



## Digital Technologies and Value Creation

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## Learning objectives of today

**Goals:** Understand key metrics relevant to Org 2.0/People analytics and their measurement

- What are the key metrics in this context and what is so special about culture?
- How can we measure culture?
- How can we gain new insights by using novel (text) data sources?

**How will we do this?**

- We will start by discussing the importance of culture to organizational performance (and, thus, organizational design)
- We then look at traditional and new ways of measuring culture
- We introduce the machine learning tools relevant to cultural measurement. We will dive into more detail in class

## What we measure (and manage) in people analytics

- Hiring, firing/attrition, and promotion
- Performance, development, and incentive systems
- Formal hierarchies and structures, informal networks, and teams
- **Organizational culture**



**Does organizational culture matter for firms?**

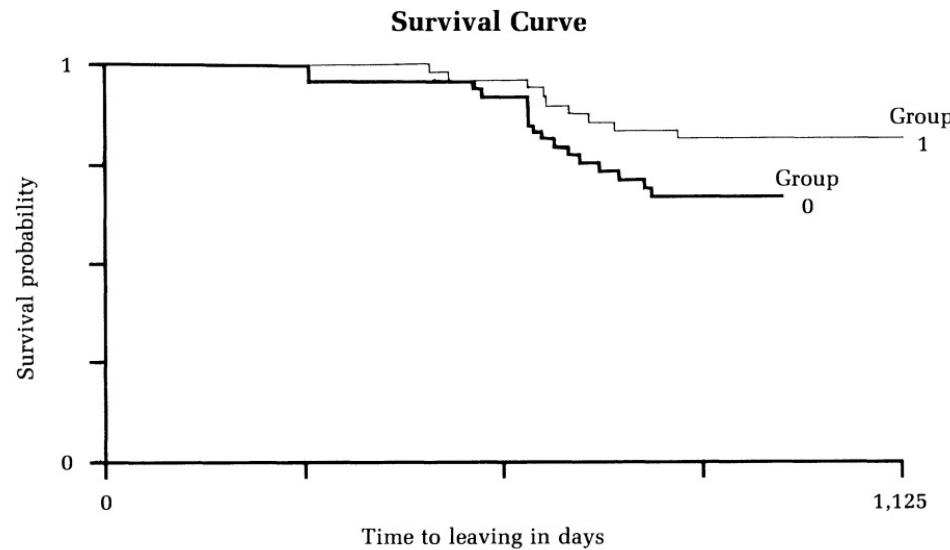
## Effect on employees

Organizational culture affects **employees' satisfaction**

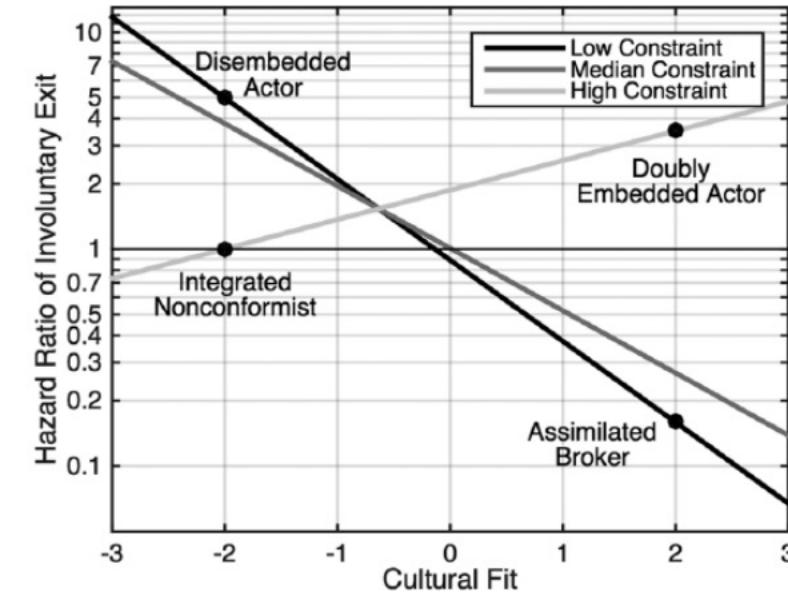
*\$7 trillion in lost productivity due  
to disengaged employees*

