



# Week 3: Discovering Requirements

**409220 Software Requirements Engineering**

**Jim Buchan**

# The aims for Today

- Review of RD patterns of activities for different software development methodologies
- Some requirements discovery techniques to address these challenges
- Some RD challenges
- Agile requirements discovery
- Which techniques to use under what circumstances
- Research and empirical evidence
- Assessments 1B and 2

# Why Requirements *Discovery*?

Rather than

- requirements gathering
- requirements elicitation
- requirements collection

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- requirements gathering
- requirements elicitation
- requirements collection

Contemporary view...

- trawling for requirements
- inventing or creating
- uncovering requirements
- emergence of requirements

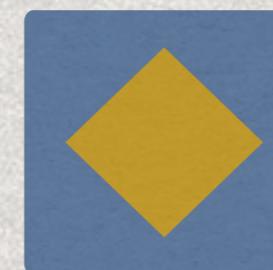
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# What is the purpose of RD activities?

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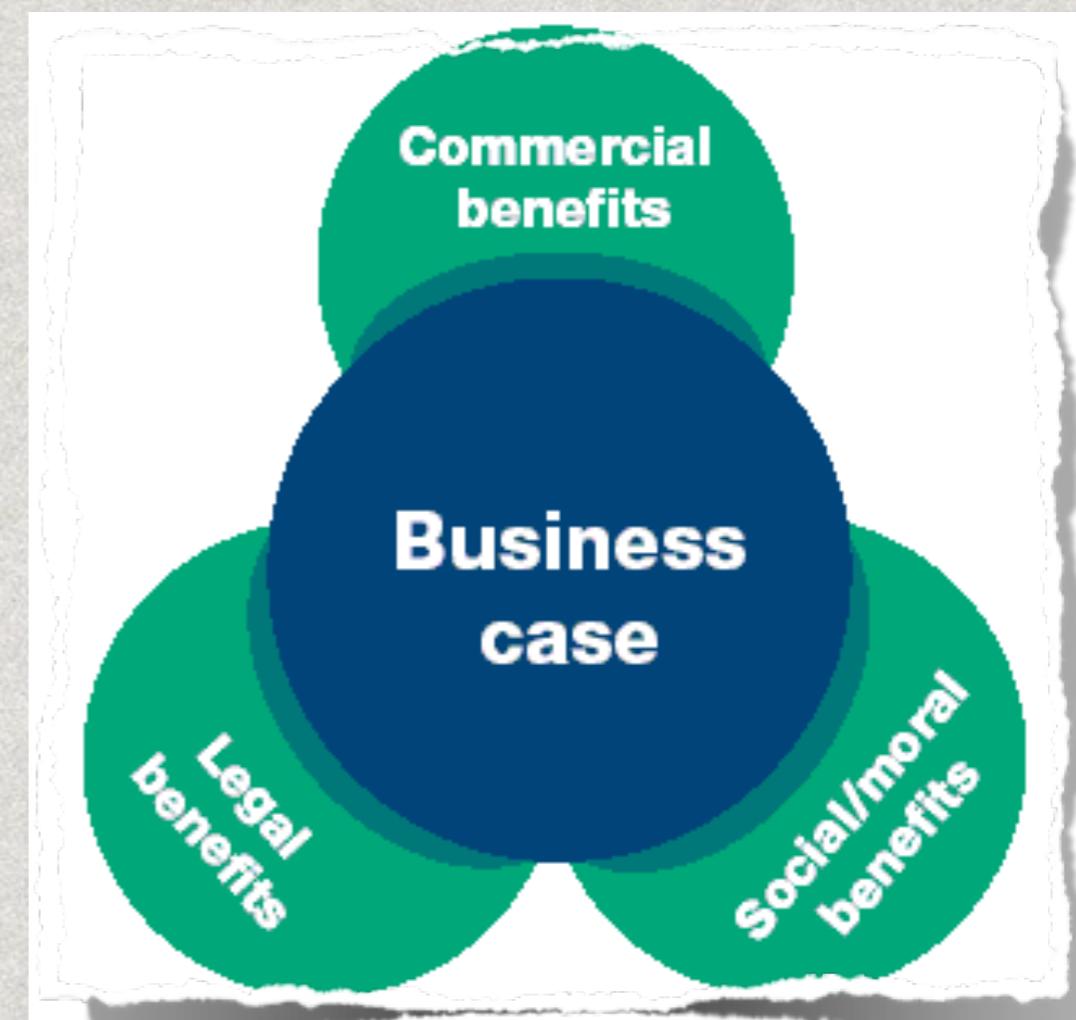
*It's about “learning and understanding the needs of users and project sponsors with the ultimate aim of communicating these needs to the system developers.”*

Zowghi, D., & Coulin, C. (2005). Requirements Elicitation: A Survey of Techniques, Approaches, and Tools. In *Engineering and Managing Software Requirements* (pp. 19–46). doi:10.1007/3-540-28244-0\_2

# Before RD

## Business case (high level model?)

- the value gained by achieving the goals of the software system
- competitive advantage
  - new service/product
  - cheaper service/product
  - faster service/product
  - easier to do business
  - harder to change
- Cost of business



# RD Activities

- Activities involve
- listening to stakeholders
- sharing understanding
- negotiating
- prioritising
- checking understanding



# Ambiguity

📍 Divide 8 in half

1 Question: Where was the Declaration of Independence signed?

2

3 Question: Funny River flows in which state?

4

5 Question: What is the main reason for divorce?

6

7 Question: What can you never eat for breakfast?

8

9 Question: What looks like half an apple?

10

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# Ambiguity

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1 Question: Where was the Declaration of Independence signed?

2 Answer: At the bottom of the page

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# Ambiguity

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1 Question: Where was the Declaration of Independence signed?

2 Answer: At the bottom of the page

3 Question: Funny River flows in which state?

4 Answer: Liquid

5 Question: What is the main reason for divorce?

6 [REDACTED]

7 Question: What can you never eat for breakfast?

8 [REDACTED]

9 Question: What looks like half an apple?

10 [REDACTED]

11

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6 Answer: Marriage

7 Question: What can you never eat for breakfast?

8 Answer: Lunch & dinner

9 Question: What looks like half an apple?

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# Types of RD Activities

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- Analyse stakeholders

# Types of RD Activities

## Analyse stakeholders

### Potential Stakeholder List

- 👤 project sponsor
- 👤 users
- 👤 client rep
- 👤 subject matter experts
- 👤 client analysts
- 👤 Client's clients
- 👤 User personas

# Types of RD Activities

- Analyse stakeholders
- Identify sources of requirements

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- Analyse stakeholders
- Identify sources of requirements

- Stakeholders
- Current systems or processes
- Existing documentation
- Business case

# Types of RD Activities

- Analyse stakeholders
- Identify sources of requirements
- Understand the Application Domain

# Types of RD Activities

- Analyse stakeholders
- Identify sources of requirements
- Understand the Application Domain

- Understand the target environment
  - social
  - organisational
  - political
  - business goals
- “As-is” compared to “to-be”

# Types of RD Activities

- Analyse stakeholders
- Identify sources of requirements
- Understand the Application Domain
- Select Techniques, Approaches and Tools to use

# Types of RD Activities

- Analyse stakeholders
- Identify sources of requirements
- Understand the Application Domain
- Select Techniques, Approaches and Tools to use

• Some techniques or approaches may be better suited to the characteristics of the project and its context

- criticality
- uncertainty
- novelty

see later slide & paper

# Types of RD Activities

- Analyse stakeholders
- Identify sources of requirements
- Understand the Application Domain
- Select Techniques, Approaches and Tools to use
- Use the techniques, approaches & tools

# IIBA and BABOK

- Institute
- [iiba.org](http://iiba.org)
- Business Analysis Body of Knowledge

# Techniques for RD

## Interviews

- unstructured
- semi-structured
- structured
- What NOT to ask

# Techniques for RD

## Questionnaires

- early requirements-used as a checklist
- open questions
- closed questions
- need knowledge
- generally looking for trends in answers
- can't probe

