

# Seeking an experimental approach to Trust

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NETWORKING SESSION on Privacy, Identity Management and Dependability in Emerging ICT-based Interaction Scenarios: Trustworthy Fulfilment of Requirements beyond purely Technological Innovation



# Outline I

This presentation is based on a review of relevant literature on Trust and ongoing work within the INDEED project

- 1 What is Trust?
  - Constructive Trust
  - Relational Trust
  - Trustworthiness
  - Rational Trust
  - Distrust
- 2 Trust Matters
  - Interactions
  - Structures
  - Knowledge Uncertainty and Risk
- 3 Trust Problems
  - Modelling Interaction

## Outline II

This presentation is based on a review of relevant literature on Trust and ongoing work within the INDEED project

- Quantifying Trust
- Seeking an Experimental Trust Framework

### 4 Trust in INDEED

- Trust and Confidence
- Trust and Responsibility
- Trust and Timing

### 5 Other Trust Aspects

### 6 Summary

### 7 Contact Information

# Constructive Trust

## Different Trust Features or Meanings

- Different meanings of trust
- Characterization of trust in terms of basic constructs:  
*Trusting Intention, Trusting Behavior, Trusting Beliefs, System Trust, Dispositional Trust and Situational Decision to Trust*
- Trust features, e.g.: Competence, Predictability, Benevolence and Integrity

## Relational Trust

- Trust is relational
- Trust as a three-part relation  
**A Trusts B in to do X or in matters Y**
- Trust depends on the context or situation
- Trust is subjective: *“trust (or, symmetrically, distrust) is a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action, both before he can monitor such action (or independently of his capacity ever to be able to monitor it) and in a context in which it affects his own action.”*

# Trustworthiness

- *“In general, the complexity of the problem of trust derives primarily from the complexity of the problem of trustworthiness. [...] the motivations for being trustworthy are manifold. In a sense, trusting someone in some context is simply to be explained as merely the expectation that the person will most likely be trustworthy.”*
- **Inducements:** *internal* (e.g., moral rules, interests, consequences, etc.), *external* (e.g., social constraints, institutional constraints, norms, etc.) or *mixed*.

## Rational Trust

- Rational theory of trust... Trust as a rational choice
- **Encapsulated-interest model of Trust**  
*“Your trust turns not directly on your own interests but rather on whether these are encapsulated in the interests of the trusted. You trust someone if you believe it will be in her interest to be trustworthy in the relevant way at the relevant time, and it will be in her interest because she wishes to maintain her relationship with you.”*

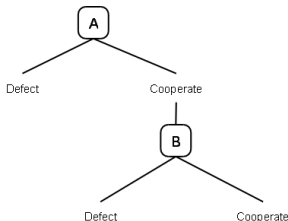
# Distrust

- dual concept of trust
- like Trust, a three-part relationship  
A distrust B with respect to X
- like Trust, a matter of degree
- asymmetries between Trust and Distrust: asymmetric grounds (motivational and epistemological), asymmetric societal implications



# Interactions I

- One-way Trust (iterated)



- Mutual Trust (e.g., Prisoner's Dilemma)
- Thick Relationships (e.g., social and institution relationships, group memberships, etc.)

## Interactions II

- Increasing complexity of interaction
- Different mechanisms work/cope with different complexities
- Local trust relationships do not scale up

## Considerations on Interactions

- Thick relationships expose the limitations of games – games poorly capture knowledge about thick relationships
- games capture cooperative interactions, rather than trust
- games need to be interpreted with respect to contextual relationships – *local* relationships might be easy to capture/model/understand/formalize/...; on the other hand, some global phenomena may be little influenced by thick relationships
- **Local and Global Trust**

## Trust and Structures

- there is yet little understanding how emerging socio-technical structures (e.g., organizations, responsibilities, etc.) affect trust
- Other structural dependencies: Dependability, Risk perception
- Structure Complexity
- Diverse Structures: Formal structures, Social structures (e.g., Social Networks), Institutional structures (e.g., Responsibilities)

Is there any implication from the social theory of risk?

## Knowledge Uncertainty and Risk

- Trust involves knowledge uncertainty, hence, risk – *“to act on trust is to take a risk, although trust is not itself a matter of deliberately taking a risk because it is not a matter of making a choice.”*
- This is, however, a simplistic interpretation of the relationships among trust, knowledge uncertainty and risk
- The better our understanding, the better the trust mechanisms that mitigate risk in presence of knowledge uncertainty

Is there any implication for Risk Theory? Risky systems involve complex interactions, hence, do they require trust?

# Modelling Interaction

- Games are a natural means for modelling interaction
- Three-part relation: A Trusts B in to do X or in matters Y
- Encapsulated-interest model of Trust
- Local and Global Interaction
- How to capture thick relationships (e.g., complex emerging relationships)?

# Quantifying Trust

- Measuring Trust
- *Probabilistic* view of trust (e.g., bayesian models of Trust)
- Events affect trust estimation

# Seeking an Experimental Trust Framework

- **Trust Relation and Interaction:** A trusts B to do X, in matters Y or to discharge responsibility Z
- **Encapsulated-trust model:** encapsulating inducements
- **Trust Structures:** ordering degrees of trust; refinement on information
- **Trust Events:** ordering on events; causality relationship
- **Trust Information**
- **Thick Relationships** (e.g., social relationships, group memberships, etc.)



## Trust and Confidence

- Experts estimate their confidence (i.e., “*the probability that a claim is true*”) on different claims
- The combinations of different arguments present some uncertainty and contingency – for instance, despite the emergence of further knowledge strengthening one of the claims, the overall confidence on the claim could decrease
- Is it possible to analyze the (multi-leg argument) confidence problem as an interaction/game problem?
- Is it possible to interpret the confidence problem with respect to trust? This would tell us how trust/confidence differ.

# Trust and Responsibilities

- How does Trust extend Responsibility models?
- Relational Trust: **A trusts B to discharge responsibility X**
- Trust models involve many tree-part relationships over responsibilities
- **How to extend emerging structures by thick relationships (e.g., social or institutional relationships)?**

# Trust and Timing

- Event structures order and constrain occurring events
- Time bands define different focuses
- Trust might emerge over different time bands

## Other Trust Aspects

- Trust as process
- Trust as routine – taken-for-granted
- Trust in Multi-Agent Systems
- Trust and Performance
- Organizational Trust
- Deciding when Trust is enough

# Summary

- Overview of Trust aspects and concepts (e.g., Distrust, Thrustworthiness, etc.)
- Basic models: relational (e.g., three-part relation, thick relationships), encapsulated-interest model, interaction (games), trust stuctures and probabilistic trust (depending on events).
- How do the basic models relate to each other? Integrating them?
- Can we use/tailor them for structuring empirical analyses on Trust?

## Directions for Future Work

- Analyzing/Modelling Trust in different application domains
- Developing Examples of Trust Problems
- Seeking an Experimental Approach to Trust: Requirements
- Developing an Experimental Approach to Trust: Modelling Framework, Experimental Analysis
- Looking at different Case Studies and Empirical investigations

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