## Effect on employees

Organizational culture affects employees' satisfaction & turnover



Chatman et al, 1991



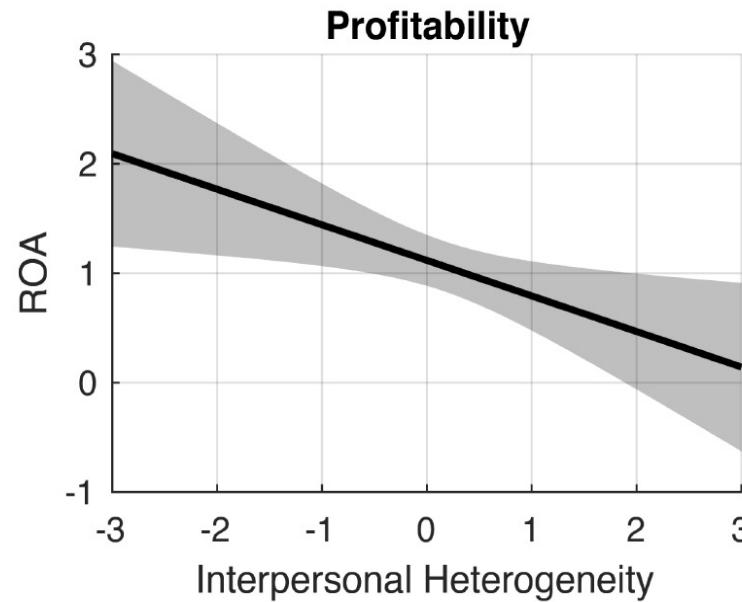
Goldberg et al, 2016

## Effect on group dynamics

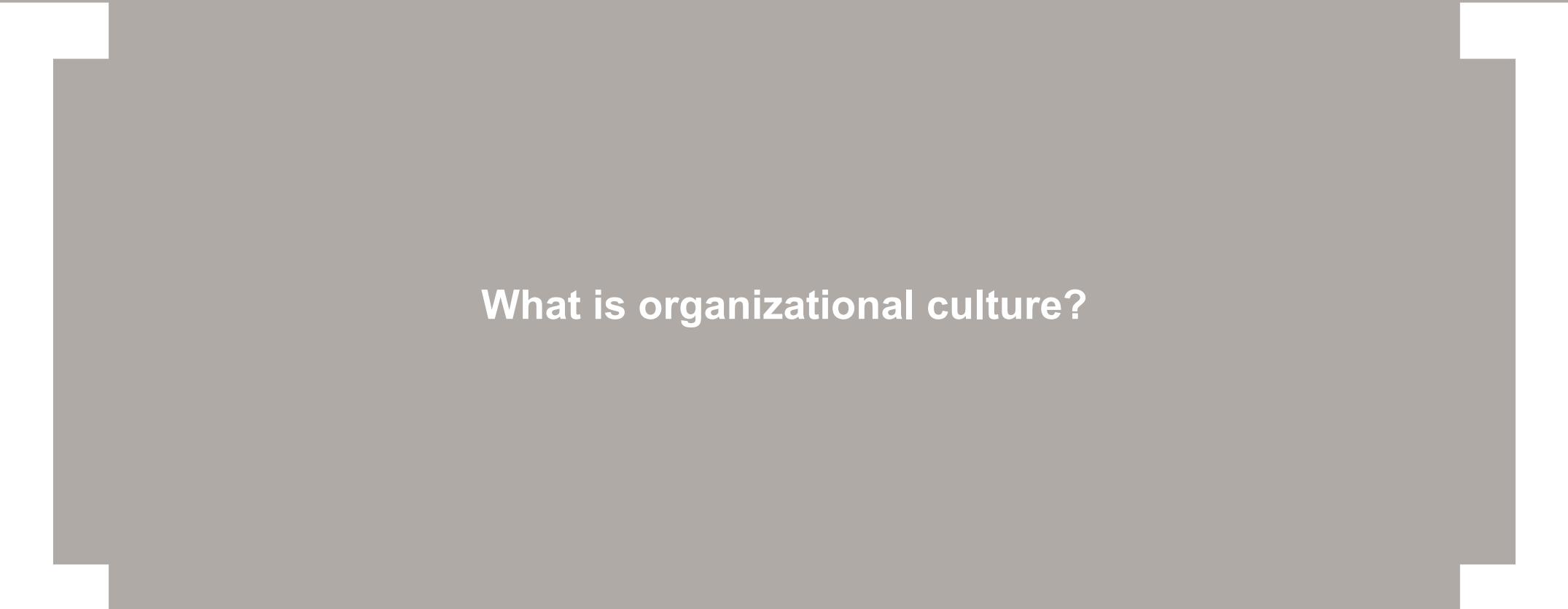


## Effect on performance

Organizational culture relates to **corporate financial performance**



Corritore et al, 2019



**What is organizational culture?**

Organizational culture – much ado...

## Build a Culture That Aligns with People's Values

by Natalie Baumgartner

April 08, 2020

Harvard Business Review

### The Dangers of Hiring for Cultural Fit

Employers often aim to hire people they think will be a good fit, but their efforts can easily veer into a ditch where new hires all look, think and act alike



Culture clashes loom after a rush of company mergers

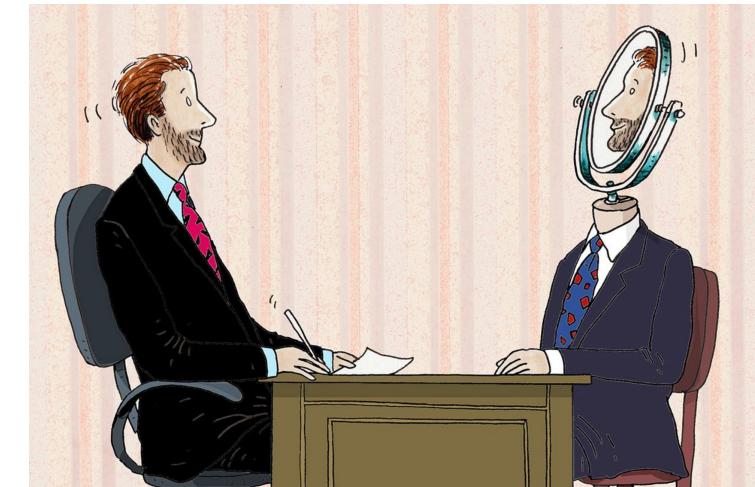


Aug 29, 2018, 09:51pm EDT

## How To Create A Positive Workplace Culture

Forbes

THE WALL STREET JOURNAL.



Jan 5, 2021, 01:10pm EST | 925 views

### 13 Ways Tech Leaders Can Build A Strong Culture In A Remote Team

Forbes

## *How to Keep Internet Trolls Out of Remote Workplaces*

## An attempt at a definition

“a complex set of **values, beliefs, assumptions, and symbols** that define the way in which a firm conducts its business”

(Barney, 1986)

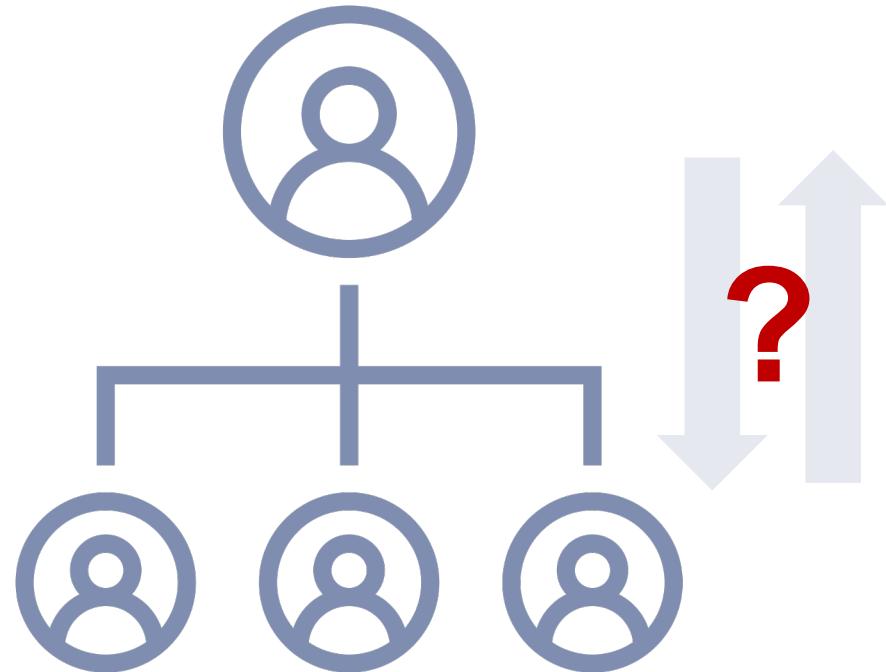
“a pattern of **shared** basic assumptions”

