



# Doctoral Course MIT

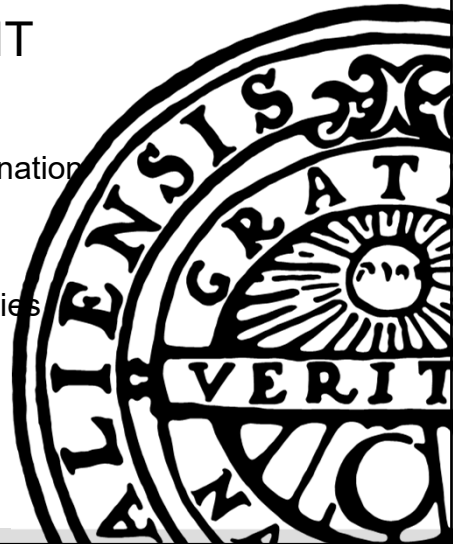
Meeting 1, 230328

**Structuring** (from noun to verb) - Coordination

Jan Lindvall

Department of Business Studies

Uppsala university



## Agenda

- Background – setting the scene
- Basic management/ organisation questions
- Coordination
- Information
- Q & A articles





## Background - Setting the scene



## In general...Organizations, March & Simon, 1958/1993.

"This book is about the theory of formal organizations. Organizations are **systems of coordinated action among individuals and groups whose preferences, information, interests, or knowledge differ**. Organization theories describe the delicate **conversion of conflict into cooperation**, the mobilization of resources, and the coordination of effort that facilitate the joint survival of an organization and its members."

March & Simon (1958/1993), *Organizations*, p. 2





## Generic questions: Management/Organisation

- Decision/s. Who? About what?
- **Coordination.** How?
- Power? Who? Why?
- Incentives/Motivation. How?



## Coordination. How? Thru...

- Rules / Standardisation. E.g IP, Charts of Accounts. Cf. F&G definitions
- **Information - Communication**
- Social, "Norms", Culture, "Matrix of Mind"





## Information: Shannon's (and Weaver) 1948 (**mathematical** theory of information) model: **syntax!**

More information is always better...

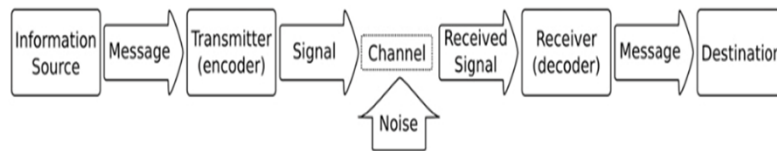


Fig. 2. Shannon's model of communication.



## In Academia...

- **Theory:** (analytical) **concepts and logics** (deterministic/voluntaristic/**social mechanisms**).
- **Structur & Actor.** Structuration.
- **Level of Analysis:** Individual – Team – Company/Value chain – Network – System/Ecology (**Multilevel approach**).
- **Topic for today:** Organizational Structure/Design - Coordination



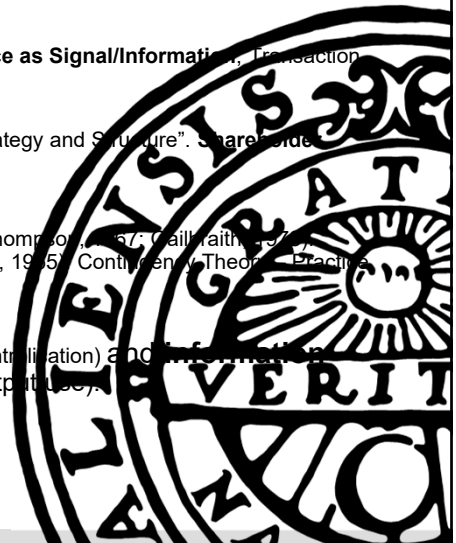
## Some generic analytical question related to structuring

- Intentions - Goals
- Competetion or Co-operation? (zero sum or win-win?)
- Linear – Non-linear - Circular
- Vertical (e.g line & staff) – Horisontal (e.g value chain)
- Consensus ("Harmony"/"alignment") or Conflicts (e.g. Conflict, conflicts)?



