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A SSM-TRIZ METHODOLOGY FOR PROBLEM STRUCTURING AND BUSINESS MODEL MAPPING

Presentation Outline

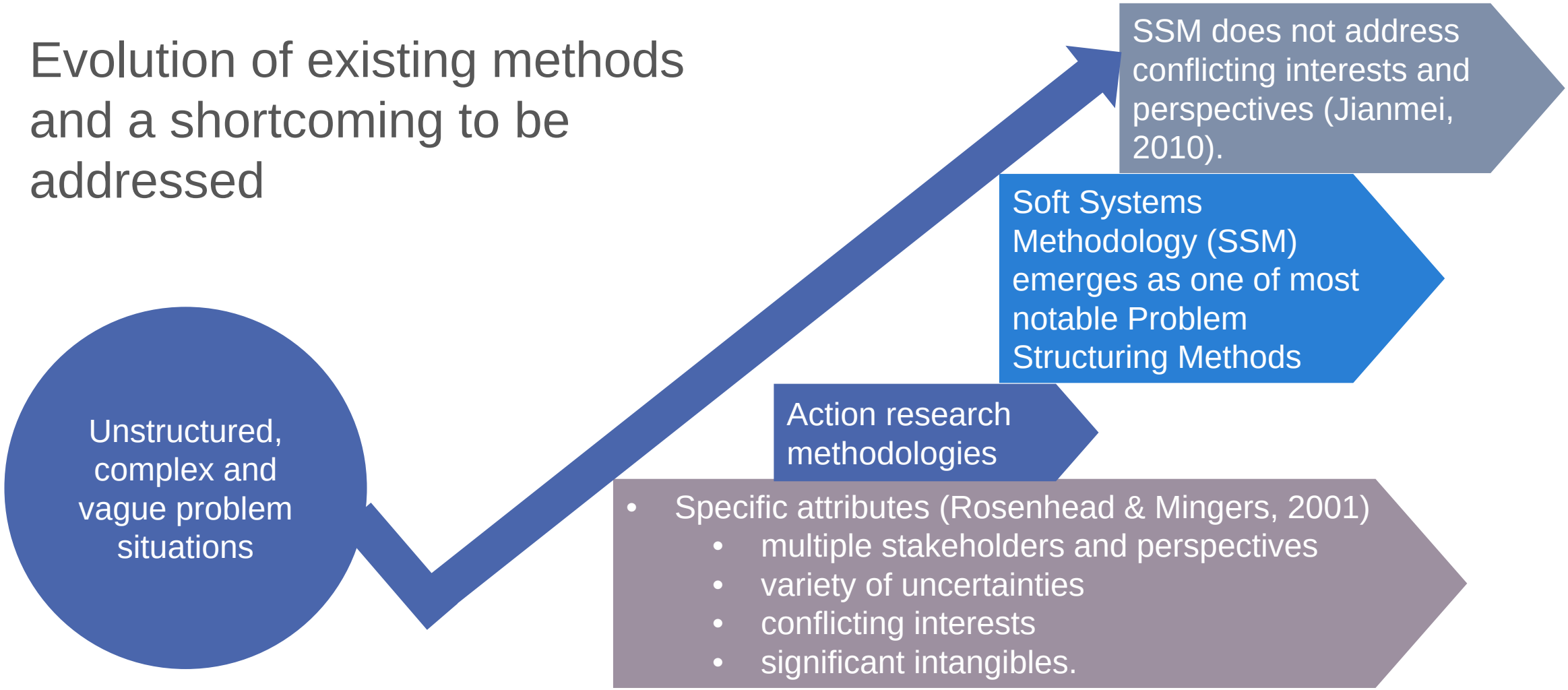
- Background and Purpose
- Shortcomings of SSM: Opportunities for TRIZ
- The SSM-TRIZ Methodology
- Case study: A Professional Development Initiative for INCOSE
- Stages of Methodology application in Case study
- Conclusion and Limitations

The Purpose of the Present Study

- Address situations with conflicting interests and perspectives
- Present a new methodology (SSM-TRIZ)
- Apply methodology to Professional Development case study.

