VNIVERSITAT DE VALÈNCIA

WOP-P
MASTER IN WORK, ORGANIZATIONAL AND PERSONNEL PSYCHOLOGY

With the support of the Erasmus+ programme of the European Union

HR Analytics sessions:

1. What? How?

2. Case study

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Session 1: What? How?

Your individual and group work

Session 2: Case study

Thursday, 21 OCT. MORNING In class	Masterclass & Discussion session HR Analytics: What and how?
Thursday, 21 OCT. AFTERNOON	Money Cash Flow case (individual work)
Friday, 22 OCT. MORNING	Money Cash Flow case (group work)
Friday, 22 OCT. AFTERNOON	Money Cash Flow case (group work)
Tuesday, 26 OCT. MORNING	Money Cash Flow case (group work)
Tuesday, 26 OCT. AFTERNOON In class	Presentations & Discussion session (case study)

LEARNING OBJECTIVES

- ***Introduction*** to HR Analytics
  - Understand what it is.
  - Identify the main factors measured in organizations by HR Analytics.
  - Familiarize yourself with the main methods used in HR Analytics.
  - Explain the differences between them.
  - Apply the knowledge acquired to a case.

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HR Analytics. PART 1: What is it?

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"ANALYTICS": MORE THAN JUST STATISTICS

Analytics: a mental framework, a logistical progression, and *only then* a set of statistical operations.

First we need to understand something about the interactions, i.e. the relationships between the problem's elements.

HR ANALYTICS: AN INTRODUCTION

- Treating problems as they appear may be a waste of time and resources if you repeatedly deal with the same problem.
- An efficient way is to invest a little time to analyze the problem before you act.
  - Gather data on what has happened (**descriptive** analysis).
  - Analyze why the problem occurred and what is likely to happen if it is left untreated (**predictive** analysis).
  - Design a way to fix it and you will most likely avoid a recurrence of the problem (**prescriptive** analysis).

The purpose of analytics is to **find the best path** through a mass of data to uncover **hidden value**.

WHAT IS ANALYTICS?

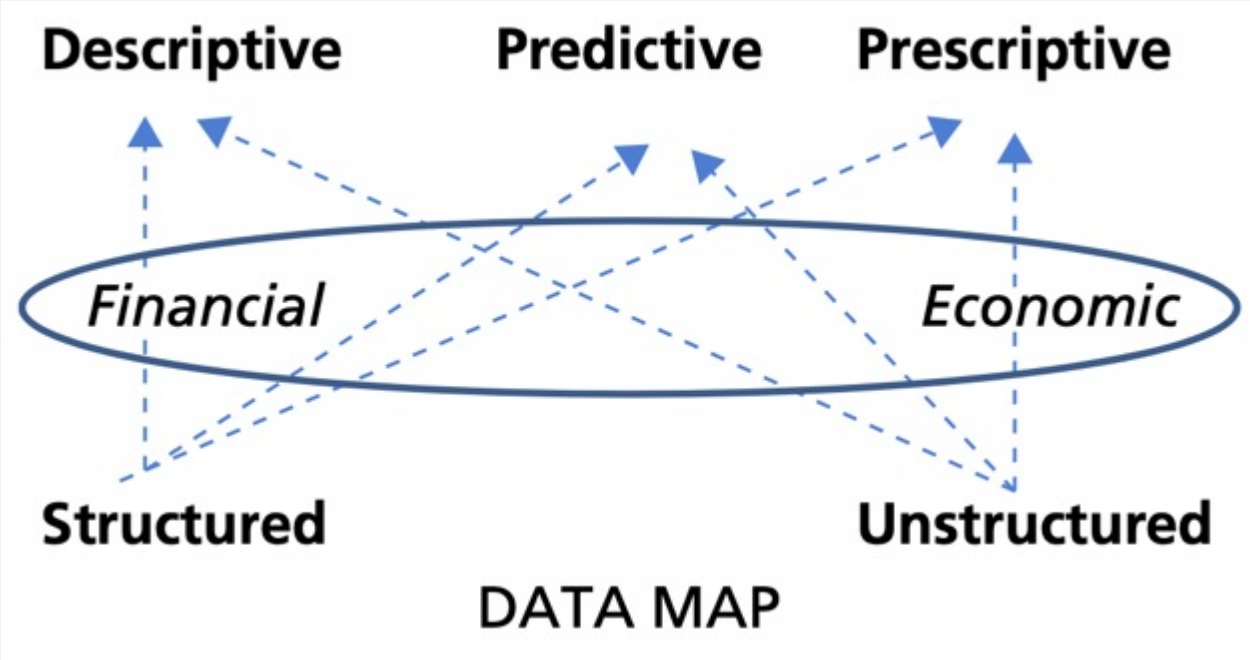
- Human resources (HR) or human capital analytics:
  - A communications device that brings together data from disparate sources such as surveys, records, and operations.
  - It provides an actionable picture of current conditions and likely futures.
  - It is an evidence-based approach to decision making.

There are three levels:

1. **Descriptive**. This reveals *relationships* and *current and historical data patterns,* e.g. traditional HR efficiency metrics (turnover rate, time to fill, cost of hire, number of those hired and trained, etc.).
2. **Predictive**. This uses statistics, modeling and data mining to make predictions about the future (probabilities, potential impact).
3. **Prescriptive**. This analyzes complex data to predict outcomes and provide decision options for business impact.

ANALYTIC PATHS

Financial data: $$



Economic data: e.g. market reputation, customer satisfaction, the best companies to work for, and community relations ('off–balance sheet assets').

- The percentage of unstructured data will expand.
- Structured and unstructured data can be merged into a mixture = hybrid data.
- The complexity of the data analysis process is increased.

ANALYTIC VALUE CHAIN

From planning to execution

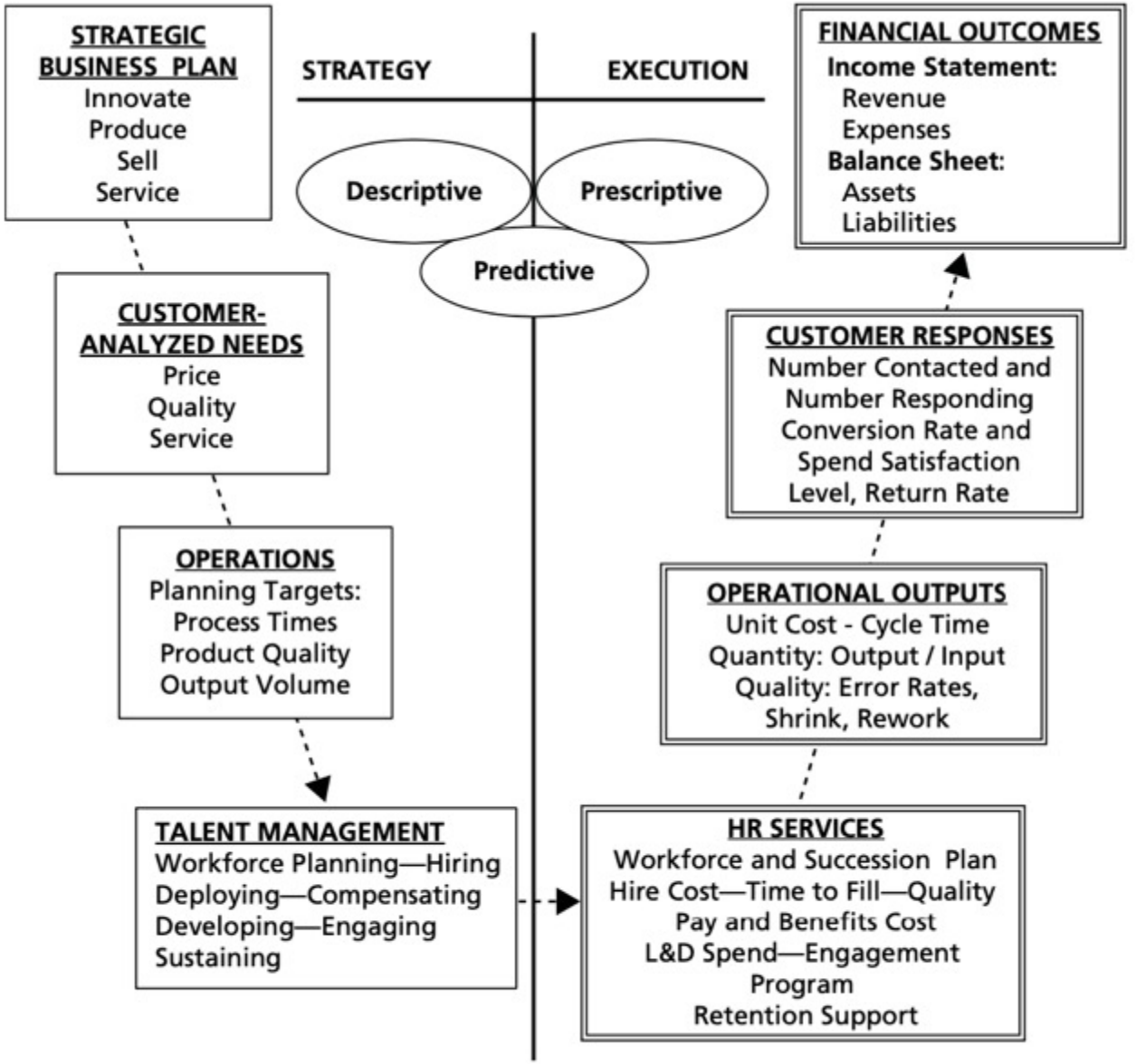
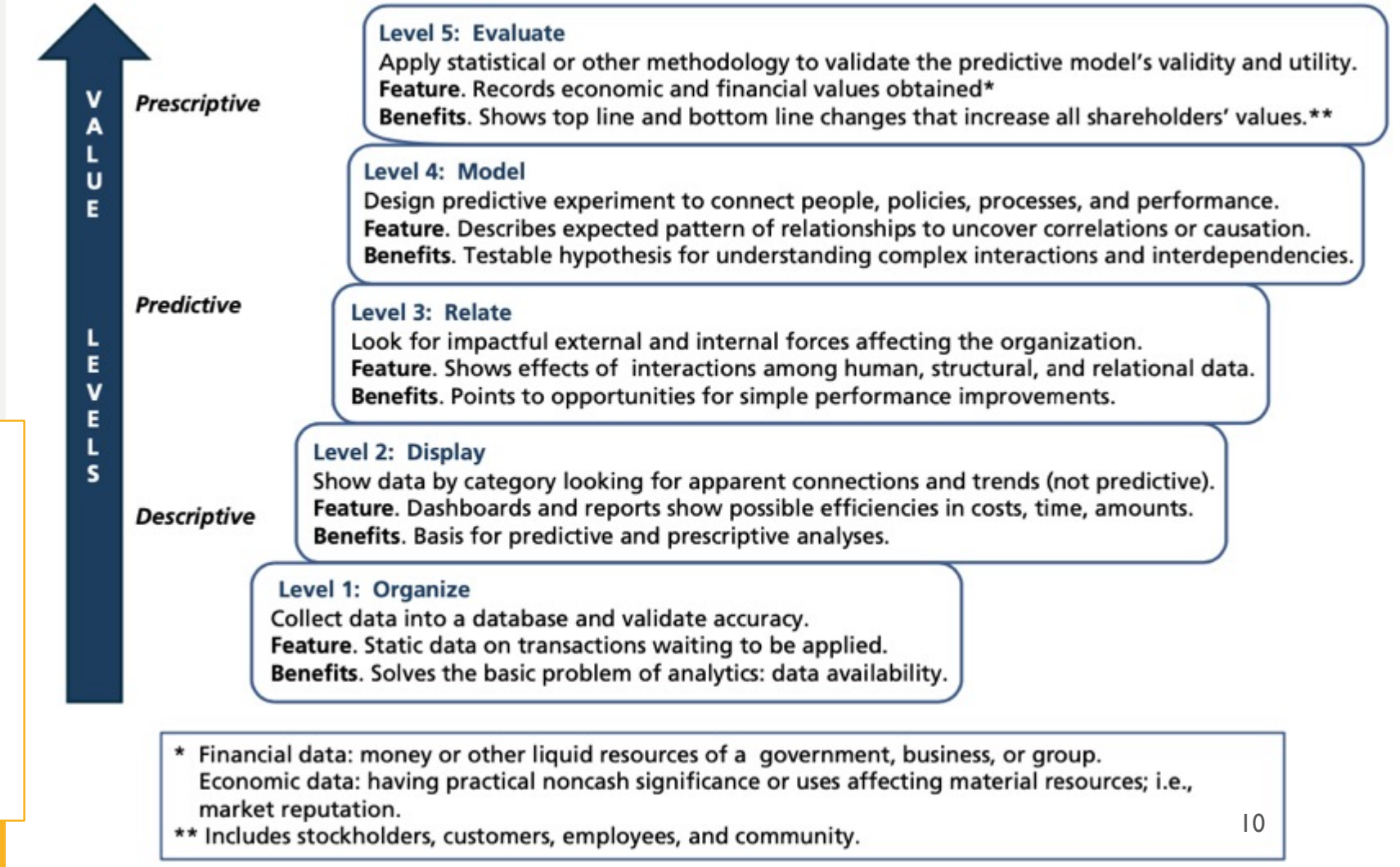