Interviews  
unstructured

# Techniques for RD

## Task and Domain analysis

- 📌 Decompose high level tasks into low level sequences of actions and events
- 📌 What knowledge is needed by the user to carry the tasks out
- 📌 What interactions take place
- 📌 Examine existing applications and documentation (similar systems, related systems in place etc)

- 📌 Interviews
  - 📌 unstructured
  - 📌 semi-structured
- 📌 Questionnaires
  - 📌 early requirements - used as a checklist

# Techniques for RD

- 📌 Repertory Grids
- 📌 Card Sorting
- 📌 Laddering
- 📌 Introspection

📌 Interviews

- 📌 unstructured
- 📌 semi-structured

📌 Questionnaires

- 📌 early requirements-used as a checklist

Task and Domain analysis

- 📌 Decompose high level tasks into low level

# Techniques for RD

## WORKSHOPS

- Brainstorming
- Joint Application Development (JAD)
- Requirements Workshops
- Facilitation techniques
- Brainstorming
- Getting Consensus
- Parking hard or unknown issues for later

- Interviews
  - unstructured
  - semi-structured

- Questionnaires
  - early requirements-used as a checklist

- Task and Domain analysis
  - Decompose high level tasks into low level

- Repertory Grids
- Card Sorting
- Laddering
- Introspection

# Techniques for RD

- Ethnography
- Observation
- Protocol Analysis
- Apprenticing

- Interviews
  - unstructured
  - semi-structured
- Questionnaires
  - early requirements - used as a checklist
- Task and Domain analysis
  - Decompose high level tasks into low level
- Repertory Grids
- Card Sorting
- Laddering
- Group work
- Brainstorming
- Joint Application

# Techniques for RD

- Prototyping
- Scenarios
- Viewpoints
- Problem Based Approach
- Goal Based Approach

- Interviews
  - unstructured
  - semi-structured
- Questionnaires
  - early requirements-used as a checklist
- Task and Domain analysis
  - Decompose high level tasks into low level
- Repertory Grids
- Card Sorting
- Laddering
- Group work
- Brainstorming
- Joint Application
- Ethnography
- Observation
- Protocol Analysis

# Techniques for RD

**Table 2.1** Techniques and approaches for elicitation activities.

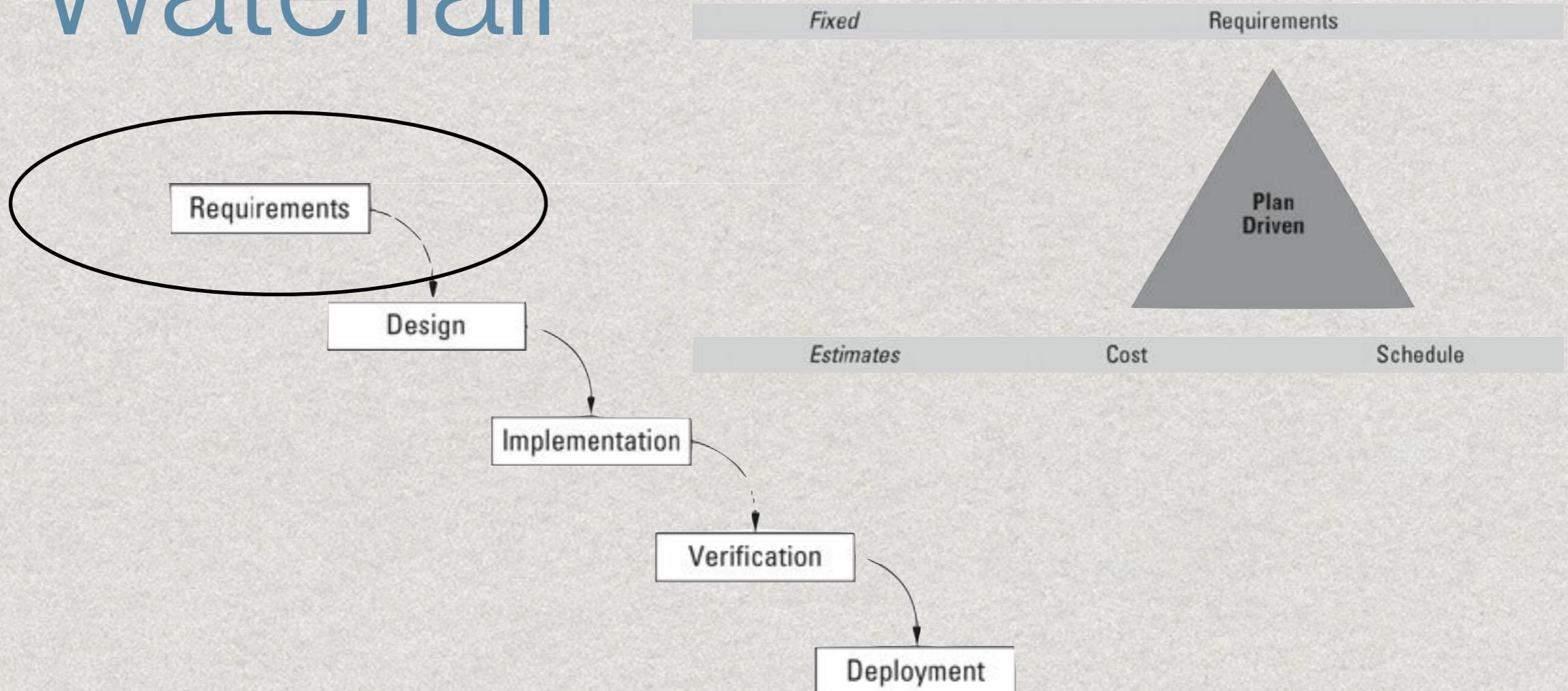
	Interviews	Domain	Groupwork	Ethnography	Prototyping	Goals	Scenarios	Viewpoints
Understanding the domain	X	X	X	X		X	X	X
Identifying sources of requirements	X	X	X			X	X	X
Analyzing the Stakeholders	X	X	X	X	X	X	X	X
Selecting techniques and approaches	X	X	X					
Eliciting the Requirements	X	X	X	X	X	X	X	X

- Interviews
- unstructured
- semi-structured
- Questionnaires
- early requirements - used as a checklist
- Task and Domain analysis
  - Decompose high level tasks into low level
- Repertory Grids
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- Group work
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- Joint Application
- Ethnography
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# Who is involved?

