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LONDON

PONTIFÍCIA UNIVERSIDADE CATÓLICA
DO RIO DE JANEIRO



From Unknown to Known Impacts of Organizational Changes on Socio-technical Systems

PhD Student: **Marília Guterres Ferreira**

Supervisor - City University London: **Neil Maiden**

Supervisor - PUC-Rio: **Julio Cesar Sampaio do Prado Leite**

Structure

- Introduction
- Methodology
- Applying the Proposal in the Post Office Case
- Results
- Conclusion

INTRODUCTION

Organization and Sociotechnical System

- A **project** introduces a new **Socio-technical System (STS - the designed thing)** into the **organization (the environment)** and this introduction generates **impact** on the organization.

Motivation



- In order to enhance their performance in a **rapidly changing environment**, organizations continuously change, frequently, guided by strategic management plans. In this setting, organizational change creates **new requirements for the deployed socio-technical system (STS)**, which, in turn, may also change the organization [1].

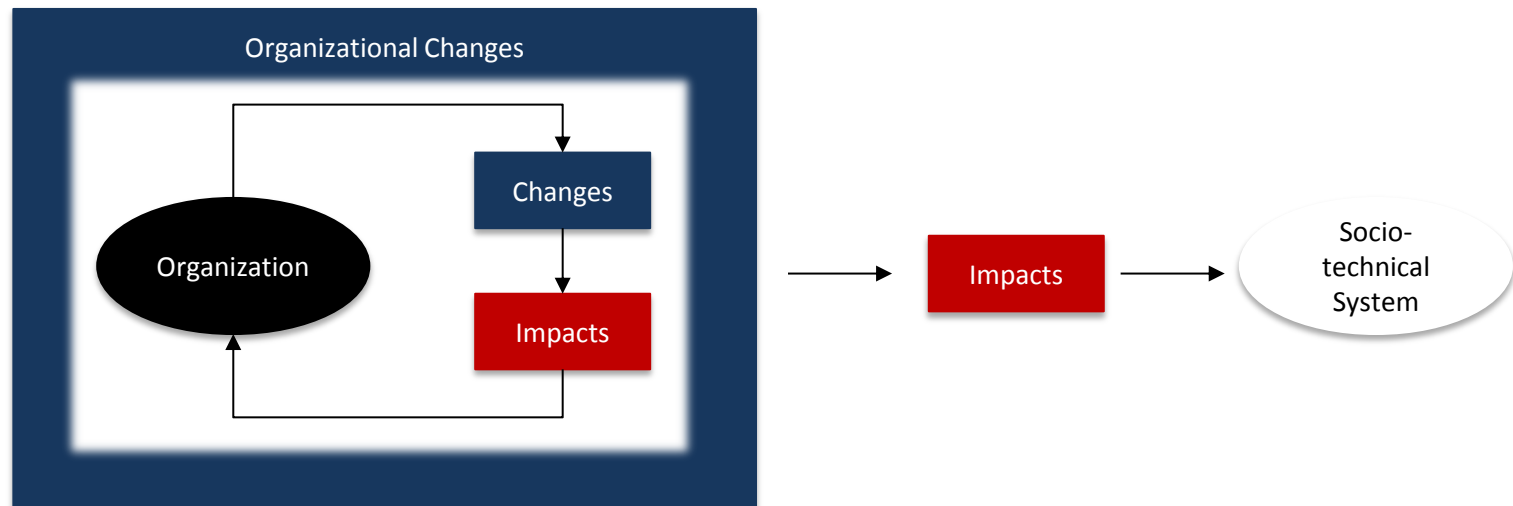
[1] Sousa, H. P., & Leite, J. S. (2014). Modeling Organizational Alignment. In S. I. Publishing (Ed.), Conceptual Modeling, (pp. 407-414).

Problem

- Over time, an **STS** presents **inconsistencies and lack of compliance** with new environmental requirements in which it was deployed, i.e. activities and business processes through which the organization intends to generate value; in other words, its *business strategy*.
- This lack of compliance is due to **unforeseen impacts** and demands the **evolution of the STS** which is a difficult, complex, costly, and time-consuming process.