Exhibit 1.2 How Your Company Makes Money © J. Fitz-enz, 2012

ANALYTIC MODEL: STRUCTURE TO ANALYTICS

- Reporting anecdotal accounts & reminiscences
- Dashboards and scorecards
- Comparisons and benchmarks
- Coincidences and correlations
- Causational data
- Predictive analyses
- Optimization



REPORTS VS. ANALYSIS

- **Reports**:
  - Static picture of the past/present or of change over time
  - Descriptive, no prediction
  - Provides data
  - Is typically standardized
  - Does not involve the reader
  - Is rather inflexible
- **Analysis**
  - Provides answers
  - Addresses a need
  - Is typically customized
  - Involves the reader
  - Is very flexible

Franks, B., *Taming the Big Data Tidal Wave* (Hoboken, NJ: John Wiley & Sons, 2012).

SOME APPLICATIONS OF HR ANALYTICS

Why do employees leave?

- New hires gain valuable skills through training that are marketable beyond our company.
- They find jobs with better work/life balance.
- They feel they are not valued and do not contribute substantially to the overall mission of the company.
- They are underpaid.

Why do employees disengage?

- Job and workplace was not as expected.
- Job-person mismatch.
- Too little coaching/feedback.
- No growth or advancement opportunities.
- Feeling undervalued/under-recognized.
- Stress from overwork and work/life balance.
- Loss of trust in senior leaders.

- **Study of:**
  - Turnover
  - Attrition
  - How talent changes affect business results (the ROI of training)

- What types of people are leaving?
- When in their career are they leaving?
- Why are they leaving?

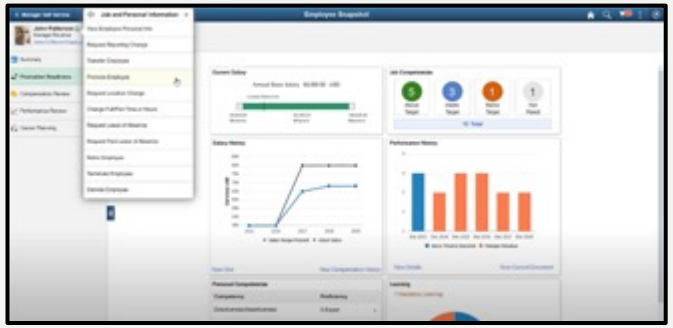
SOME APPLICATIONS OF HR ANALYTICS (DAVENPORT, HARRIS & SHAPIRO, 2010)

- Selection and monitoring of key indicators of organizational health.
- Identifying which units or individuals need attention.
- Determining which actions have the greatest impact on economic results.
- Forecasting workforce levels.
- Learning why people choose to stay or leave the organization.
- Adapting the workforce to changes in the business environment.

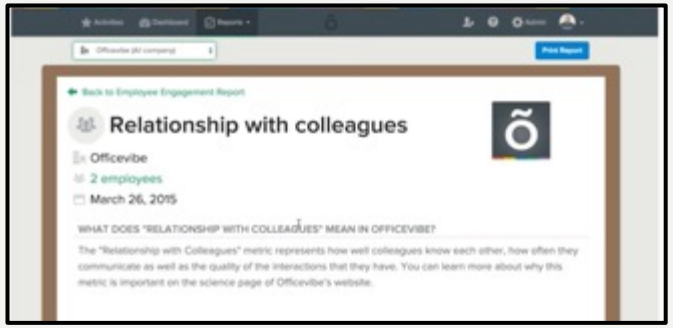
Davenport, Harris, and Shapiro, "Competing on Talent Analytics," *Harvard Business Review* (October 2010).

HR ANALYTICS: EXAMPLES OF SOFTWARE

- ORACLE PeopleSoft: https://youtu.be/alt-DNPHk7g



- Officevibe: https://youtu.be/brlVkJ5Zpho



Feelings? Opinions?

Strengths? Weaknesses?

FUNDAMENTAL POINTS ABOUT DATA

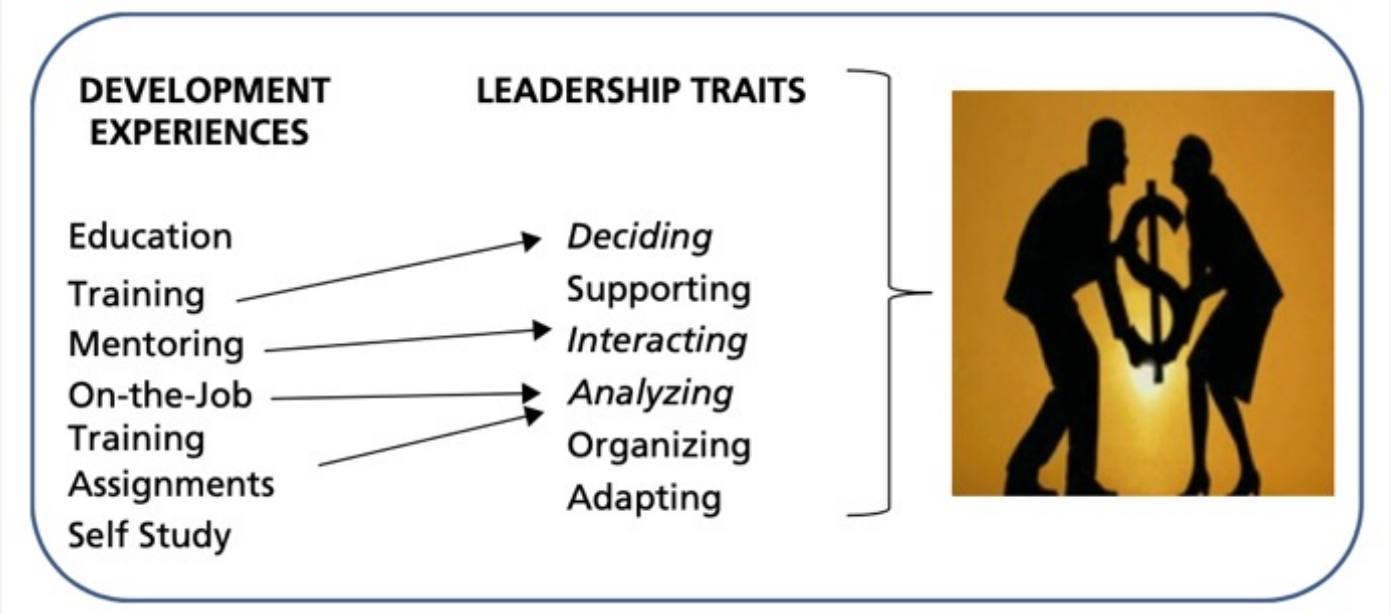
- **The need for <u>standard definitions:</u>**
  - A global single accounting and reporting system.
  - To improve international accounting and investor confidence.
  - The Center for Talent Reporting (CTR; www.centerfortalentreporting.org)

- **The importance of <u>intangibles:</u>**
  - An **intangible asset**: a claim to future benefits that does not have a physical or financial embodiment.
  - Intangible data outweigh tangible data on corporate balance sheets by a ratio of 5:1.
  - **Examples**: Leadership, Engagement, Culture, Commitment, Loyalty, Employer Brand.

EXAMPLE:
WAYS TO COVER LEADERSHIP DEFICIENCIES

- Fundamental elements of the foundation of every company: (1) **vision**, (2) **brand**, and (3) **culture** (VBC).
- Installing off-the-shelf packages without regard to VBC is a waste of time and money.
  - E.g. leadership skills needed will vary in different organizations.

Predictive analysis can improve the efficiency of the **change initiatives** as it identifies **the most effective paths** to change.



