Experience the commitment®

WHITE PAPER

HR Analytics

for saving the value of talents

Role of Analytics in Human Resources

In current highly competitive environment, talented people are definitely the most valuable assets. During last years, large investments were put into tools and information systems to manage performance, hiring, compliance and employees' development in order to enhance its capabilities and increase effectivity.

Using data produced by these tools and systems typically implemented into enterprise HR departments, most companies are able to provide reports at least at some basic level. Organizations that already launched digital transformation processes do take things one step further by accompanying their reporting with basic analysis of HR metrics.

They are usually able to go through data from several previous periods to assess positive or negative trends, or to create benchmarks comparing their performance against their competitors across time and regions. However, in order to bring real value and help driving the business competitiveness, HR analytics utilization needs to go far beyond.

The biggest struggles in achieving better utilization of data resources and information systems are inefficient use of the data, asking wrong questions and lack of analytical ability in HR environment in general. HR departments are in need for analytically capable people enabled to provide right insights combining reporting skills and domain knowledge. This combination of right analytical approach and experience is the crucial premise for successful HR IS and data utilization.

Key elements for bringing valuable insights

Organizations are often solving absence of these key elements in their HR processes by deploying more information systems and "black-box" analytical tools, which cannot fully redeem and actually get into vicious circle of ineffective investments.

RIGHT QUESTION FOR HR ANALYTICS: HOW TO SAVE THE VALUE OF TALENTS

At the very beginning of setting every analytical process, there should be the right question to answer. Defining clear goals is indispensable for choosing suitable approach, which leads to apply consecutive solution effectively.

In these days, organizations are facing a significant insufficiency of qualified people on the market. Highly competitive environment then pushes on to avoid loss of key people and the know-how associated with their expertise. The question associated with this situation is defined clearly. Which employees are in a danger of attrition and how to save them?

A lack of qualified people defines the right analytical question:

"Which employees are in a danger of attrition and how to save them?"

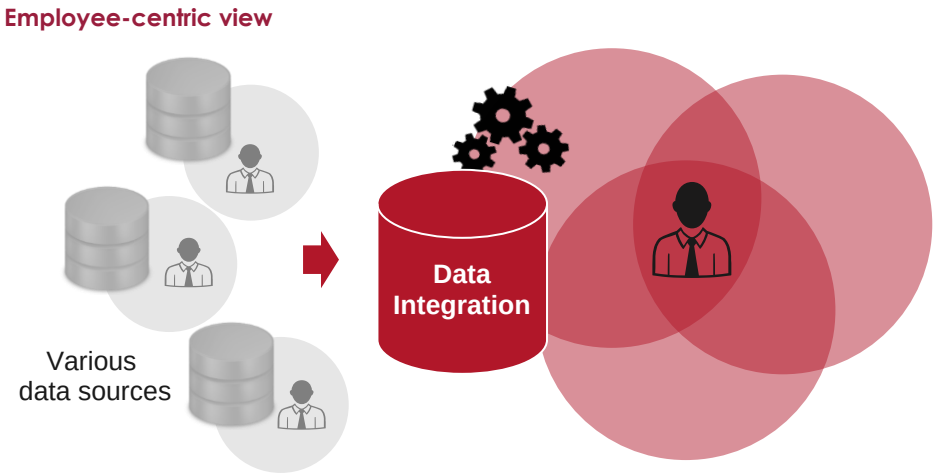
Opposed to observation of turn-over rate, which is common part of usual HR reporting, an attrition is mentioned as an expression describing voluntary leaves of actually valuable employees. The turn-over has to be viewed as neither positive nor negative phenomenon that regularly occurs as people are joining and leaving the organization for many different and natural reasons. The attrition, in contrary, is considered here as strongly negative and connected with direct loss of value.

DATA SOURCES

To be able to provide any data analytical solution, it is essential to gather and inspect available sources including independent HR databases and possible outputs from tools and information systems:

- Employee profile
  (experience and skillset)
- Satisfaction evaluation
  (company environment and coworkers)
- Performance evaluation
- Project planning and utilization
- Absence and time-sheets
- Communications and interaction schemas

The key presumption to successful and precise analysis is to have the data from various sources integrated to deliver holistic employee-centric view. It is also necessary to understand what the data describe and how they were produced or calculated. Such process is difficult to perform in without proper data analysis, especially to understand the context the data are describing.



