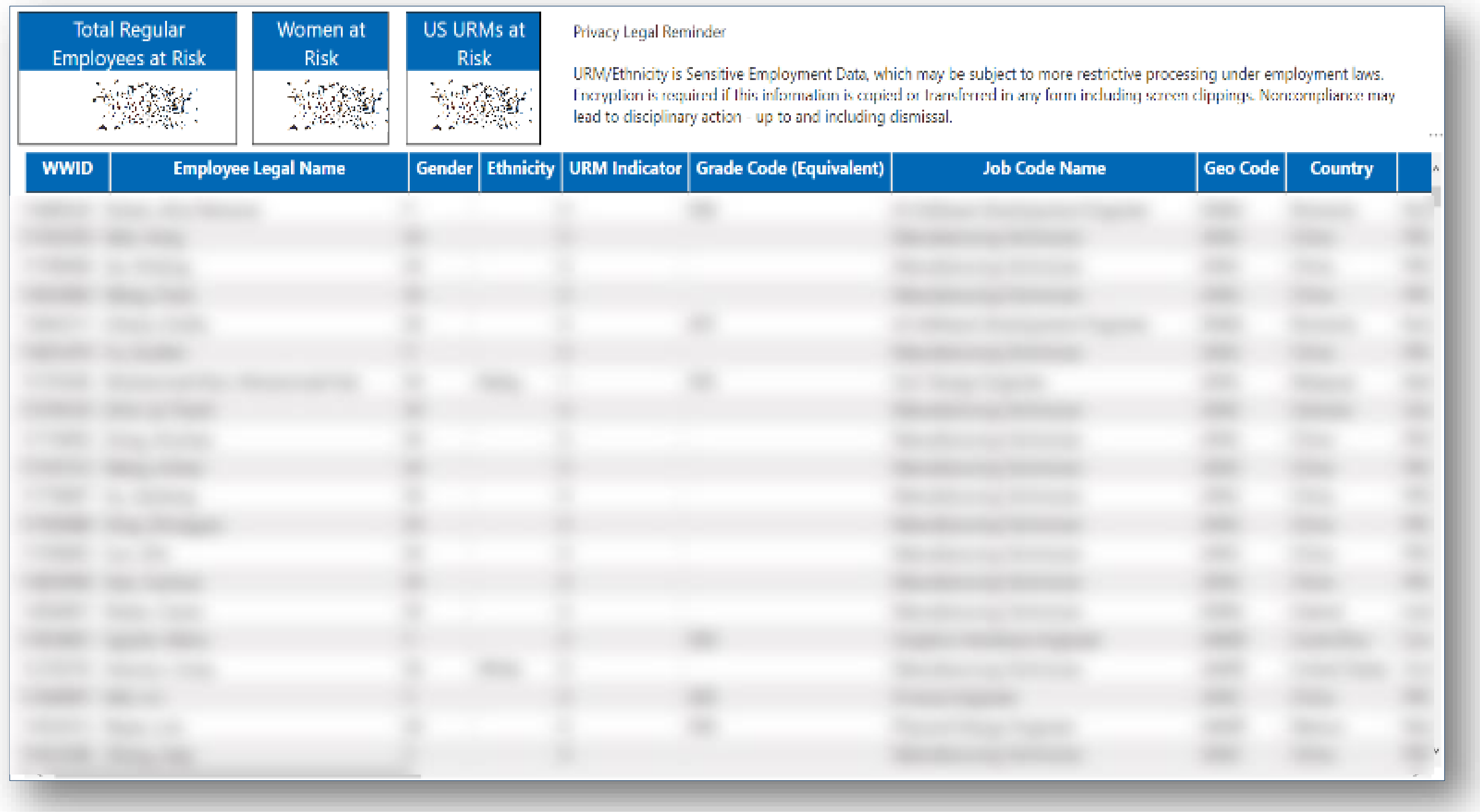
Description of Model Performance



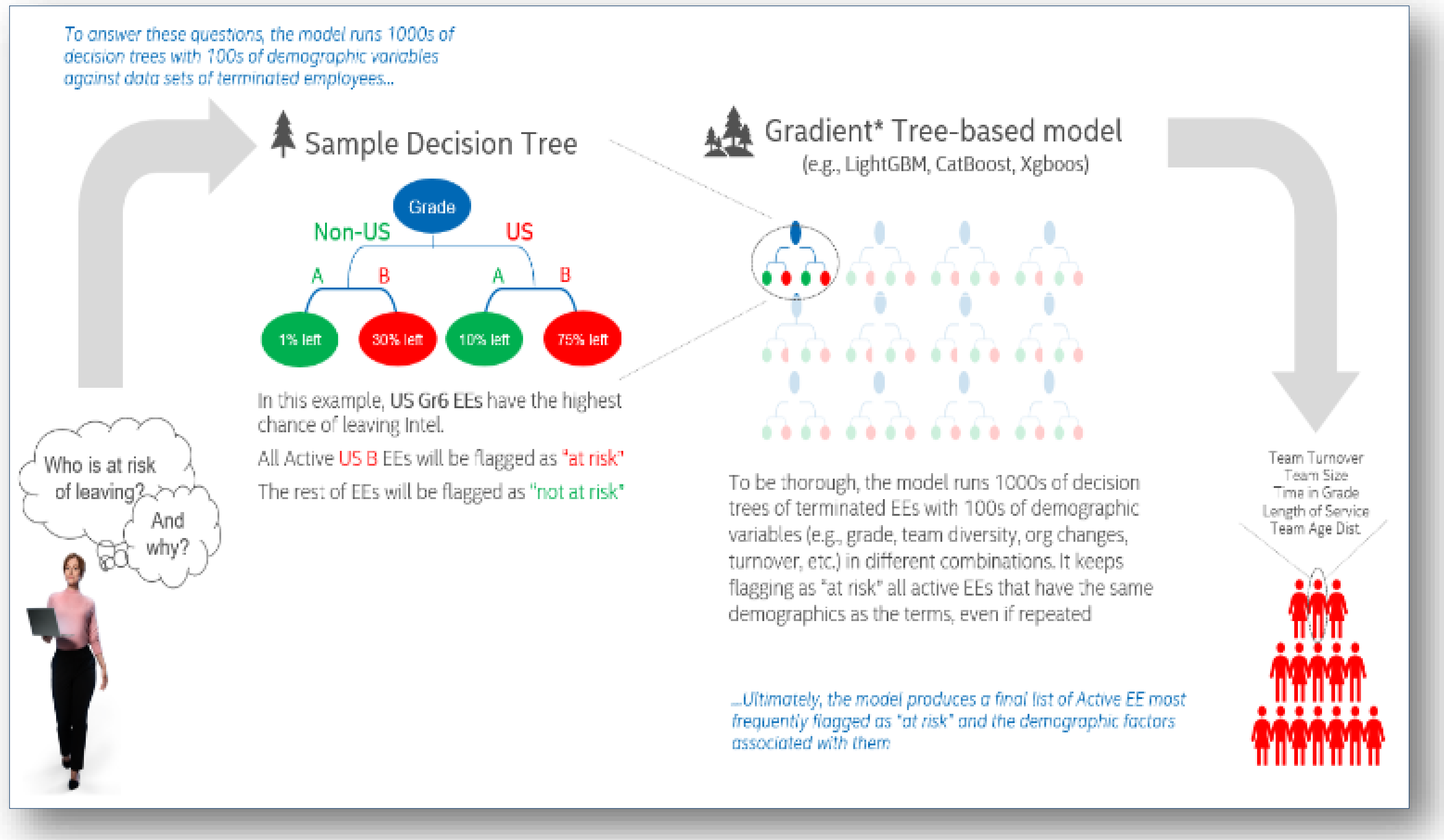
Simple Visualization



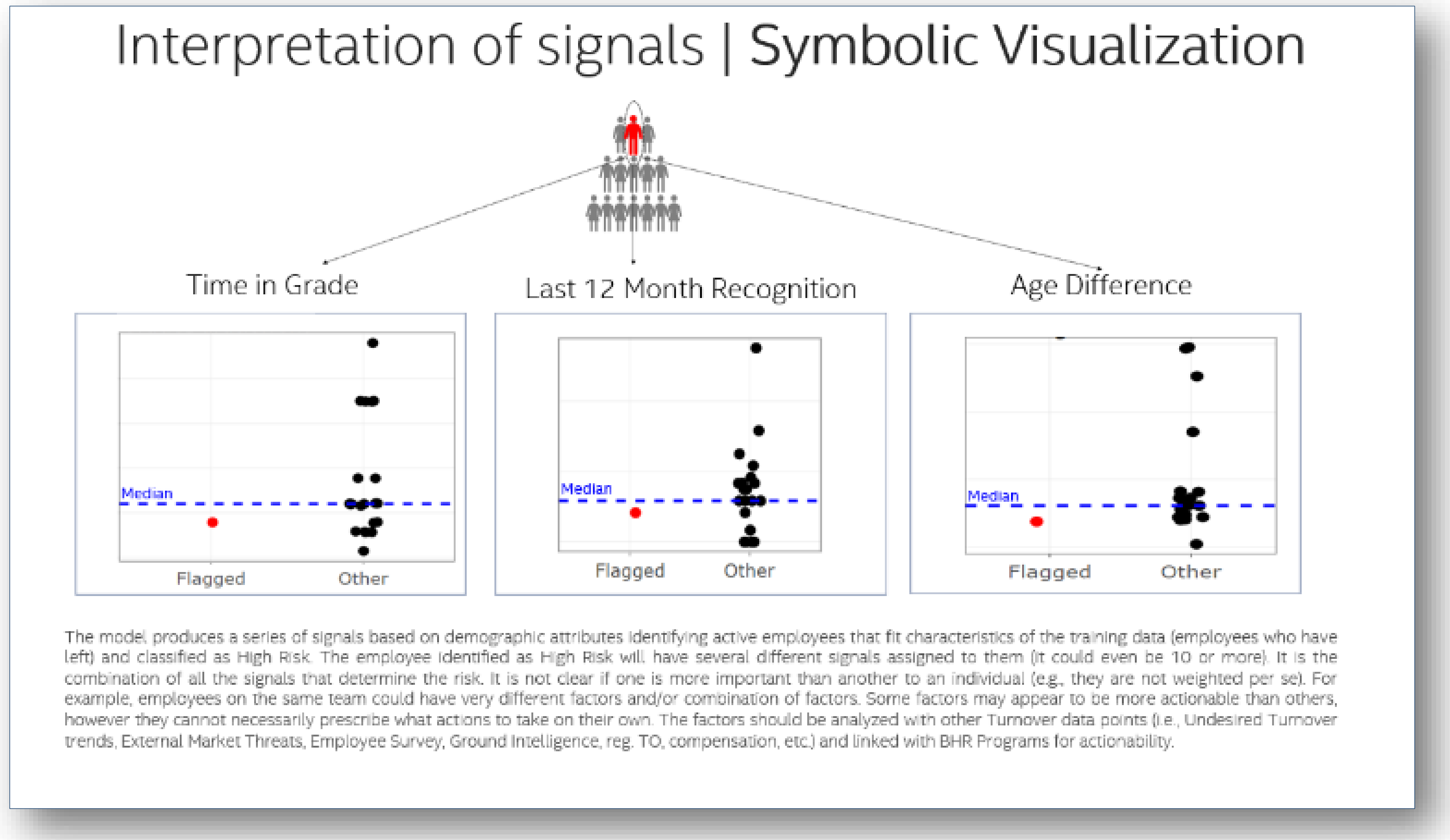