## Coordination/Integration as Academic Concept. Uncertainty!

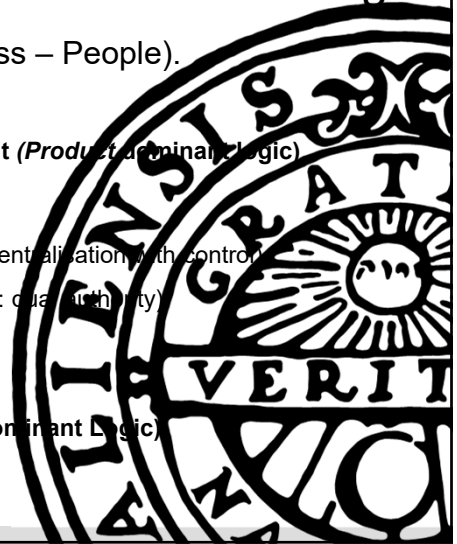
- Market or Hierarchy? (Coase, 1937, Williamson , 1981). **Price as Signal/Information**, Transaction Cost.
- Managerialism (Chandler, 1962, 1977) "The Visible Hand", "Strategy and Structure". **Shareholder orientation**
- How to structure/"Design"? : Lawrence & Lorsch, 1977; Thompson, 1967; Daill, Faithfull, 2017. Uncertainty; Differentiation & Integration. Technology/ work (Woodward, 1955) Contingency Theory, Practice Theory (Situating Practice)
- Uncertainty reduced by **structuring** (centralisation/ decentralisation) and **information processing!** (input/search; store; process; distributed; output use).





## Alfred Chandler important for our view of structuring

- Strategy – Structure- System (Purpose – Process – People).
- Efficiency – Growth! Volume driven. Perspective **inside- out** (*Product Dominant Logic*)
- Functional (specialization) – Divisional, **M-form** (decentralization with control)
- Later: \*Matrix – organisation (complexity, solve complexity: dual authority)  
\*Networks/Value systems, \*Platforms (open).
- Value/Customer oriented. "Outside – in". (*Service Dominant Logic*)



## Important sources: Open systems: Contingency Theory

**Uncertainty** – Risk: causality (cause & effect). Ambiguity!

- Woodward (1965). Technology types: **small batch**(custom order); **large batch**(mass production); **process/continuous production**.
- Lawrence & Lorsch (1967). "Open system": **Differentiation & Integration**.
- Thompson (1967): **Pooled, Sequential, Reciprocal interdependence**.
- Gailbraith (1973): Design Complex Organizations: Reduce uncertainty by using information; reduce the need of information; improve the information capacity.

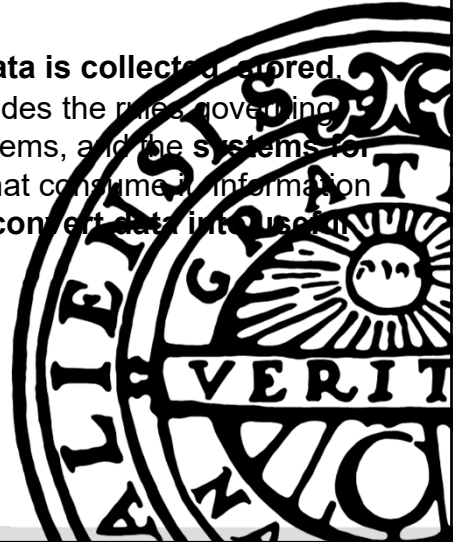




## In Practice. Materiality. Data architecture – a definition

"A company's **data architecture** describes **how data is collected, stored, transformed, distributed, and consumed**. It includes the rules governing structured formats, such as databases and file systems, and the systems for **connecting data with the business processes** that consume it. Information architecture governs the processes and rules that **convert data into useful information**.

Dallemulle & Davenport, 2017, What's your Data Strategy?