In the next section, CGI Advanced Analytics team covers a sample case-study over anonymous corporate employees' data. The study shows the way how the right HR data analysis saves value and help to prevent the attrition of valuable talents.

Case-Study

Prediction and understanding the attrition of employees

To explain and demonstrate typical analytical process, CGI Advanced Analytics Team performed advanced analysis over anonymous corporate employees' data. The sample dataset represents prepared and clean data integrated from several HR information systems. The dataset contains common and specific HR-oriented features for utmost **1500 individual employees** regarding:

- Demographics
- Job and company environment satisfaction
- Travelling
- Education and field
- Job type, level and status
- Time reports and absences
- Rates, salary and project utilization

For each individual record there is an information determining whether the corresponding employee left the company at the end of analyzed period. This information is used to identify key features connected to attrition issue.

Uncovering hidden data patterns to predict present employees in the risk of attrition, **outcomes of this study show the way how to save a value by identifying possible causes of talents**.

ANALYTICAL APPROACHES

The selection and right execution of suitable analytical approach and modelling method is essential for the precision and usability of final outcomes and its utilization. Usual approach included in black-box analytical tools, such as automatic feature selection and choosing from predefined prediction algorithms, is rather problematic. This leads to inaccurate solutions and chiefly, very limited and incomprehensive conclusions.

CGI Advanced Analytics methodology brings solid and proven approach defining how to correctly manipulate the data, test and select suitable modelling techniques and discover reliable and highly applicable insights.

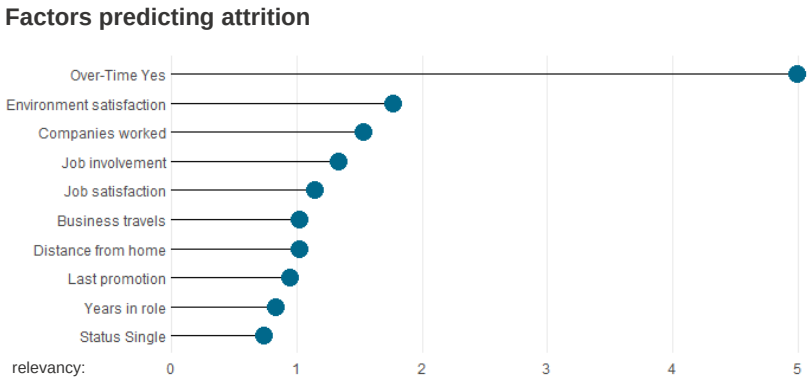
For the purpose of the case-study, whole dataset was inspected and using logistic regression method, two different questions were answered:

- **Which specific factors increases or decreases the probability of attrition?**
- **Which individual employees across different jobs are in high risk of attrition?**

Regarding the first question, advanced modelling techniques like neural networks or logistic regression are able to identify "drivers" that influence target variable – risk of attrition in this case. In opposite to traditional and trivial methods such as simple correlation, advanced methods are able to get further information and uncover more complex patterns.

