Studies of Software Technical Review Meetings

Pierre N. Robillard, Ph.D., P.eng.
Professor
Ecole Polytechnique de Montréal
Canada

Université de Montréal

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- Measuring team cognitive activities
  - Problem definition
- Measurement approaches
  - Steps required for cognitive measurements
- Exchange patterns
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- Participant roles
- Concluding remarks

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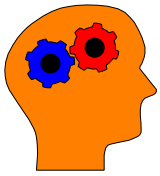
Cognitive activities

Team cognitive activities



Individual mental activities

Psychology of programming

Team activities

Share cognition

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Problem to be solved

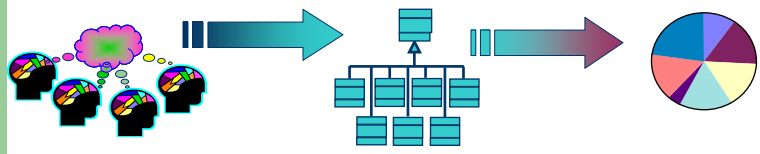
Team cognitive activities

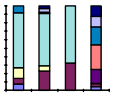
- **How to measure team cognitive activities?**
  - **Such that it will be**
    - **reliable**
    - **repeatable**
    - **automatically done**
    - **applicable to a variety of meetings**
      - **Technical review meeting**
      - **inspection, walkthrough**
      - **design, …..**

Research objective

Team cognitive activities

Team interaction → **Events recording** → **Automated processing**





Technical Review Meeting
Inspection
Design
Walkthrough

Effort
Artefact
Activties
Practices

Modeling behavior
Improving practices

Measurement approaches

Team cognitive activities

- **Process approach**
  - Finding collaborative tasks during project development.
  - Based on a logbook filling tool
- **Activity approach**
  - Finding cognitive activities during collaborative work.
  - Based on videotaping tool.

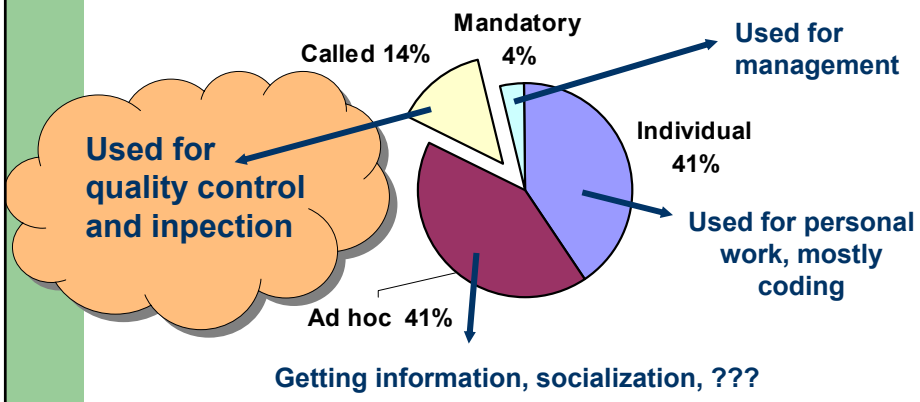
Type of collaborative tasks

Team cognitive activities

- **Mandatory**
  - formal meetings scheduled on a regular basis.
- **Called**
  - called meeting by team members.
- **Ad hoc**
  - Teammates share on an ad hoc basis comments, or information on what they are doing.
- **Individual**
  - team member is working on an unshared task and is then unlikely to interact on this subject.