HOW TO CONNECT HR & FINANCIAL OUTCOMES

CONNECTING HUMAN CAPITAL & FINANCIAL OUTCOMES

Human Capital Profit Index (HCPI) =

Revenue per full-time equivalent (FTE) employee

–

Total labor cost per FTE employee

CONNECTING HUMAN CAPITAL & FINANCIAL OUTCOMES

- Example:
  - Leadership and revenue, profits, human capital productivity, and total cost of workforce.
- Often HR services already produce most of the raw data but they are not analyzed in this way.

Human Capital Income Statement:

Workforce Productivity Impact

Revenue	Prior Year	Current Year
Net Operating Revenue (Current Annual)	$1,400,000,000	$1,540,000,000
Total Headcount (FTE)	15,000	16,400
Revenue per FTE	$93,333	$93,902
Costs		
Total Expenses	$1,170,000,000	$1,285,000,000
Total Operating Expense	$725,000,000	$795,000,000
Total Cost of Workforce (TCOW)	$779,950,000	$861,000,000
TCOW Percent of Revenue	55.7%	55.9%
TCOW Percent of Expenses	66.7%	67.0%
TCOW Percent of Operating Expenses	107.6%	108.3%
Profit		
EBITDA	$310,000,000	$340,000,000
Net Operating Profit	$143,750,000	$159,375,000
Profit per FTE	$9,583	$9,718
Productivity and ROI of Human Capital		
Total Market Capitalization[1]	$2,156,250,000	$2,390,625,000
Average Market Capitalization Value per FTE	$143,750	$145,770
Human Capital ROI Ratio	1.29	1.30
Return on Human Capital Investment	18.4%	18.5%
Lagging Workforce Productivity Impact	**$4,219,281**	**$8,169,200**
Projected (Mkt) Workforce Productivity Value	**$30,350,719**	**$33,125,000**
TOTAL WORKFORCE PRODUCTIVITY IMPACT:	**$34,570,000**	**$41,294,200**

Total Cost of Workforce

Compensation and Benefits Costs	Prior Year	Current Year
- Total Workforce Salary Cost	$530,000,000	$587,000,000
- Total Bonus and Incentives Cost	$65,000,000	$68,000,000
- Total Benefits Cost	$120,000,000	$135,000,000
- Total Contingent Workforce Cost	$13,000,000	$14,000,000
- Total Other Compensation	$3,000,000	$3,000,000
Total Workforce Compensation and Benefits Cost:	**$731,000,000**	**$807,000,000**
HR Costs		
- Total Training & Development Cost	$27,800,000	$31,250,000
- Total Recruiting and Onboarding Cost	$8,000,000	$9,000,000
- Total Employee Relations and Risk Mitigation Cost	$5,000,000	$5,100,000
- Total HR Transaction & Administration Cost	$7,150,000	$7,650,000
- Total Management Cost*	$2,000,000	$2,100,000
- Total Benefits Program Cost*	$2,000,000	$2,200,000
- Total Payroll Cost*	$1,500,000	$1,600,000
- Total Internal Mobility Cost*	$650,000	$700,000
- Total Other HR Cost*	$1,000,000	$1,050,000
Total HR Expenses:	**$47,950,000**	**$53,000,000**

Talent Management Impact

Recruiting and Hiring	Prior Year	Current Year
Quality of Hire Index (Adjustment Factor)	*68%*	*70%*
Change in Average Days to Start[2]	–5	–5
Total Open Positions (Critical Revenue Producing)	200	250
Total Internal Hires	500	675
Average Lost Revenue or Production per Day per Position	–$1,000	–$1,200
Average Internal vs. External Cost per Hire Differential	$2,500	$4,500
Change in Open Position Lost Revenue & Production	$1,000,000	$1,500,000
Internal vs. External Cost per Hire Differential	$1,250,000	$3,037,500
Total Recruiting and Hiring Impact:	**$2,295,000**	**$4,660,721**
Mobility		
Career Path Ratio	*0.35*	*0.36*
Internal vs. External Hire Compensation Differential	$1,000	$1,000
Internal vs. External Hire Compensation Cost Impact:	$500,000	$675,000
Total Mobility Impact:	**$510,000**	**$665,182**
Leadership and Management		
Talent Management Index	*55%*	*63%*
Managerial Bench Strength	*53%*	*54%*
Total Management Headcount	1,250	1,300
Management Span of Control	12.0	12.6
Span of Control Cost Impact:	$3,000,000	$10,066,665
Total Leadership and Management Impact:	**$3,244,500**	**$11,837,808**
Training		
Training Effectiveness Index	*55.0%*	*53%*
Total Employees with Training Productivity Gains	3,000	5,000
Average Training Performance Differential per Employee	$1,500	$2,000
Training Performance Differential Impact:	$4,500,000	$10,000,000
Training Impact:	**$4,950,000**	**$9,684,477**
Performance and Engagement		
Employee Engagement Index or Score	*47.0%*	*51.7%*
Employee Engagement Revenue Linkage Impact	*0.5%*	*0.5%*
High Performer Productivity Differential	10.0%	10.0%
Total End of Period High Performers	1,500	1,650
Employee Engagement Productivity Impact:	$1,500,000	$7,720,975
High Performer Productivity Impact:	$14,000,000	$15,443,249
Performance and Engagement Impact:	**$15,500,000**	**$23,164,225**
Turnover and Retention		
Total Applicable Replacement Hires	300	390
Total Terminations	700	800
Average Replacement Hire Compensation Cost Differential	–$2,000	–$7,359
Average Cost of Turnover	–$3,000	–$9,959
Compensation Cost of Replacement Hires Impact:	–$600,000	–$2,870,010
Cost of Turnover Impact:	–$2,100,000	–$7,966,990
Turnover and Retention Impact:	**–$2,700,000**	**–$10,837,000**
TOTAL TALENT MANAGEMENT IMPACT:	**$23,799,500**	**$39,175,412**

EFFICIENCY MEASURES

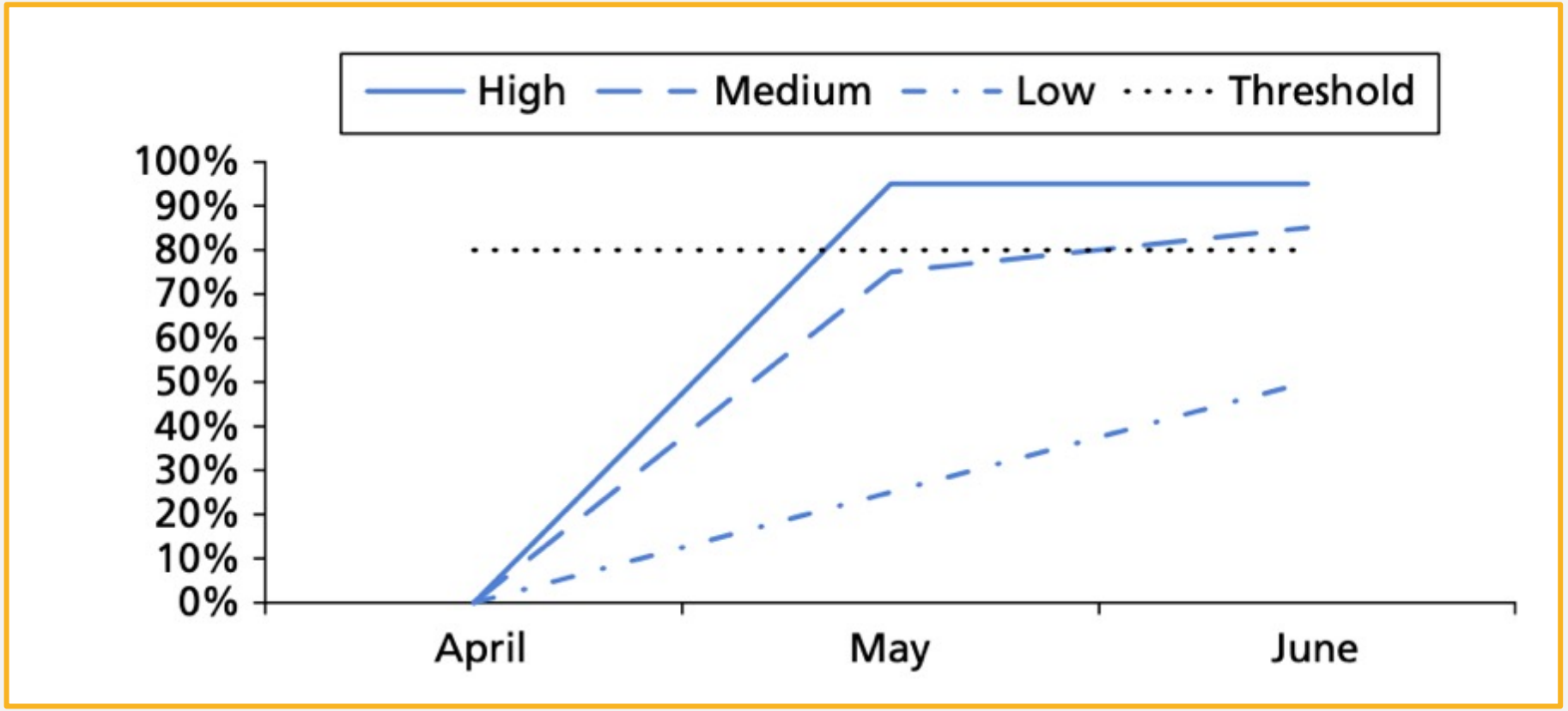
- Number of open positions in the business unit
- Number of positions filled/month
- Average number of days to fill an open requisition
- Average salary of the open position
- Cost to hire

Examples of effectiveness measures tailored to an organization:

- Performance ratings of new hires at 90 days
- Competency assessment results – strengths and gaps
- Speed to competency
- Engagement survey results
- Exit survey data and exit interview comments