(Schein, 2010)

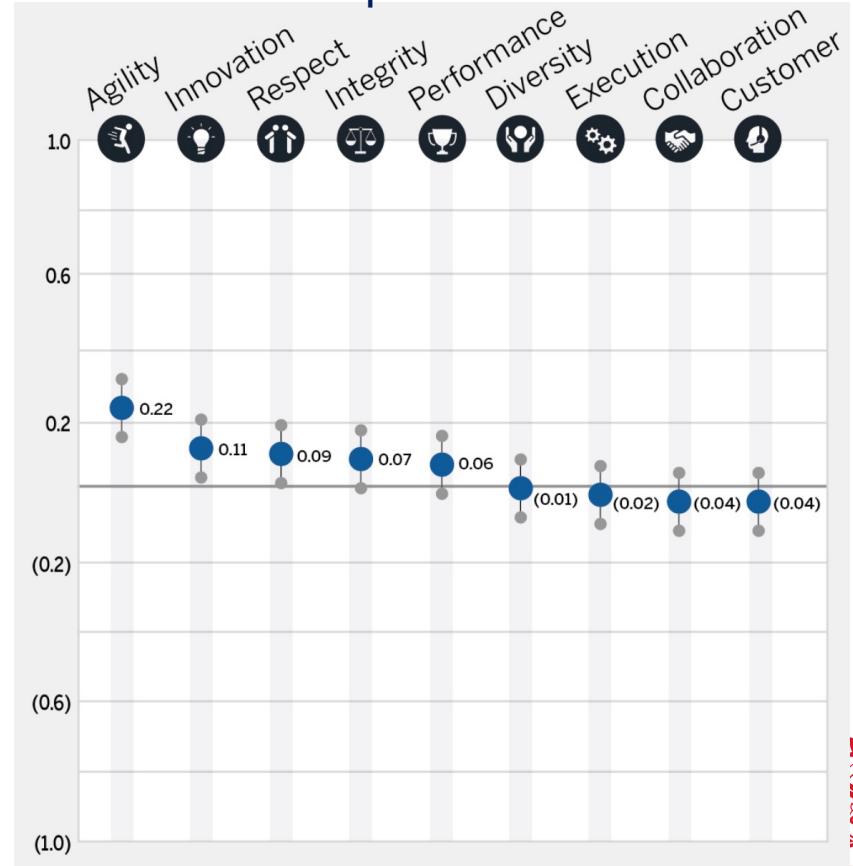


Reflects what people collectively believe & care about

# Different levels of analysis



No Correlation Between Official Values and Corporate Culture

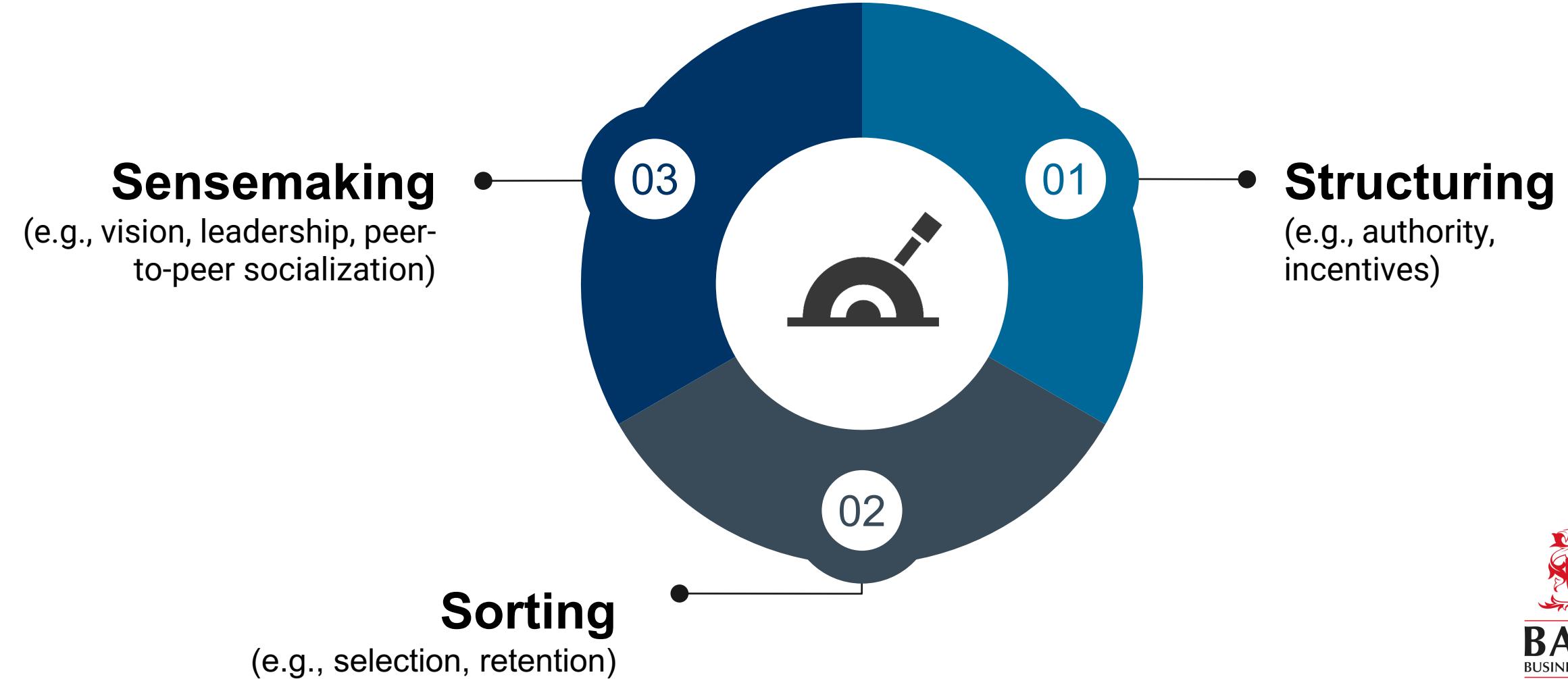


Sull et al, 2020



Designing organizational culture

## Three levers of organization design



## Data sources to study organizational culture

What are suitable data you can think of collecting to measure organizational culture?

## Traditional and novel data sources to study organizational culture



- Employees' **surveys, interviews**
- **Qualitative feedback** by superiors as part of performance assessment

SURVEY ANALYSIS



- Text data produced by organizational members is ever-so **easily accessed**

ML FOR NATURAL LANGUAGE  
PROCESSING

# Measuring organizational culture through surveys

| OCP Items                                      |  |  |
|--|--|--|
| Listening to Customers                         | Being Fair                               | Security of Employment                       |
| Adaptability                                   | Respecting Individuals                   | Urgency                                      |
| Stability                                      | Being Tolerant                           | Learning From Mistakes                       |
| Predictability                                 | Having Integrity                         | Confronting Conflict Directly                |
| Being Innovative                               | Being Easy Going                         | Cooperative                                  |
| Being Quick to Take Advantage of Opportunities | Being Calm                               | High Levels of Conflict                      |