Access to Row-Level Data



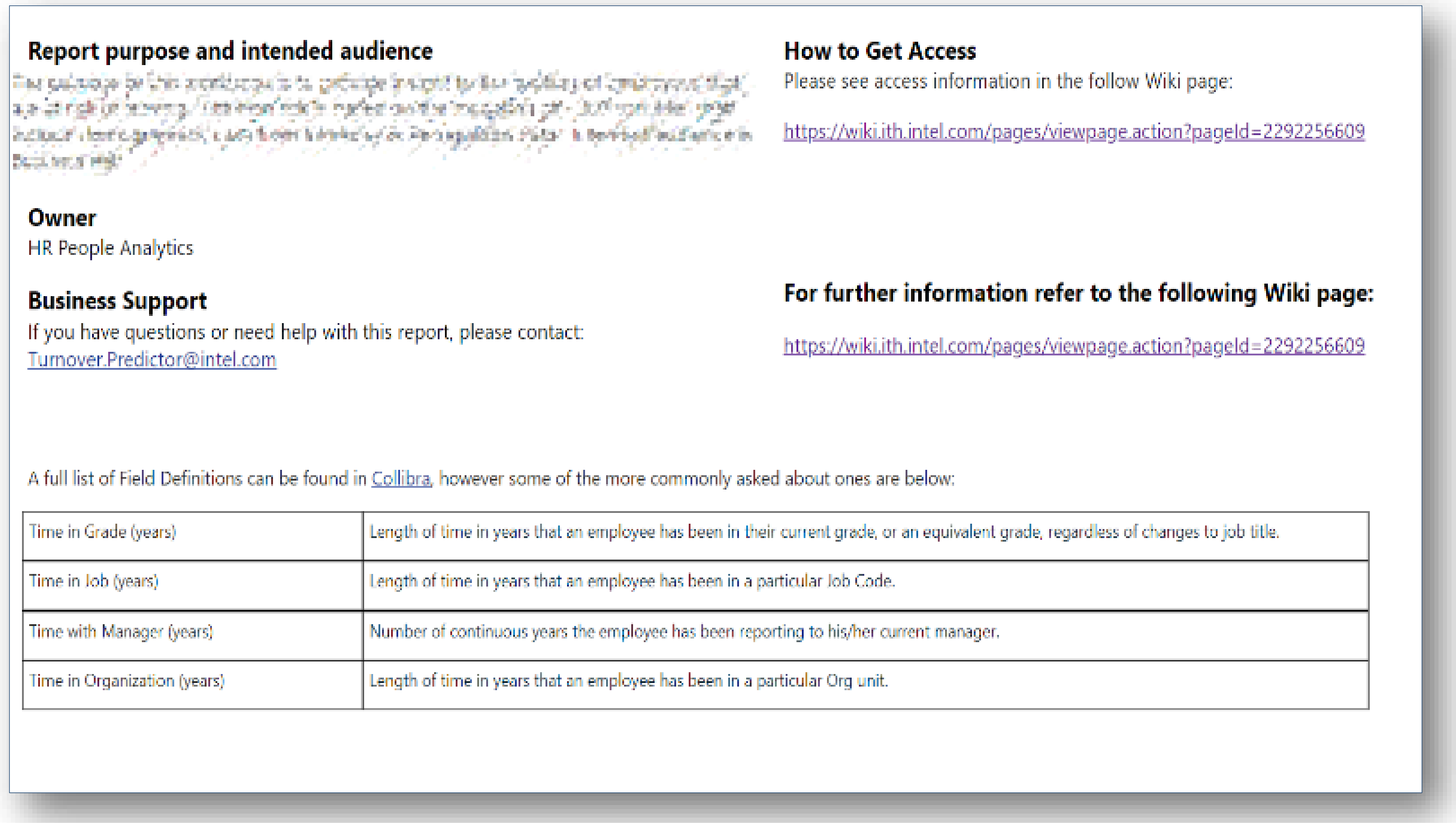
Description of Model Methodology



Description of Interpretation of signals



Description of Help and Support

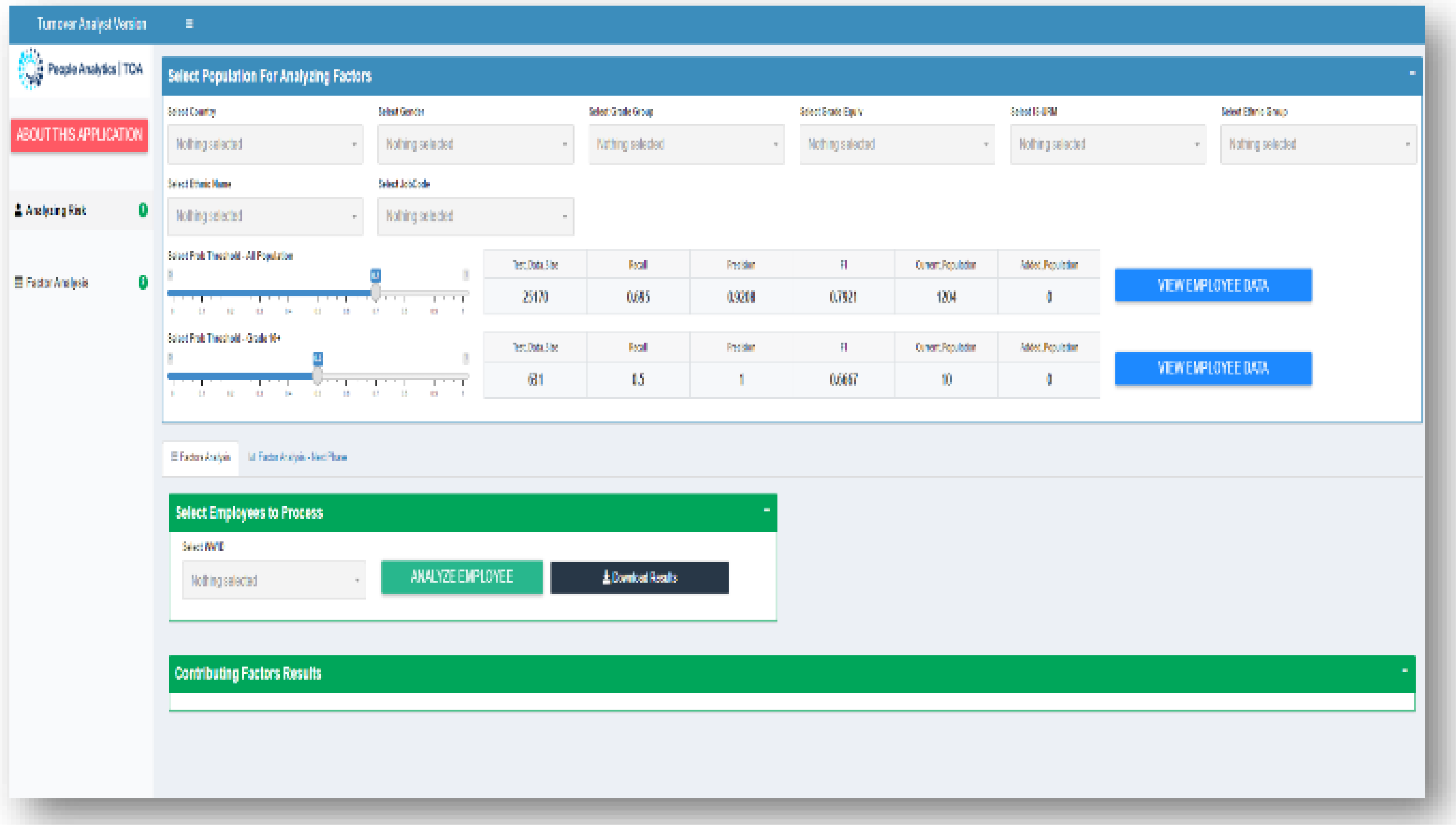