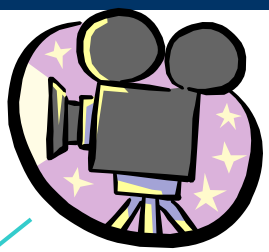
Distribution of collaborative tasks

Team cognitive activities

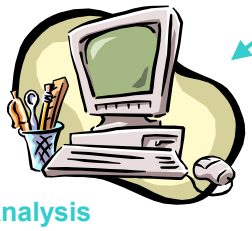


Measurement approach

Collaborative tasks

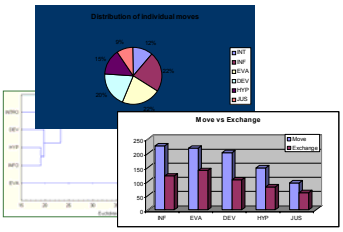


Video

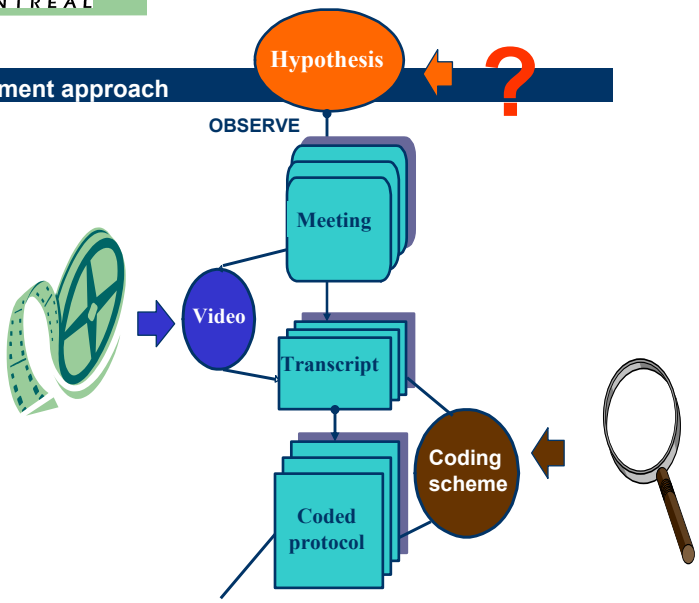


Analysis

Results



Measurement approach



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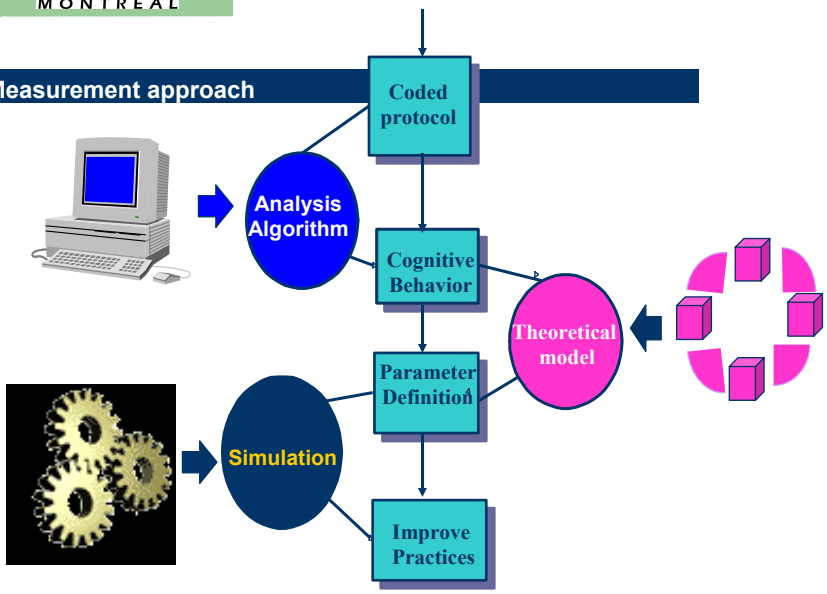
Measurement approach



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Hierarchical coding scheme

Measurement approach

- ID
  - Identify the move
    - rank in conversation and speaker
- ACTIVITY:
  - Identify the action intended by the speaker
    - Evaluate, justify, inform, ….
- SUBJECT:
  - Identify the part of discourse concerned by the activity
    - Topic, section, paragraph
- ATTRIBUTE: (Optional)
  - Nature of the content of the subject
    - Content (ISO 9126), Form (programming guide)

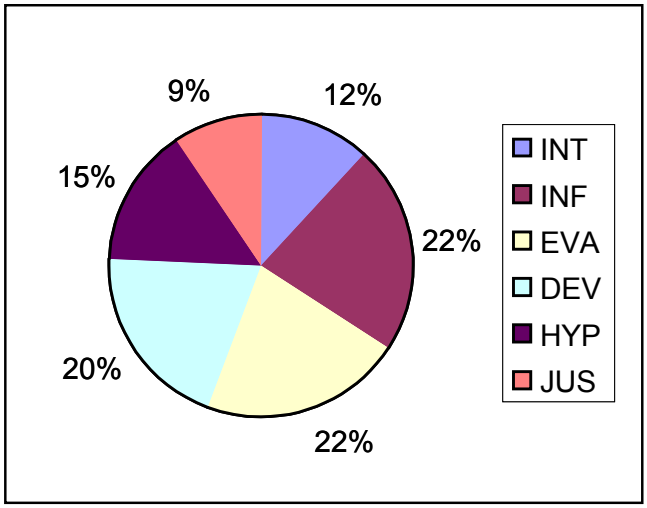
Move definitions

Measurement approach

- **INTroduction**
  - Bring in new document section.
- **EVAluation**
  - Judge value of subject, - , +, or neutral.
- **JUStification**
  - Argue or explain the rationale of a choice.
- **INFformation**
  - Hand out new knowledge on the subject.
- **HYPothesis**
  - Express personal view of a subject.
- **DEVelopment**
  - Detail a new idea

Distribution of the activities among the moves.