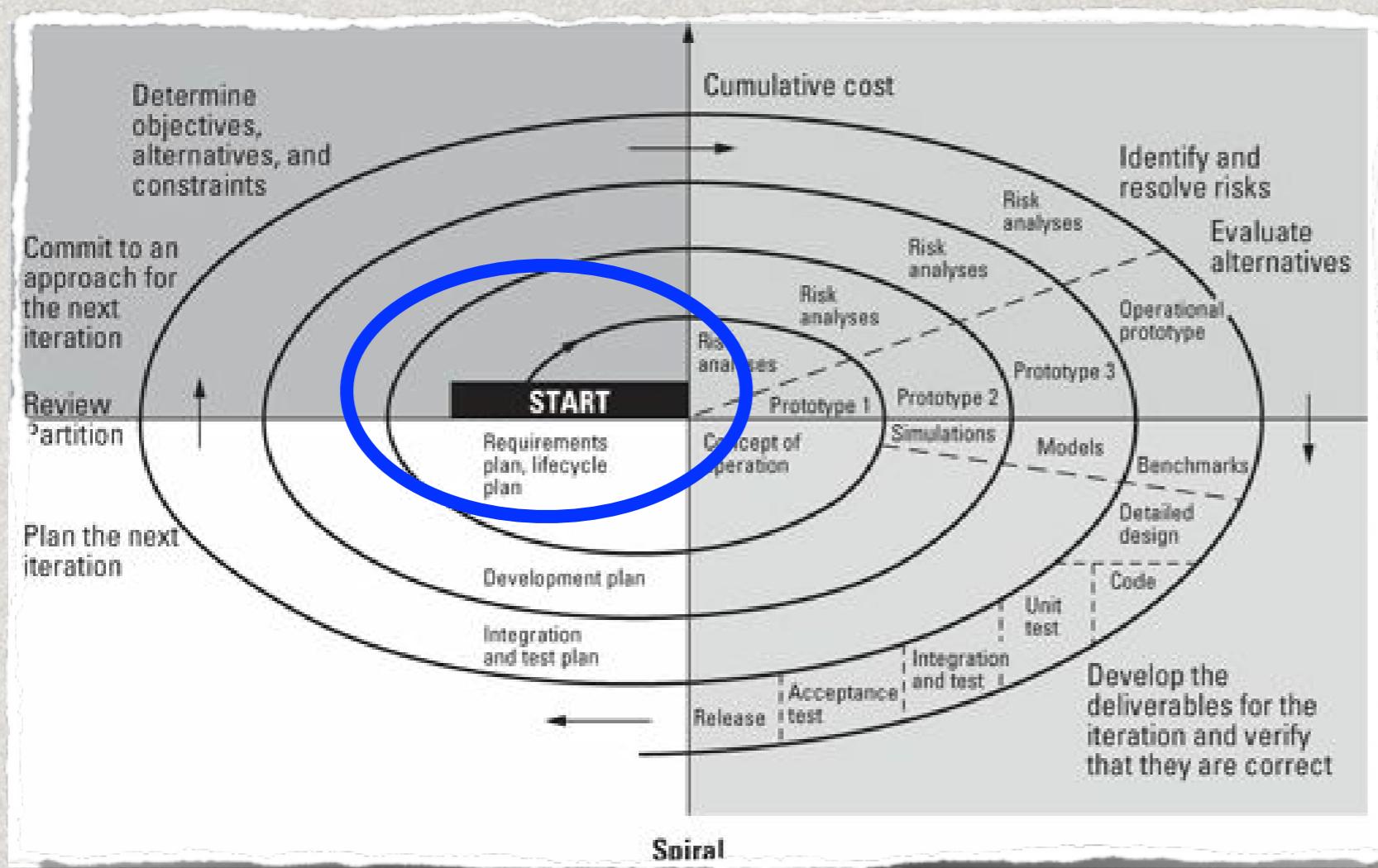
- Requirements Engineer
- Business analyst
- Developer/analyst
- Project Manager
- Tester QA

# Waterfall



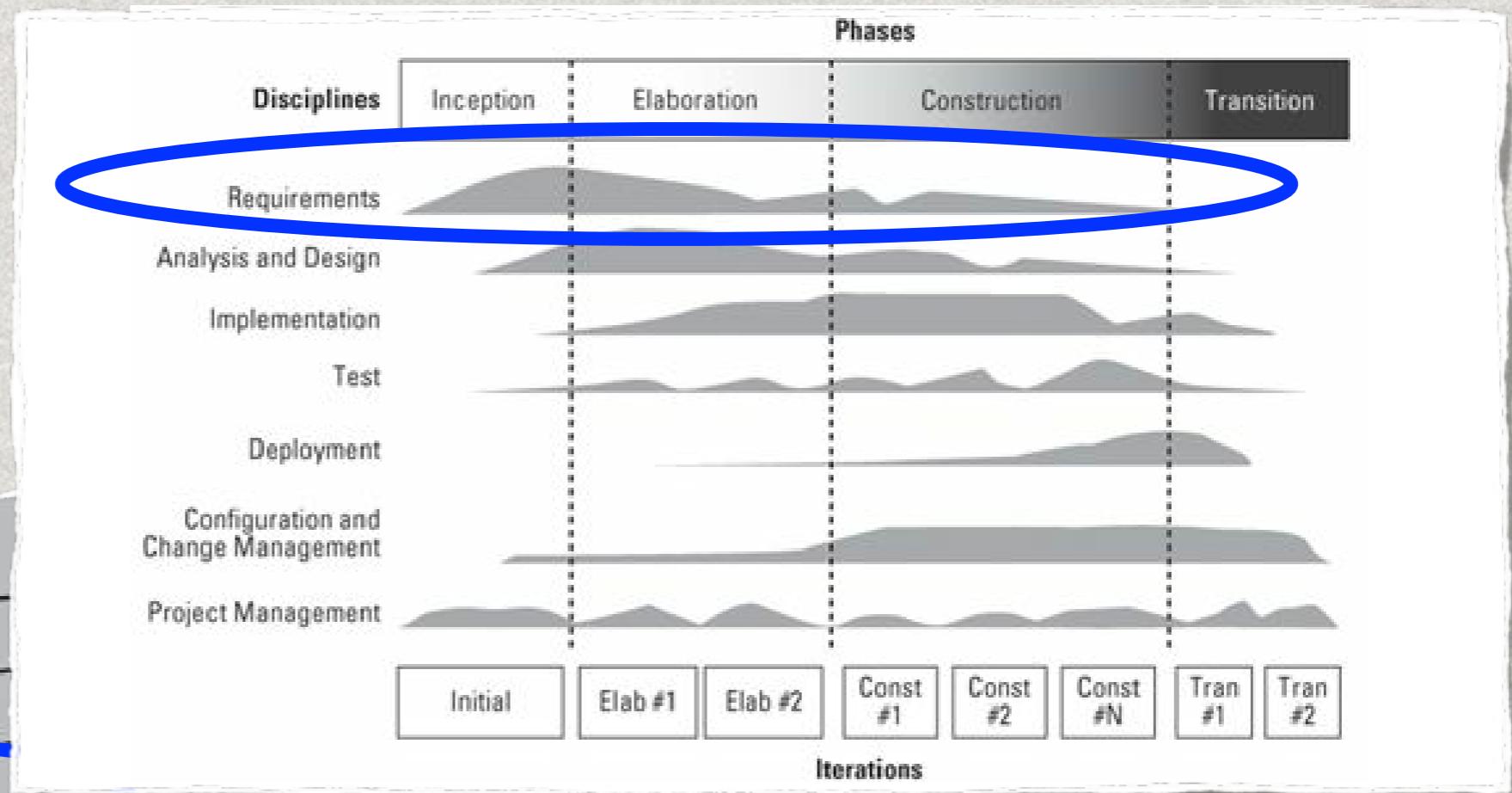
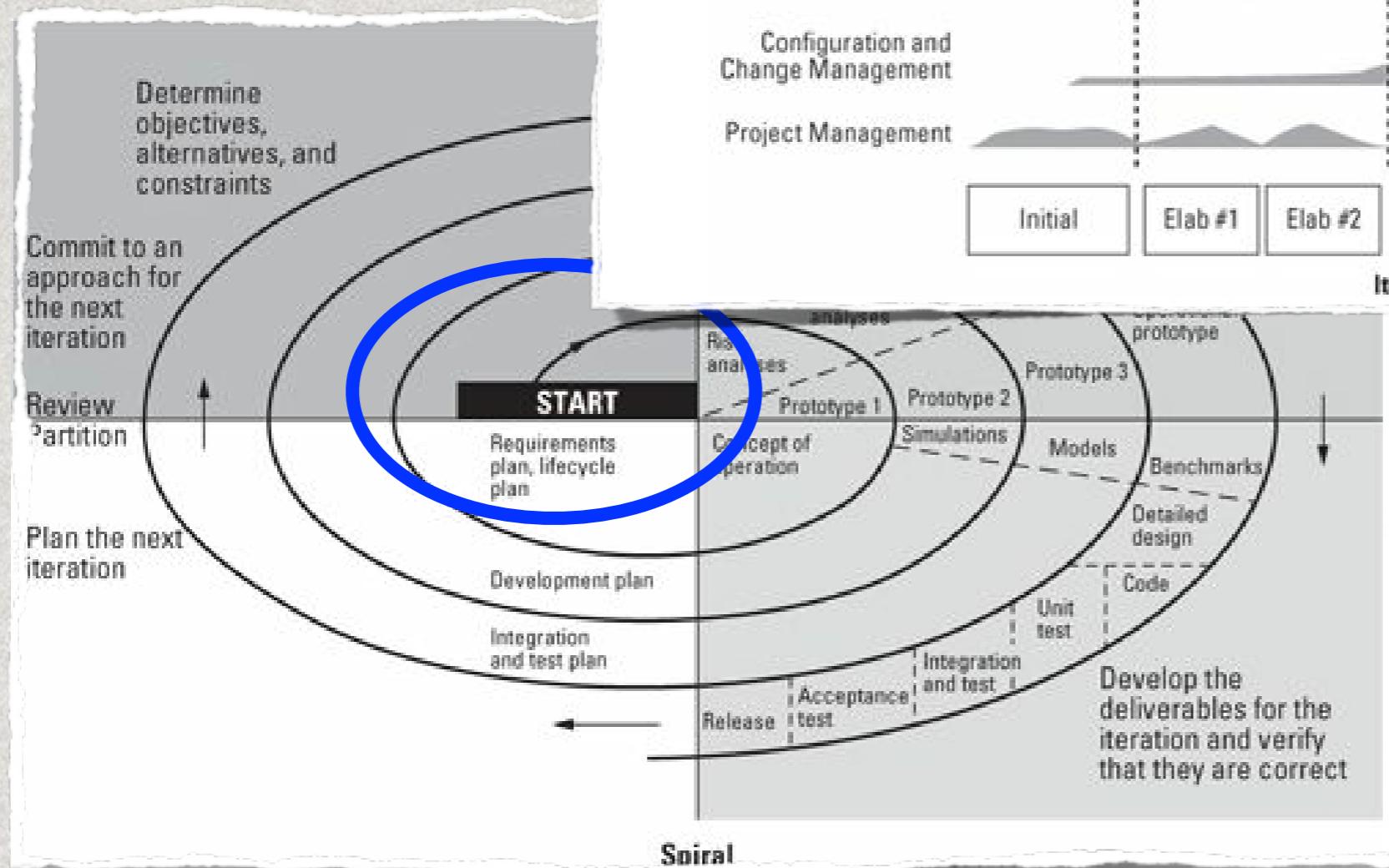
Big up-front effort in RD activities...