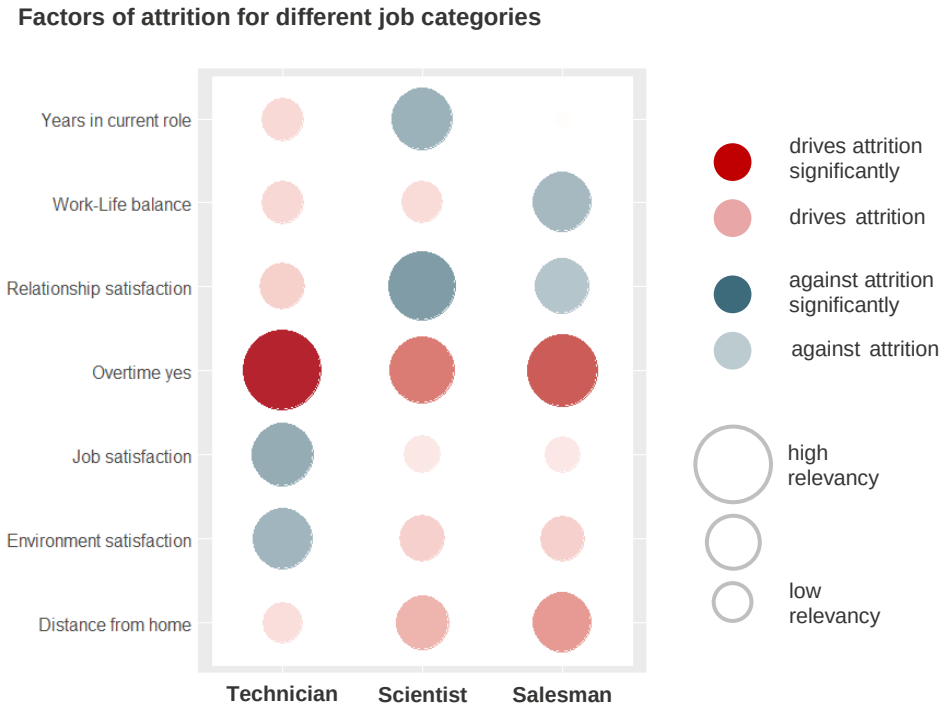
"Usual approach included in black-box analytical tools is rather problematic. It leads to inaccurate solutions and very incomprehensive conclusions."

The figure bellow shows far most relevant factors influencing attrition:



This kind of information provides seemingly straightforward insight. However, in order to deliver more thorough and usable conclusions it is necessary to go a little bit deeper.

One possible way how to do that is for example to perform such an analysis separately for different job types and roles. The next figure shows the importance of various factors for three different job categories: technician, scientist and salesman.



One of many insights the diagram shows is, that working overtime is strongly positive attrition driver for all three groups. Nevertheless, every job category has different negative drivers (*driving against* the attrition). Improving environment might help to save some technicians. Scientists and sales executives are more sensitive to working relationships. The insight provided by this kind of analysis is far more usable and identifies solutions that brings very clear impacts.

Answering the second question - who are the employees in a danger of the attrition, prediction model was developed and applied. For evaluating purposes, one third of the dataset was separated to test the model accuracy. The rest was used to train the model and perform previous analysis. Developed model is able to **predict 88.9%** of employees with left-the-company flags.

9 of 10 attritions predicted

Performing the analysis of sample data from typical HR information systems sources, CGI Advanced Analytics methodology uncovered hidden data patterns to predict present employees in the risk of attrition. The outcome of this study is not only a model predicting with almost 90% accuracy, but is also showing the way how to save a value preventing the possible loss of talents by applying revealed insights.

MODELLING TECHNIQUES
- NO FREE LUNCH THEOREM

There is no ultimate method or algorithm suitable to handle all analytical problems generally. Different techniques like deep learning, neural networks or logistic regression have to be considered and tested for different data of various type or size. This so-called “No free lunch theorem” has to be taken in account to develop optimal and highly usable solutions.

Analytical Extensions

for getting better HR insights

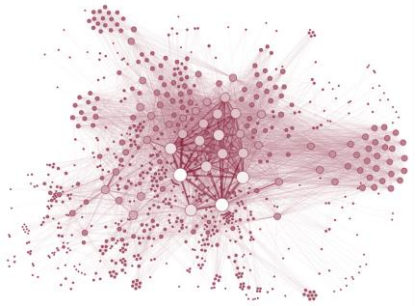
SOCIAL NETWORK ANALYSIS

In the general meaning, social network analysis term is not only associated to social media like Facebook or Twitter. It also describes a way how to explore various type of social interaction. In the context of HR analytics, this can be used as an instrument how to enhance standard models by adding information about interactions among employees.

Real social networks and communication flows in companies often differ from structural organization charts. Social leaders might be identified even they are not on the top of structural hierarchy.