EFFICIENCY MEASURES

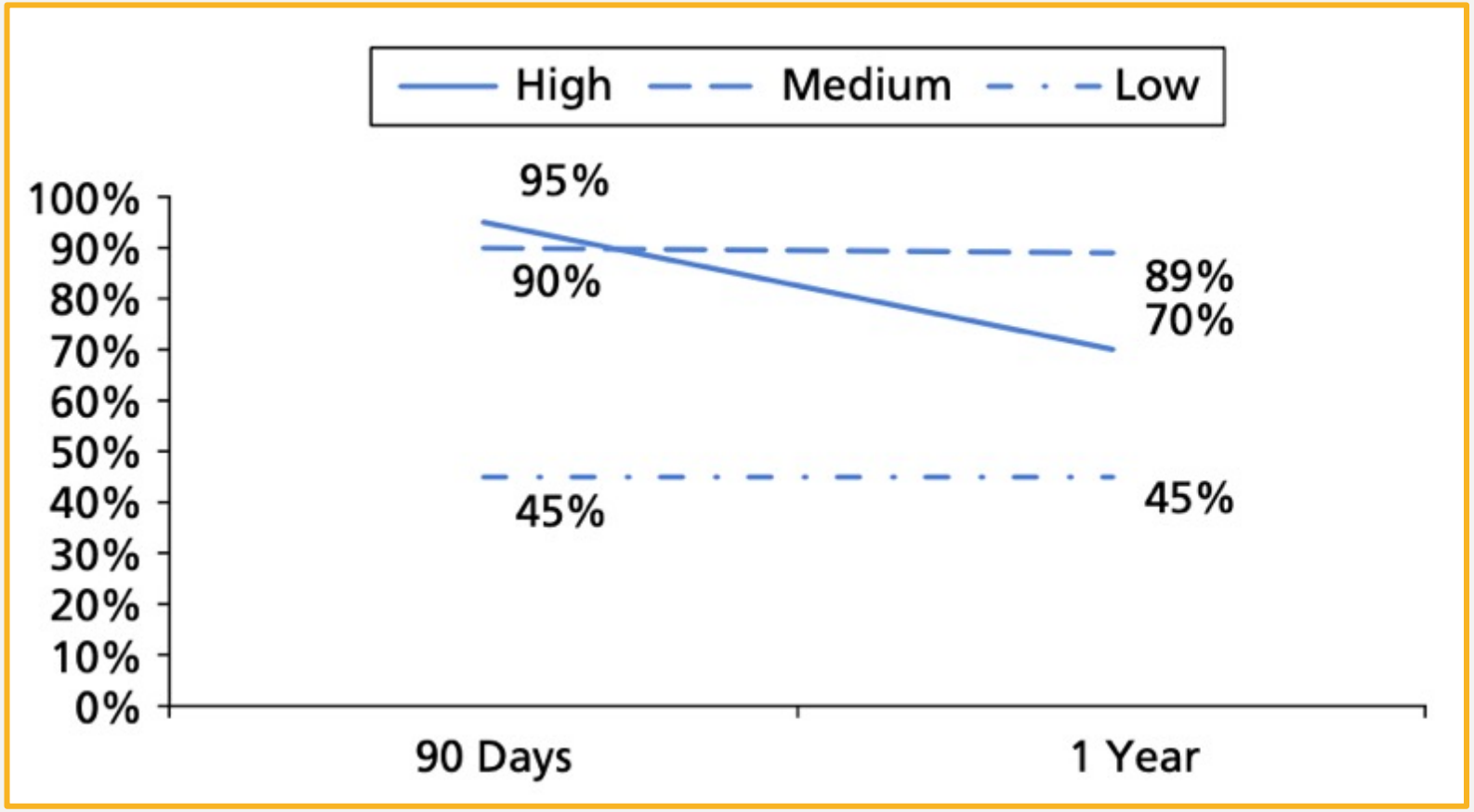
Speed to competency by performance group



(High, medium & low performance group)

EFFICIENCY MEASURES

Employee engagement by performance group at 90 days and one year



(High, medium & low performance group)

EFFICIENCY MEASURES

Exit survey results by performance group

Top Reasons for Leaving the Company		
High Performers	**Mid-Tier**	**Low Performers**
More challenging work	New industries in a similar role	Family/friends at the company
Higher pay	Better work/life balance	Better work/life balance
Promotion/higher position	Higher pay	Less demanding job

(High, medium & low performance group)

EFFICIENCY MEASURES

Most leading indicators are **intangible**.

- **Leadership.** Employee survey of attitudes toward leaders. Correlated with the likelihood of staying or leaving the organization.
- **Engagement.** This relates to loyalty, productivity, and commitment.
- **Readiness.** Having a given number of important positions with at least one person qualified to step in in the event of a vacancy predicts a continuity that relates to customer service and work quality. There is a correlation between readiness and revenue growth.
- **Knowledge Management programs.** Correlated with revenue growth.
- **Loyalty.** Turnover and engagement are affected by loyalty or lack thereof.
- **Customer Satisfaction.** This leads to return business, a larger spend, and referrals. It is a strong predictor of future business levels.

EFFICIENCY MEASURES

Most leading indicators are **intangible**.

- Human Capital **Competence** Level: *% of key employees who have met competence standards.*
- Human Capital **Readiness** Level: *% of key positions with at least one fully qualified person ready.*
- Human Capital **Commitment** Level: *% of employees expecting to stay at least three years.*
- Human Capital **Satisfaction** Level: *% of employees scoring in top quartile of job satisfaction survey.*
- Corporate **Climate:** *% of employees who indicate concern with culture and climate.*
- Human Capital **Depletion** Rate and Cost: *Voluntary separations as a % of head count and the cost of separations.*

DISCUSSION

–HR Analytics: Yes, please!

or

–HR Analytics: No thanks?

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WAYS TO ADD VALUE

- From simple to complex:
  - **Solve a concrete problem** by picking a low-hanging fruit to improve some aspect of operations – a good first step.
  - **Form an analytics unit** to benefit from the intelligence generated by a constant analytics function.
  - **Develop an analytics culture** to transform an organization's decision-making culture to be based on analytics (needs full management support).

The key is to find **strong support** from the board so that it transforms from an HR initiative into an **organizational problem**.

MAKING A PLAN

1. **HR'S Vision and Goals** – reflecting management's mandate.
2. **Standard Definitions** – reaching consensus on terminology.
3. **Reporting Design** – updating and negotiating.
4. **Database Architecture** by analysts & coders – accessing data from various units (e.g. finance, marketing).
5. **Technology Tools/Apps** – budgeting to acquire the analytic tools.
6. **Project Design** – agreeing on the start date of regular reports.
7. **Data Collection/Organization** – data collection methodology, trial and error.
8. **Analysis and Test** – with internal and external users.
9. **Report** – continuous analytics and report training to the line managers (e.g. > 1 year).
10. **Implement and Monitor** – providing actionable operating data; continuous improvement (> 2 years).

MAKING A CASE

"The most important issue is revenue growth."

- You need:
  - To do research: identify **top-of-mind issue(s)** of the board:
    - what is being published by the board (e.g. advice, directions, demands, requests).
    - where does the board focus its time and energy?
  - a **mentor** or coach (e.g. brainstorming, advice, a sounding board) who knows the organization; relationships built on trust, common interests, personal compatibility, and shared goals. Someone who likes you.
  - a **sponsor** who is very close to the CEO and who has power (and can provide guidance in preparing the pitch).

MAKING A CASE

"The most important issue is revenue growth."

- You need:
  - a captivating **pitch**:
    - *"Effective leadership drives productivity, operating revenue, cost management, and profitability."*
    - *"It is imperative that a leadership development program's outputs make a connection with those financial outcomes."*
    - Include graphic statistical evidence.
    - Create a need by citing some deficiency within the company (e.g. turnover).
    - Show a financial value gained.
    - Mention the cost and time until the results are seen.

MAKING A CASE

"The most important issue is revenue growth."

- Telling the story:
  - Executive summary, the **pitch (the problem, the offer, the investment)**.
  - State the problem.
  - Set the background.
  - Mention the objectives.
  - Describe the current processes.
  - Indicate the requirements.
  - Compare the alternatives.
  - Mention further considerations.
  - Outline the action plan.

HOW TO ACCESS THE DATA?

- Data are often located in many different systems; often they are controlled by IT.

Efficiency	Effectiveness	Outcomes
Human Resources Information System (HRIS)	Evaluation System	Performance Appraisal System
Number of open requisitions	Satisfaction with learning	Speed to productivity
Time to fill open positions	Assessment results	Productivity measures (chargeable hours or widgets produced/hour, etc.)
Salary associated with positions	Performance Appraisal System	Quality System
Finance System	Performance Ratings	Error rate/1M units
Cost to hire the new resource	Identification of high potentials	Customer Service/ Relationship Management System
Cost to train new hires (onboarding)	HRIS	Customer loyalty
	Turnover within 90 or 365 days	Sales
	Lost productivity (salary × time unfilled)	CRM/Finance
		Revenue/trainee

DATA SOURCES

HOW TO ACCESS THE DATA?

Internal data at the enterprise, function, and human capital management levels.

- In which department does the data reside?
- Who is the gatekeeper or owner of the data?
- Is it sensitive information?
- If so, what approvals are necessary to gain access?
- What type of data are they (e.g. nominal, ordinal, interval ratio, qualitative versus qualitative)?
- What is the format of the data (e.g. HTML, text, comma delimited, etc.)?
- Is there a standard process for requesting the data?
- What is the standard turnaround time for a request?

OTHER (OPEN) DATA SOURCES

They help to build an appealing story

Examples:

- Society for Human Resource Management https://www.shrm.org
- EUROSTAT https://ec.europa.eu/eurostat
- Eurofound https://www.eurofound.europa.eu
- Instituto Nacional de Seguridad y Salud en el Trabajo (INSST) https://www.insst.es
- FEDSTATS (http://www.fedstats.gov)
- Instituto Nacional de Estadística https://www.ine.es
- Department of Labor: Bureau of Labor Statistics
- Federal Reserve Board
- Social Security Administration
- U.S. Census Bureau
- Etc.

International demographic, economic data, industry and technology data.

e.g. Labor trends: unemployment level, workforce population, absence and turnover rates, part-time versus full-time employment ratios, etc.

THINGS TO CONSIDER

- Request suitable **data format**: HTML, XML, txt, comma delimited, SPSS, Excel, Access, etc.
- Request adequate **data structure**:
  - Long data: several rows per person (scores on different variables).
  - Wide data: one person per row, multiple columns (scores on each variable).
- **Missing data**:
  - Large amounts: > 50%.
  - Analyze why and, if possible, try to correct the data collection problem.
- **Errors in the data**
  - Data entry errors, incorrect query requests, misaligned data.
  - Inspect the data first to ensure its quality (e.g. response scales and actual responses, number of subjects, etc.).

QUESTION

What problems (and solutions) with data access do you envision?

DATA ACCESS PROBLEMS & SOLUTIONS

Problems

- Data owners may be unwilling to share.
- Data may be classified as 'sensitive'.
  - e.g. gender, age, ethnicity, medical history, performance appraisals, engagement scores.