The purpose of this BI Solution is to provide insight to the profiles of employees that are at risk of leaving

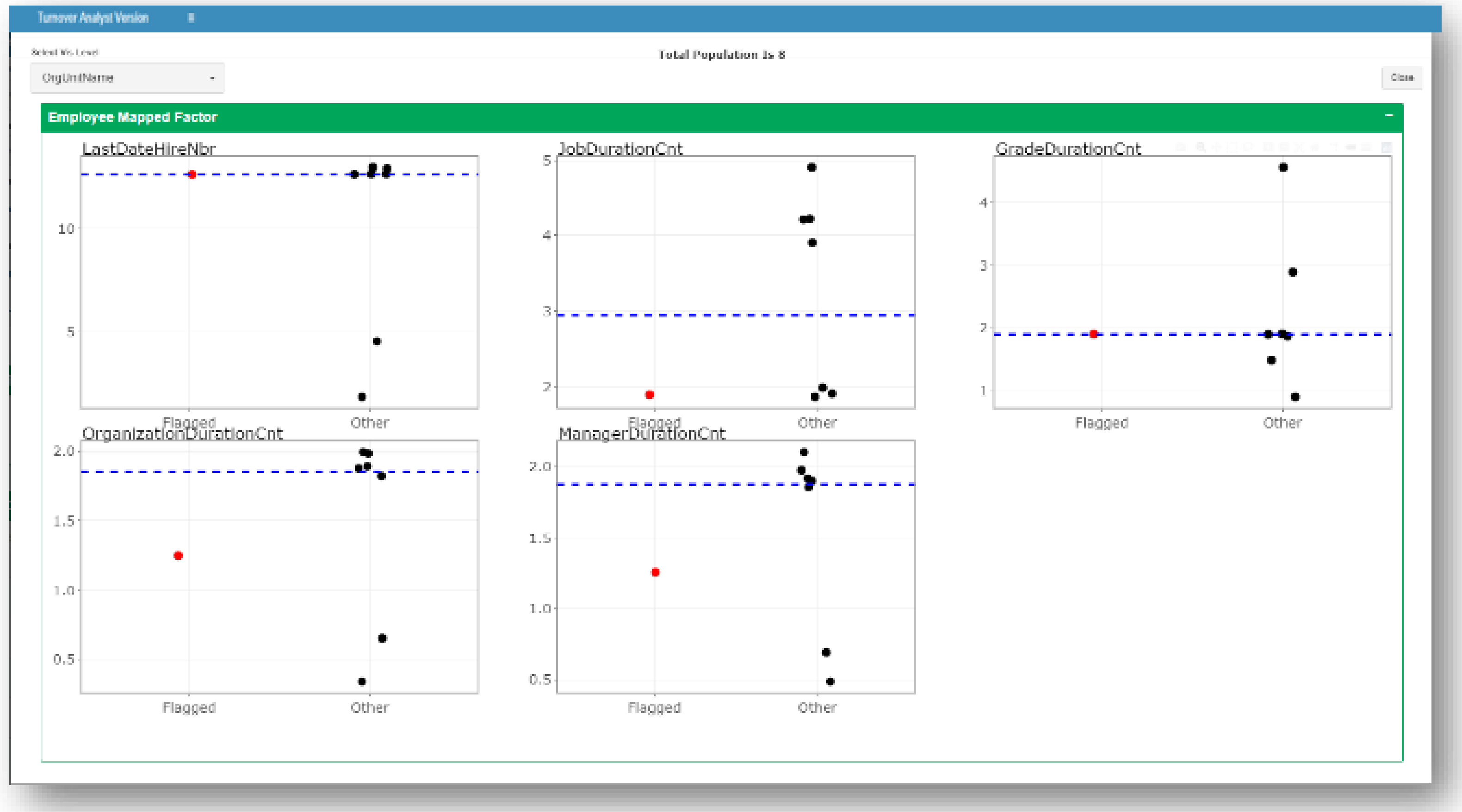
Start Small and Iterate!