| Being Willing to Experiment                    | Being Supportive                         | Working in Collaboration with Others         |
| Risk Taking                                    | Being Aggressive                         | Avoiding Conflict                            |
| Being Careful                                  | Being Decisive                           | Individual Goals Are Transparent             |
| Having High Ethical Standards                  | Action Oriented                          | Not Being Constrained by Many Rules          |
| Being Rule Oriented                            | Taking Initiative                        | Emphasizing Quality                          |
| Being Analytical                               | Being Reflective                         | Putting Org's Goals Before Unit's Goals      |
| Paying Attention to Detail                     | Achievement Oriented                     | What You Know Matters More Than Who You Know |
| Being Precise                                  | Hard-driving                             | Being Customer Oriented                      |
| Being Team Oriented                            | Taking Individual Responsibility         | Being Results Oriented                       |
| Sharing Information Freely                     | Having High Expectations for Performance | Being Market Driven                          |
| Being Honest                                   | Emphasis on Professional Growth          | Being Competitive                            |
| Being People Oriented                          | Fast-moving                              | Making Your Numbers                          |

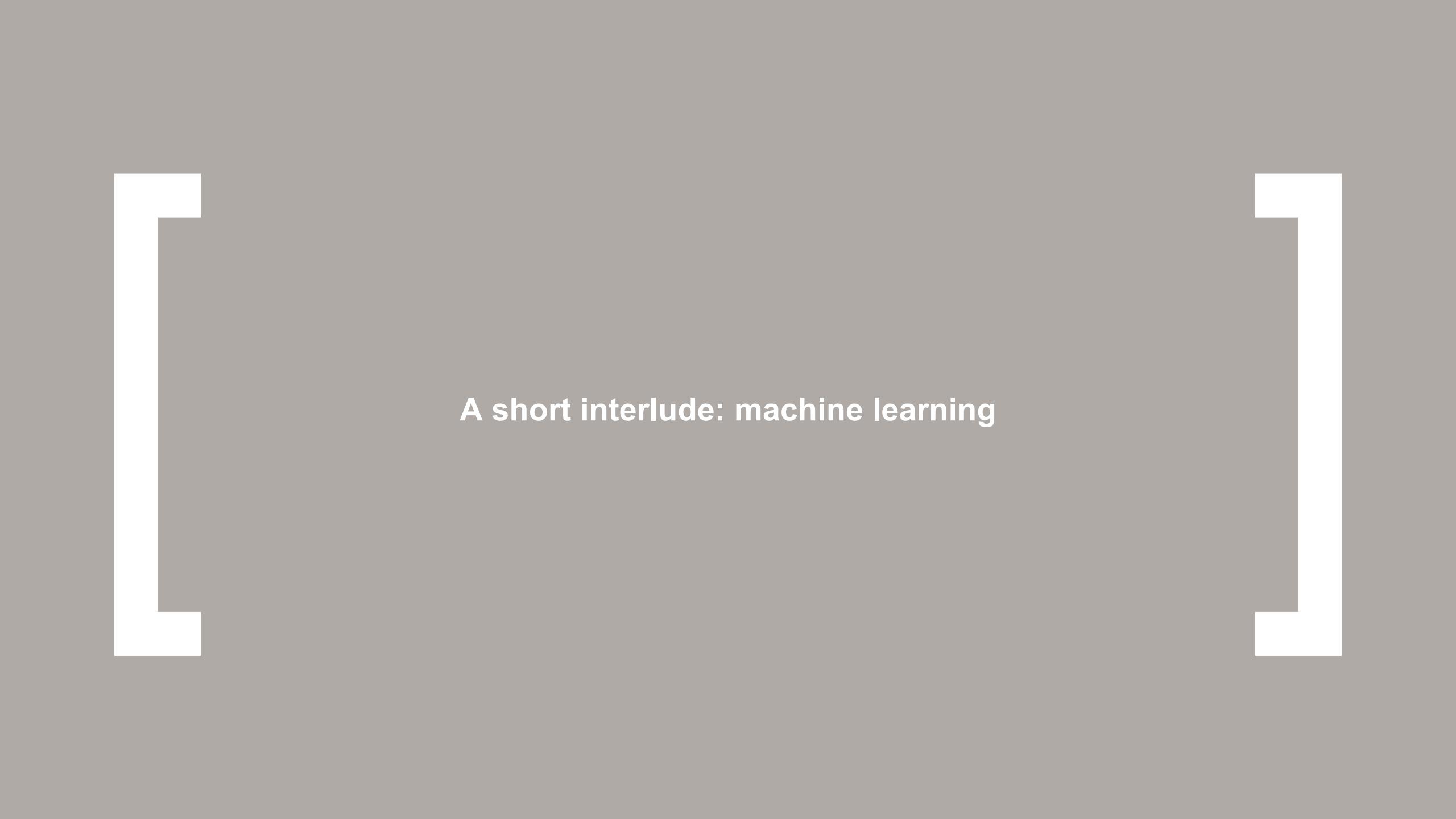
# Measuring organizational culture through surveys