# Discovery Based Processes- Iterative and Incremental



Leffingwell, D. (2011). *Agile Software Requirements: Lean Requirements Practices for Teams, Programs, and the Enterprise* (Agile Software Development Series) (1st ed. p. 560). Addison-Wesley Professional.

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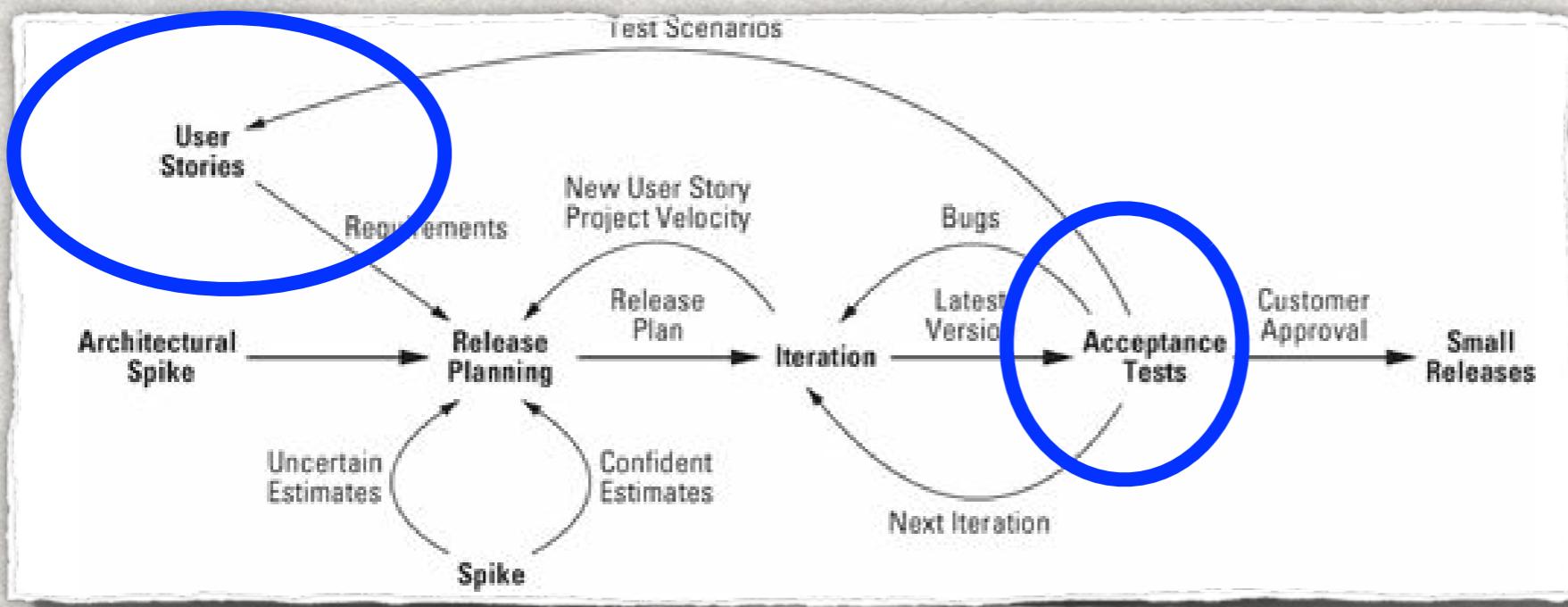
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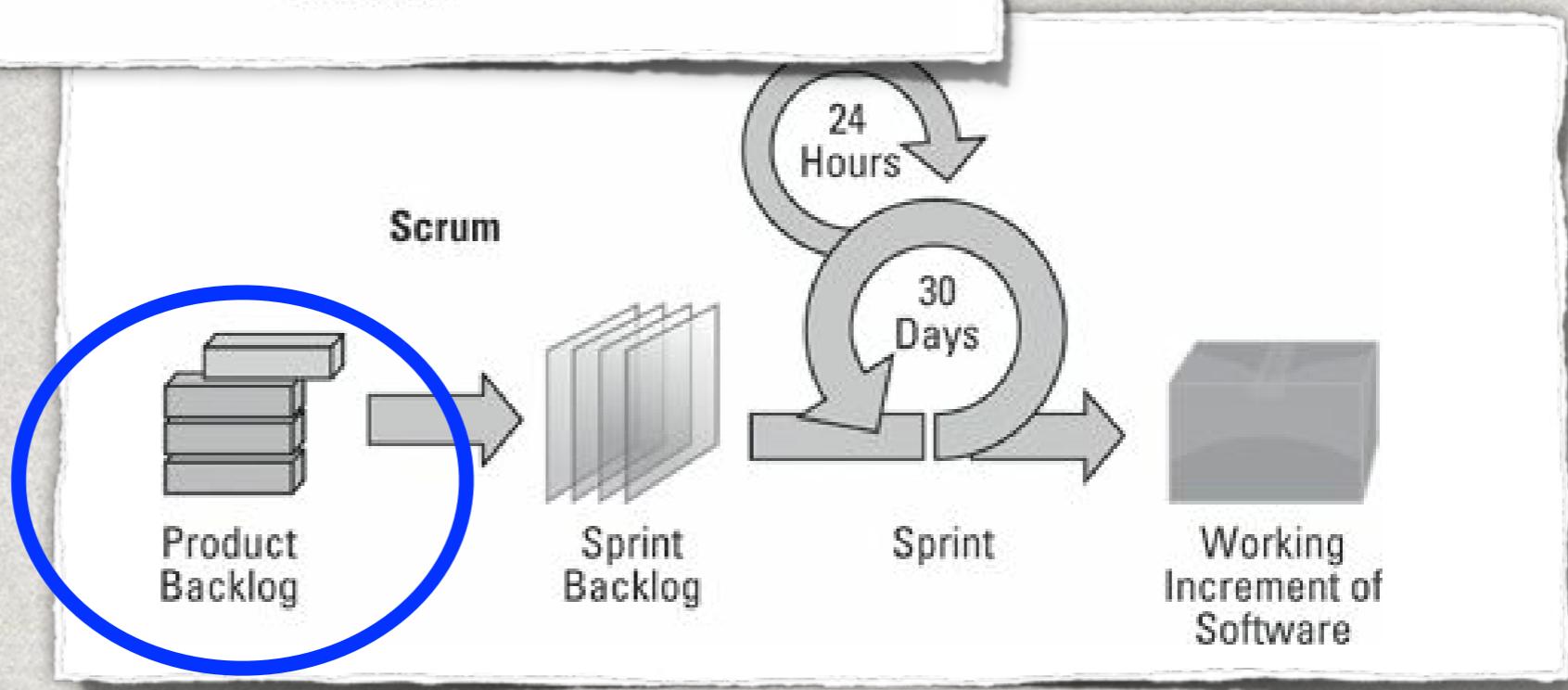
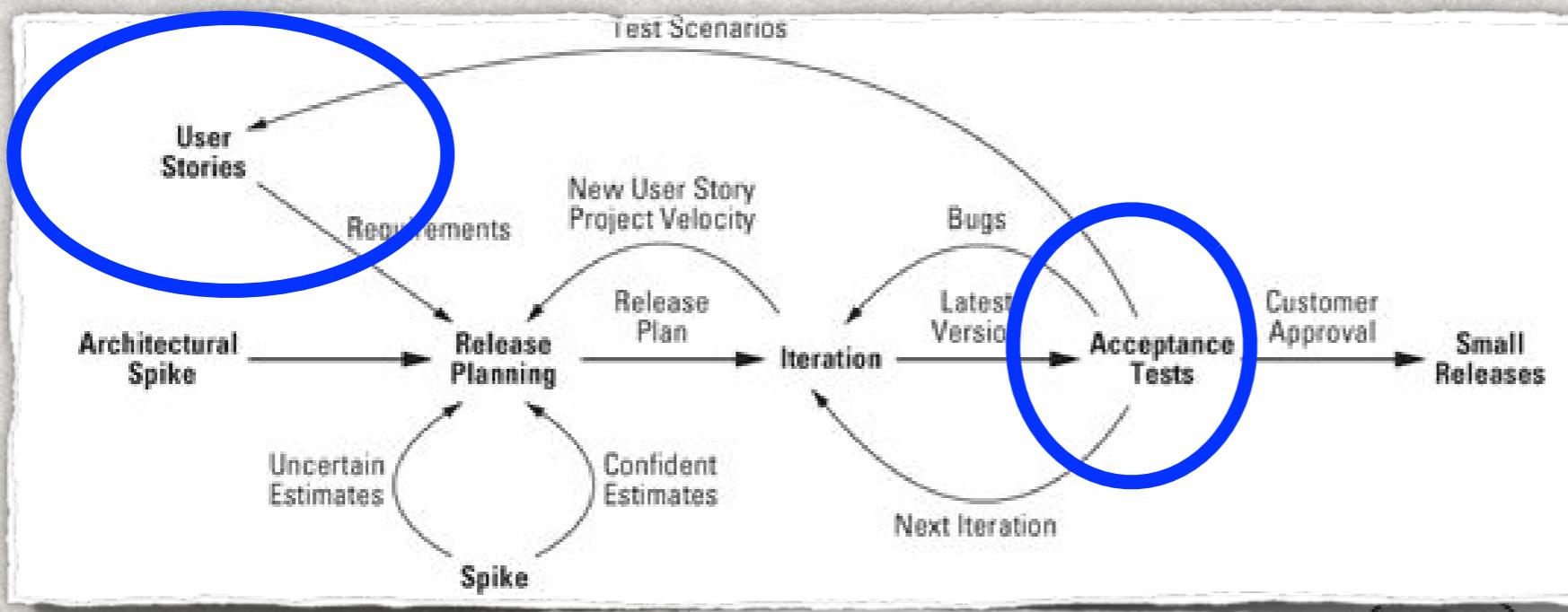
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# Exercise