Solutions

- Data anonymization (no ID or email).
- Ask IT who protects data to join datasets and delete the identifiers.
- Request data through official channels (rather than simply by email).
- Gain permission/approval from the gatekeeper's supervisor.
- Get an executive sponsor to make the request.

WHAT TO DO WITH THE DATA?

WHAT TO DO WITH THE DATA?

- **Describe**
  - Simple statistics: frequencies, means, standard deviations.
  - Often aggregated e.g. by unit, whole organization.
- **Explain**
  - Descriptives of differences by groups.
- **Predict**
  - Inferential statistics: e.g. regression, ANOVA, SEM.
- **Optimize**
  - Feedback loop: constant monitoring of the inputs and performance to optimize organizational investment in performance improvement.

HR ANALYTICS IN ACTION

STEP 1

DETERMINE THE KEY PERFORMANCE INDICATORS (KPIs)

- Developed through conversations with the VP, segmented into three types of measures: efficiency, effectiveness and outcomes.

Efficiency	Effectiveness	Outcomes
Human Resources Information System (HRIS)	Evaluation System	Performance Appraisal System
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	Turnover within 90 or 365 days	Sales
	Lost productivity (Salary × time unfilled)	CRM/Finance
		Revenue/trainee

HR ANALYTICS IN ACTION

STEP 1

Build a database

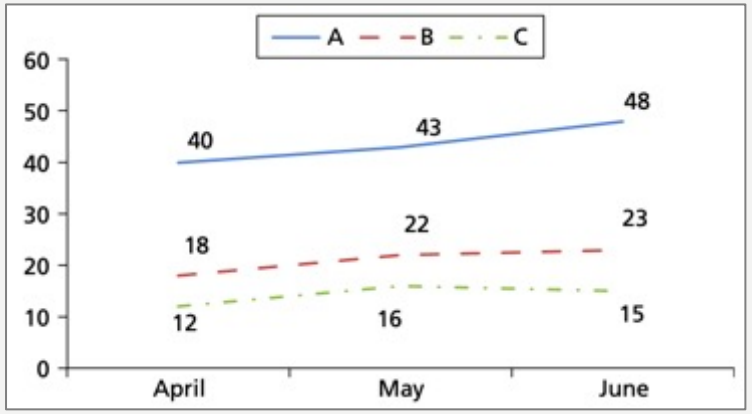
Course Type	Learning Method	Student Email	Question	Question Category	Answer	Entered Date	Answer Type
Uncategorized	Instructor Led	pearson1@companya.com	I learned new knowledge and skills from this training	Learning Effectiveness	2.333333333	27-Feb	Likert
Uncategorized	Instructor Led	pearson1@companya.com	I will be able to apply the knowledge and skills learned in this class to my job.	Job Impact	2.333333333	27-Feb	Likert
Uncategorized	Instructor Led	pearson1@companya.com	This training will improve my job performance.	Business Results	2.333333333	27-Feb	Likert
Uncategorized	Instructor Led	pearson1@companya.com	This training was a worthwhile investment in my career development.	Return on Investment	2.333333333	27-Feb	Likert
Uncategorized	Instructor Led	pearson2@companya.com	This training was a worthwhile investment in my career development.	Return on Investment	2.777777778	30-Mar	Likert
Uncategorized	Instructor Led	pearson2@companya.com	I learned new knowledge and skills from this training.	Learning Effectiveness	2.333333333	30-Mar	Likert
Uncategorized	Instructor Led	pearson2@companya.com	This training was a worthwhile investment in my career development.	Return on Investment	2.333333333	18-Apr	Likert
Uncategorized	Instructor Led	pearson2@companya.com	I learned new knowledge and skills from this training.	Learning Effectiveness	2.333333333	18-Apr	Likert
Uncategorized	Instructor Led	pearson3@companya.com	I learned new knowledge and skills from this training.	Learning Effectiveness	2.333333333	20-Mar	Likert
Uncategorized	Instructor Led	pearson3@companya.com	This training was a worthwhile investment in my career development	Return on Investment	2.333333333	20-Mar	Likert

HR ANALYTICS IN ACTION

STEP 2

ANALYZE AND REPORT THE DATA

- **Descriptive statistics:**
  - use statistical terms that have become common in day-to-day language (e.g. the number of responses, the average, the SD, frequency distribution) to understand the data.



- **Inferential statistics**
  - search for relationships (e.g. correlation and regression), test for differences between groups (e.g. *t*-test, ANOVA) to infer that the relationship (or difference) is true for the cases in the sample but can also be generalized to the whole population.

Why is it taking longer to hire people in business unit A?

- What if we look outside our geographic region?
- What if we lowered the standards in the hiring criteria?
- What if we offered higher salaries?
- What is the monetized benefit of reducing time to hire?

PREDICTIVE ANALYTICS

- **Correlation**
  - How are X and Y associated? When X increases, does Y also increase?
  - It does not imply causation.

- **Multiple linear regression**
  - This selects the variables with the strongest relationship to the outcome variable.
  - It shows the unique contribution of each predictor to the outcome by eliminating the overlap among the predictors.
  - Percentage of explained variance.

- **Structural equation modeling (SEM)**
  - This tests multiple relationships at once, just as in real life.
  - It does not eliminate any variables. It provides pathways.

- **Artificial Neural Networks, machine learning, etc.**

PREDICTIVE ANALYTICS INTERPRETING THE RESULTS

- Correlation

KPI	Time to Fill	Salary	Cost to Hire	Performance Rating 90 Days	Performance Rating 365 Days	Assessment Results	Speed to Competency (days)	Sponsor Satisfaction	Exit Survey Rating	Engagement Survey Rating	Productivity	Profitability
Time to fill	1	.052	.065	.633	.556	.398	−.326	.201	.587	.140	.537	.386
Salary	.052	1	.999	−.170	−.046	.105	−.024	.070	−.568	.029	−.006	.514
Cost to hire	.065	.999	1	−.168	−.046	.100	−.022	.062	−.569	.024	−.002	.512
Performance Rating 90 days	.633	−.170	−.168	1	.915	.695	−.746	.449	.851	.341	.848	.468
Performance Rating 365 days	.556	−.046	−.046	.915	1	.714	−.686	.492	.838	.334	.864	.548
Assessment Results	.398	.105	.100	.695	.714	1	−.749	.726	.809	.492	.747	.585
Speed to competency (days)	−.326	−.024	−.022	−.746	−.686	−.749	1	−.555	−.865	−.264	−.750	−.503
Sponsor Satisfaction	.201	.070	.062	.449	.492	.726	−.555	1	.732	.339	.572	.467
Exit survey rating	.587	−.568	−.569	.851	.838	.809	−.865	.732	1	.525	.799	.714
Engagement Survey Rating	.140	.029	.024	.341	.334	.492	−.264	.339	.525	1	.316	.207
Productivity	.537	−.006	−.002	.848	.864	.747	−.750	.572	.799	.316	1	.617
Profitability	.386	.514	.512	.468	.548	.585	−.503	.467	.714	.207	.617	1

	Productivity
Productivity	1.00
Performance rating 365 days	.864
Performance rating 90 days	.848
Exit survey rating	.799
Speed to competency (days)	−.750
Assessment results	.747
Profitability	.617
Sponsor satisfaction	.572
Time to fill	.537
Engagement survey rating	.316
Salary	−.006
Cost to hire	−.002

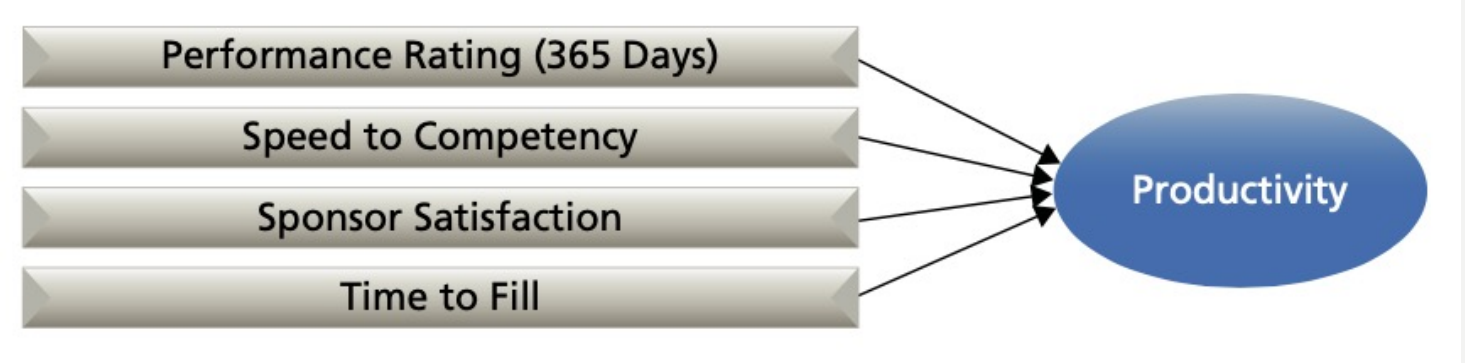
PREDICTIVE ANALYTICS INTERPRETING THE RESULTS

- Multiple linear regression

Which of these indicators is **the best one to act upon**? Why?

PREDICTIVE ANALYTICS INTERPRETING THE RESULTS

- **Multiple linear regression**



Interpretation:

- Which of these indicators is **the best one to act upon**?
  - Annual **productivity** is not practical (there is a long time to wait).
  - Average **speed to competency** is more practical because it comes earlier (e.g. anyone requiring over 90 days is a candidate for performance support or termination).
  - **Time to fill**: quality employees come in time.

PREDICTIVE ANALYTICS INTERPRETING THE RESULTS

HR management practices
- Participation in decision-making
- Autonomy
- Support from supervisor
- SMART objectives
- Task variety
- Meaningful work
- Constructive feedback
- Distributive, procedural, informational and interactional justice
- Opportunities for advancement
- Work-family balance
- Perceived organizational support

Attitudes
- Satisfaction
- Commitment

Intentions
- Quit/stay
- Internal mobility

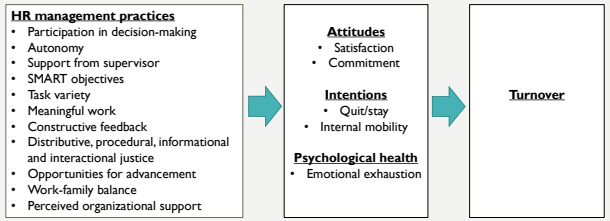
Psychological health
- Emotional exhaustion

Turnover

A *simplified* summary of the literature on employee turnover.