Measurement approach



Exchange Patterns

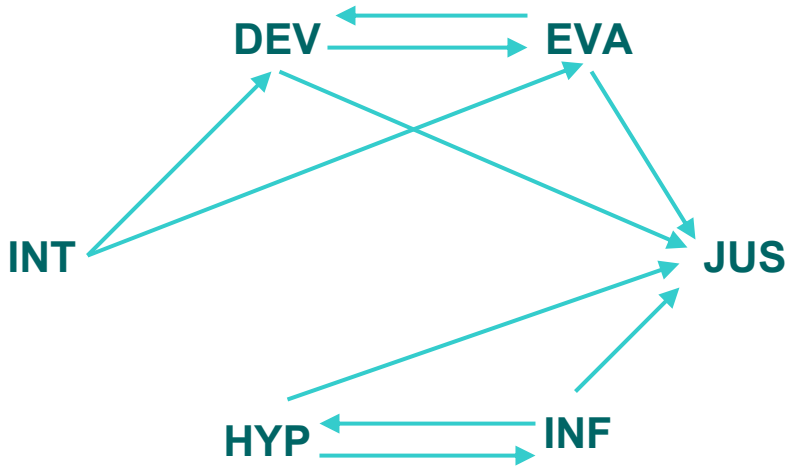
Exchange Patterns

- Analyze sequence of moves to determine patterns of exchanges
- LSA: Lag Sequential Analysis is used to find patterns of sequences

10	INT	INF	INF	HYP	INF	INF	INF	HYP	INF	HYP	HYP	HYP	JUS	EVA	INF	DEV
11	INT	INF	INF													
12	INT	INF	EVA	HYP	HYP	HYP	DEV	DEV	DEV	DEV	DEV	INF	INF			
13	INT	INF	INF	INF	EVA	HYP	DEV	DEV	EVA							
14	INT															
15	INT	INF	EVA	INF	INF	INF	INF	INF	INF							
16	INT	EVA	EVA	EVA	INF	EVA	EVA									