# Selecting an approach

SOFTWARE PROCESS IMPROVEMENT AND PRACTICE

*Softw. Process Improve. Pract.* 2006; 11: 505–519

Published online 13 July 2006 in Wiley InterScience

(www.interscience.wiley.com) DOI: 10.1002/spip.293



## Framework for Matching Requirements Elicitation Techniques to Project Characteristics



### Research Section

Toshihiko Tsumaki<sup>1\*,†</sup> and Tetsuo Tamai<sup>2</sup>

<sup>1</sup> Nihon Unisys, Ltd., Japan

<sup>2</sup> The University of Tokyo, Japan

One of the most difficult jobs for requirements engineers is to select an appropriate RE method for the project at hand. Good engineers make good choices and have skills in applying selected techniques appropriately. Poor engineers usually have a narrow choice range limited by their training and biased by their experience. Once a RE technique that does not fit the current project is selected, the project is doomed to fail. In this article, we propose a framework to characterize typical RE techniques and use it as a base for selecting appropriate techniques at the time a project is started, as well as at the time a change in the nature of the project is recognized, or an obstacle is encountered in defining a suitable set of requirements. Copyright © 2006 John Wiley & Sons, Ltd.

# Selecting an approach

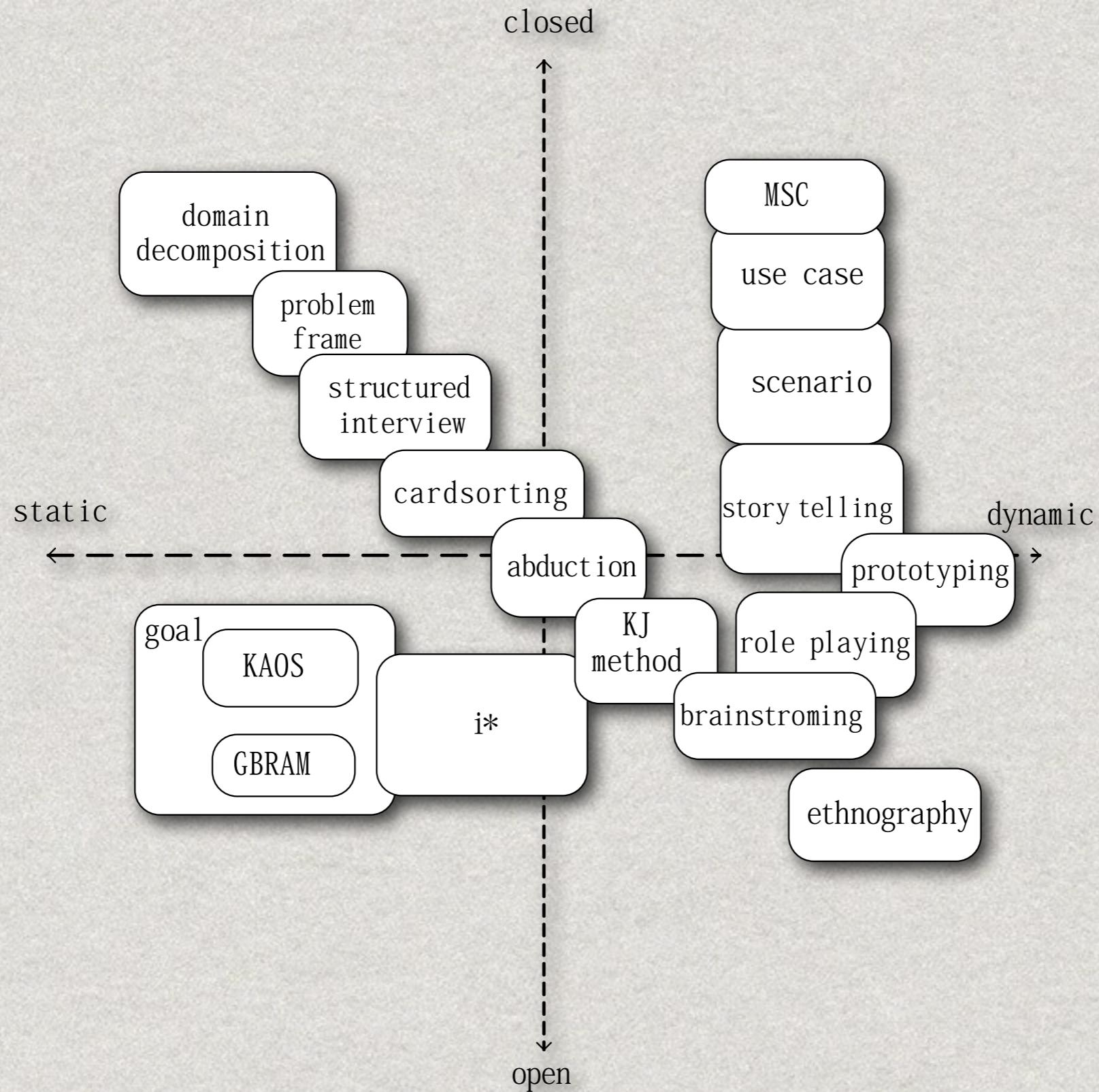


Figure 1. RE technology map

# Selecting an approach

## Closed

The object space is relatively stable, known, and closed.

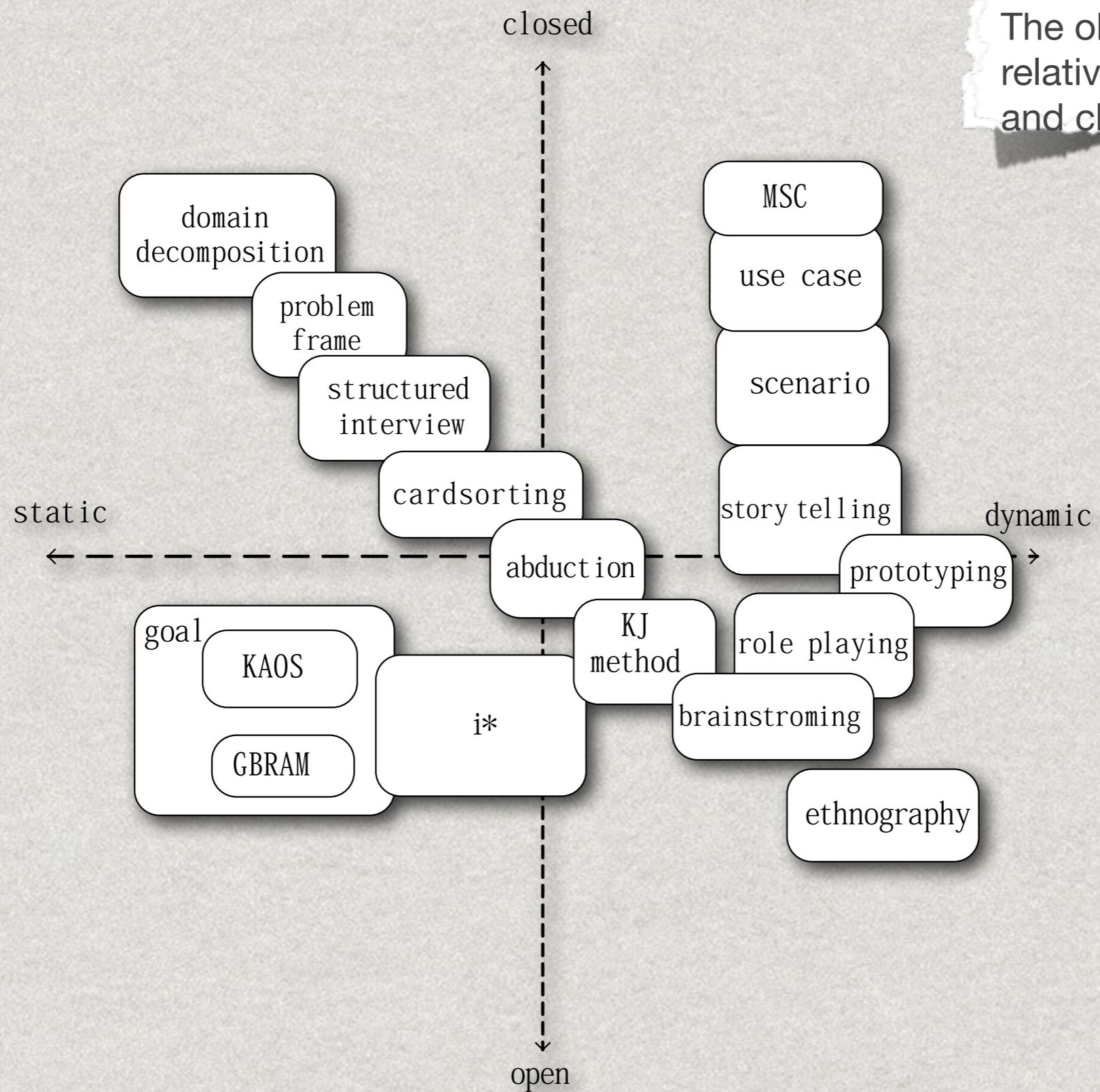


Figure 1. RE technology map

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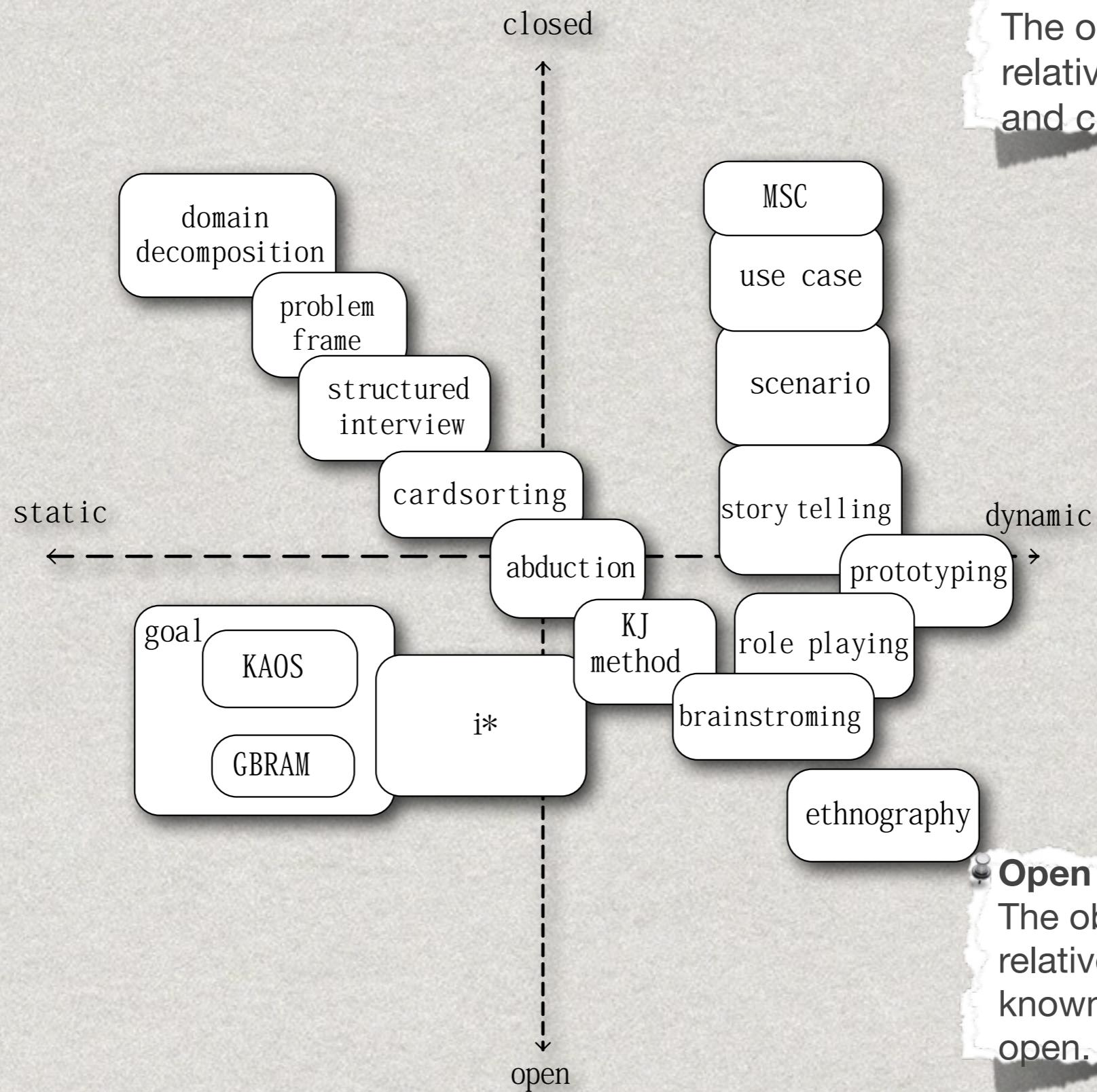