## Pros

- Fine-grained view on organizational members
- Can be designed by researchers to target (virtually any) specific aspects of culture
- Very apt for capturing pre-determined cultural content

## Cons

- Low response rates & generalizability concerns
- Hard to track respondents over time
- Are people responding about their own perception, or the perception of their organization?
- Super-imposed dimensions designed by the researcher & potential underestimation of idiosyncratic cultural elements (unique to a company)
- Not very suitable to measure cultural configuration



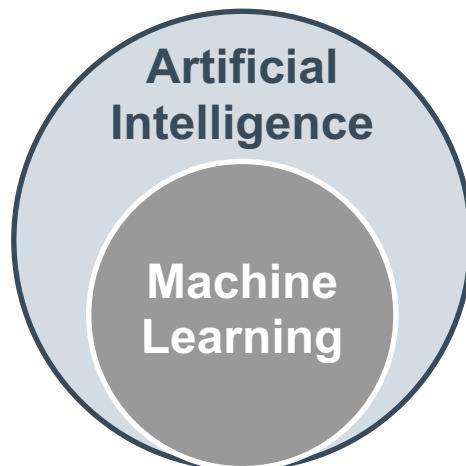
**A short interlude: machine learning**

## **Machine Learning (ML):**

Well-defined concept. Set of algorithms (i.e., procedures) that take data as an input and learn patterns or predictions from this data without being told explicitly how to build these patterns or predictions.

## **Artificial Intelligence (AI):**

Not as clear. Typically set of tasks performed by a computer that are commonly associated with intelligent beings (includes interaction with environment and making decisions to maximize goals)



# Types of machine learning algorithms

## Supervised learning

Data is labeled (e.g., this employee left, this one didn't)

### Goals:

- *Regression*: based on past data, what productivity will we have tomorrow?
- *Classification*: based on past data, will we be able to retain this employee?

### Techniques:

- *Regression*: linear, tree-based methods, neural networks
- *Classification*: logistic regression, tree-based methods, neural networks

## Unsupervised learning

Data is unlabeled

### Goals:

- *Dimensionality reduction*: how can I go from many features of an employee to a couple of main ones that describe them?
- *Clustering*: how can I cluster similar employees?

### Techniques:

- *Dimensionality reduction*: PCA
- *Clustering*: k-means clustering, hierarchical clustering



**Back to measuring culture (from employee text data)**

# Algorithmically assisted text analysis

## ALGORITHMICALLY ASSISTED TEXT ANALYSIS

### DICTIONARY METHODS

- Keyword frequency, category-word associations, tone scores
- Usually not context-aware: words can have negative or positive connotations, or have different meanings, in different contexts

### MACHINE LEARNING [for Natural Language Processing: NLP]

#### SUPERVISED ML

- Classification happens based on existing “training” data
- Humans do some of the categorization, then feed it into the machine and the machine does the rest

#### UNSUPERVISED ML

- There is no a priori trained sample
- Good for discovering unknown topics and categories

# Dimensionality reduction of text through unsupervised machine learning

## ALGORITHMICALLY ASSISTED TEXT ANALYSIS

DICTIONARY  
METHODS

MACHINE LEARNING [for Natural Language  
Processing: NLP]

SUPERVISED ML

UNSUPERVISED ML

Topic  
Modelling

Embedding  
Models

# Dimensionality reduction of text through unsupervised machine learning

## ALGORITHMICALLY ASSISTED TEXT ANALYSIS

DICTIONARY  
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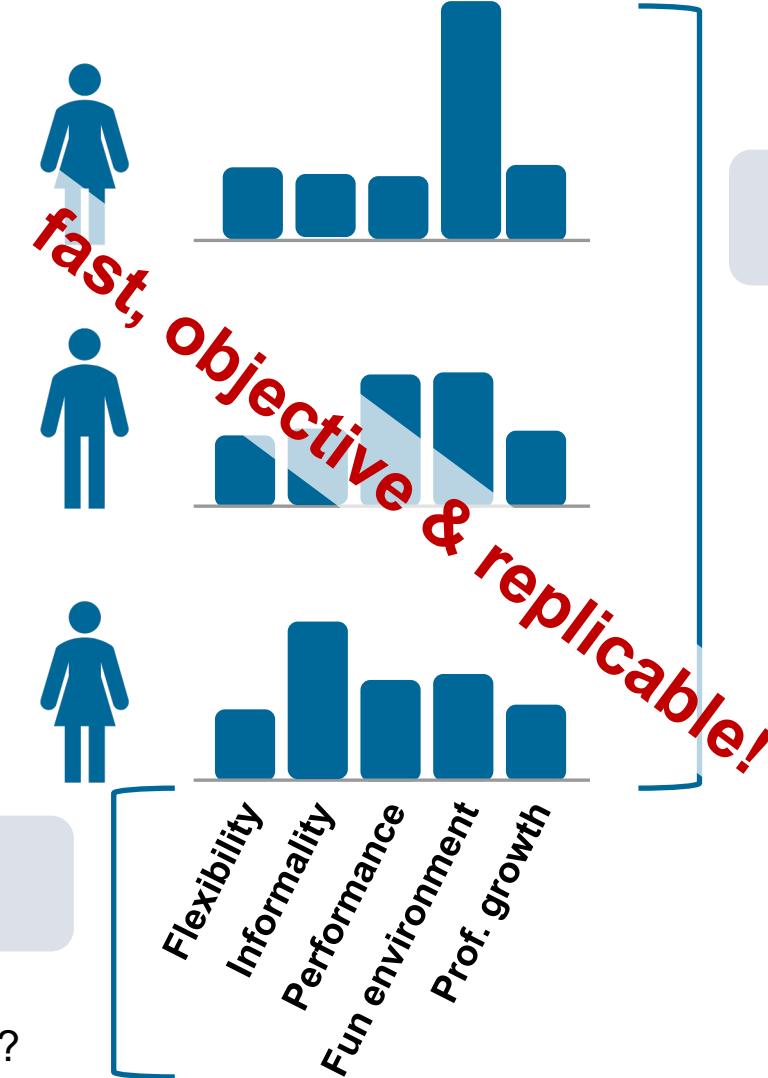
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# Objective of using NLP techniques