Existing Soft Problem Structuring Methods

Evolution of existing methods and a shortcoming to be addressed



SSM methodology overview

- Soft System Methodology process

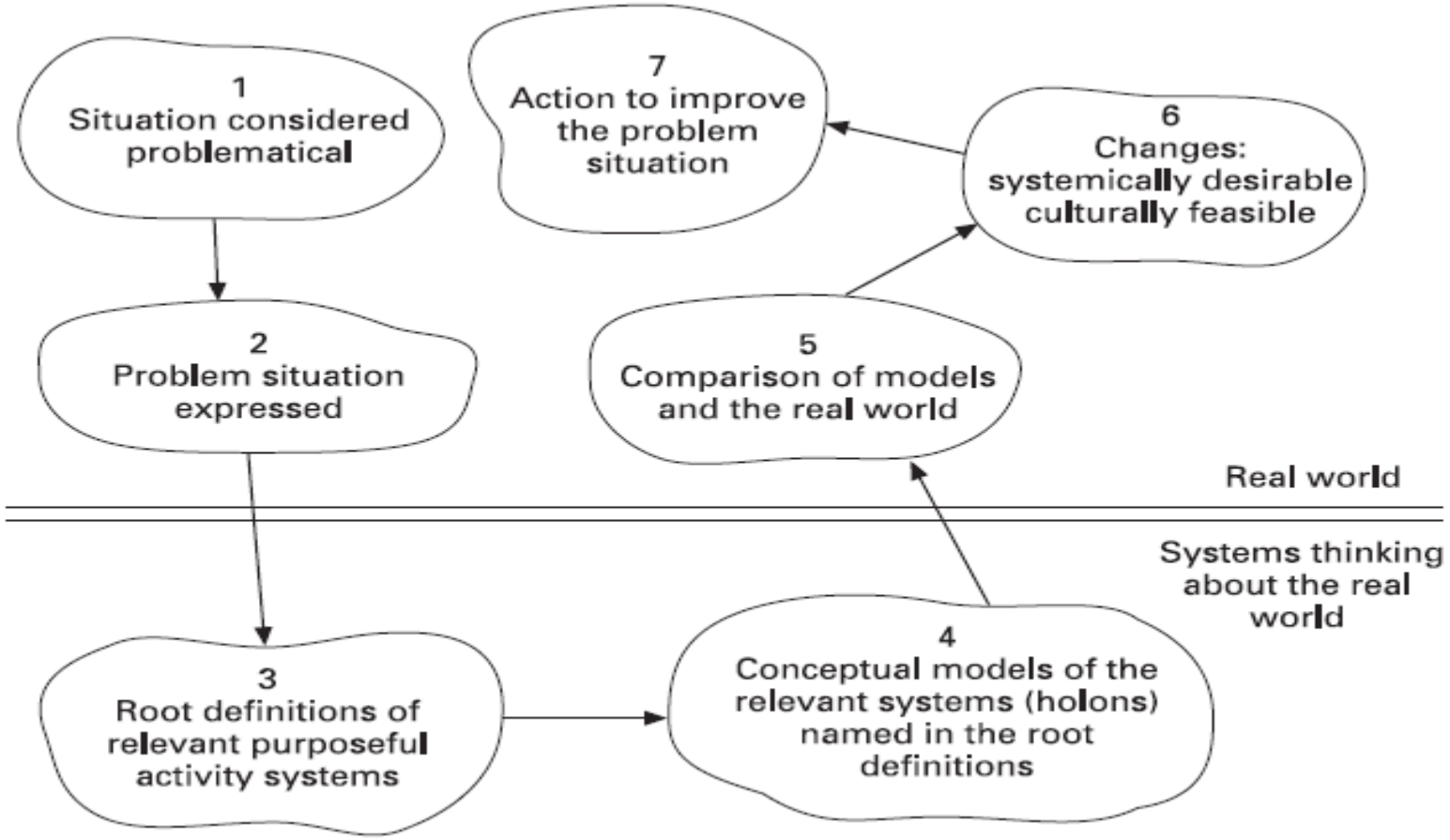


Figure 1: Learning cycle of Soft Systems Methodology.
(Source: (Jackson, Michael C. 2003)**)**

