Session 9. Complementarities

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Data driven transformation case for a non high tech: Caesars Entertainment

- Caesars Entertainment is an old, established company in the gaming industry

- Traditionally, decisions in a casino are made by relying on the people that work there

- Caesars had a loyalty card program in place allowing to track customers' spending

- That data stream was used to offer new services based on precise data about customers activities

- Digital transformation is feasible for old, established companies, but it is much slower then for high tech Co's

Traditional industries using ML case: Sport

- Contenders to US National Basketball Association

- Began using in 2015 a California machine-learning start-up analytics

- Digitized the past few seasons' games

- Created predictive models to distinguish between a bad shooter who takes good shots and a good shooter who takes bad shots

- Coaches used that for their decisions in games

Second Spectrum

Traditional industries using ML case: GE

- General Electric is very traditional (oldest member of Dow Jones Industrial Average)

- GE already collects data from jet engines to optimize performance

- It is now using data-processing power, sensors, and predictive algorithms - same as Google uses to predict **individual online behavior** – to get insight for improving a **jet engine**

Traditional industries using ML case: Consulting

- Application of machine learning analytics to talent management

- ML algorithms examined scanned résumés

- Forecast which of 10,000 job candidates the firm would have hired

- Predictions strongly correlated with the real-world results

- Machines accepted a higher % of female candidates
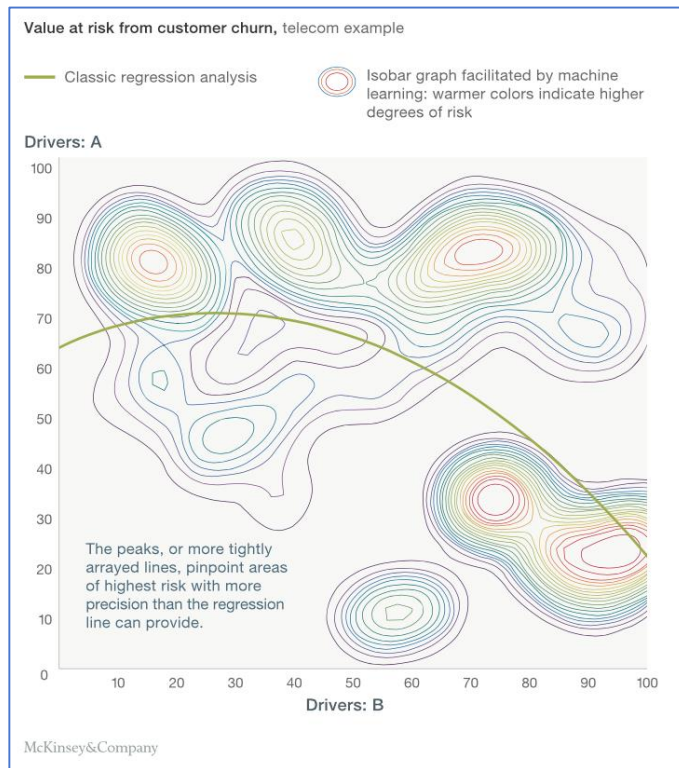
(countered human *cognitive bias!*)

Traditional industries using ML case: Banks

- Many European banks have replaced statistical-modeling approaches with ML

- ML models more accurately predict who will default on their loans

- ML also gives better recommendation for clients in retailing

- Results: 10% increases in sales of new products, 20% savings in capital expenditures, 20% increases in cash collections

Statistical modeling vs. machine learning in business

Value at risk from customer churn, telecom example

— Classic regression analysis

○ Isobar graph facilitated by machine learning: warmer colors indicate higher degrees of risk

Drivers: A

The peaks, or more tightly arrayed lines, pinpoint areas of highest risk with more precision than the regression line can provide.

Drivers: B

McKinsey&Company

- **Problem:** to understand the risk level of customers churn over a period of time for a Telecom company

- **Data:** Two Drivers – A and B

General purpose technologies

- The most important question for YOU as an economist?