| Review text-pros |  |
|------------------|--|
| 1                | You will be working with the most talented ppl around.   |
| 2                | Freedom and responsibility. You're treated like an adult. You're part of a pro team that is highly functioning. The company is well respected and has a super positive brand awareness -- i'm never able to go anywhere without getting peppered with raves and happy customer comments, and i love wearing company logo gear when i'm out for this reason.  |
| 3                | You matter at Chimera. There is no dead wood, everyone is doing something very important to the company or they wouldn't be there. What you are doing matters and makes a difference, and that feels good. You can really make a difference no matter what your role.  |
| 4                | The company often repeats that as an employee, you're not on an olympic team -- meaning, you don't do this 24/7 with no life, with all focus on the gold. WE're more of a varsity team, playing to win, very good, but still have to balance with classes and learning. We need to have a good work/life balance and its very important to the company that we do.   |
| 5                | I think the best thing - and subtle - is this no vacation/no holiday stuff. you work when you work, they seem to realize that everyone is working hard and all the time, nights, weekends often, a ton of hard work, so if you want to take time off for a vacation, a long holiday, a day off, whatever- it happens at your own discretion, you don't ask, you don't get permission, you just do what you have to. no one is keeping track. i've never heard of this kind of policy and you cannot imagine what it does for your morale, for feeling like you're being treated like a grown up. For that rule alone I think it stands beyond any other org.   |
| 6                | Great colleagues -- incredible really  |
| 7                | The upper management of Chimera really does seem to want to take a different approach with how they handle their employees, and accepts the fact that as an adult, you're able to get your job done. They appear to be very with it. The call center attempts to echo that sentiment, and provides many perks that make work an alright place to be. From the free coffee and refreshments in the cafeteria to the free rental plan, great benefits, and competitive pay, there is a great ideal that the company attempts to live up to - that the people populating the center are worth the extra buck or two. It was refreshing to work for a company that was capable of identifying problems, and instead of sweeping them under the rug, took the initiative to change the problem. |
| 8                | The people there are fantastic, the service is great, the facilities are terrific as well as comfortable. Some of the perks were worth it (free Chimera). The training team is great, the support staff are incredible, all very hard working people, the representatives on the floor are, without a doubt, the best in the industry. And who doesn't want to work "in the movies"? The pay is pretty decent, the benefits are acceptable.  |
| 9                | Benefits are terrific and I have my perfect shift. Free movies are always wonderful. This is the perfect job for me because it really is low stress and it is a perfect avenue for my love of film, film history and general film knowledge.   |
| 10               | Transparent corporate culture and opportunities to learn about the new exciting development in the industry.   |
| 11               | You will be surrounded by brilliant, competent, mature, hard working peers. You will be challenged to exceed your past accomplishments. It's a big company that strives to maintain a small company feel. Office politics are 99% absent; you are expected to focus on your work and you can expect from your peers that you will not be distracted by gossip or personality clashes. Chimera is a place that is very aware of its culture and everyone inside works hard to maintain it. Everybody you know outside of work loves Chimera, and they will let you know when it comes up that you work there.   |
| 12               | Innovation, intelligent people, incredible brand, incredible business model  |
| 13               | Fast paced, dynamic, not afraid to try something different to make the company better. That means not everything is a win, but the company is honest about what hasn't worked out and doesn't hold on because of ego or prior investment.  |
| 14               | My favorite thing about Chimera is being surrounded by a ridiculously talented group of people who are also fun to work with. Management provides a clear compass about the priorities of the company, and that makes it easy for teams to prioritize their projects appropriately. The next few years are going to be really interesting, with the company making the transition from a really good DVD by mail service to a great way to get movies by mail or over the internet.  |
| 15               | You are surrounded by very bright people focused on creating a great product for our subscribers and a great environment for employees. It's exciting to be on the cutting-edge of media and technology. The company offers a lot of freedom, and the responsibility that comes with it. Employees are treated like the adults they are.   |
| 16               | From the top down, my colleagues at Chimera are the among the most talented individuals in their class of trade. There is not a set vacation policy other than "take it when you need it". Maybe the best reason of all is the communication. Management goes to great lengths to make sure that everyone in the organization has a full understanding of the opportunities and challenges facing the business, as well as the strategic vision that the company is executing against.   |
| 17               | Great projects, high performance culture, incredible people to work with   |
| 18               | Smart, passionate, fun loving colleagues that keep the mood light and the pace fast. Flat organizations rule. Great facilities - clean, professional, uncluttered, with plenty of space and sunshine. A place where 'forgiveness' is valued over 'permission'. A place where 'take risks and recover quickly' is lived every day. Customers are raving fans of our product.  |

## Culture Content

What is the culture about?



## Culture Configuration



Cultural Strength  
[0,1]

Do employees agree in which values and beliefs they share?