## Database & Relational databases (Codd, 1970)

See Zuboff (1988) "In The Age of The Smart Machine"

**Database:** A central repository of data.

"**Relational databases** store data in **collection of tables** where each table has a **structure of one row** per instance and one column per attribute. Links between tables can be created by having **key attributes** appear in multiple tables. This structure is suited for **SQL queries** which define operations on the data in the tables."

Glossary, Data Science







## Data Warehouse Framework

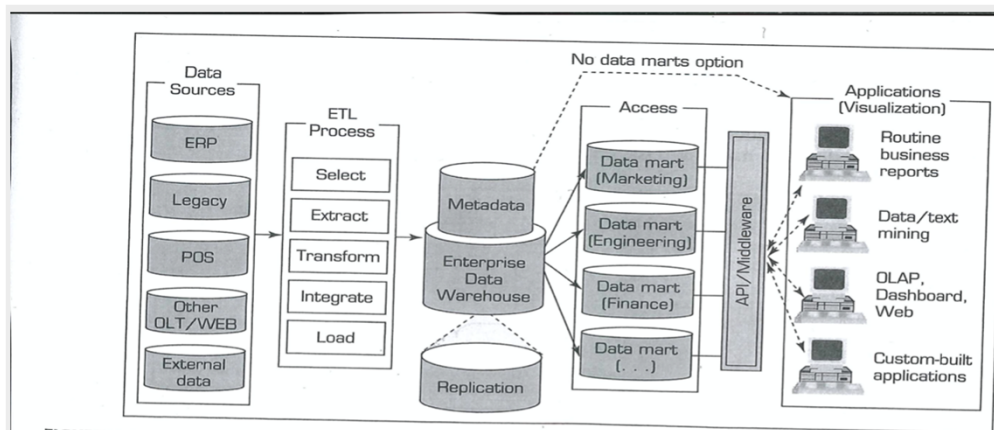


FIGURE 2.1 A Data Warehouse Framework and Views.



## Cloud & Service

NIST SP 500-292

NIST Cloud Computing Reference Architecture

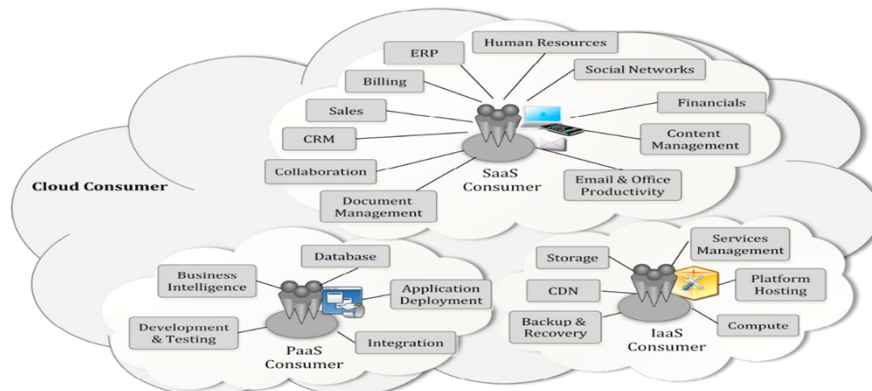


Figure 6: Example Services Available to a Cloud Consumer





## Cloud Service Models- "EA Stack"

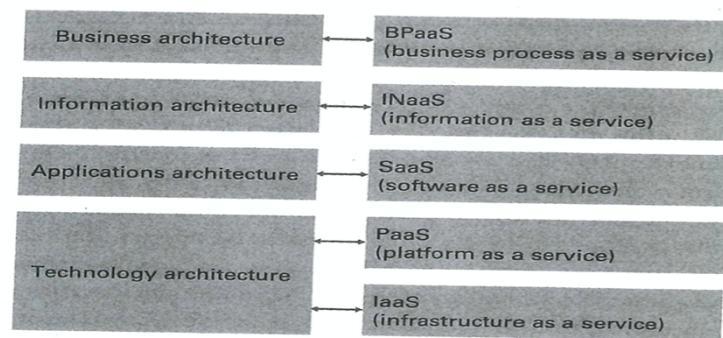


Figure 2 Enterprise architecture stack and cloud service models



Q &A Articles



## DIKW! Data, Information, Knowledge, Wisdom. **Knowledge sharing**

"The literature on knowledge sharing suggests that organization members from diverse specialties can **best work across community boundaries** when they: (i) share a common lexicon; (ii) help to reconcile interpretive differences by creating shared meaning; and (iii) facilitate means through which individuals can jointly transform their local knowledge. **Carlie (2002) refers to these three processes as transferring, translating, and transforming. (syntax, semantics, pragmatics).**