Interactions can be identified by:

- **List of calls**
- **Mail communication**
- **Instant messages**
- **Mutual meetings**
- **Work on same project and shared folders access**
- **Common history & background**



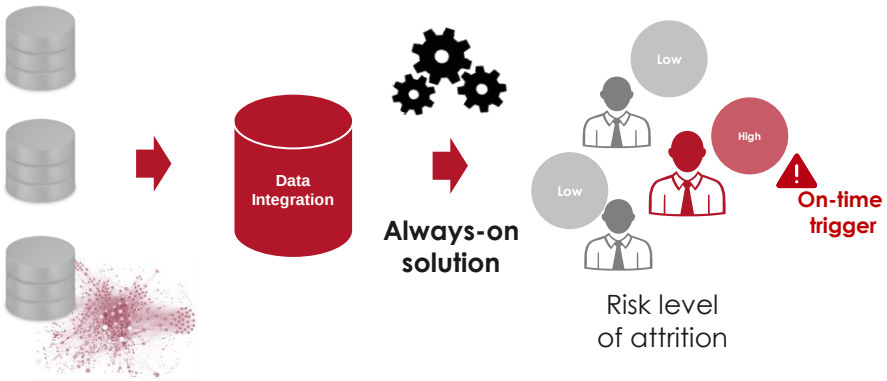
CGI Advance Analytics methodology contains know-how to analyze social links among people in order to identify social leaders and influencers.

Losing these employees brings higher risk of dispossessing value as breaking their links affects the others. Including an additional information about company social network also improves an accuracy of attrition models.

TARGETED TRIGGERING

Developed prediction models are able not only to identify potential employees in a risk of the attrition, but also to calculate a scoring that may be used to express the level of that risk.

CGI provides solutions for an attrition prevention which can be deployed on always-on basis, continuously processing the data and pulling on-time triggers anytime defined thresholds are reached for any particular employee.



CGI Advanced Analytics Methodology

Thanks to wide experience with data analytics in various fields like customer churn or insurance accident prediction, CGI built a solid and proven approach to obtain valuable insights from the data, ***tailored for client's specific business needs****.*

Choosing the right solution

HR specialists are challenged by the insufficiency of qualified employees on the market. Digital environment encourages them to enhance their approach by more technological and analytical aspects in order to prevent attrition. The loss associated with the departure of talents brings directly measurable costs, but usually also affects the organizational structure. Damaging corporate co-working networks leads to even more hidden costs in case of attrition of social leaders and linkers.

CGI Advanced Analytics methodology provides an approach how to apply complex solutions like prediction models and social networks analysis to actively help to prevent attrition. This solution can be deployed on always-on basis pulling triggers anytime an employee is evaluated at the high risk of attrition. Bringing more insights about drivers causing employees to leave, HR is able to conceptually plan changes and introduce suitable measures on time.

The selection and right execution of suitable analytical approach is essential for the precision and usability of final outcomes and its utilization. Understanding correctly the data patterns and asking right questions is essential. It prevents from large investments into robust black-box solutions and avoids inaccurate results and incomprehensive outcomes.

CGI approach always starts by prove of concept in client's specific environment and then helps to develop and deploy tailored solution with all important details in account. Defining and answering right questions, we save the value that lies in your talents and well-functioning employees' network.

CGI Advanced Analytics team contact person

Jiří Materna
Director Consulting Services
jiri.materna@cgi.com
+420 284 020 111

CGI IT Czech Republic s.r.o.
Laurinova 2800/4
Prague, 155 00
Czech Republic

ABOUT CGI ADVANCED ANALYTICS TEAM

- Talents with data science profiles, statisticians and data story-tellers
- Winner on Kaggle.com, international machine-learning competition
- **Part of global CGI world-wide BI community** (4000+ specialists)
- Senior consultants with 10+ years of various sectors know-how

cgi.com

Founded in 1976, CGI is one of the largest IT and business process services providers in the world, delivering high-quality business consulting, systems integration and managed services. With a deep commitment to providing innovative services and solutions, CGI has an industry-leading track record of delivering 95% of projects on time and within budget, aligning our teams with clients' business strategies to achieve top-to-bottom line results.