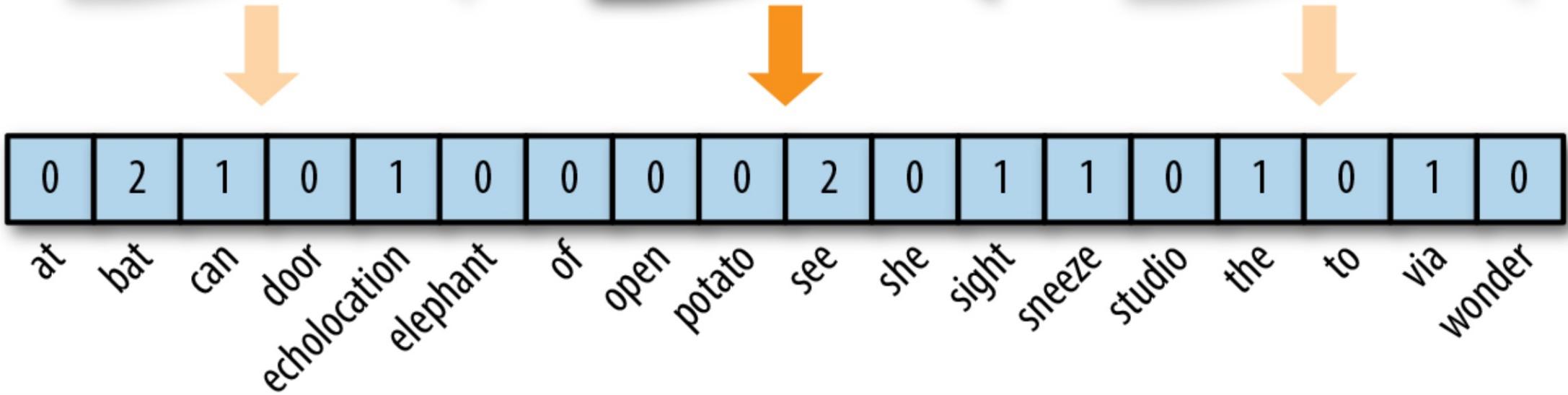
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## Why is machine learning for NLP so efficient?

The elephant sneezed  
at the sight of potatoes.

Bats can see via  
echolocation. See the  
bat sight sneeze!

Wondering, she opened  
the door to the studio.





Topic modeling

# Data generation & algorithmic estimation



## How is a document created by an individual?

“What topics are important for me to write about?”

Topic distribution per document

“Which words to describe a topic?”

Word distribution per topic



## LDA Topic Modeling for parameter estimation

Determines which topics are discussed in each document

Which topics per document & in which proportion?

Sorts words into topics

Which words associated with which topic?

### Cultural Configuration

Do employees agree about which values and beliefs they share?

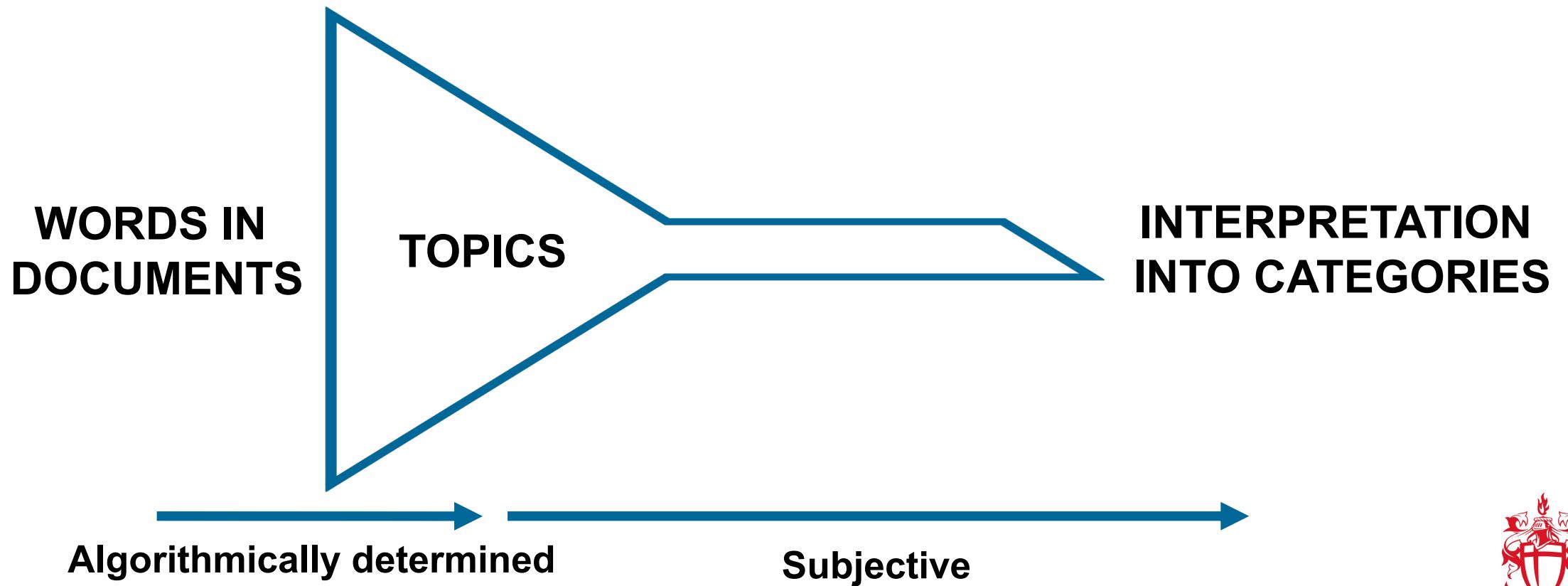
### Cultural Content

What is the culture about?