TRIZ problem-solving model

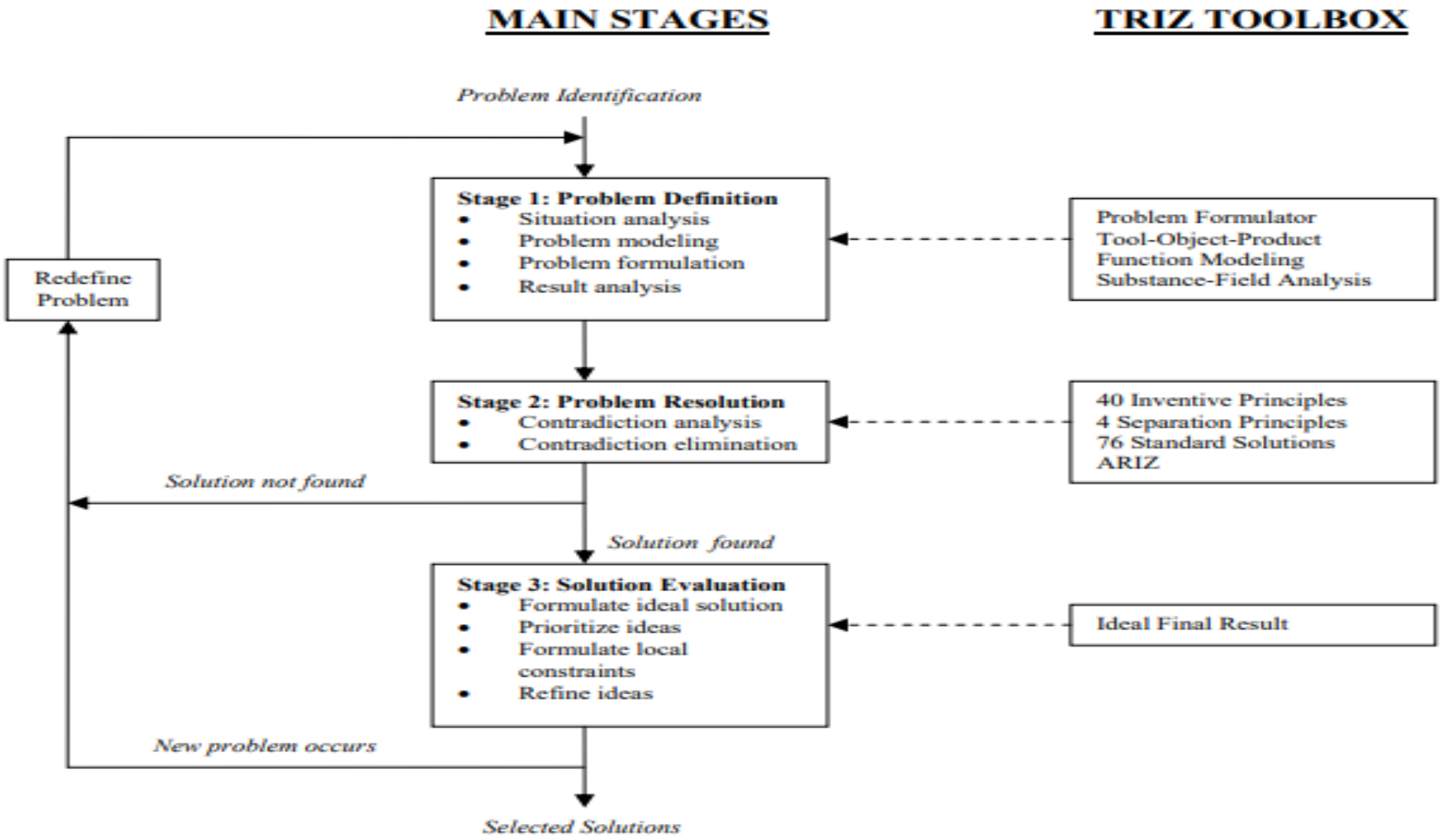


Figure 2: TRIZ Problem solving model.
(Source: (Zhai, Chang and Tan 2005)**)**

Shortcomings of SSM: Opportunities for TRIZ

Table 1: Comparison of SSM and TRIZ approaches for resolving problems with conflicting-interests.

	SSM	TRIZ
Why problems occur	Not explicitly stated during problem expression.	Breaks problems down into discovering inherent contradictions that provide clues for solution.
Mechanism for resolving conflicting-interests' problems	None.	Possesses contradiction resolution techniques • 40 inventive principles • ARIZ • Separation techniques etc.
Comparison to Ideality	None: stops with real-world which is what we need to improve upon.	Concept of ideality (Ideal Final Result) in an input-modification-output sequence.
Encouragement of further hard-thinking approaches	None.	Encourages breaking out of 'soft solution' paradigm • System Identification techniques in heuristics, optimization, statistics, decision theory e.tc. for seeking desirable changes to system in addition to soft methods.

The SSM-TRIZ Methodology

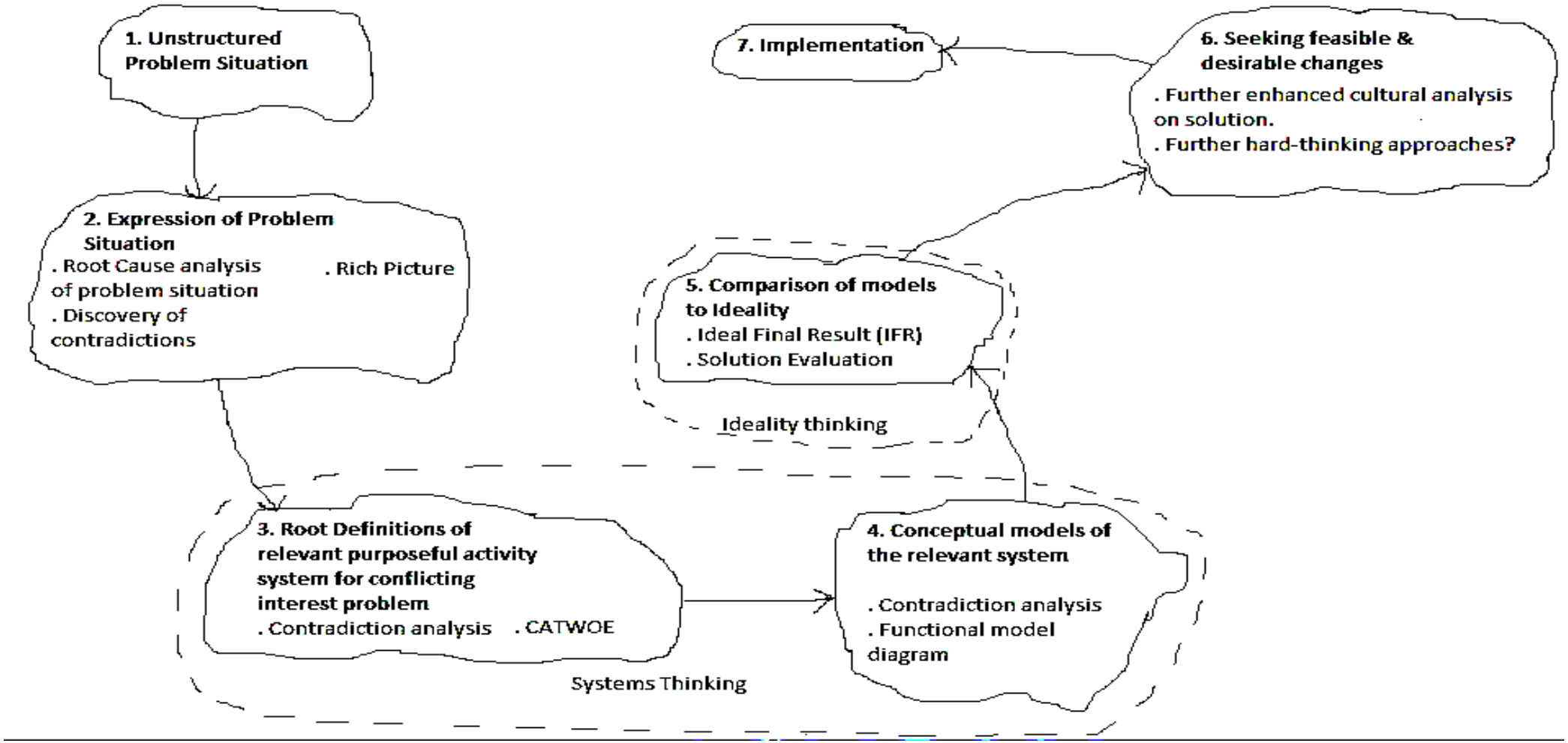
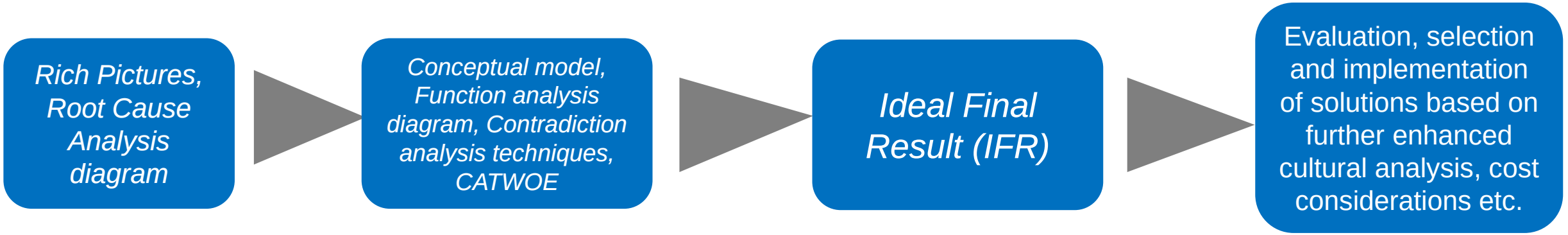