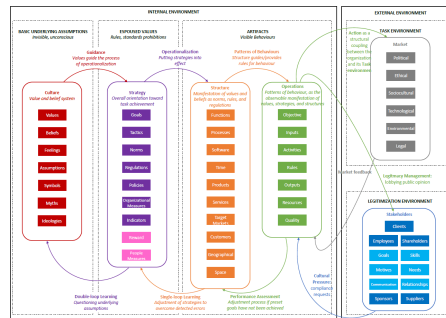
Research Objective

- Our research aims to **support stakeholders and organizational analysts** in **understanding likely organizational impacts of proposed organizational changes**, as strategic changes, and then **gain insights and reasoning on the impacts of these changes on the STS' requirements evolution**.



Research Proposal

- To understand organizational flow of impacts, we propose a **Dynamic Organizational Model**



- To reasoning about organizational changes and impacts, we provide a **database of questions** to be used as “*Seed for Thought*” during scenarios walkthroughs. These scenarios walkthroughs support stakeholders to understand impacts and the need of STS’ requirements changes.

Justification - why i*?

- i* is suitable for **modelling** and **analysis** in requirements engineering, then we can model and **understand stakeholders' underlying motivations** for systems, identify the **relation between the system and the organizational and business context**, **clarify** and **capture** organizational changes, impacts and requirements from the analysis.

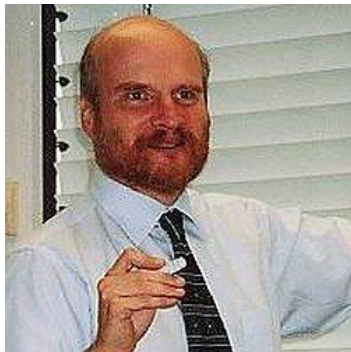


Horkoff, J., & Yu, E. (2014). Interactive goal model analysis for early requirements engineering. *Requirements Engineering*, (pp. 1-33)

Justification – Why scenarios?



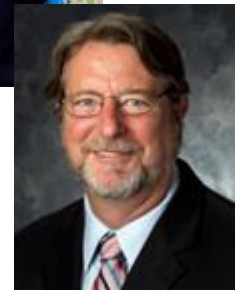
- *The big idea behind these **impact scenarios walkthroughs** is very simple—that **people are better at identifying facts of commission rather than omission** (Baddeley 1990).*



- *From this general trend in human cognition for **recall to be weaker than recognition**, impact scenario walkthroughs offer stakeholders support to think about most likely impacts of organizational changes.*

Justification – Why a dynamic model?

*Ployhart and Vandenberg (2010) emphasize the need to consider **time** and **change** in developing **models**, to consider the inherent **effect of change** over time on **causal relationships** between two constructs.*



Ployhart, R. E., & Vandenberg, R. J. (2010). **Longitudinal research: The theory, design, and analysis of change.** *Journal of Management*, 36, 94-120.

Justification – Why STS and Organizational Strategy Alignment?



*The success of information systems projects inside a business has always required a **high degree of alignment with business objectives (organizational strategy)** in order to be successful.*

METHODOLOGY

Research Questions

*RQ1. How **strategic initiatives** can change an organization?*

*RQ2. How can we **model** an organization?*

*RQ2.1. What are the **dimensions** of an organization?*

*RQ2.2. How do organizational dimensions **relate** to each other?*

*RQ2.3. What are the **elements** of each organizational dimension?*

*RQ2.4. What are the **external dimensions** that might have impact on the organization?*

*RQ3. In occurrence of change, how is the **flow of impacts** within organizational dimensions?*