# What is a topic?

| Topic | Words  | What is it about?            |
|-------|--|------------------------------|
| 1     | environ, time, flexibl, technolog, new, hour, friendli, alway, chang, engin          | <b>Work environment</b>      |
| 2     | work, great, compani, peopl, manag, team, cultur, place, job, product                | <b>Generic praise</b>        |
| 3     | life, balanc, understand, mind, engag, attitud, explor, perfect, u, situat           | <b>Work-life balance</b>     |
| 4     | start, everyon, global, meet, cowork, will, system, share, though, across            | <b>Collaborative culture</b> |
| 5     | good, pay, nice, growth, train, market, top, perform, process, organ                 | <b>Generic</b>               |
| 6     | benefit, employe, salari, industri, compens, care, competit, health, better, program | <b>Compensation</b>          |
| 7     | busi, within, advanc, atmospher, option, respect, plenti, stock, insur, gym          | <b>Perks</b>                 |
| 8     | depend, locat, build, field, gain, hand, real, strategi, requir, fresher             | ?                            |
| 9     | show, less, much, need, still, reward, success, full, month, term                    | ?                            |
| 10    | get, make, like, also, day, go, take, sale, everi, even                              | ?                            |
| 11    | free, 2, 1, 3, 4, facil, polici, 5, food, week                                       | <b>Numbers</b>               |
| 12    | home, offic, schedul, etc, travel, class, peer, futur, may, seem                     | <b>Work schedule</b>         |
| 13    | year, servic, profession, know, vacat, tri, famili, think, abl, money                | <b>Generic</b>               |
| 14    | opportun, lot, learn, project, career, intern, differ, train, support, interest      | <b>Career growth</b>         |

## Interpreting cultural content



## The output of our algorithm

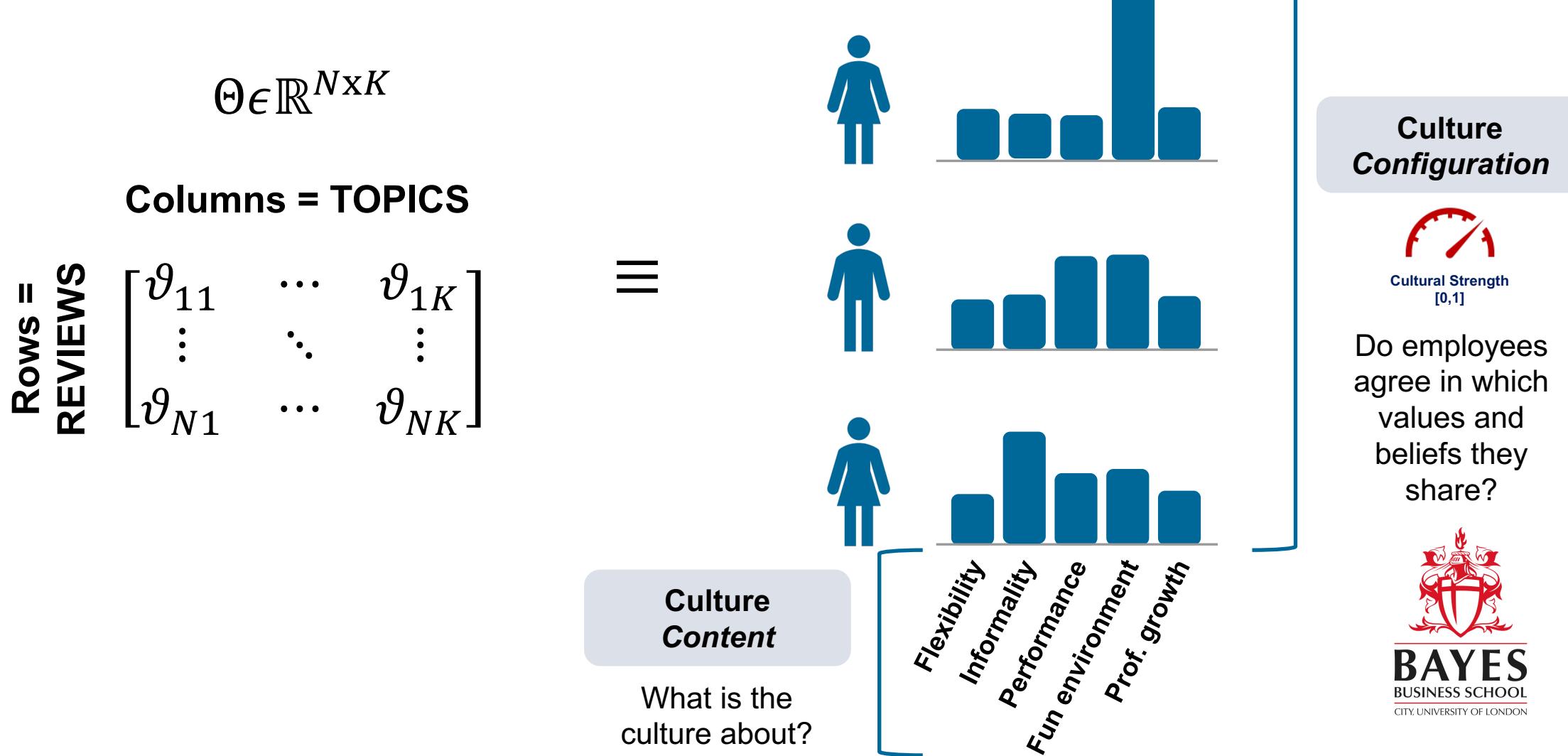
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| 1                | Freedom and responsibility. You're treated lik... |
| 2                | Great colleagues -- incredible really             |
| 3                | The upper management of Chimera really does se... |
| 4                | The people there are fantastic, the service is... |

From the raw data to the distribution of individual reviews over estimated topics



| review | topic_1 | topic_2 | topic_3 | topic_4 | topic_5 | topic_6 | topic_7 | topic_8 | topic_9 | topic_10 |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| 1      | 0.1     | 0.1     | 0.3     | 0.00    | 0.00    | 0.2     | 0.2     | 0.05    | 0.0     | 0.05     |
| 2      | 0.2     | 0.0     | 0.4     | 0.00    | 0.00    | 0.3     | 0.0     | 0.00    | 0.1     | 0.00     |
| 3      | 0.1     | 0.1     | 0.2     | 0.05    | 0.05    | 0.2     | 0.1     | 0.20    | 0.0     | 0.00     |
| 4      | 0.0     | 0.0     | 0.6     | 0.10    | 0.00    | 0.3     | 0.0     | 0.00    | 0.0     | 0.00     |

## Using the output of our algorithm



## Do we believe the findings?

How do we figure out if our analysis provides an accurate picture  
of the organizational culture?



See you in class!