Figure 3. Phases of SSM-TRIZ Methodology

Stages in the SSM-TRIZ Methodology



Perception of Problem Situation

Root definition and Conceptual model of relevant system

Comparison of models to Ideality

Seeking feasible and desirable changes

Case study: A Professional Development Initiative for INCOSE

- INCOSE objective: create value for individuals and corporate bodies by increasing proficiency of the global systems engineering workforce.
- Vision: facilitate engagement between suppliers and consumers of SE professional development.
- Solution approach: provide a comprehensive professional development capability through an integrated web-based portal.
- Potential benefits
  - increased revenue for INCOSE
  - increased competency among SE practitioners
  - quantitative competency tracking,
  - service analytics and reviews
  - promotion of general interest in Systems Engineering.

Stage 1: Perception of Problem Situation

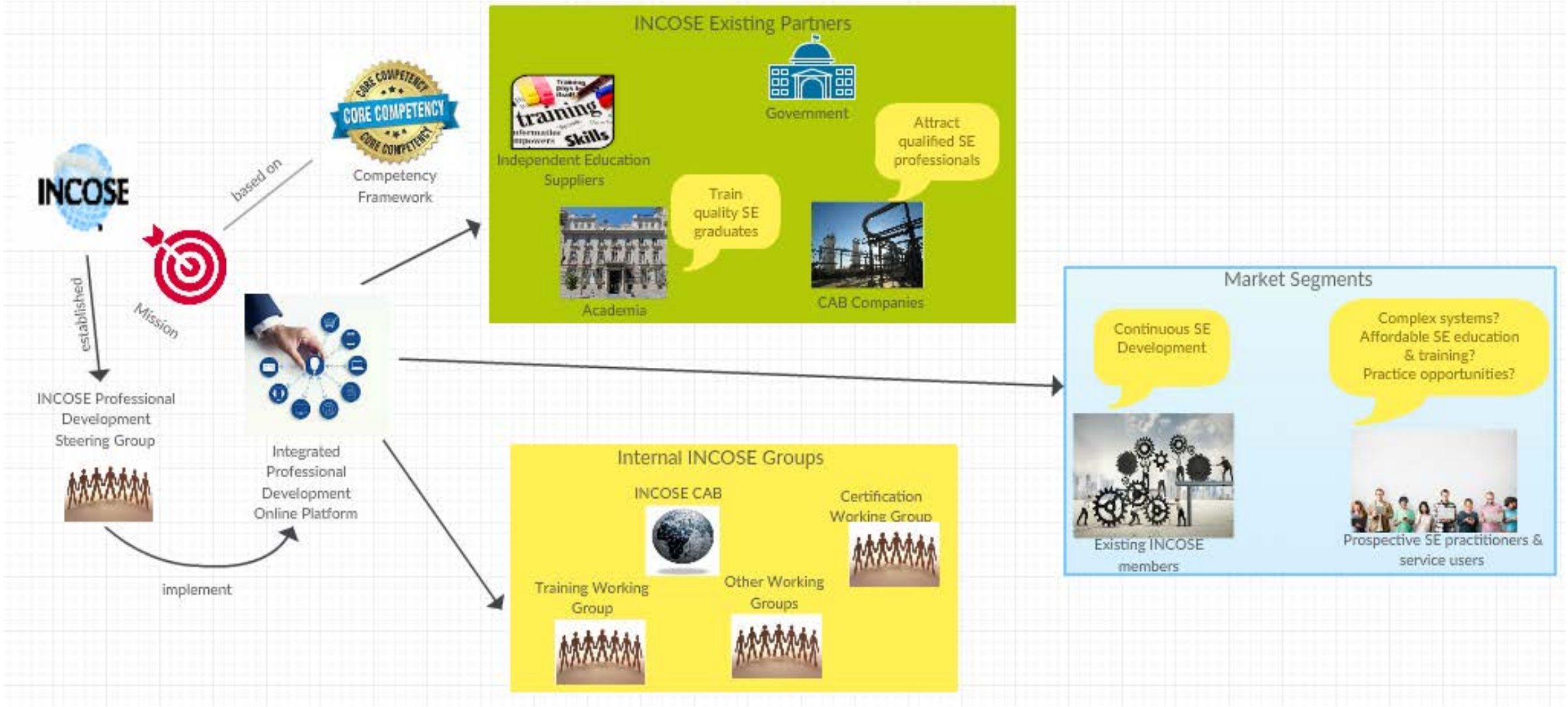


Figure 4: Rich Picture of INCOSE's Current Professional Development Circle.