P 38



## Article 1. **Structure** and Information.

ORGANIZATIONAL STRUCTURE, INFORMATION PROCESSING, AND  
DECISION MAKING: A RETROSPECTIVE AND ROADMAP FOR RESEARCH

John Joseph  
University of California, Irvine  
Paul Merage School of Business  
Irvine, CA 92617  
[johnj2@uci.edu](mailto:johnj2@uci.edu)

Vibha Gaba  
INSEAD  
1 Ayer Rajah Avenue  
Singapore 138676  
[vibha.gaba@insead.edu](mailto:vibha.gaba@insead.edu)

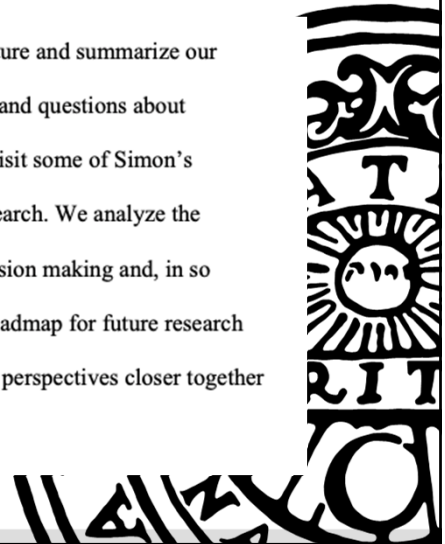
Beginning with Simon (1947) — and motivated by an interest in the effect of **formal organizational structure** on **decision making** — a large body of research has examined how **organizations process information**. Yet, research in this area is extremely diverse and fragmented.





## The goal

Therefore, the goal of this paper is to review the extant literature and summarize our collective knowledge, as well as identify and advance new concerns and questions about organizational structure and decision making. In this process, we revisit some of Simon's original ideas and assess how they are reflected in contemporary research. We analyze the different perspectives of how an organization's structure affects decision making and, in so doing, identify some of the literature's key issues. We then offer a roadmap for future research that addresses these issues and a point of view that could bring these perspectives closer together and expand research in new directions.



## Four major categories of research

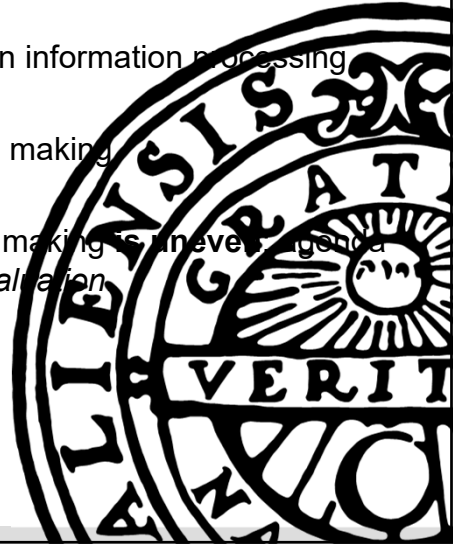
- **Problem-skill matching:** organizational economics; **efficient allocation** of tasks among members of multi-agent team.
- **Screening. Screening of information** by individuals situated in different structures. Decision Rules
- **Adaption.** Learning and adaption. Limited human cognition. Trial-and-error, reinforcement learning. **Performance feedback. Exploration & Exploitation.**
- **Cognition** "managers bring a set of simplified models to the problems they identify. The feedback they receive, the solution they find, and the decisions they make" (p. 13). **Attention based view.**