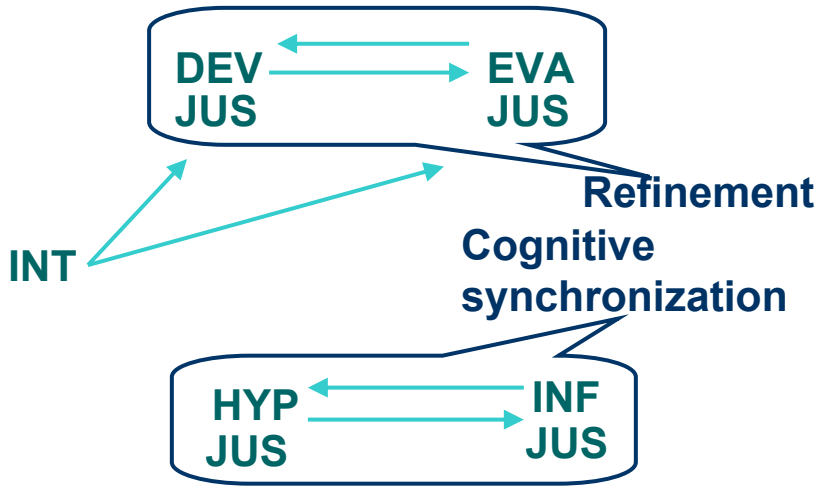
Move patterns derived from LSA

Exchange Patterns



Move patterns derived from LSA

Exchange Patterns



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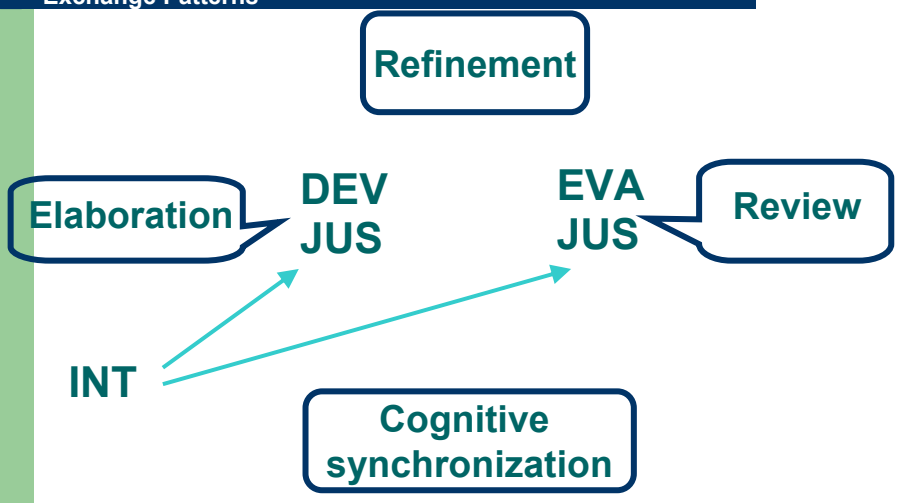
Exchanges defined from moves patterns

Exchange Patterns



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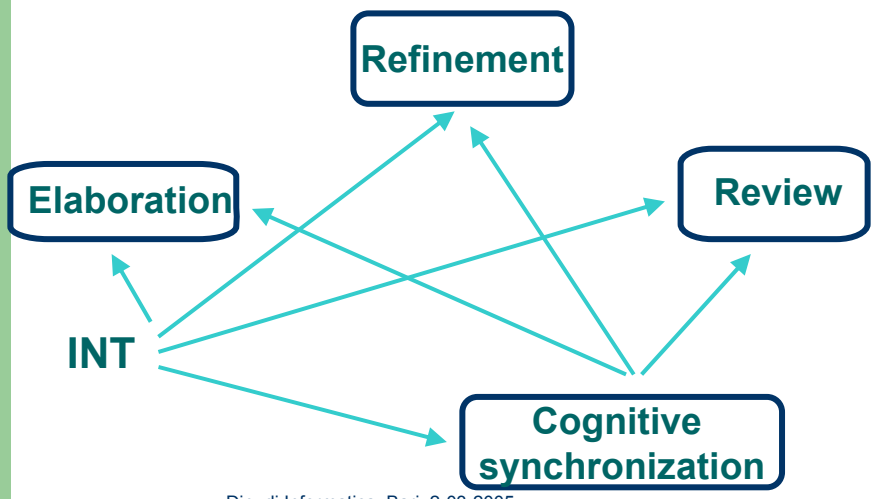
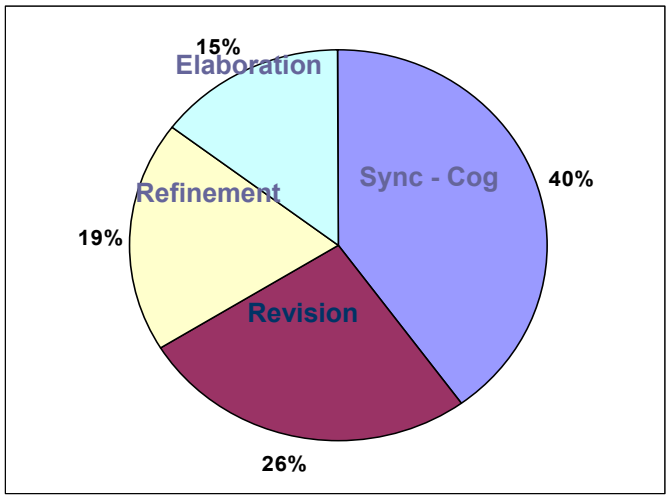
Exchanges Patterns

Exchange Patterns



Distribution of Exchanges

Exchange Patterns



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Participant roles

Participant roles

- Quantifying the influence of participant roles during co-located collaborative review meetings
- 3 views characterize 7 participant roles.
  - Project view (3 roles):
    - supervisor, procedure expert and developer.
  - Meeting view (2 roles):
    - author and reviewer,
  - Task view (2 roles):
    - direct and indirect interest in the artifact under review.