Mapping of Rich Picture to Root Cause

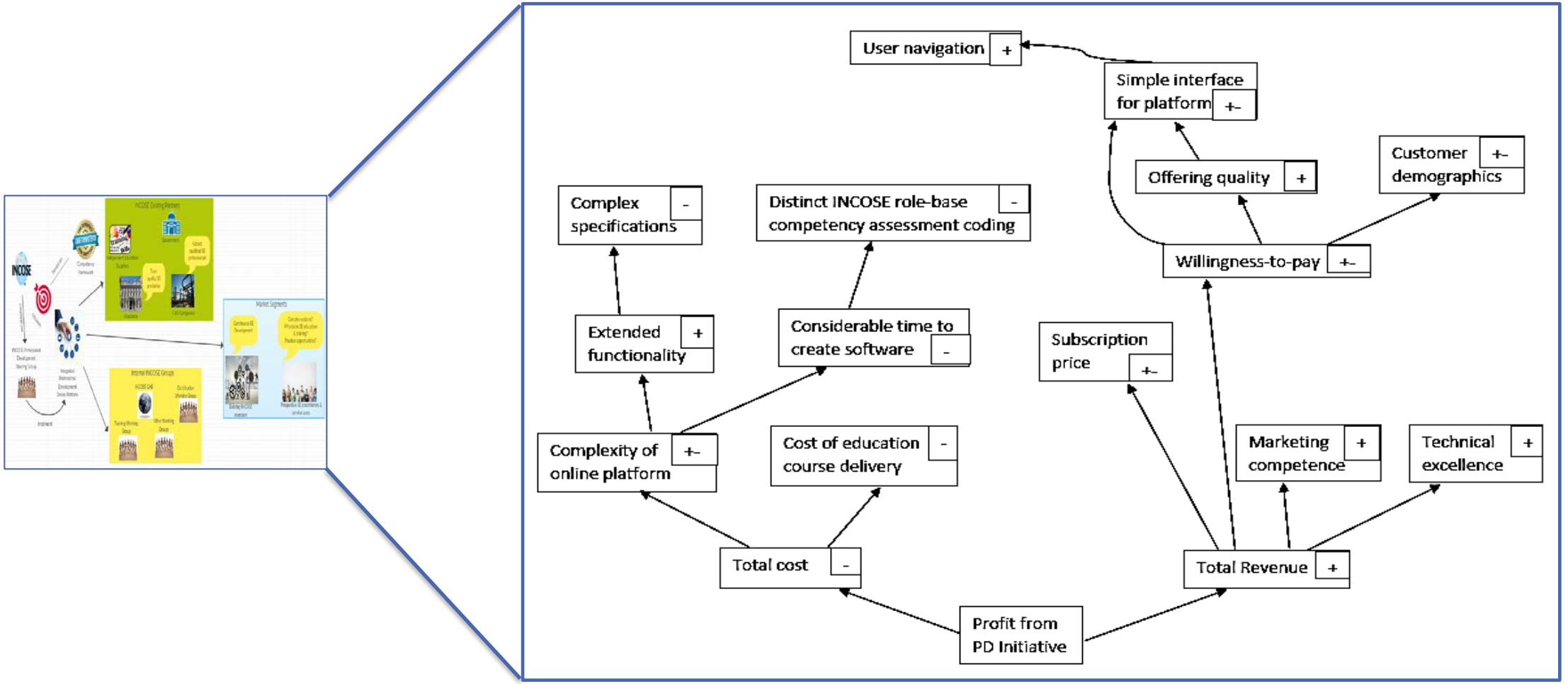


Figure 5: Root Cause effect chain for profit generation.