## Three critical issues in the literature (p 5 & 6)

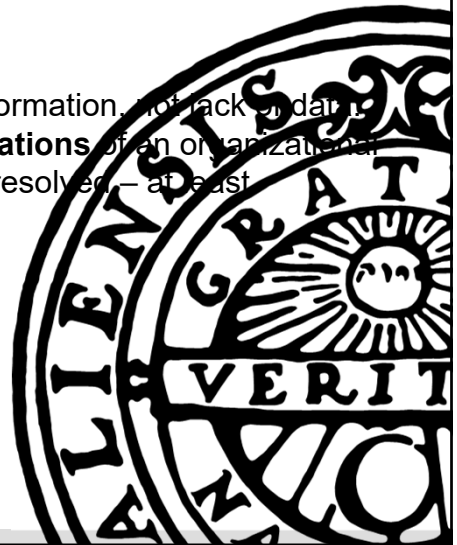
- **Dived** in the treatment of the role of structure in information processing
- Overlooks the potential for **conflicts** in decision making
- The treatment of the various stage of decision making is uneven – general setting, problem representation, **search** and *evaluation*



## Ambiguos ("tvetydig") information

"... a major problem for managers is **ambiguos** information, not lack of data. Ambiguity implies that there are **multiple interpretations** of an organizational situation. Ambiguity, unlike uncertainty, cannot be resolved – at least theoretically – with additional information".

P 43





# Formal and Informal organisations – social networks

**ANNUAL REVIEWS**

*Annual Review of Organizational Psychology and Organizational Behavior*  
**The Integration of People and Networks**

Martin Kilduff<sup>1</sup> and Jung Won Lee<sup>2</sup>

<sup>1</sup>School of Management, UCL, London E14 6AB, United Kingdom; email: m.kilduff@ucl.ac.uk

<sup>2</sup>ESSEC Business School, 95021 Cergy-Pontoise Cedex, France; email: jwl@essec.fr

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<http://orgpsych.annualreviews.org>  
<https://doi.org/10.1146/annurev-orgpsych-012119-045177>  
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## Keywords

social networks, personality, cognition, strength of ties, self-monitoring, structural holes

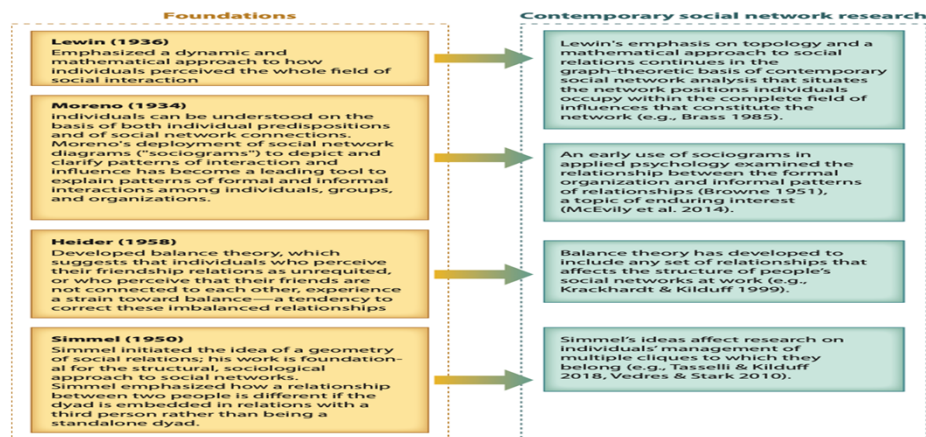
## Abstract

Social networks involve ties (and their absence) between people in social settings such as organizations. Yet much social network research, given its roots in sociology, ignores the individuality of people in emphasizing the constraints of the structural positions that people occupy. A recent movement to bring people back into social network research draws on the rich history of social psychological research to show that (a) personality (i.e., self-monitoring) is key to understanding individuals' occupation of social network positions, (b) individuals' perceptions of social networks relate to important outcomes, and (c) relational energy is transmitted through social network connections. Research at different levels of analysis includes the network around the individual (the ego network), dyadic ties, triadic structures, and whole networks of interacting individuals. We call for future research concerning personality and structure, social network change, perceptions of networks, and cross-cultural differences in how social network connections are understood.