E.g. satisfaction is considered a predictor of commitment, which is itself a predictor of intentions.

PREDICTIVE ANALYTICS INTERPRETING THE RESULTS



- **Quit intentions**: main vector in employee turnover (Griffeth et al., 2000).
- **Attitudes** (e.g. organizational commitment, job satisfaction): main predictors of quit intentions (Allen et al., 2010).
- **Beliefs** and **perceptions** (e.g. perceived organizational support): affect turnover (attitudes formation).
- (Allen et al., 2003) An individual's perception of organizational support relates to:
  - Favorable **behaviors** (e.g. work attendance, job performance, OCB).
  - Favorable **attitudes** (e.g. job satisfaction, affective commitment).
- **HRM practices based on support** (participation in decision-making, compensation equity, career development opportunities) → development of perceived organizational support.

HRM value chain:

HRM practices → Perceived organizational support → Positive attitudes towards the organization → Organizational performance

PREDICTIVE ANALYTICS PREDICTING THE FUTURE

- **Multiple linear regression -** Example:

Productivity = 83.23 – .30 (Speed to competency) + .42 (Time to fill)

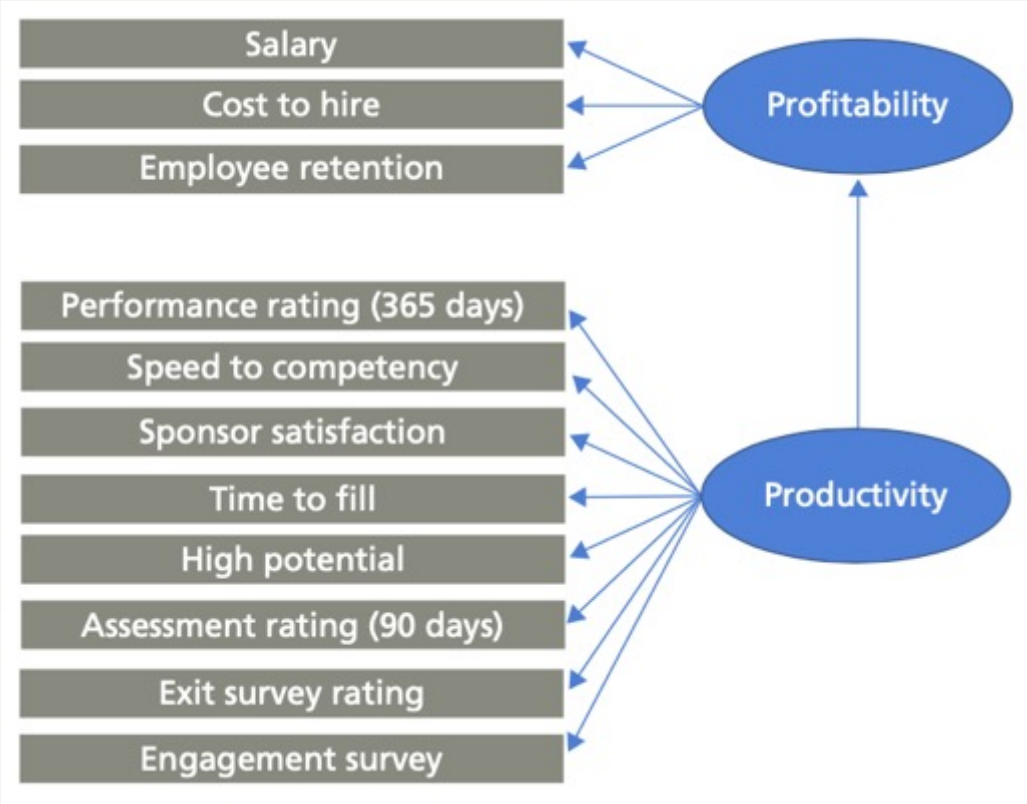
Predicted Productivity Scores for Five New Hires

New Hire	Speed to Competency	Time to Fill	Predicted Productivity
A	50 days	67 days	96.37
B	45 days	50 days	90.73
C	66 days	55 days	86.53
D	Not declared competent	12 days	No value
E	Not declared competent	28 days	No value

Predicted Profitability
$38,446
$34,543
$31,636

PREDICTIVE ANALYTICS PREDICTING THE FUTURE

- **Structural Equation Modelling**
  - Needs more cases to test a model.
  - Its advantage is simplicity of pathways.
  - Is time-consuming but rewarding.
  - Does not lose sight of the end goal, i.e. usable information for decision making.



FALLACIES IN TREND IDENTIFICATION

FALLACIES IN TREND IDENTIFICATION

Finding meaning

- The research business **sells data patterns** to people who want to better understand their company, market, or region.
- This may lead researchers to claim a **causality that does not exist**.
- **We cannot *prove* anything**. We don't try to prove our hypothesis.
- We can only try to disprove the null hypothesis =

  That the effects we observed are not caused by forces other than our treatment 95 percent of the time (.05 level of confidence).

> *"Mistaking coincidence or correlation with causality is the stuff of the naive, of charlatans, and of demagogues. Politicians, religious fanatics, and consultants are masters at this tactic."*
> Fitz-enz (2009)

Avoid the natural desire to draw correlations where they do not exist.

FALLACIES IN TREND IDENTIFICATION

Extrapolation

- Assuming a past trend will be repeated in the future is **risky**.
- The future is **not a mirror of the past**, especially when witnessing a highly **disruptive** technology
- The importance of the **context**:
  - e.g. Sales can increase for many reasons and have nothing to do with the incentive pay plan for salespeople.
  - Other variables need to be eliminated by comparing one's product with that of the competition in terms of price, performance, reliability, deliverability, and service, the personal seller-buyer relationships.

All attempts to explain the future must be made under *ceteris paribus* conditions.

=

other things being equal

FALLACIES IN TREND IDENTIFICATION

Tricks of the charlatan:

- Recommending a set of mixed, arbitrary, often overlapping issues while ignoring quantitative performance records.
- Promising to draw correlations with the creation of shareholder value.
- These are very thinly veiled attempts to sell consulting services.

FALLACIES IN TREND IDENTIFICATION

Performance evaluations are filled with room for error.

- It is not easy to set standards of performance even for the simplest tasks.

THE FUTURE OF HR ANALYTICS

THE FUTURE OF HR ANALYTICS

- Fields that provide insights for looking to the future:
  1. **Finance: business standards and the valuation of organizations**
     - More organizations are adopting the Talent Development Reporting Principles (TDRP) framework (which gathers and reports standard measures on HR): these are easily understandable and used for decision making.
  2. **Mathematics: chaos theory** https://youtu.be/Lx8gMBJBIP8
     - Humans are not 100% predictable; the flow of employees often seems chaotic.
     - Gleick: the goal of mathematics is to reveal "the fine structure hidden within a disorderly stream of data".
     - The term 'chaos' implies that there is infinite complexity that cannot be modeled; the scientific study of seemingly chaotic processes has the end goal of finding and defining the hidden patterns.
     - Lorenz's 'butterfly effect': dynamic systems such as weather can change dramatically even when the inputs to the system are very small.

THE FUTURE OF HR ANALYTICS

- Fields that provide insights for looking to the future:

  3. Information Technology: Big Data

  - Three big data characteristics:
    - **Volume**: the amount of data being created on a daily basis is overwhelming.
    - **Velocity**: the speed and rate of change at which data is collected and processed is immense.
    - **Variety**: the range of data types and sources is expanding.

- HR: the accumulation of big data is triggered by the automation of HR practices & IT systems:
  - **Learning management systems**: these store courses and registrations, provide e-learning, track compliance, issue certifications, and administer tests.
  - **Talent systems**: these store candidate applications and information on employee demographics, salary, performance reviews, and promotions, etc.

Efficient systems = a massive source of data.

THE FUTURE OF HR ANALYTICS

- Fields that provide insights for looking to the future:

  3. Information Technology: Big Data

  – Grand Unified Theory of Human Capital to uncover the driving factors of hiring, promoting, and retaining the best talent available.

  – Tested, confirmed and modified by billions of HR records, "***N* = all**".

  Support by:

  1. **Thirst for predictive analytics among leaders** beyond descriptives, dashboards, and correlations.
  2. **Tools will be readily available** (e.g., SAS, R, SPSS, Minitab, Mplus, even MS Excel) packaged with cloud-based systems.
  3. **Abundant resources:** university analytics degrees.

THE FUTURE OF HR ANALYTICS

- Fields that provide insights for looking to the future:

4. Automated Processes: decision support

These set control parameters around performance, monitor the performance, and provide continuous feedback in real time for continuous improvement.

Example:

- Select key performance indicators (KPIs) along critical business dimensions (financial, internal business processes, learning and growth, and customer).
- Gather, analyze and report data on a scorecard.
- Leaders review the scorecards on a regular basis (e.g. quarterly, more often) and take actions for improvement.