Stage 2: Root definition & Conceptual model of relevant system

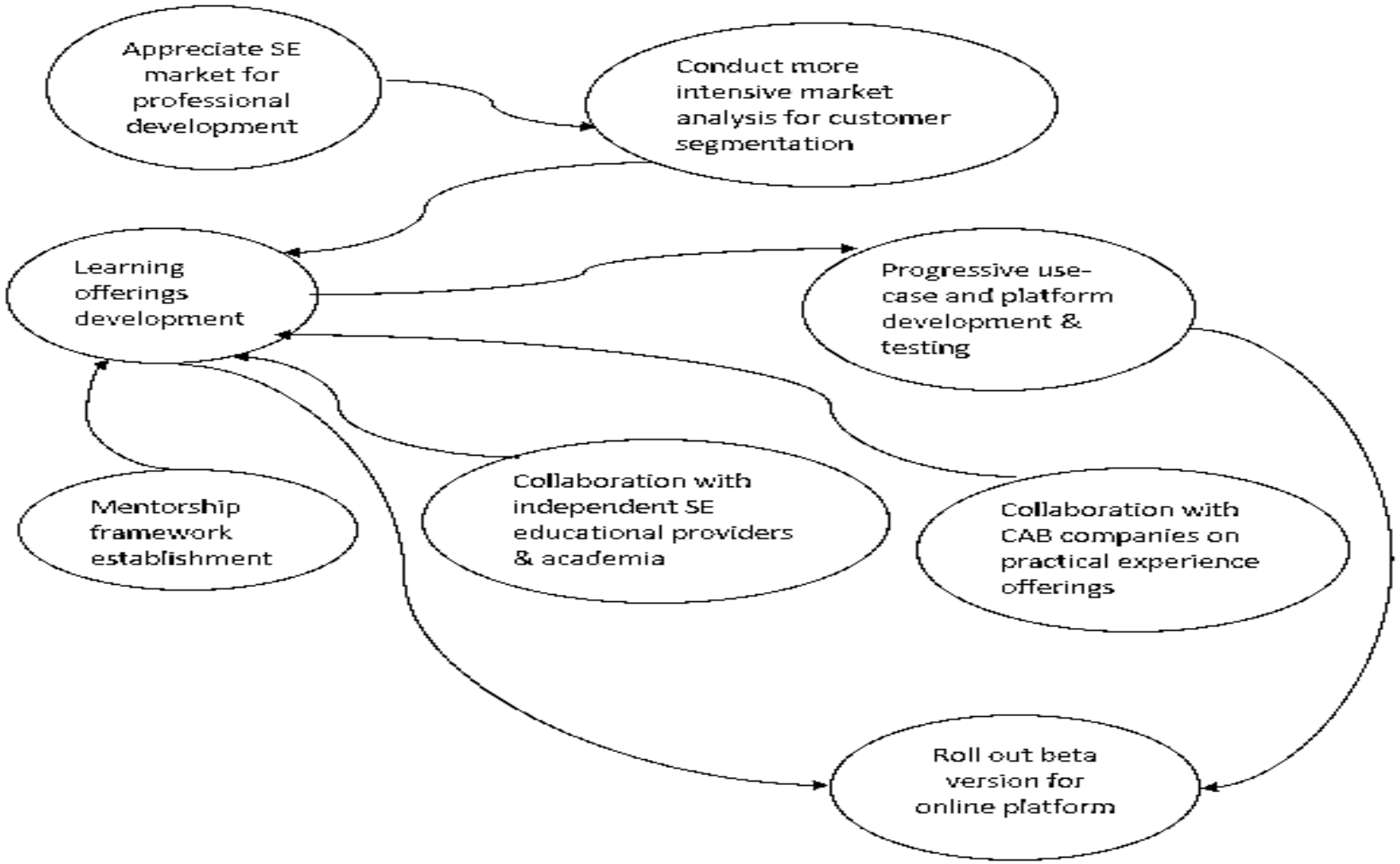


Figure 6: Conceptual model for purposeful activity system.