Review in Advance first posted on  
 October 21, 2019; (Changes may  
 still occur before final publication.)



## Intellectual history



**Figure 1**  
 Social network research foundations in the work of Lewin, Moreno, Heider, and Simmel together with contemporary applications.



**Three lenses:** Position, Embeddedness, Location

Much social network research emphasizes that **the structure** of networks affects and shapes people's identities and outcomes in ways that are beyond individuals' control. People are integrated into networks without the necessity of their volition. The effects of structure on individuals are captured through three different lenses: (a) network **positions** occupied, (b) **embeddedness** of ties, and (c) **location** in larger systems of connections.

## Structure dominates!

### The importance of central position!

A fundamental axiom of network theory and research is that **individuals who occupy central positions in social networks** are likely to benefit from **enhanced communication and timeliness** of information and resource flow.



## Embeddedness: Burt (1992) Structural holes; Bridging and Bonding

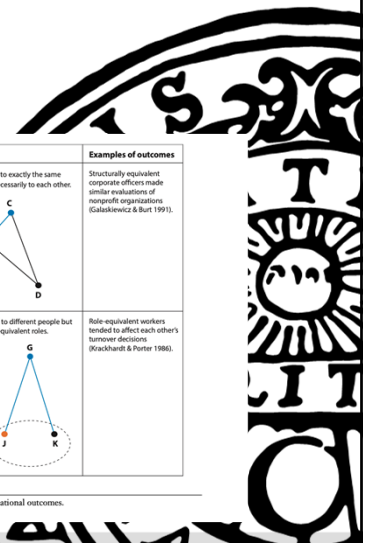
### Embeddedness

People are also integrated in social networks through a set of processes summarized by the term embeddedness, which represents a core principle of organizational social network research

### Visualisation

Concept	Definition	Examples of outcomes
<b>Structural equivalence</b>	Persons A and C are connected to exactly the same other people (e.g., B) but not necessarily to each other.	Structurally equivalent corporate officers made similar evaluations of nonprofit organizations (Galaskiewicz & Burt 1993).
<b>Role equivalence</b>	Persons F and G are connected to different people but these different people occupy equivalent roles.	Role-equivalent workers tended to affect each other's turnover decisions. (Krackhardt & Porter 1986).

Figure 2  
Structural equivalence, role equivalence, and organizational outcomes.







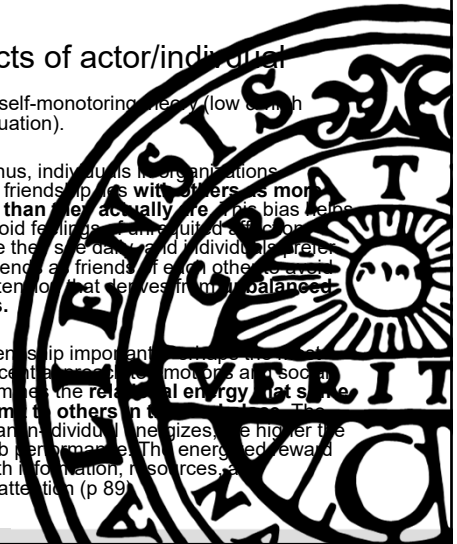
## Actor – People: Bringing People Back In

### People – Actor: Bringing People Back In

- Social networks involve ties between interacting individuals. Yet it is this emphasis on individual people that the structuralist perspective, summarized above, **has sought to deny**.
- Research that incorporates attributes of individuals has long been **demonized** as a “dead end” (Mayhew 1980, p. 335) because network patterns are assumed to derive from social structure rather **than human agency**. Thus, structuralists “shun the ‘person’ construct as polluting” in their search for an individual-free science of networks

### Three aspects of actor/individual

- **Personality:** self-monitoring theory (low & high responds to situation).
- **Cognition.** Thus, individuals in organizations perceive their friendships with others as more **reciprocated than they actually are**. This bias helps individuals avoid feelings of being gulfed as well as among people they see daily and individuals prefer to see their friends as friends of each other, even if the cognitive tension that derives from unbalanced relationships.
- **Emotion:** Friendship important to happiness and compelling recent research on emotions and social networks examines the **relational energy** that **some people transmit to others** in the workplace. The more people an individual energizes, the higher the individual's job performance. This energized reward energizers with information, resources, and discretionary attention (p. 89).