- R. Solow (*Nobel Prize in economics*): growth comes from inventions of **new, better technologies**, NOT from working harder, putting in more hours, or even by investing more capital

  - sustainable, equitable and inclusive growth in the digital age requires *more then business as usual*

- Three characteristics general purpose technologies (GPTs):

  - pervasive, improve over time and enable follow-on innovations

- GTPs only have this impact when **complementary changes** *in practices* are made

  - example: the power source of a factory and the design of a factory should be complements

- It took about 30 years for industries to make **complementary changes between** 1890 anв 1920s
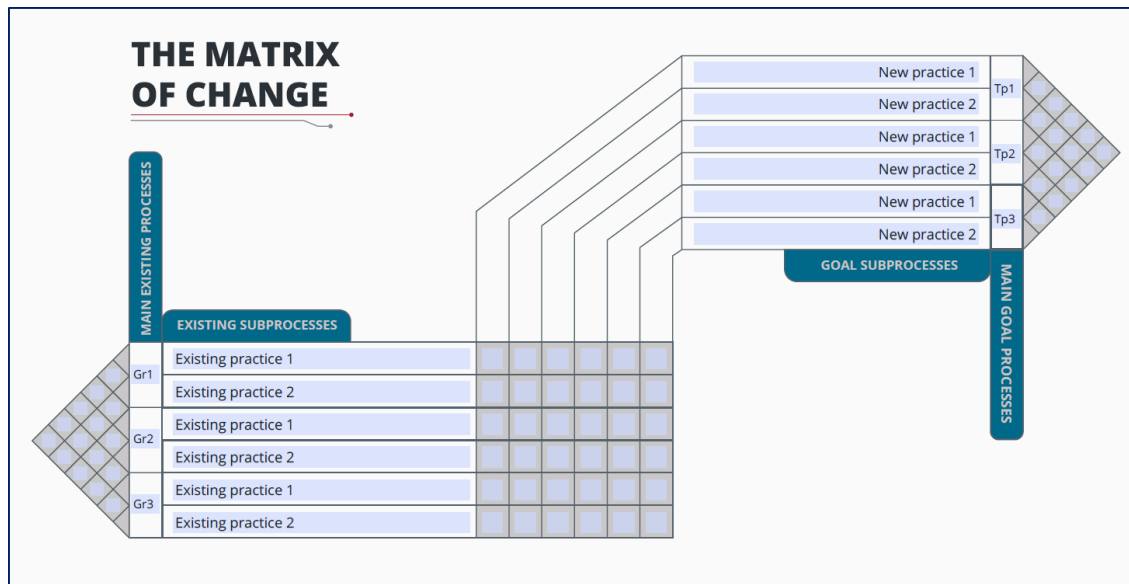
Economics of complementarities

- Two inputs to a production process are compliments of one another if a **decrease** in the price of one causes an **increase** in the demand for the other

- Technically, complements show cross-elasticity in their demand curves

  - price changes in one product induce quantity changes in both products (example: dropping price of hamburger patties increases *both* the *quantity of patties sold* and the *quantity of buns sold*, even if the price of buns does not change)

- Complementarities can affect product pricing

  - when product A is complementary to product B, it may make sense to give away product A and then charge more for product B

  - product B becomes more valuable the more people are consuming product A

    - complementary products: razors and blades, bottles and caps, printers and toner

Economics of complementarities

- If complementarities are not taken into account, they become much less valuable

- Business implication
  - one of the complements is a digital good whose price can be zero or near-zero.
  - if it attracts a lot of customers as a result, it can drive sales of a complementary product that is very profitable
  - example: each free app on iTunes makes the iPhone more valuable to the prospective customer

- For business processes
  - complementary processes reinforce each another
  - complementarities affect the speed of change
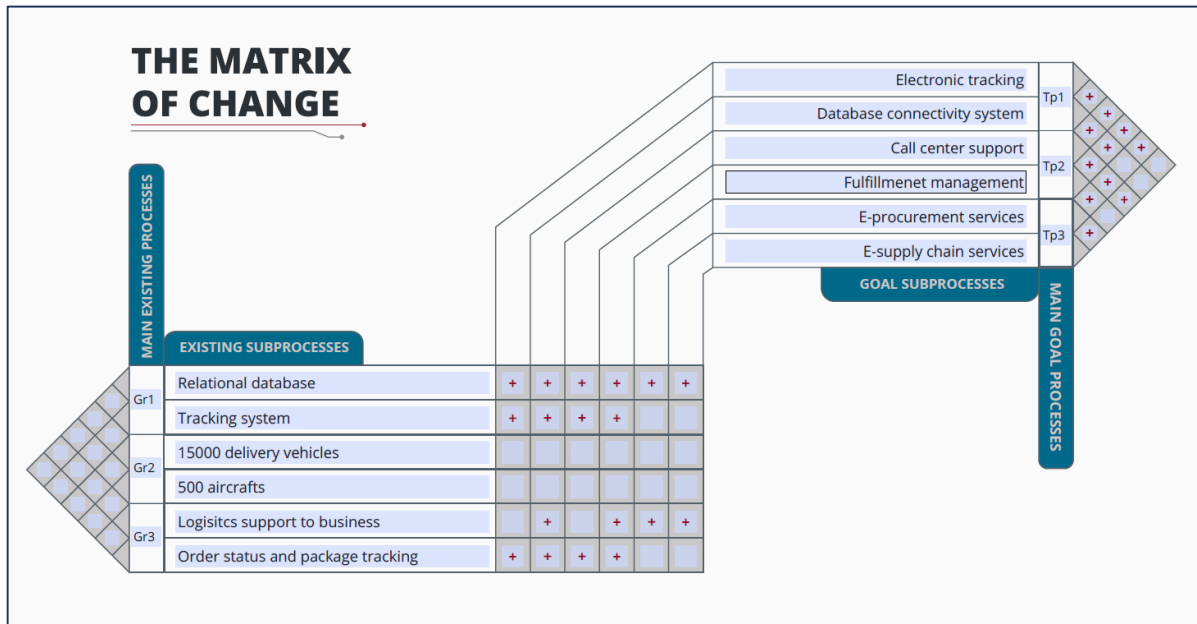
The Matrix of Change