Components to consider for | **Analyst View**

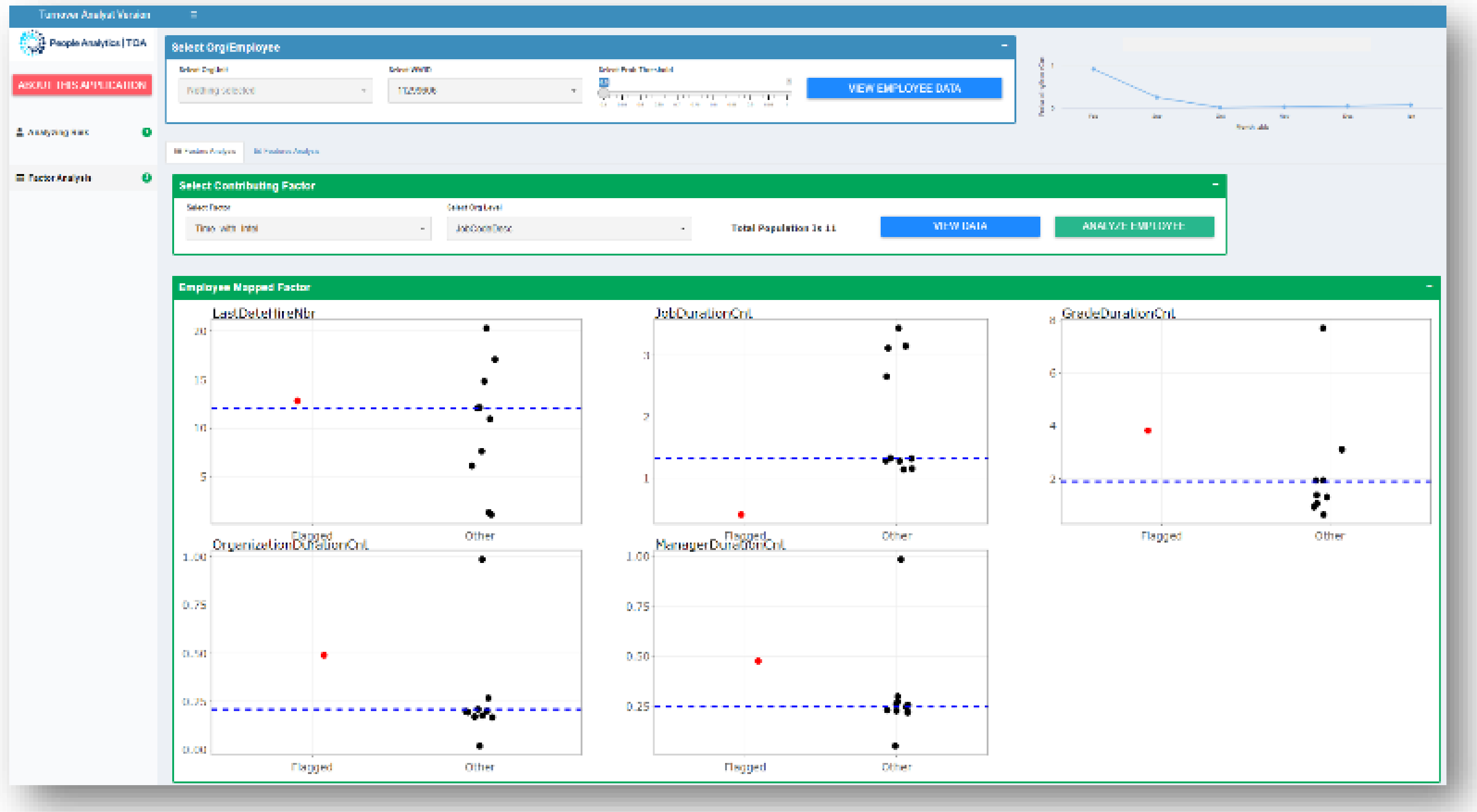
Simulation of Model Performance



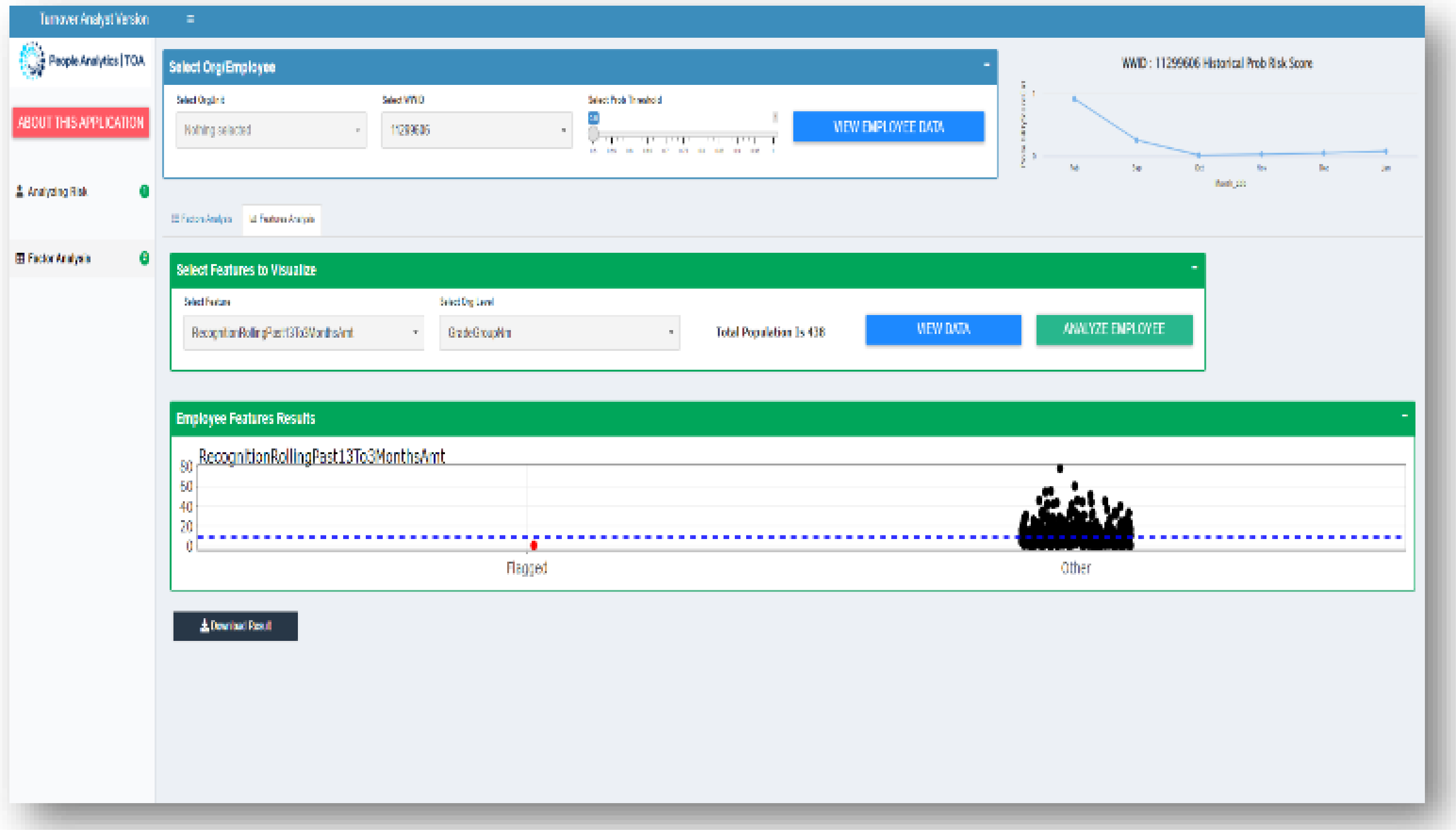
Symbolic Dynamic Visualization



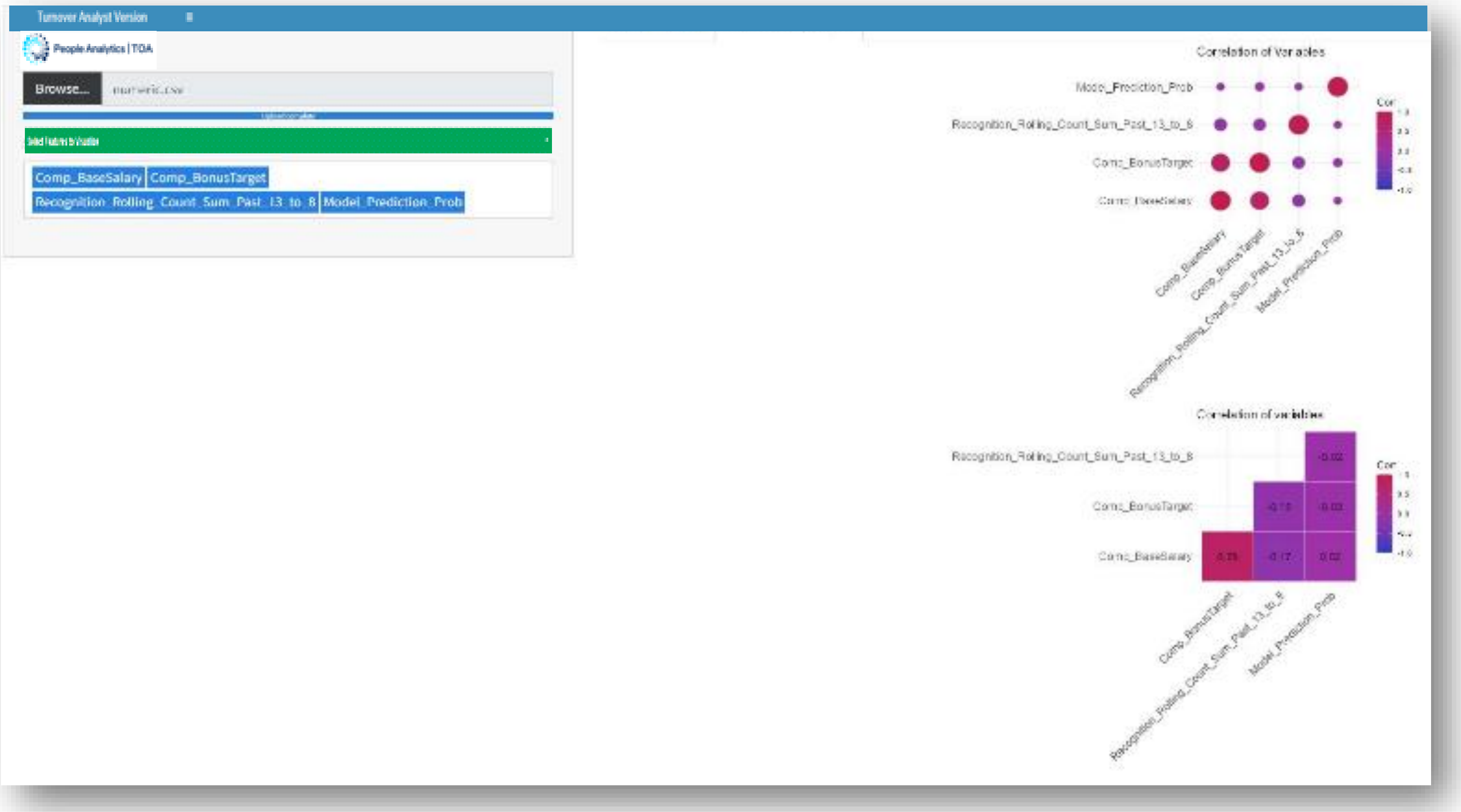