## Different Levels of Analysis

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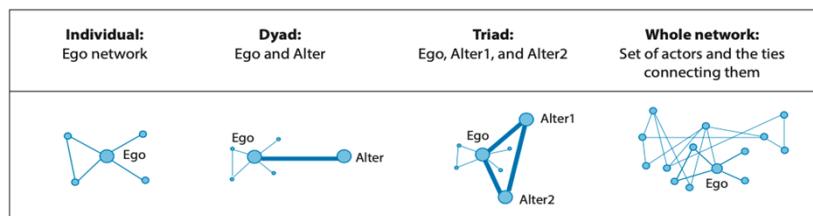


Figure 3

The individual, dyadic, triadic, and network levels of analysis.







## Article 3. Work & Technology

Organization Science

Vol. 21, No. 3, May–June 2010, pp. 713–730  
doi:10.1287/orsc.1090.0471

INFORMA

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### Minding the Gaps: Understanding Technology Interdependence and Coordination in Knowledge Work

Diane E. Bailey

School of Information, University of Texas at Austin, Austin, Texas 78701,  
diane.bailey@fisher.utexas.edu

Paul M. Leonardi

Department of Communication Studies, Department of Industrial Engineering and Management Sciences,  
Northwestern University, Evanston, Illinois 60208, p.leonard@northwestern.edu

Jan Chong

Center for Work, Technology and Organization, Department of Management Science and Engineering,  
Stanford University, Stanford, California 94305, jchong@cs.stanford.edu

In this paper, we broaden the concept of interdependence beyond its focus on task to include technology, defining technology interdependence as technologies' interaction with and dependence on one another in the course of carrying out work. With technologies increasingly aiding knowledge work, understanding technology interdependence may be as important as understanding task interdependence for theories of organizing, but the literature has yet to develop ways of thinking about technology interdependence or its impact on the social dynamics of work. We define a technology gap as the space in a workflow between two technologies wherein the output of the first technology is meant to be the input to the second one. Using data from an inductive study of two engineering occupations (hardware engineering and structural engineering), we analyzed engineers' gap encounters (episodes in which a technology gap appeared in the course of action) and found striking differences in how engineers minded the gaps. Hardware engineers minded the gaps by coordinating technologies via "bridges" that automated data transfer between technologies. Structural engineers, in contrast, allowed technology gaps to persist even though traversing gaps consumed significant time and effort. Our findings highlight a difference between task and technology in the degree of coordination necessary for success. Managers in our study designed policies around technology interdependence and coordination not to manage technology most efficiently, but to manage work and workers in a manner consistent with occupational structures and industry constraints. We discuss the implications of our findings for theories of organizing work.

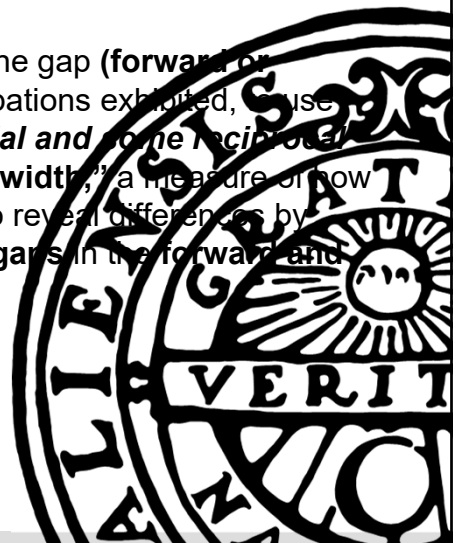
**Key words:** interdependence; technology; coordination; knowledge work; engineering  
**History:** Published online in Articles in Advance September 25, 2009.