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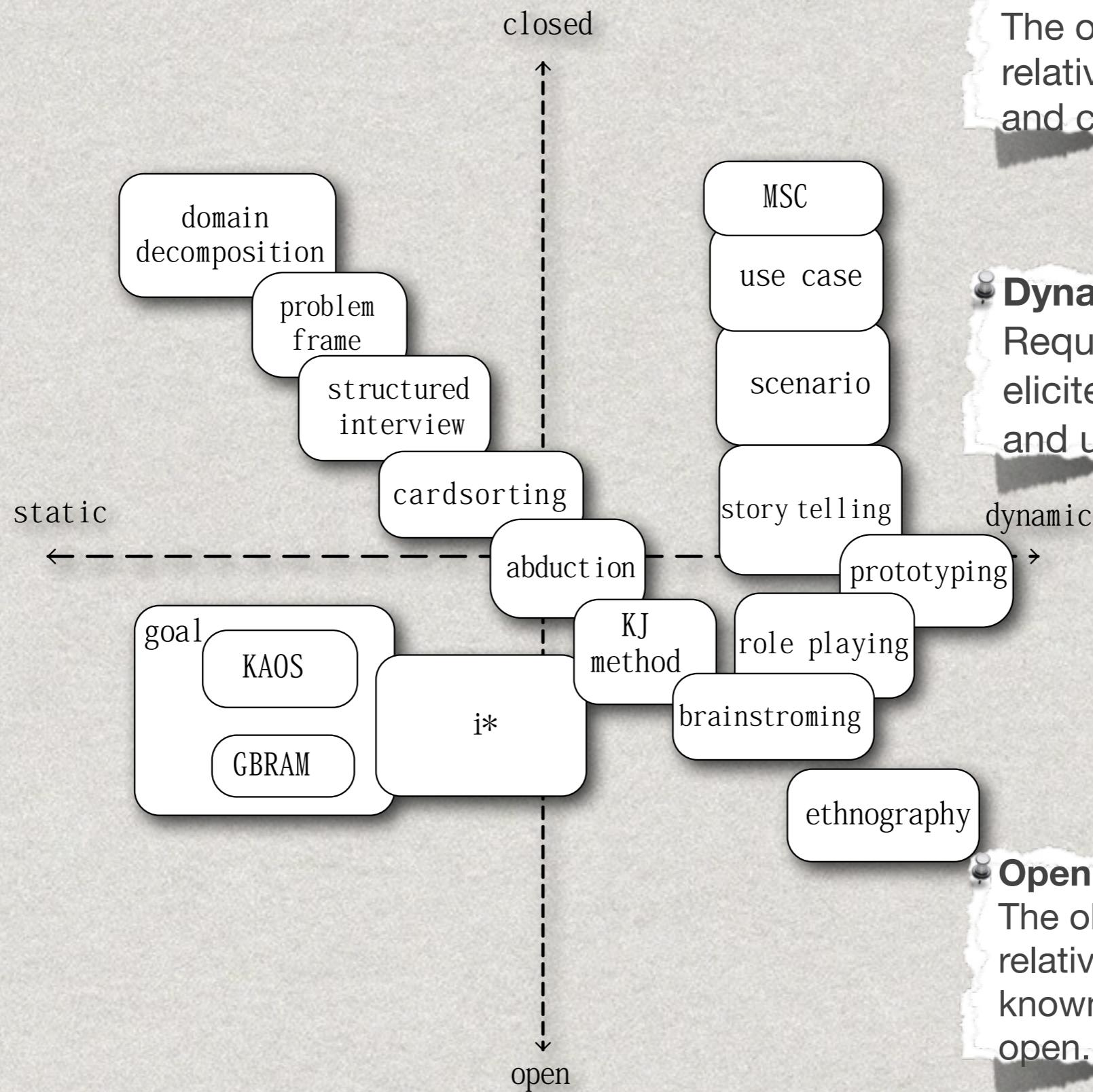


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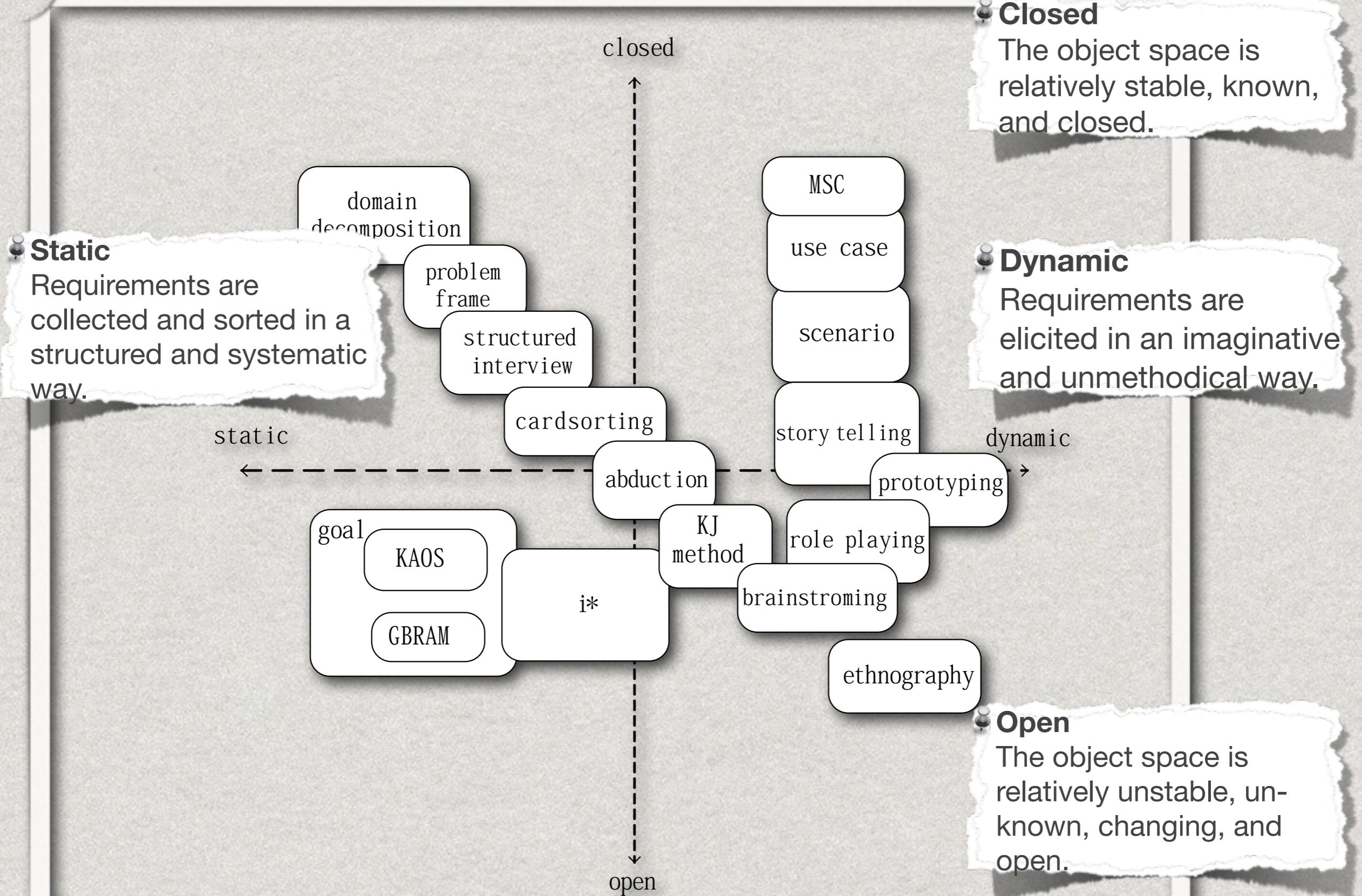