*RQ4. How to elicit possible organizational **impacts**?*

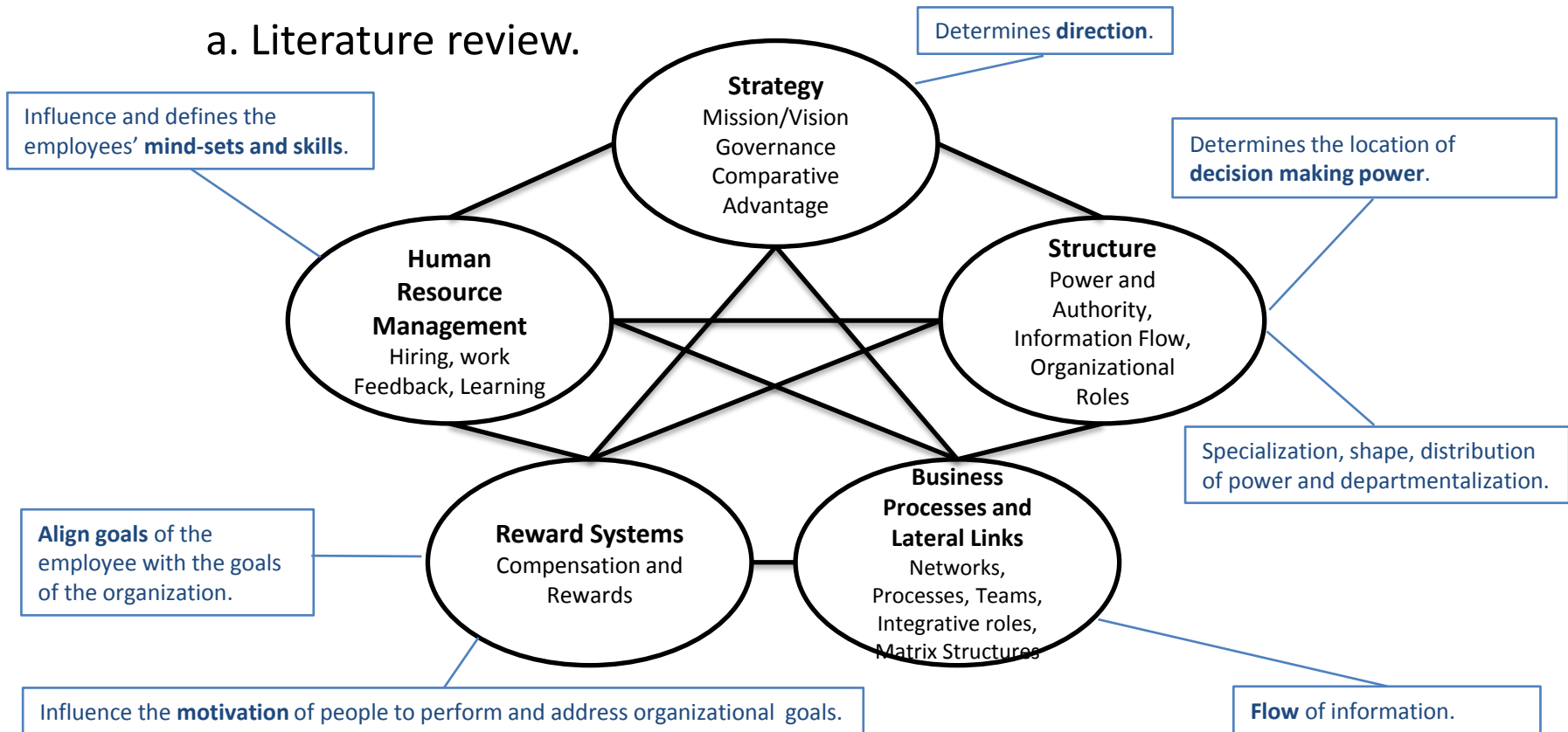
*RQ5. How do **organizational changes** impact the deployed STS?*