"We identify in our field not a 310 gap encounters, or episodes in which an engineer, in the course of his work, came to the edge of a technology gap that he had to traverse."



## Categorizations & definitions

"By examining the direction of **work-flow** across the gap (**forward or backward**), we find that technologies in both occupations exhibited, to use Thompson's (1967) terms, **considerable sequential and some reciprocal interdependence**. We **categorize gaps by their "width,"** a measure of how difficult traversal of the gap was for the engineer, to reveal differences by occupation in the distribution of **wide and narrow gaps** in the **forward and backward directions**."





Cont.

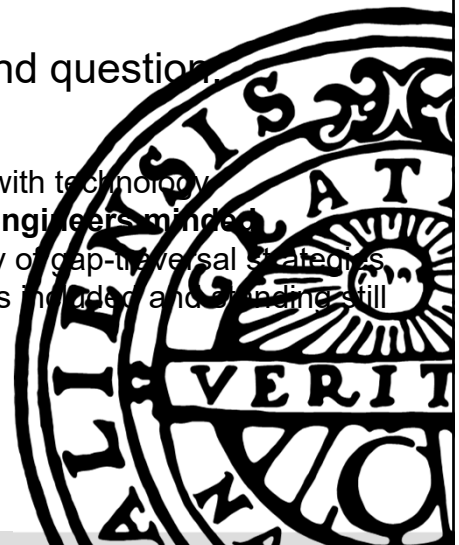
"By examining how many substitutable technologies were available to the engineers for the completion of any task, we can speak to the prevalence of **pooled technology** interdependence as well."



"Minded" – cognition?!

We explore this possibility in our second question.

"How do knowledge workers experience and deal with technology interdependence? In particular, we focus on **how engineers minded technology gaps**, ultimately developing a typology of gap-universal strategies used by the engineers we studied. These strategies included and handling still at gaps."





## Result: Variations! (Cf Bailey & Barley, 2020).

"We also show that **interdependence among technologies** in both settings was **largely distinct from task interdependence** among people. We find that although **both occupations** exhibited what we would call high **technology interdependence**, differences in how that interdependence was manifested across occupations suggest that the experience of technology interdependence might vary considerably."

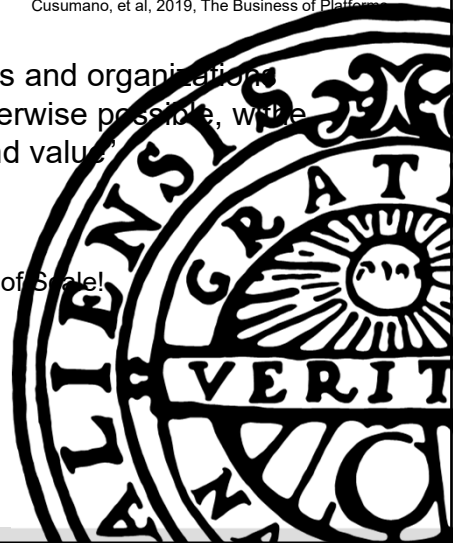


## New ways to coordinate/Integrate. What is a Platform Company?

Cusumano, et al, 2019, The Business of Platforms

"More importantly, they bring together individuals and organizations so they can **innovate** or **interact** in ways not otherwise possible, while the potential for **nonlinear** increases in utility and value."

- Nonlinear
- Network effects: positive feedback loops. Economies of Scale!





## Platform business models: two basic types

- **Innovation platforms** usually consist of common technological building blocks that the owner and ecosystem partners can share in order to create new complementary products and services. E.g Google, IBM Watson, Amazon AWS.
- **Transaction platforms.** Largely intermediaries or online marketplaces that make it possible to share information or to buy, sell or access a variety of goods and services. E.g. Facebook, Uber, Airbnb.
- **Hybrids:** emphasize a combination of product and platform business models. E.g. Apple, Oracle