Figure 1. RE technology map

# Selecting an approach

 Closed

 Static

 Dynamic

 Open

# Selecting an approach

- The application domain

• Static

• Closed

stable

• Dynamic

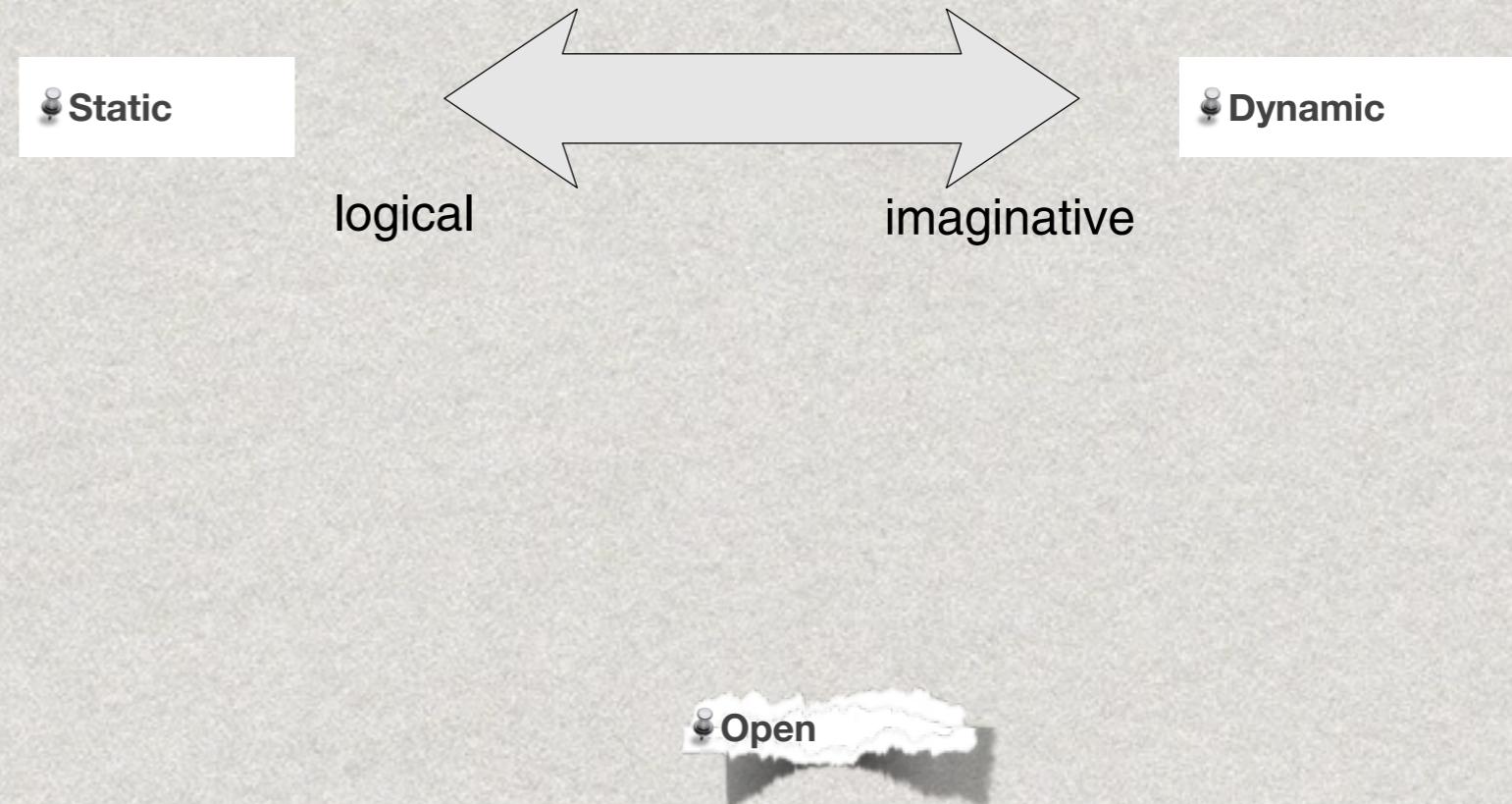
unstable

• Open

# Selecting an approach

Closed

- The application domain
- requirements engineer types



# Selecting an approach

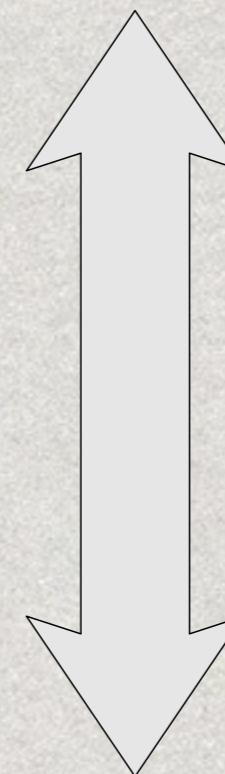
- The application domain
- requirements engineer types
- information resources

 Closed

 Static

 Dynamic

abundant



scarce

 Open

# Selecting an approach

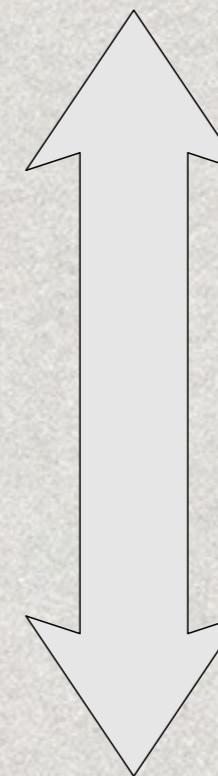
- The application domain
- requirements engineer types
- information resources
- user involvement

• Closed

• Static

• Dynamic

little involvement



much involvement

• Open

# Selecting an approach

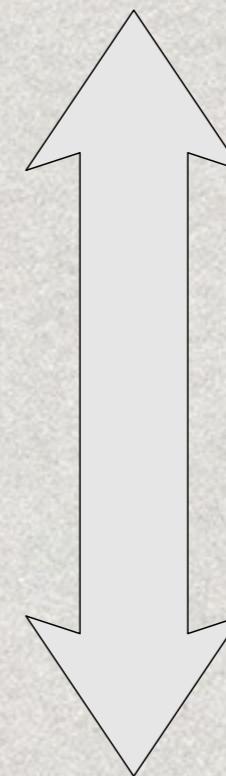
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- user involvement
- requirements properties.

• Closed

• Static

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little involvement



much involvement



# Challenges & pitfalls

Table 2. Requirements elicitation problems

Incomplete requirements
Incomplete understanding of needs
Incomplete domain knowledge
Poor users' collaboration
Overlooking tacit assumptions
Incorrect requirements
Ill-defined system boundaries
Misunderstanding of system purpose
Ambiguous requirements
Synonymous and homonymous terms
Untestable terms
Inconsistent requirements
Non-solid intentions of requesters
Different views of different users
Unfixed requirements
Fluctuating requirements
Continuous acceptance of additional requirements
Excessive requirements
Unorganized bulky information sources
Too many requesters
Overcommitment by sales staff
Unnecessary design considerations

# Chapter 2

- Tool Support
- Trends in current state of Practice
- Trends in Current state of research
- Future Directions