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Role definitions

Participant roles

View	Role	Definition
Project	Proc EXPert	Responsible for standards and guidelines.
	DEVeloper	Responsible for their individual work only.
	Project SUPerv	Supervises technical work and understand project.
Meeting	AUThor	Authored the document being reviewed.
	REViewer	Not the author of the document.
Task	DIRect interest	Artifact content closely related to their tasks.
	INDirect interest	Artefact content not closely related to their task.

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Role Definitions

Participant roles

Project Role
- Project Supervisor
- Procedure Expert
- Developer

Meeting Role
- Author
- Reviewer

Task Role
- Direct relationship
- Indirect relationship

MOVE
Verbal Activity
Subject
Attribute

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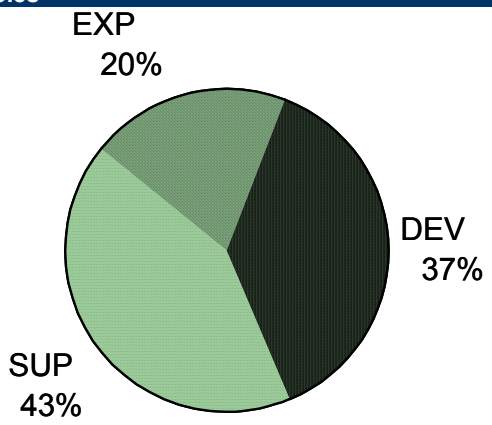
Project move initiator

Participant roles



Move Initiator

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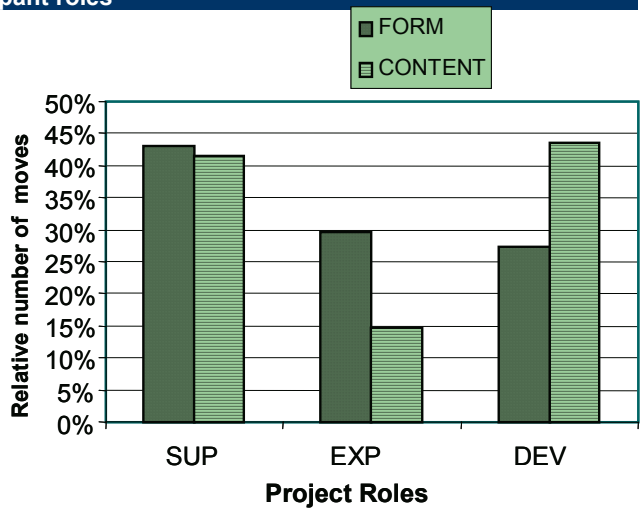
Form vs Content

Participant roles



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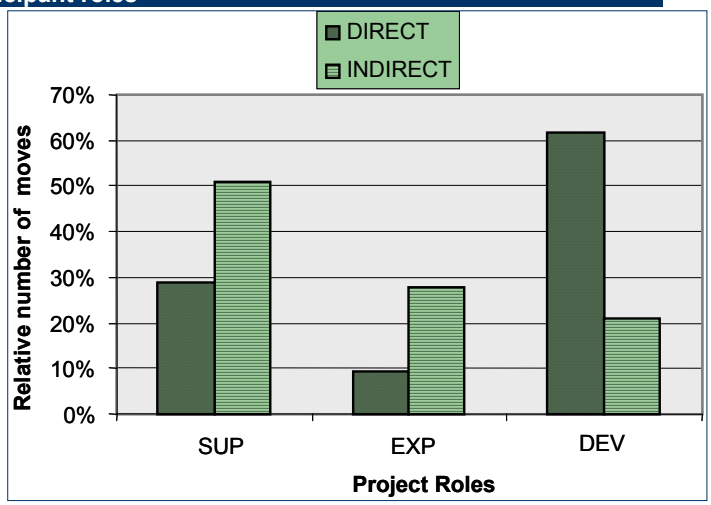
Impact of interest

Participant roles



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Comments on views

Participant roles

- **Meeting view:**
  - other roles than those of author and reviewer are important,
  - supervisor and procedure expert, impact meeting outcomes.
- **Project view:**
  - participants selected according to their project roles.
- **Task view:**
  - appropriate participants more important than the number
  - participants with a direct interest in the artifact will be the most active

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Conclusion

- Collaborative activity is an important component of software process
- Empirical studies bring insight into software process
- Better understanding of collaborative activities required rigorous measurements and analyses
- Cognitive sciences have develop tools and methods for the measurement and analysis of cognitive activities
- Software engineering can greatly benefit from the cognitive sciences approaches.

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Mille grazie per attenzione

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