Mapping of Conceptual Model to Function Analysis Diagram

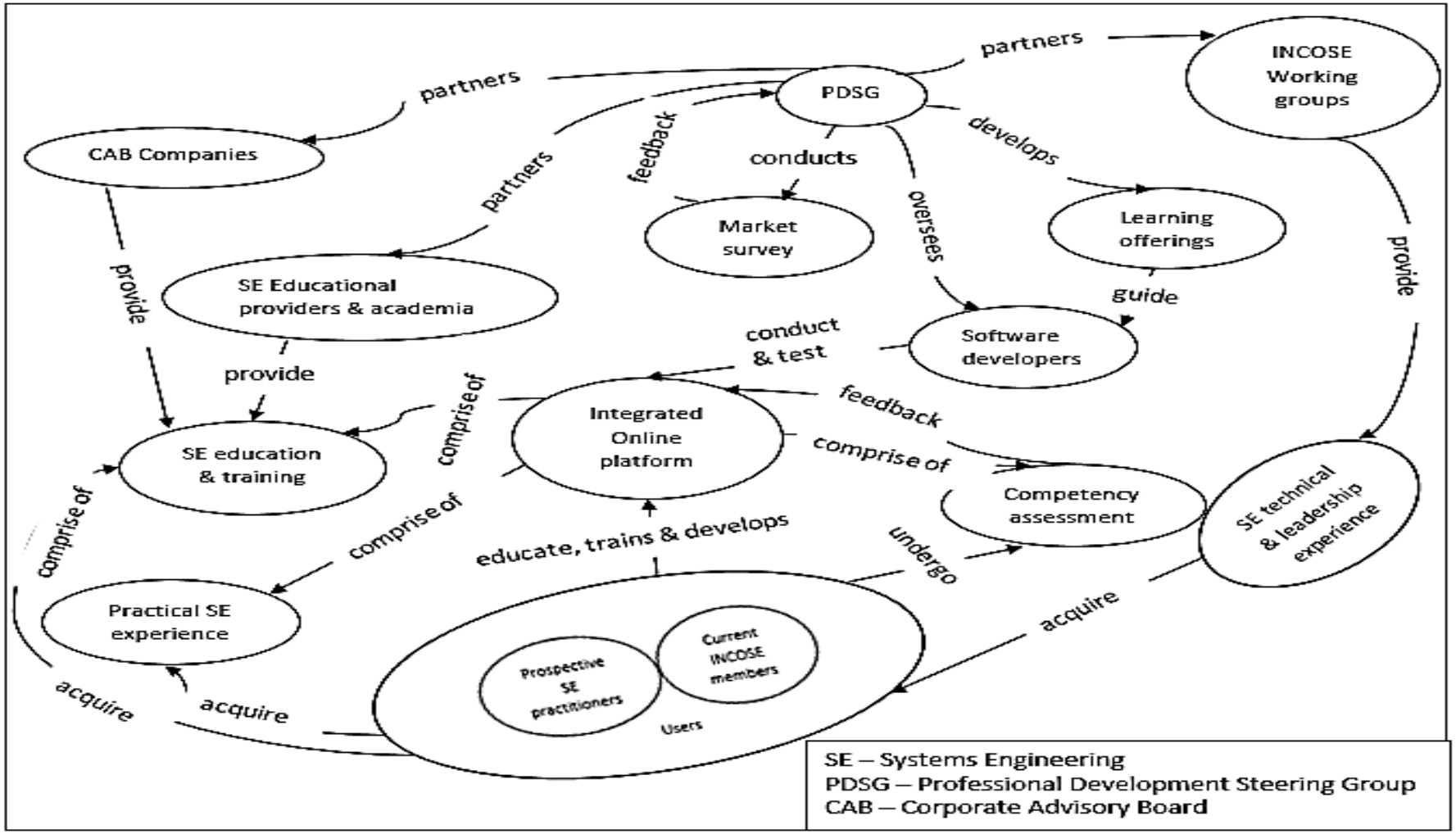
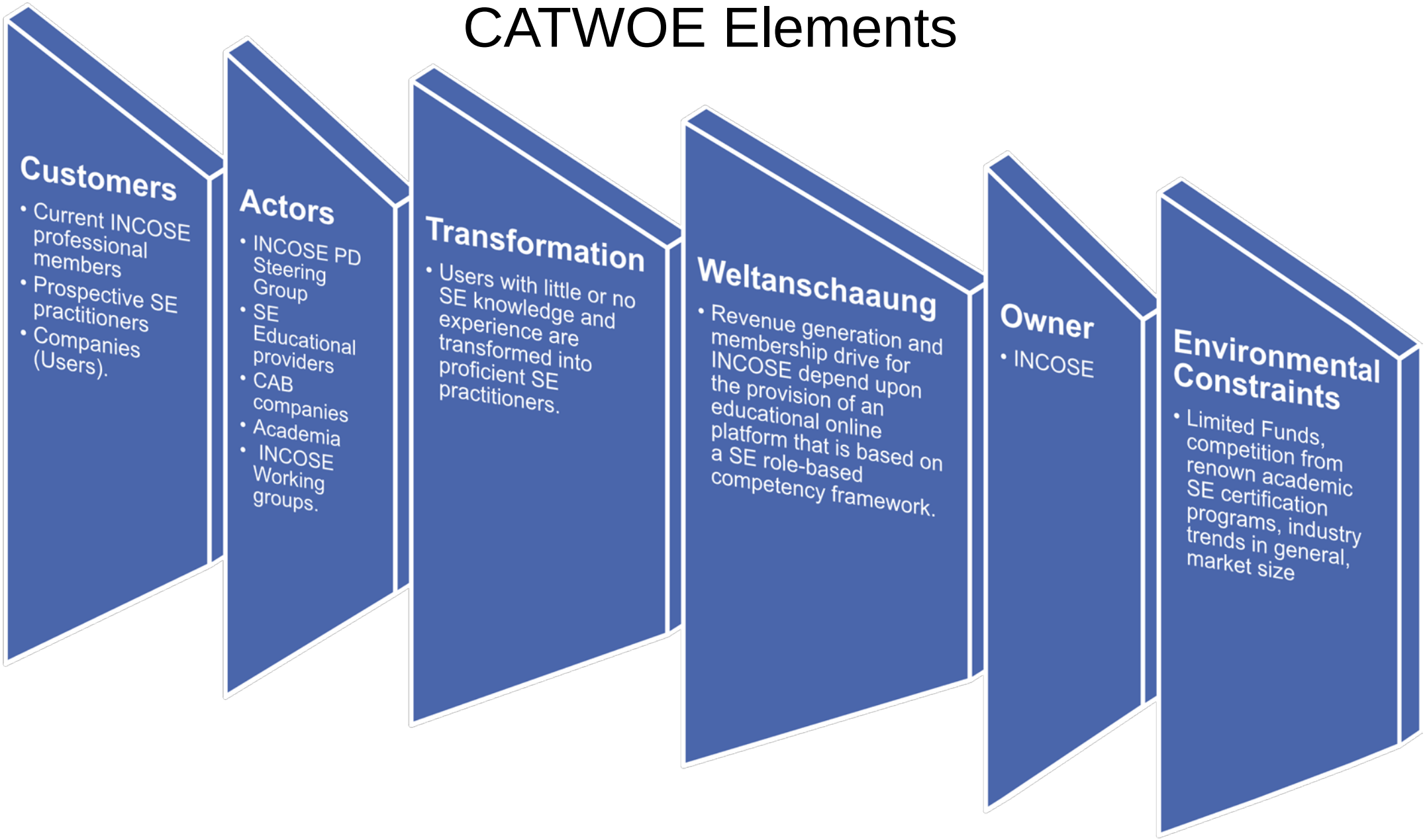


Figure 7: Function Analysis Diagram.