Probability of Risk Trend



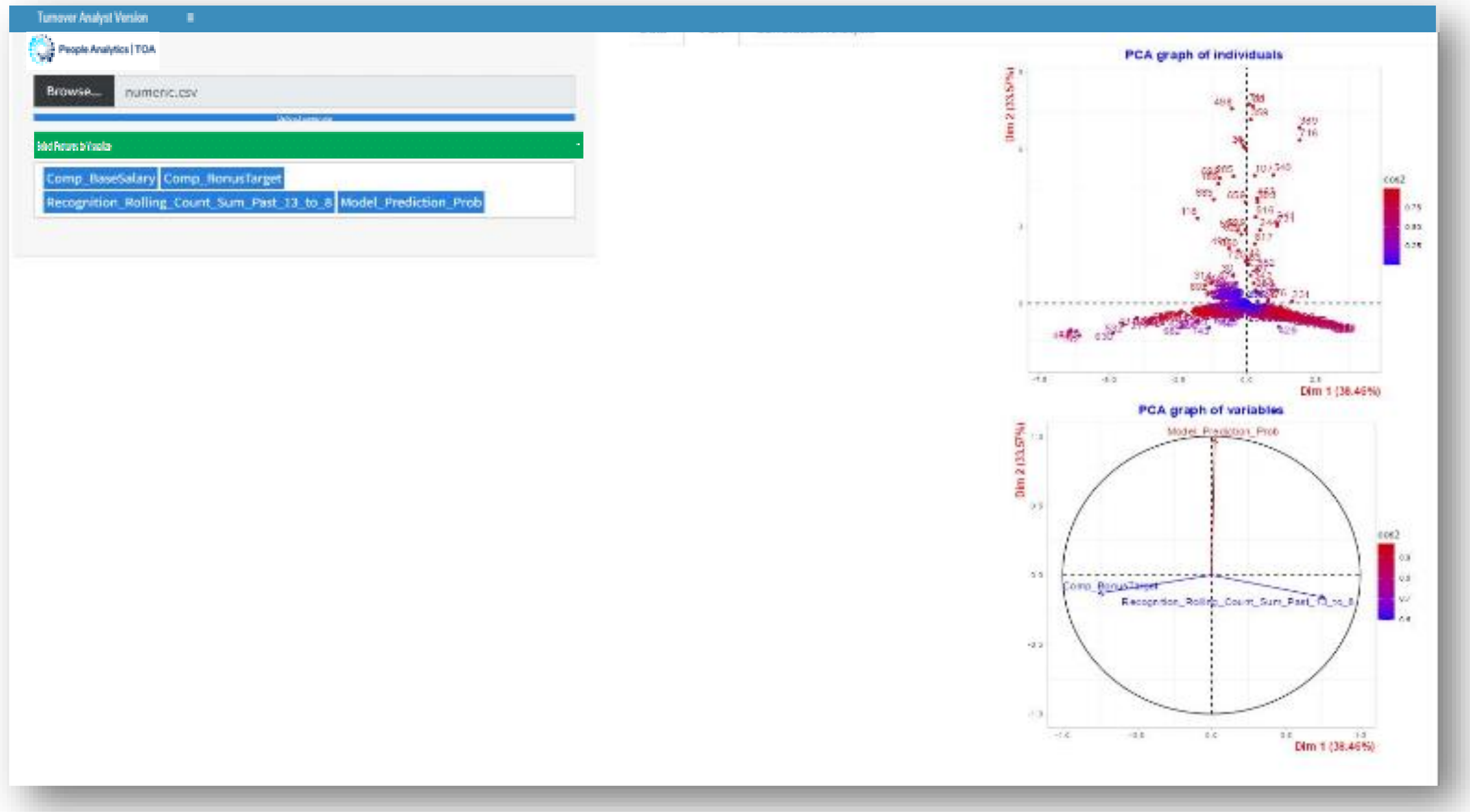
Individual Feature Visualization



Correlation Matrix



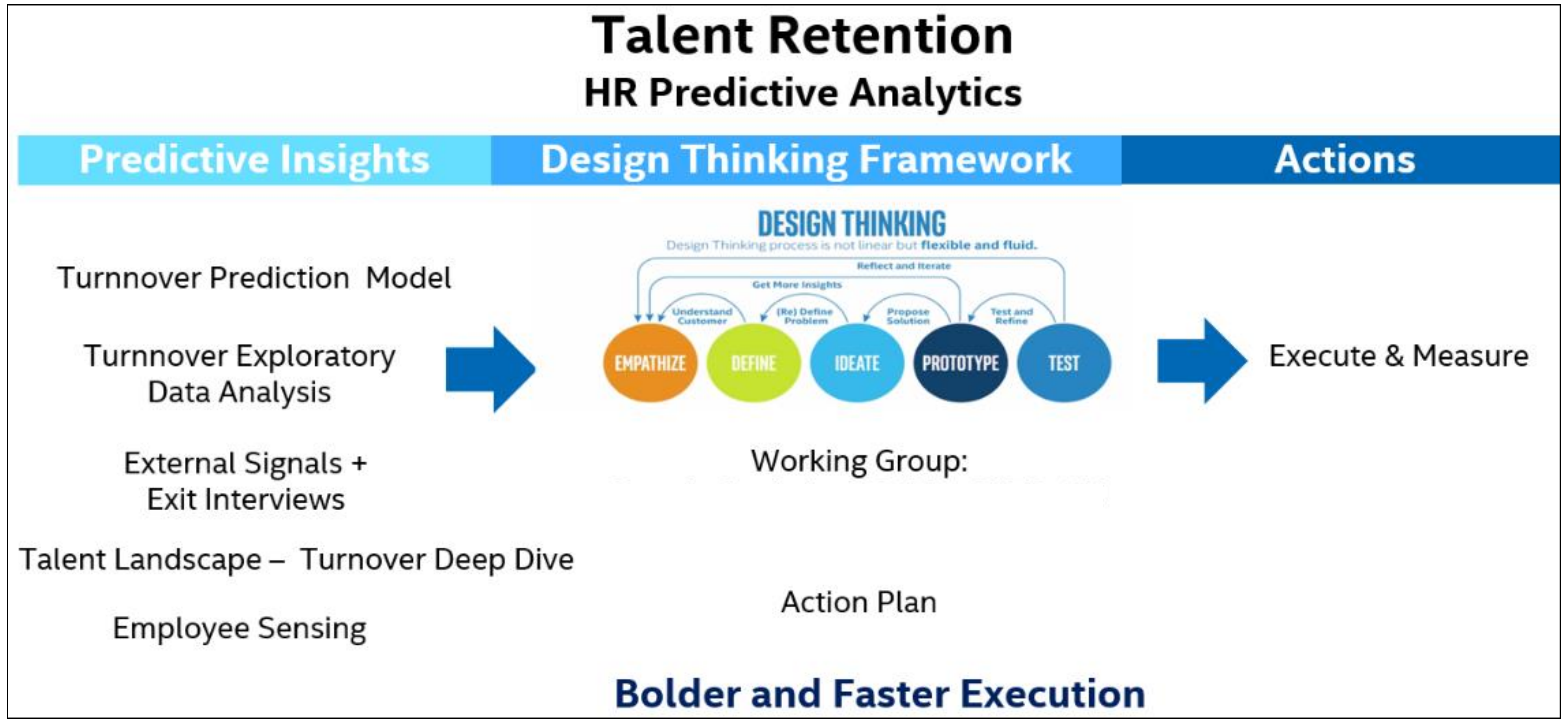
Principal Components Analysis (PCA)