*RQ6. How does the **deployed STS** impact the organizational?*

Iterative Process to answer the Research Questions

1. Identification of a core organizational model:

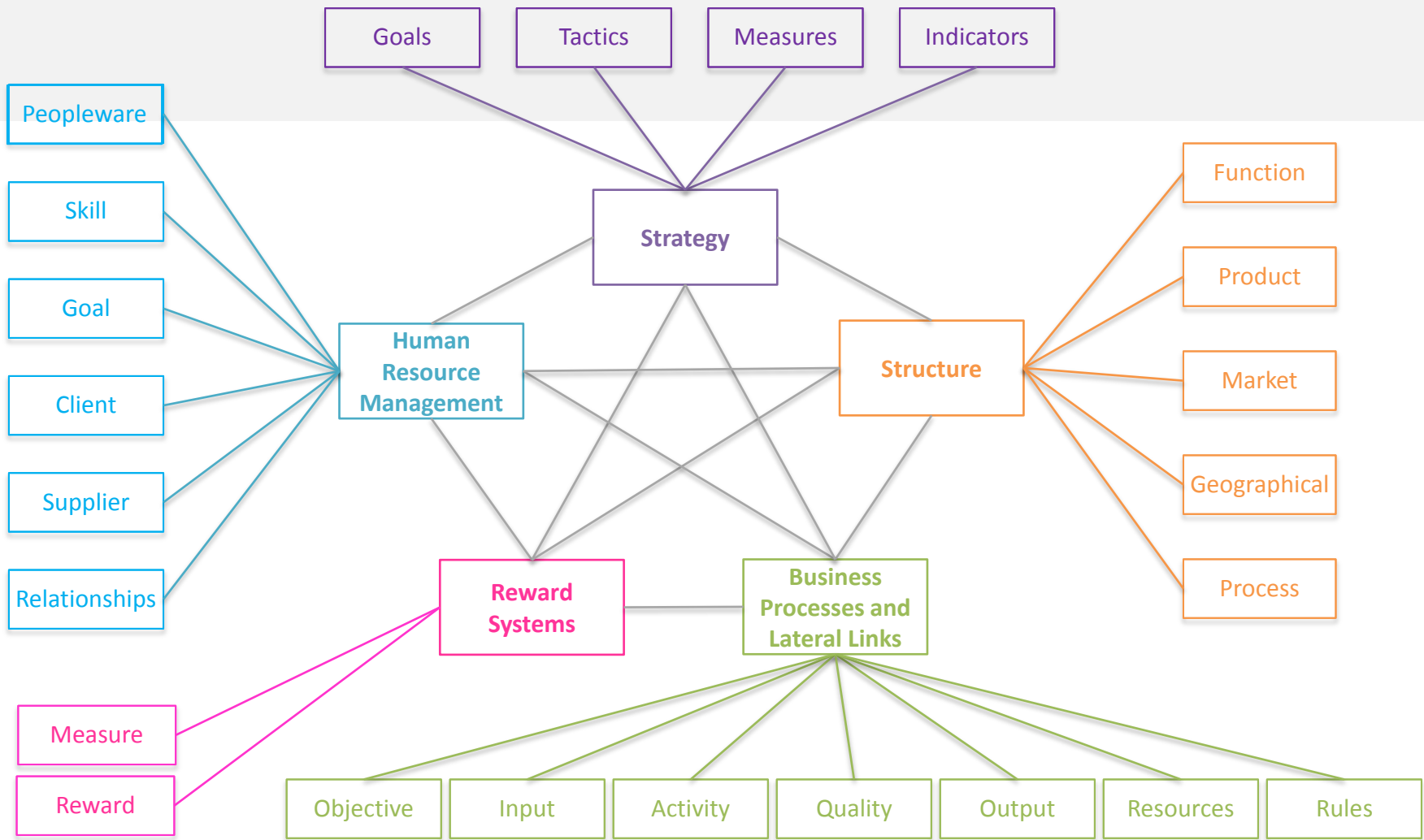
a. Literature review.



Iterative Process to answer the Research Questions

2. Identification of each five end of the star elements and extension of the model:

- a. Literature review;
- b. Refinement of the model;
- c. Application in a real case (Post Office) for validation and identification of elements;
- d. Refinement of the model.



Iterative Process to answer the Research Questions

3. Elicitation of knowledge in a workshop: discussion on the model of a real case (specialists and me as a facilitator):
 - a. Validation of elements and relationships;
 - b. Refinement of the model.