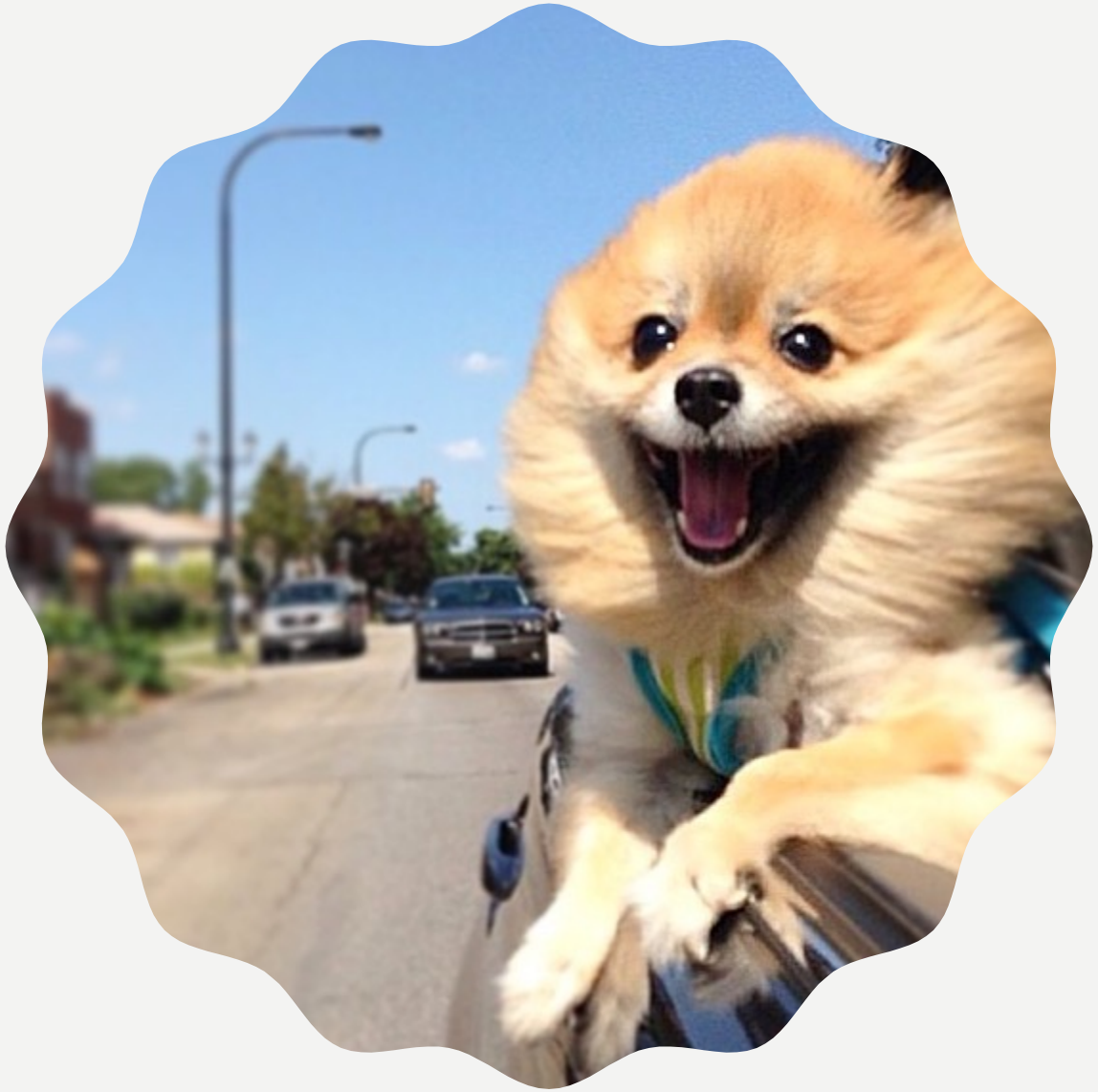
--> Talented employees will be retained.

THE FUTURE OF HR ANALYTICS

- **Integration** of talent systems by IT and HR departments to link data from various talent processes.
- Creation of **standard HR scorecards** that gather the right data (efficiency, effectiveness, outcomes) to demonstrate the influence of HR on the business.
- Data scientists within HR will use **advanced analytics** to assess what insights to provide to business leaders, and why.
- HR departments will set up continuous, automated **feedback loops** that put information in the hands of decision makers to increase the efficiency and effectiveness of HR processes.

THE FUTURE OF HR ANALYTICS

Threat or opportunity?



BIBLIOGRAPHY

- Fitz-enz, J. and Mattox II, J.R. (2014). *Predictive Analytics for Human Resources*. John Wiley & Sons, Inc., Hoboken, New Jersey.
- Fitz-enz , J. (2009). *The ROI of Human Capital: Measuring the Economic Value of Employee Performance*. AMACOM, New York.

MONEY CASH FLOW CASE OVERVIEW

- Your group is an **external consultant** to Money Cash Flow (MCF) Inc.
- You have been asked by Tony Martel (Head of Operations for the Call Centers Division) for **reliable indicators** to **monitor** the situation and develop appropriate **action plans**.
- You need to **pool the information** obtained from key players in this situation in the MCF to meet the needs of the client system.

MONEY CASH FLOW CASE

Thu 21/10 morning	Theory review Assignment: introduction to the case	*In-class*
Thu 21/10 afternoon	Individual work Read the case and answer questions on it	*Non-presential*
Fri 22/10 morning	Group work	
Fri 22/10 afternoon	Group work	
Tue 26/10 morning	Group work	
Tue 26/10 afternoon	Presentations & discussion	*In-class*

MONEY CASH FLOW CASE
INDIVIDUAL WORK: REFLECTION QUESTIONS

Read the case and respond individually to the following question: **What key elements will you need to bear in mind even before you start looking for indicators?**

Bring your response to your groupwork session and share it with your group. Upload your notes (max ½ page, Calibri 12, double-spaced) to the *Aula Virtual* by 8 am on Friday 22/10.

Here are **some hints** that may help you to answer the question above:

- Who are the key players and what are the relationships between them?
- What is the corporate culture the information seems to describe?
- What is the overall history of Money Cash Flow Inc. and how is it currently trending?
- How is Money Cash Flow Inc. positioned in its socioeconomic environment?
- What are the main characteristics of the company's internal environment?
- How can the problem be defined?
- Are senior management's objectives aligned with the company's business issues?
- What factors will make it easier or more difficult to carry out the mandate?

MONEY CASH FLOW CASE
GROUP WORK: SOLVING THE CASE

The purpose is to diagnose the turnover problem at Money Cash Flow Inc., and present and justify your thoughts and investment decisions to the CEO.

- Upload your presentation to the *Aula Virtual* by 3 pm om Tuesday 26/10.

- You need to provide **concrete proposals** on which **actions** the company should take based on the **descriptive** (*M*s, *SD*s) and **analytical results** (correlations and regressions).
- This means you will need to suggest a model for diagnosing the issue facing the company by drawing on the theoretical model given in this case.

MONEY CASH FLOW CASE
GROUP WORK: SOLVING THE CASE

You will need to:

1. **Analyze the problem** presented in the case (Part A), understand the situation, and propose reliable (well-defined!) **indicators** to monitor the situation.
    1. Some helpful questions to consider: What are the strengths and weaknesses of Money Cash Flow Inc.? How are the indicators related and what do these relationships mean?

2. **Interpret the results** using several indicators (Part B), discuss the significance of the results, understand how the different indicators are related, and use these results to recommend **actions** for Money Cash Flow Inc.
    1. Some helpful questions to consider: What steps does Money Cash Flow Inc. need to take to reduce its turnover rate? In other words, what HR practices should management put in place? What action plan would you suggest to senior management? Why?

3. Prepare a **PowerPoint** presentation (15-20 min) for a meeting with the CEO of Money Cash Flow. Remember the need for a strong pitch.

4. Appoint a **spokesperson** who will present your ideas and solutions to the CEO on the afternoon of Tuesday 26/10.

MONEY CASH FLOW CASE
GROUP WORK: TEACHING OBJECTIVES

- Understand the **complexity of an HR analytics study**, in a specific business context, and develop a **systemic understanding of HR issues** (employee retention and well-being).
- Develop the ability to identify and analyze the most **relevant information** in developing such a study in terms of business issues and related HRM issues.
- Become familiar with several **statistical tools** used in documenting HRM issues: descriptive statistics (Means, Medians, SDs) and analytical statistics (Correlations, Regressions).
- Become aware of the **importance of measuring HRM results** to contribute to thinking and **action plans** by managers responsible for managing human capital.

MONEY CASH FLOW CASE
GROUP WORK: HELPFUL RESOURCES

- Literature on turnover and commitment (uploaded to MS Teams)
  - ALLEN, David G., Philip C. BRYANT, and James M. VARDAMAN (2010). "Retaining talent: Replacing misconceptions with evidence-based strategies," *The Academy of Management Perspectives*, Vol. 24, No. 2.
  - KLEIN, Howard J., Janice C. MOLLOY, and Joseph T. COOPER (2009). "Conceptual foundations: Construct definitions and theoretical representations of workplace commitments," in *Commitment in Organizations: Accumulated Wisdom and New Directions*, H.J. Klein, T.E. Becker, J.P. Meyer (Eds.), New York, Routledge, pp. 3–36.
- Slides (e.g., 54 & 55)

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VNIVERSITAT DE VALÈNCIA

WOP-P
MASTER IN WORK, ORGANIZATIONAL AND PERSONNEL PSYCHOLOGY

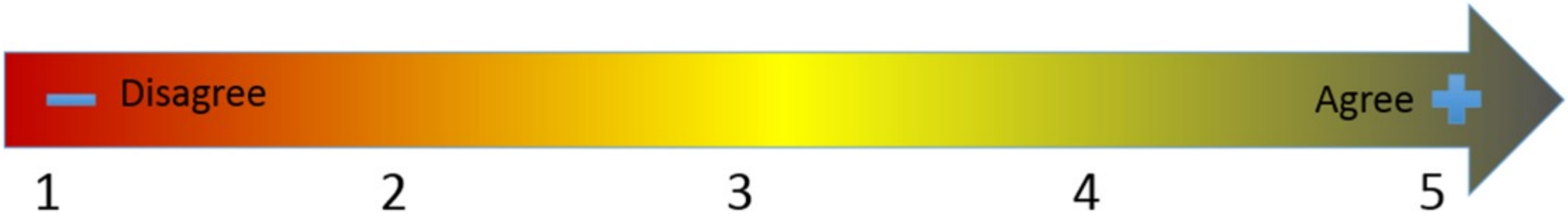
With the support of the Erasmus+ programme of the European Union

HR Analytics:

Meeting with the CEO

George Douglas
CEO, Money Cash Flow Inc.

What are Money Cash Flow Inc.'s strengths and weaknesses?



Autonomy
Job complexity
Emotional exhaustion

Social support
Task identity
Realistic objectives
Skill variety
Client feedback
Information processing
Distributive and procedural justice
Overall job satisfaction
Affective commitment
Quit intentions – internal
Quit intentions – external

Task significance
Task variety
Skill variety
Feedback from manager
Relational justice
Informational justice

HR ANALYTICS: ETHICAL CHALLENGES

HR ANALYTICS: ETHICAL CHALLENGES

- HR Analytics:
  - are AI-based tools based on **algorithmic technologies**.
  - are aimed at **developing the behavior and character of people** (Isson & Harriott, 2016).
  - aim to improve the **work experience** of organizational members (i.e. reduce stress and increase satisfaction).

HR ANALYTICS: ETHICAL CHALLENGES

- The application of algorithmic technologies may inhibit people from developing their virtue:
  - Algorithmic **opacity** (Burrell, 2016).
  - **Datafication** of the workplace (Tsoukas, 1997).
  - **Nudging** (Mateescu & Nguyen, 2019).