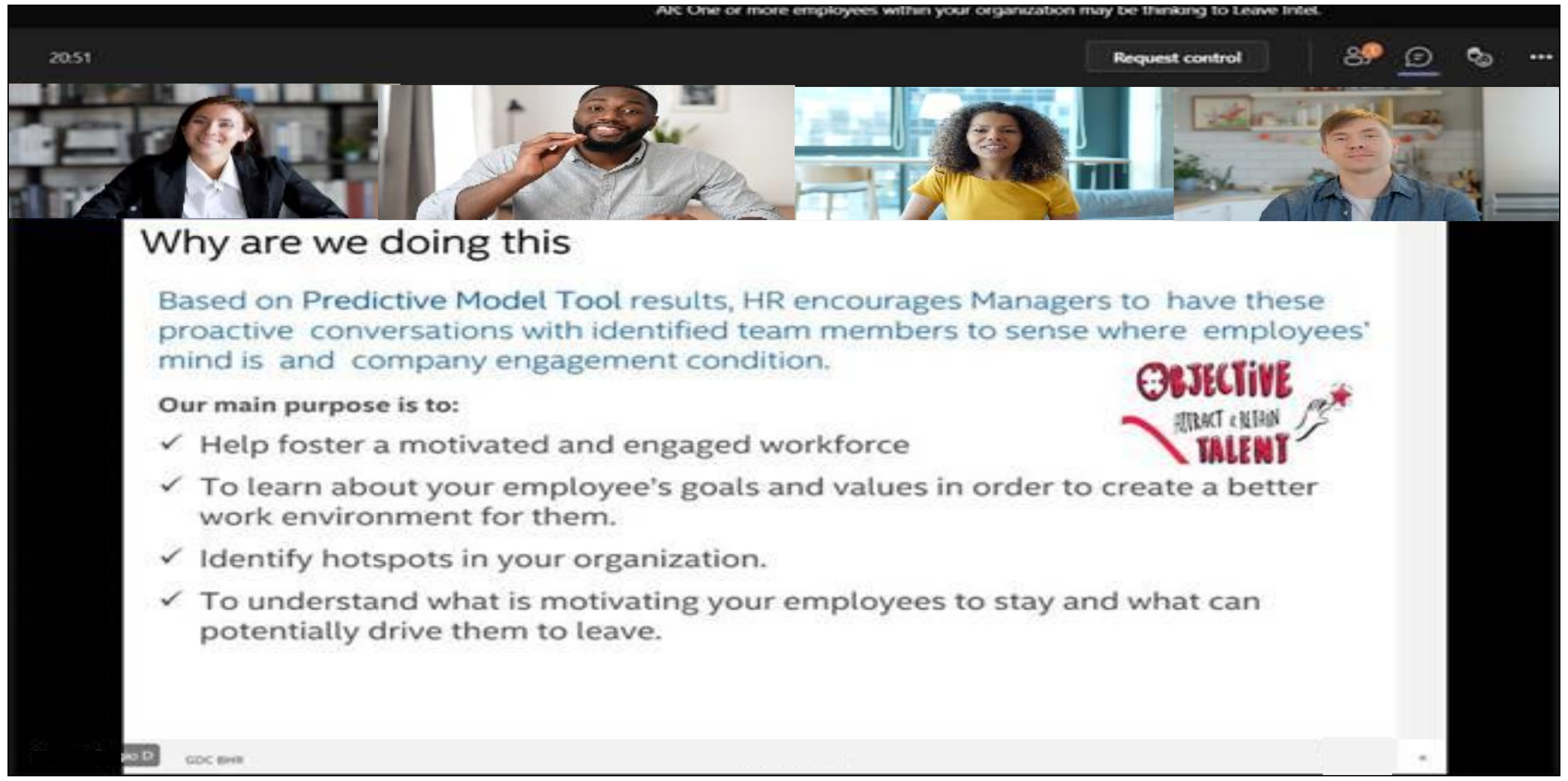
The purpose of this BI app is to provide a solution to fill gaps customer view doesn't have and facilitates characterization of additional population at risk

Business Case | Conceptual Example

Methodology: Design Thinking



Managers: Predictive Model Intro



Employees at Risk: Manager Assessment

❖Signs of engagement can be easily determined

Engaged

- **Enjoys day-to-day responsibilities**
- **Collaborative**
- **Communicates effectively**
- **Supports and encourages others**
- **Pursues opportunities for growth**

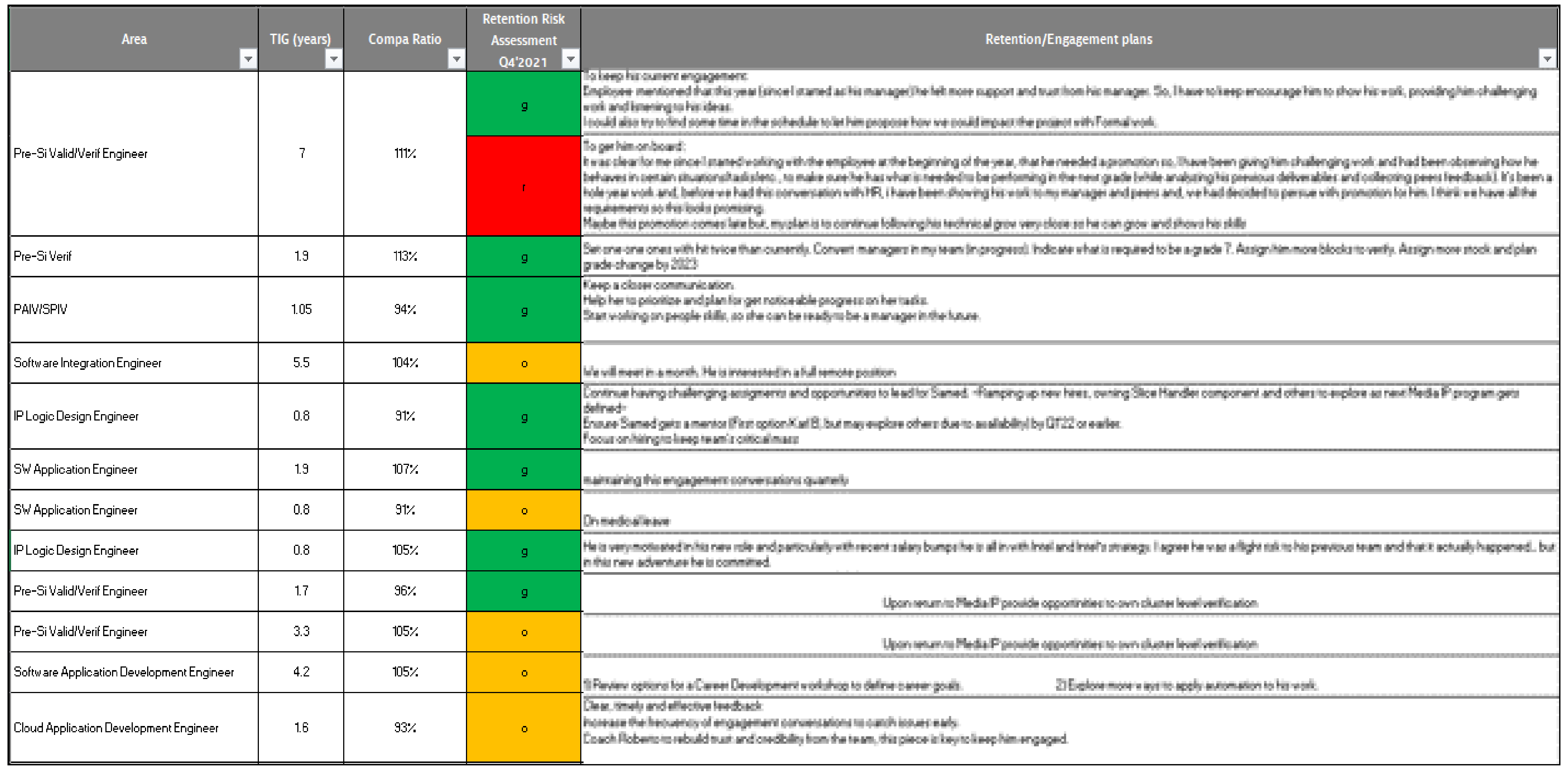
Not Engaged

- **Lack of participation**
- **Silence**
- **Lack of curiosity**
- **Blaming others**
- **Poor communication**
- **Complacency**

Actively Disengaged

- **Burned out**
- **Complaining**
- **No Initiative**
- **No Questions**
- **Distracted**
- **Lack of Enthusiasm**