CATWOE Elements



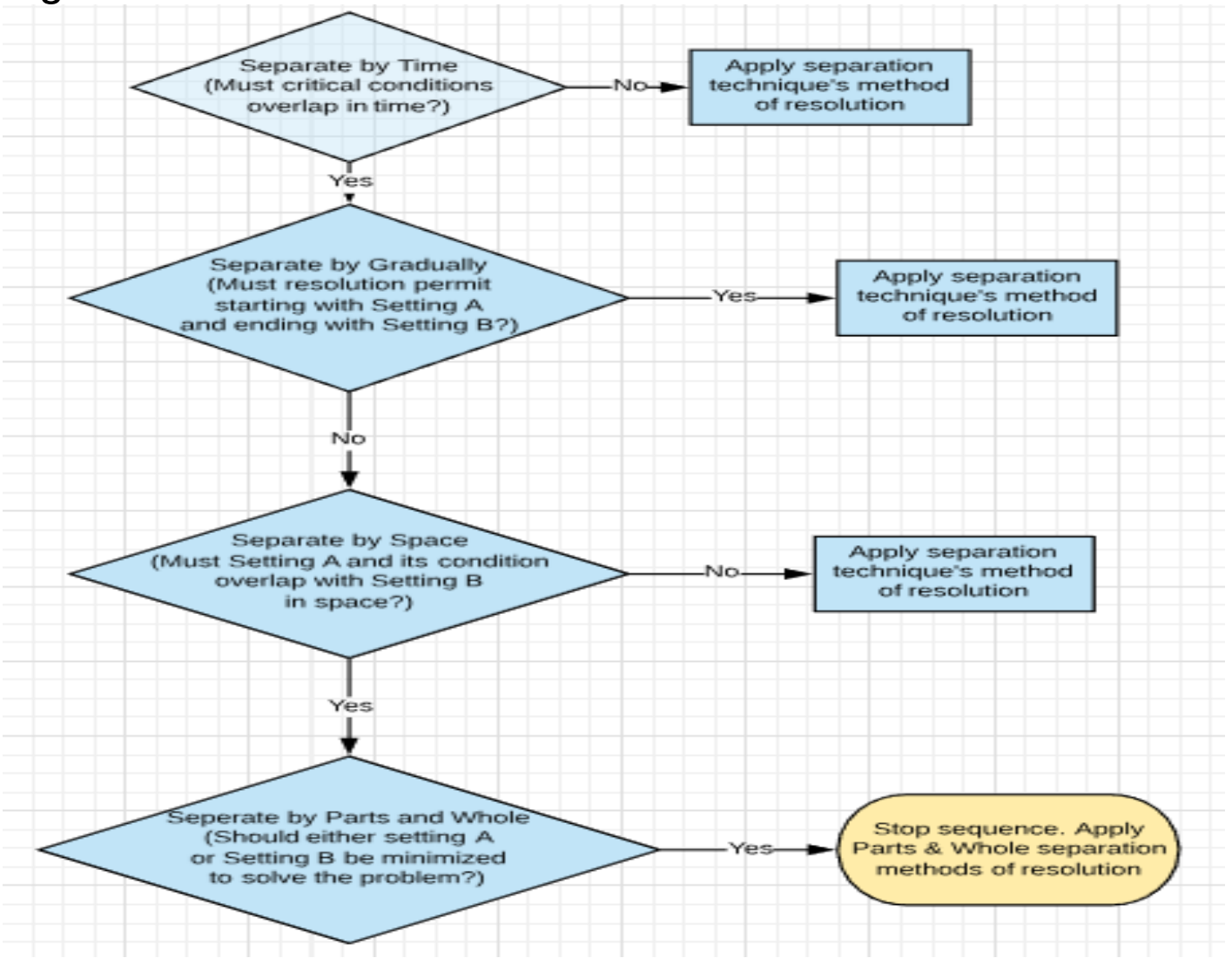
Contradiction Analysis

- Contradiction is the presence of conflicting elements, features or solutions and is the central theme of the TRIZ methodology.
- Contradictions with '+-' signs from Figure 3 were reviewed and one of them selected for analysis in this study.
- Selected contradiction is:

  'INCOSE will *incur high costs of delivery* to offer an array of quality platform courses for users but *does not want to incur high costs of course delivery*'.
- Contradictions can be subdivided into element, settings and condition.
- For selected contradiction,
  - Element: offer an array of quality platform courses.
  - Setting A: will incur high cost of delivery.
  - Setting B: does not want to incur high cost of delivery.
  - Condition: online platform.

Contradiction Analysis

- Contradiction separation techniques and logical sequences from *opensourcetriz.com* were used in resolving this contradiction.



Contradiction Analysis

- Below is the resulting separating techniques evaluated to arrive at adequate separation technique.

	Does Contradiction pass separation technique test?	
Separation Technique	**✓ (YES)**	**✗ (NO)**
Time		✗
Gradually		✗
Space		✗
Parts and Whole	✓	

Table 2: Separation technique tests for contradiction resolution

Stage 3: Comparison of models to Ideality

- Contradiction statement was resolved by the separation by parts and whole technique.
- Solution strategy from ‘parts and whole’ separation technique is the Merging method:

  INCOSE offering an array of quality courses accessible via an online platform while not incurring costs of course delivery by transferring aspects of delivery costs to interacting educational suppliers to incur.
- Ideal product is a catalogue of quality SE course lectures and materials.
- Ideal tool is the comprehensive web portal.
- Ideal Physical phenomena is the independent SE education suppliers administering SE courses and materials, vetted on INCOSE standards of quality.

Stage 4: Seeking feasible and desirable changes

- Important success criteria for adopted solutions are quality of educational content and revenue generation.
- Solution that satisfies quality constraint:

  INCOSE can decide to establish a vetting framework like PMI's Registered Educational Providers (REP) initiative for these educational suppliers to ensure that lecture videos and materials found on the web platform are up to the organization's rigorous SE standards.
- Solution that satisfies revenue generation constraint:

  INCOSE permits independent educational suppliers and academia develop and run their course and training lectures on INCOSE's web platform. INCOSE can then earn a commission for hosting their courses on her platform.
- An example of enhanced cultural analysis for these solutions is the consideration of setting up a legal framework that takes advantage of different legal systems in different countries.

Conclusions and Limitations

- SSM-TRIZ methodology can be beneficial for technical and business applications.
- It can benefit business companies by helping them narrow down their unstructured business problems into structured soft solutions that can expose questions that can be easily solved quantitatively.

However, it does not

- provide definite solution implementations for technical and business problems as quantitative methods will be mostly relied on to supplement its soft solutions.

Disclaimer: The conclusions and recommendations expressed in this paper are those of the author and do not necessarily reflect the positions of the International Council on Systems Engineering (INCOSE).

QUESTIONS!!!

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