Mind Map

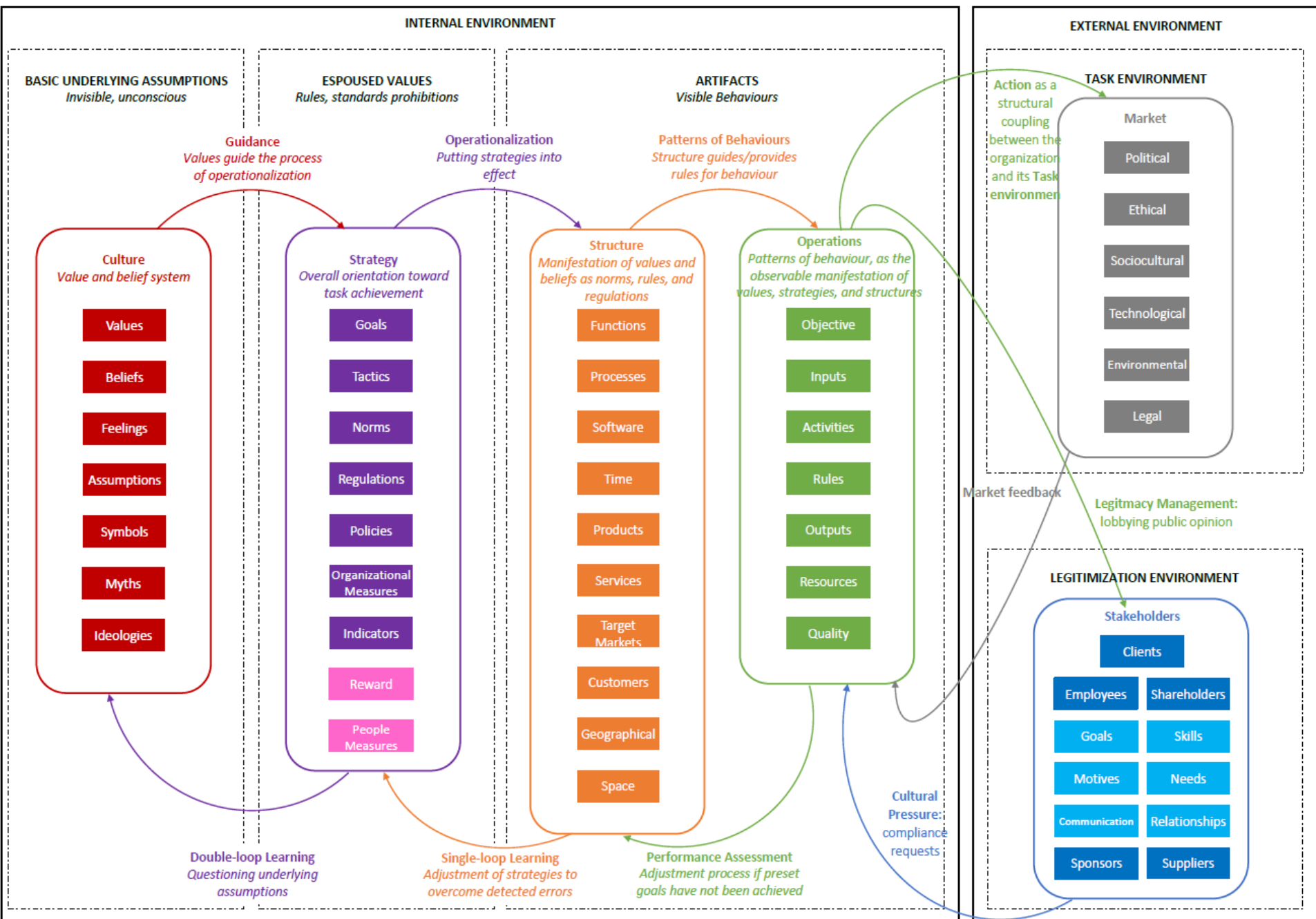


Iterative Process to answer the Research Questions

4. Identification of flow of impacts of organizational changes:
 - a. Application of the model on workshop's results;
 - b. Refinement of the model;
 - c. Literature Review;
 - d. Refinement of the model;
 - e. Study of real cases of author's professional practice;
 - f. Refinement of the model.

Dauber, D., Gerhard, F., & Yolles, M. (2012). A Configuration Model of Organizational Culture. *SAGE Open* 2.1 DOI: 10.1177/2158244012441482, 1-16.

From Unknown to Known Impacts of Organizational Changes on Socio-technical Systems

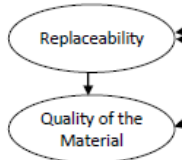
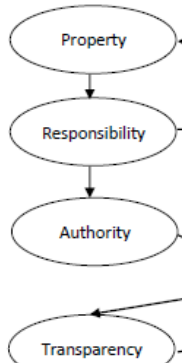


From Unknown to Known Impacts of Organizational Changes on Socio-technical Systems

INTERNAL ENVIRONMENT

BASIC UNDERLYING ASSUMPTIONS *Invisible, unconscious*

Culture
Value and belief system



ESPOUSED VALUES *Rules, standards prohibitions*

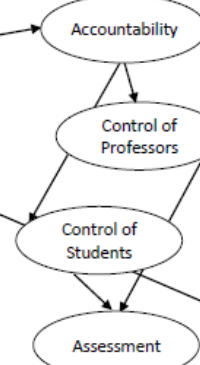
Strategy
Overall orientation toward task achievement