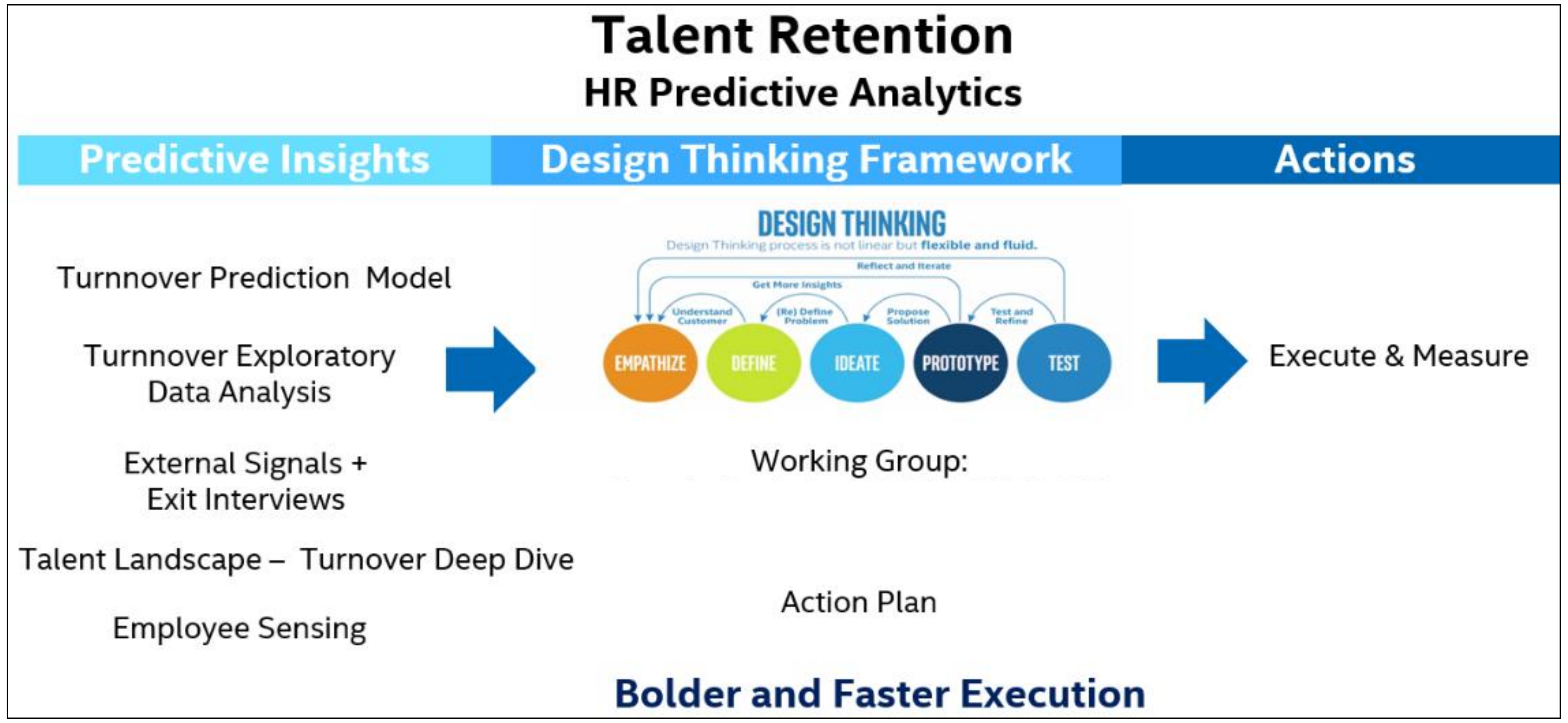
Employees at Risk: Retention Plan



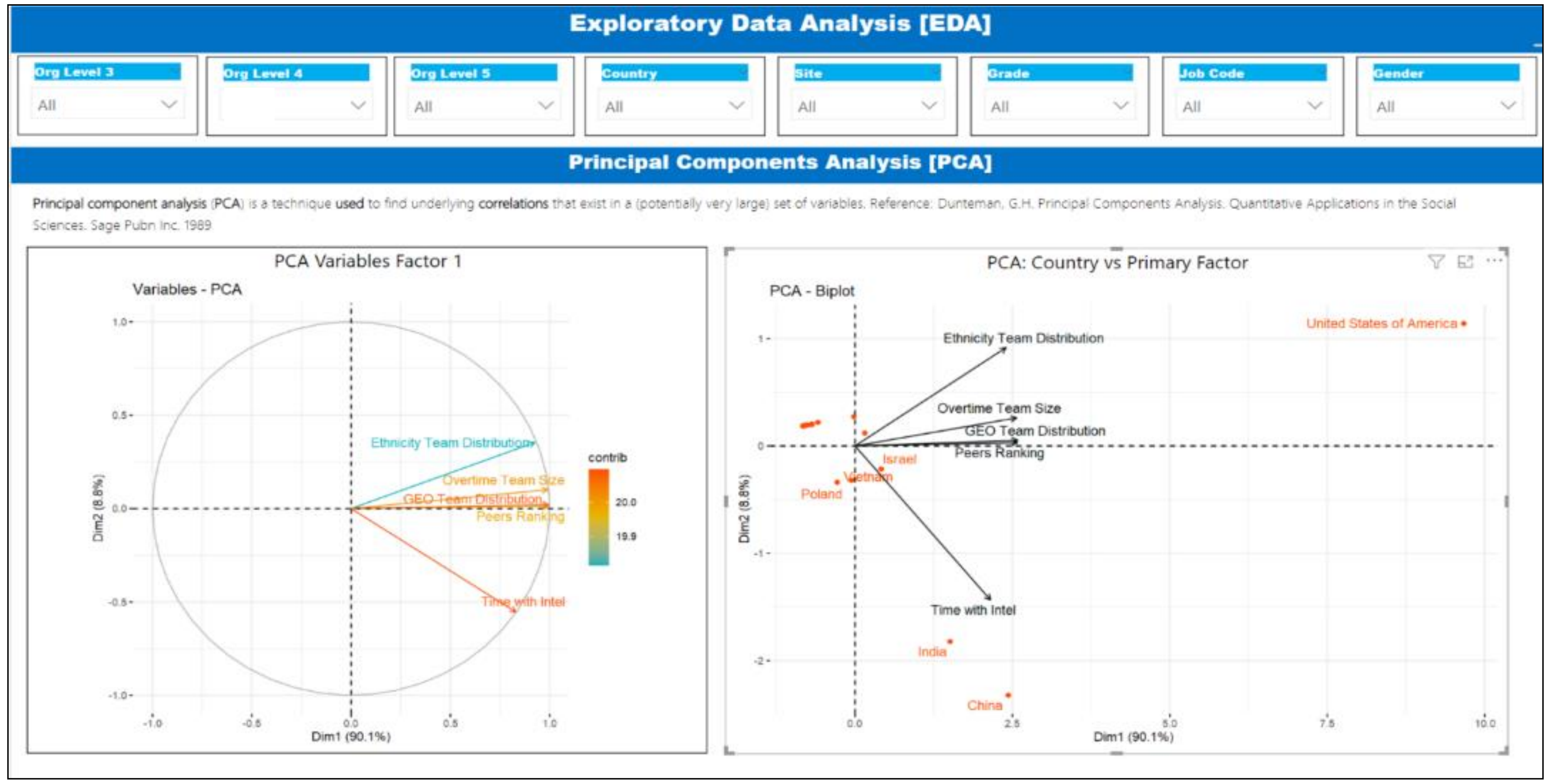
Area	TIG (years)	Compa Ratio	Retention Risk Assessment Q4'2021	Retention/Engagement plans
Pre-Si Valid/Verif Engineer	7	111%	g	To keep his current engagement: Employee mentioned that this year (since I started as his manager) he felt more support and trust from his manager. So, I have to keep encourage him to show his work, providing him challenging work and listening to his ideas. I could also try to find some time in the schedule to let him propose how we could impact the project with Formal work.
			r	To get him on board: It was clear for me since I started working with the employee at the beginning of the year, that he needed a promotion so, I have been giving him challenging work and had been observing how he behaves in certain situations/tasks/etc., to make sure he has what is needed to be performing in the next grade (while analyzing his previous deliverables and collecting peers feedback). It's been a hole year work and, before we had this conversation with HR, I have been showing his work to my manager and peers and, we had decided to persue with promotion for him. I think we have all the requirements so this looks promising. Maybe this promotion comes late but, my plan is to continue following his technical grow very close so he can grow and shows his skills
Pre-Si Verif	1.9	113%	g	Set one-one ones with him twice than currently. Convert managers in my team (in progress). Indicate what is required to be a grade 7. Assign him more blocks to verify. Assign more stock and plan grade change by 2023
PAIV/SPIV	1.05	94%	g	Keep a closer communication. Help her to prioritize and plan for get noticeable progress on her tasks. Start working on people skills, so she can be ready to be a manager in the future.
Software Integration Engineer	5.5	104%	o	We will meet in a month. He is interested in a full remote position
IP Logic Design Engineer	0.8	91%	g	Continue having challenging assignments and opportunities to lead for Samed. ~Ramping up new hires, owning Slice Handler component and others to explore as next Media IP program gets defined~ Ensure Samed gets a mentor (First option Karl B, but may explore others due to availability) by Q1'22 or earlier. Focus on hiring to keep team's critical mass
SW Application Engineer	1.9	107%	g	maintaining this engagement conversations quarterly
SW Application Engineer	0.8	91%	o	On medical leave
IP Logic Design Engineer	0.8	105%	g	He is very motivated in his new role and particularly with recent salary bumps he is all in with Intel and Intel's strategy. I agree he was a flight risk to his previous team and that it actually happened... but in this new adventure he is commited.
Pre-Si Valid/Verif Engineer	1.7	96%	g	Upon return to Media IP provide opportinities to own cluster level verification
Pre-Si Valid/Verif Engineer	3.3	105%	o	Upon return to Media IP provide opportinities to own cluster level verification
Software Application Development Engineer	4.2	105%	o	1) Review options for a Career Development workshop to define career goals. 2) Explore more ways to apply automation to his work.
Cloud Application Development Engineer	1.6	93%	o	Clear, timely and effective feedback. Increase the frequency of engagement conversations to catch issues early. Coach Roberto to rebuild trust and credibility from the team, this piece is key to keep him engaged.