THE MATRIX OF CHANGE

Interaction: "+" reinforcing interactions; "0" no interaction; "-" interfering interaction; "/" unknown interaction

- The Matrix of Change (MoC) **- a software created at MIT -** is a tool to map and manage digital transformations of an organization

- Business processes have to be complementary with each other to create a coherent system

- MoC helps to check systematically whether processes are **complementary** (doing more of one complement increases returns to the other) or **conflicting** (work at cross-purposes)

The Matrix of Change Case: UPS

Transition to e-logistics at UPS

THE MATRIX OF CHANGE

MAIN EXISTING PROCESSES

EXISTING SUBPROCESSES

		Tp1		Tp2		Tp3	
Electronic tracking		+					
Database connectivity system		+	+				
Call center support		+	+	+			
Fulfillmenet management			+	+			
E-procurement services			+				
E-supply chain services			+				

GOAL SUBPROCESSES

MAIN GOAL PROCESSES

|	EXISTING SUBPROCESSES						
Gr1	Relational database	+	+	+	+	+	+
	Tracking system	+	+	+	+		
Gr2	15000 delivery vehicles						
	500 aircrafts						
Gr3	Logisitcs support to business		+		+	+	+
	Order status and package tracking	+	+	+	+		

Gr1 – Information; Gr2 – Core; Gr3 – Transport
Tp1 – Information; Tp2 – Core; Tp3 – E-services

- MoC shows a preponderance of complementary interactions between the existing business system, and the proposed transition of services planned in its e-logistics venture

- Highly complementary transition matrix

Work with case: propose complimentary digital changes for Kodak
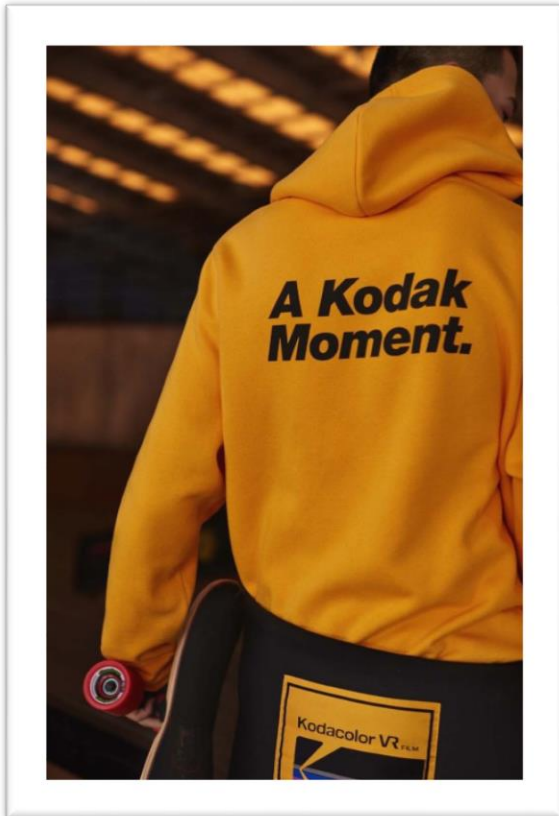
"… *sentimental, beautiful moment worthy of being captured* …" (Kodak's ad campaign)

https://www.youtube.com/watch?v=8BRu1tuCvhA

The rebalancing in different areas of a business

Business processes
- Between assigning work to minds vs. machines
- **Which types of business decisions would you consider turning over to machine learning systems?**

Business models and offerings
- Between offering a product vs. building a digital platform

Organizational design
- Between relying on centralized core of knowledge vs. accessing a decentralized knowledge

Thank You

For references contact your instructor at
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