HR ANALYTICS: ETHICAL CHALLENGES

… leading to the following problems:

- They may create **information asymmetries**.
- Datafication can have adverse effects on **privacy**.
- Nudging can have harmful effects when it manipulates people's behavior without their **consent** or against their **interests**.
- When acting on algorithmic predictions, decision-makers can create the conditions that facilitate **self-fulfilling prophecies.**

PROBLEM 1: ALGORITHM OPACITY

- Algorithms can be used to **optimize, filter, rank, and classify data** for decision-makers who must decide who to hire, who to fire, who to promote, and how to construct work teams to maximize their productivity, etc.

> Uber drivers interact with the company via the Uber app. Algorithms determine drivers' pay rate, work placement, status, and ratings.

- Frequently, they are **difficult/impossible for employees to access** (corporate confidentiality).
- The relationship between **cause and effect can become blurred.**

> A highly productive consultant was almost fired for 'under-performing' due to extended periods of 'inactivity'.

- 'Algorithm games': organizational member's '**fake**' **behaviors** as they are registered by the algorithm.

PROBLEM 2: DATAFICATION OF THE WORKPLACE

- Datafied organizations do not treat members as fully-fleshed, subjective beings but as **collections of objective digital data** they produce actively and passively in their work (Constantiou & Kallinikos, 2015).
- These organizations use data from performance evaluations, personality analyses, psychological analyses, online activities, and relationships with colleagues, etc.
  - e.g. at Uber and Deliveroo, digital data and algorithms are used to construct representations of members and their work, which are **used for all decision-making** about workers.
  - e.g. members are classified into pre-specified personas (e.g., 'the engager', 'the catalyst', 'the responder', 'the broadcaster', and 'the observer') based on their behavior in enterprise social networks.
- There is a **risk of oversimplifying** the vast wealth of human variation!

PROBLEM 2: DATAFICATION OF THE WORKPLACE

Algorithm systems are often designed to be **over-confident.**

PROBLEM 3: NUDGING TO ENGAGE IN SPECIFIC BEHAVIORS

Nudge: *"Any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives."* (Thaler & Sunstein, 2008, p. 6)

- Systematic collection of data on workers' activities.
  - Location data from employees' mobile devices (physical location, who they interact with).
  - Internet browsing patterns = workers' emotional states.
  - Biometric data from wearables.
- Employees are often unaware of the extent and nature of data collected about them. This profoundly diminishes workers' privacy.

In 2017, Facebook monitored posts in real-time to help advertisers identify moments when teenagers felt stressed and vulnerable in order to persuade them to buy their products.

- Nudging can be employed by organizations to encourage 'appropriate' behaviors.
  - This is manipulative and ethically questionable when it aims to covertly influence people's decision-making.

HOW TO MITIGATE THE ADVERSE EFFECTS OF ANALYTICS

- Reframing Analytics as a **fallible companion technology**.

- Decrease opacity by:
  - Making the data used **visible** (i.e. their scope, type, and quality).
  - Making connection between the data and conclusions **open to assessment**.
  - Treating algorithms as **recommendations** that can (or cannot) be reasonable and fair (e.g. so they do not discriminate against job applicants based on their race).

FOSTERING ETHICAL HR ANALYTICS
Challenge 1: Opacity

- **Humanizing Analytics**
  - portraying them as technologies that are **capable of making mistakes** and that should therefore be scrutinized and held to account.
- Acknowledge that algorithmists **can sharpen human oversight** in algorithmic decision-making.
- There should be a **balanced** emphasis on **human-machine input**.
- **Revealing Analytics reasoning**, including their **shortcomings** and **uncertainty**, makes them more easily interpretable and less opaque.

FOSTERING ETHICAL HR ANALYTICS
Challenge 2: Datafication of the workplace

- Acknowledging the complexity of moral situations highlights the need to mitigate datafication and **cultivate human interpretations**.
- Incorporate a **diversity of viewpoints** and negotiations to counteract reductionism and one-sided representations.
- Exposing shortcomings in algorithmic reasoning highlights **the need for additional, non-datafied insights** and a more mindful mindset.

FOSTERING ETHICAL HR ANALYTICS
Challenge 3: Nudging

- Universal nudging can result in a morally deficient workforce.
- Organizations should **limit the scope of nudging** and allow members to reflect and to **exercise human judgment.**
- Algorithmists can ensure that nudging is **transparent** and consistent with workers' pursuit of their internal goods.
- Employees should be taught how to **understand** the algorithmic architecture of nudging.
- A readily available **opt-out option** should be incorporated for workers.
- Workers can be given several options to **choose** from.

SHIFT FROM CERTAINTY TO PROBALBILITIES

Instead of receiving a list of top 20 people most likely to quit in the next six months, a system could produce the same top list but with confidence scores.

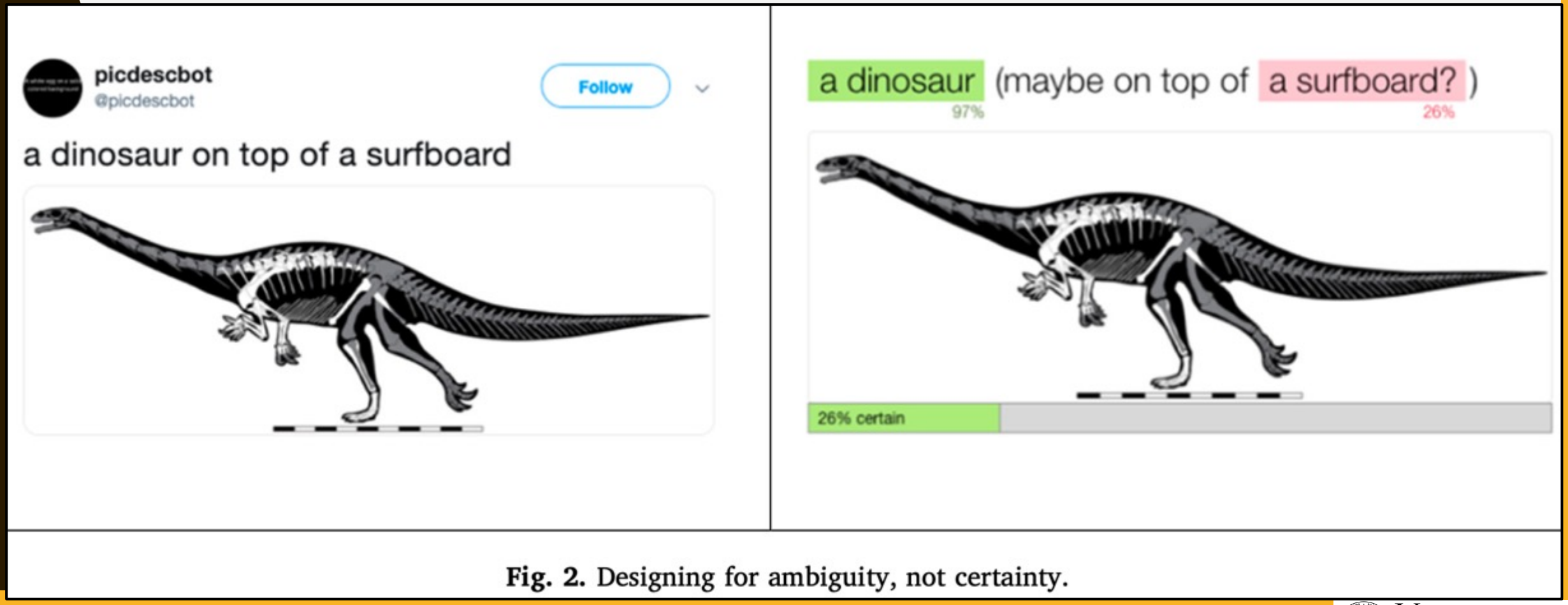


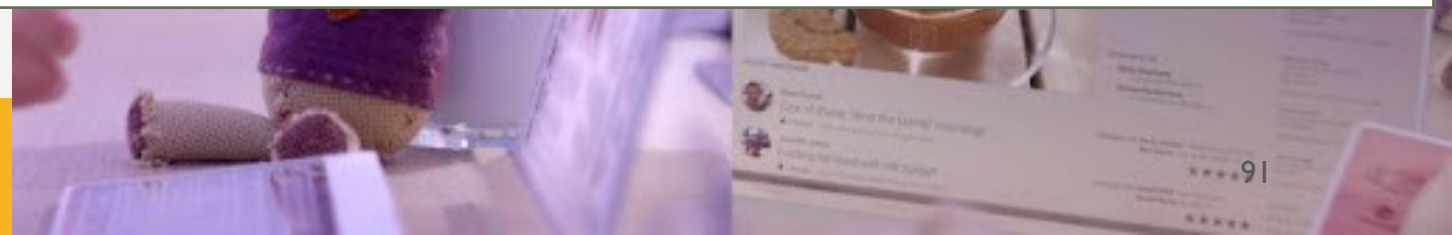
Fig. 2. Designing for ambiguity, not certainty.

AVENUES FOR FUTURE RESEARCH

- To understand how Analytics' **underlying machine-learning algorithms** work
  - e.g. empirically examine how the presence of algorithmic technologies can enhance workers' ability to cultivate virtue.
- To better understand **algorithmic sensibilities and rationality**.
  - e.g. to uncover how algorithms 'sense' the world and impact people's behavior.
- To provide **rich descriptions of the implementation and use** of Analytics in organizational practice:
  - how they shape and are shaped by organizational members, roles, and routines.
- Study how the use of analytics in organizations can create a **vicious cycle** of mutually-reinforcing **ethical challenges** – algorithmic opacity, datafication, and nudging.

THE FUTURE OF HR ANALYTICS

- STEVEN is a good but not a *great* performer. He used to be great. He has been in the company for seven years.
- His stellar performance lasted for five years until he was promoted and received a large increase in salary. In the last two years he has plateaued as an average performer.
- An alert from the HR system says that there is a 75% probability that Steven is likely to leave for a new position that opened up at a competitor. This percentage jumped to 95% when he requested a day off last Monday – probably for a job interview (Mondays and Fridays are usual interview days).
- There are many alternatives. For example, 100 candidates match Steven's job requirements, 90% percent of whom are in the metropolitan area. Of these, 20 make 25% less than Joe and have 25% more experience.
- Laura is my top candidate. New hires like to prove themselves, so she is likely to work harder than Joe and we expect she will be 21% more productive. If we offer her the job at a salary 19% lower than Joe's, there is an 85% chance she will take it.
- The probability jumps to 87% if we give her one flexible day per week; it jumps to 99% if we let her work from home and only require her to come to the office for critical meetings.
- When do we interview her? – In 15 minutes.



THE FUTURE OF HR ANALYTICS

Avoid the black scenario

by **bridging**
science & practice