Business Case | Conceptual Example

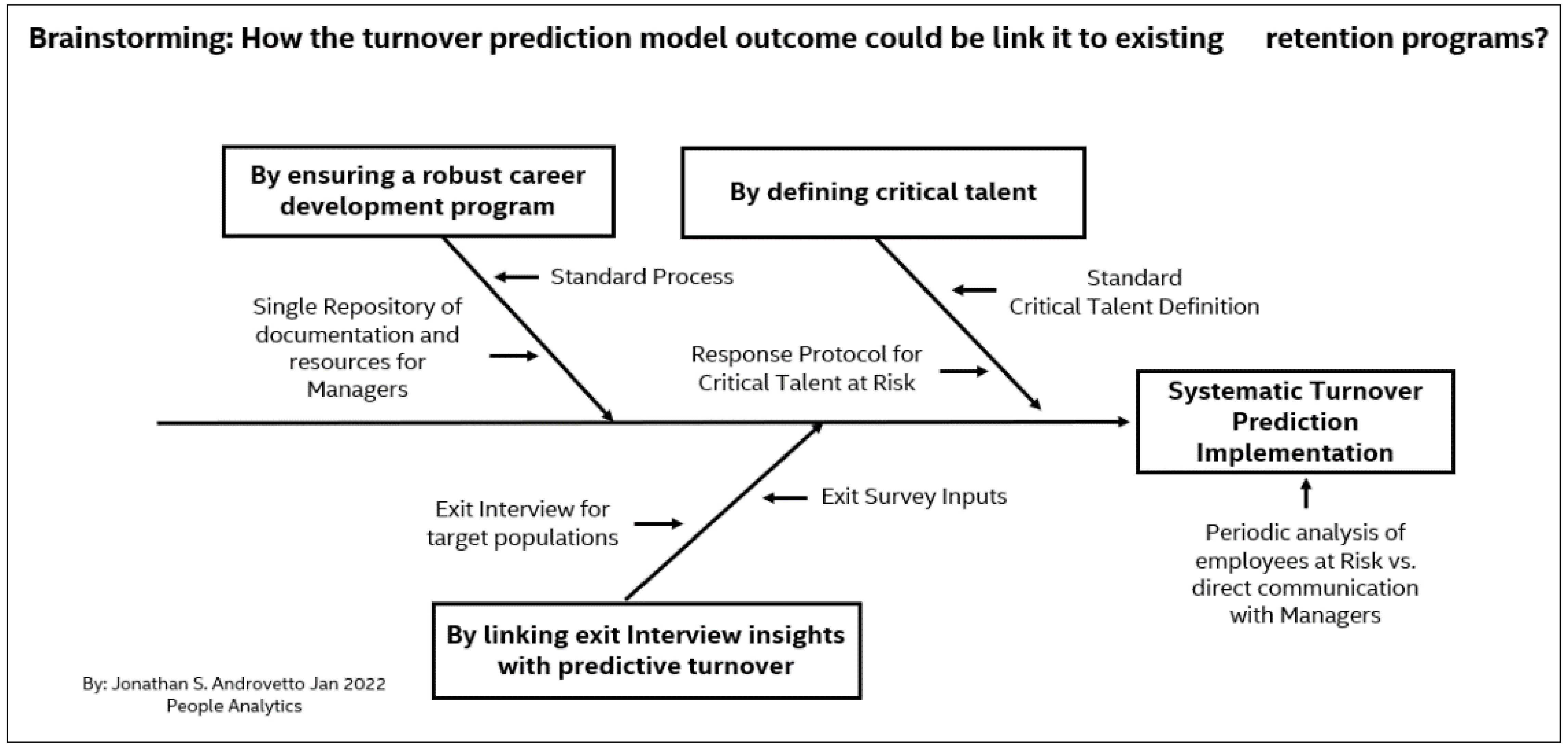
Methodology: Design Thinking



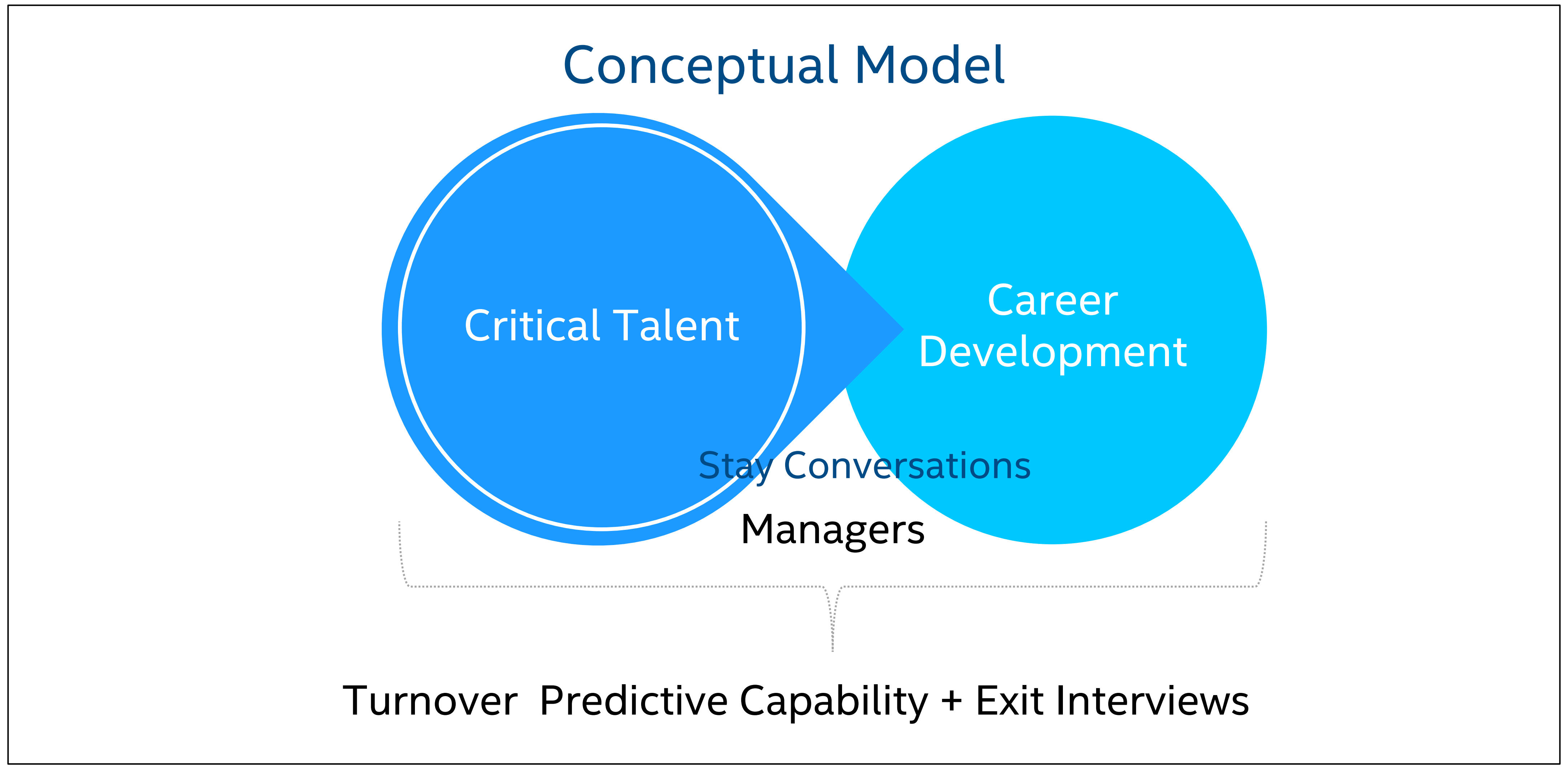
Exploratory Data Analysis



Prediction Model Results vs Retention Programs



Systematic Implementation



Key Takeaways

Data Protection Impact Assessment

Required Expertise in a ML Project

A verity of skills are required – Assemble a team with all required expertise

- Computer Science/IT
- Math and Statistics
- Domains/ Business Knowledge

Prioritize delivering a working solution over a perfect one perfection can be a time-consuming

Don't aim for perfection on the first try

Keep it Simple!
By adopting an interactive approach, you can quickly deliver value to the business, while continuing to improve
Monitoring ML Solution – So you won't get surprised

Start Small and Iterate – Remember that ML is just a small part of the end-to-end Solution

Thank you & ¡Pura Vida!

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