Adoption of a LMS

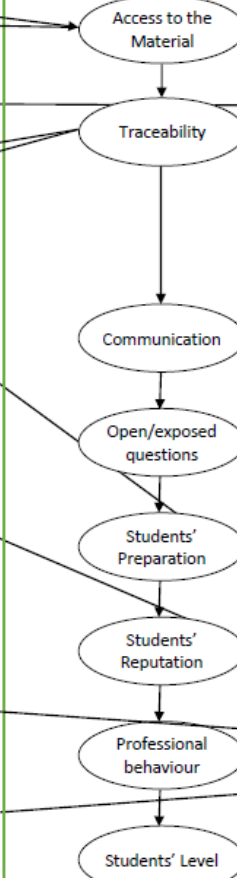
Policies

ARTIFACTS *Visible Behaviours*

Structure
Manifestation of values and beliefs as norms, rules, and regulations

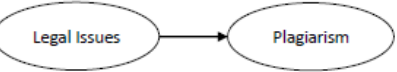


Operations
Patterns of behaviour, as the observable manifestation of values, strategies, and structures

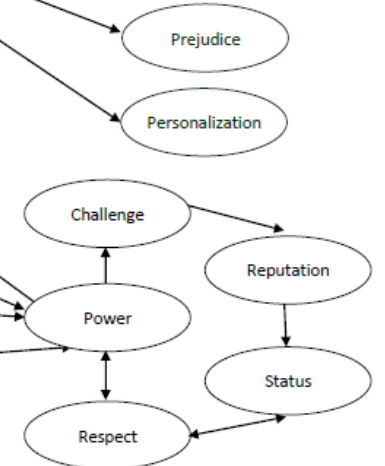


EXTERNAL ENVIRONMENT

TASK ENVIRONMENT *Market*



LEGITIMIZATION ENVIRONMENT *Stakeholders*



Iterative Process to answer the Research Questions

5. Elaboration of questions to support possible organizational impacts:

- a. Analysis of workshop's results;
- b. Analysis of real cases of author's professional practice;
- c. Analysis of Post Office case.

File: General Questions.docx

<p style="text-align: center;">IMPACT ANALYSIS QUESTIONS</p> <p>Below, we present generic questions to organizational impact analysis. They should be customized to each organization having a process of organizational change and impact analysis.</p> <p>INTERNAL ENVIRONMENT</p> <p><u>Impacts of new structure</u></p> <p>Impacts of new/changed structure on operations</p> <ol style="list-style-type: none"> 1. What are the objectives of this new structure? 2. Does this new structure need inputs? 3. How does security apply to this new input? 4. What are the activities needed? 5. Is this activity needed? 6. Is an activity missing? 7. How does the concept of security apply to this activity? 8. What are the roles needed? 9. Is a business rule required? 10. What are the resources needed? 11. How does security apply to this new resource? 12. How does this new structure need to be monitored regarding quality aspects? 13. Is it possible to make it faster? 14. Is it possible to make it cheaper? 15. Does this new structure need outputs? 16. How does security apply to this new output? <p>Performance Assessment</p> <p>Impacts of new/changed operations on structure</p> <ol style="list-style-type: none"> 1. How do these new operations affect the structure (power distribution)? 2. Does the organization need other organizational functions to execute the new operations? 3. How does the new function relate to existing functions? 4. Does the organization need new processes to execute the new operations? 5. How do the new processes relate to the others? 6. Does the organization need new software to support the new operations? 7. Do the new operations affect the work skills division? 8. Is the organization going to produce new products? 9. Is the organization going to provide new services? 10. Is there any target market change? 11. Does this structural change bring a new class of customers? 12. How is this new operation going to affect other branches? 13. Where does this new operation fit in the organizational structure? 14. How do these new operations affect the space in where they are going to be executed? 	<p>Externalization</p> <p>Impacts of new/changed strategies on structure</p> <ol style="list-style-type: none"> 1. What are the consequences of this new strategy on the organizational structure? 2. How does this new strategy change current functions? 3. What new functions are needed to implement these new strategies? 4. How does this new strategy change current process? 5. What new processes are needed to implement these new strategies? 6. What new processes does this change imply? 7. Is the new software going to communicate with other software? 8. Is the new software going to need inputs from other software? 9. Is the new software going to provide outputs to other software? 10. How are the organizational skills affected by the new strategies? 11. How do these new strategies affect the products? 12. Does the organization need new products? 13. How do these new strategies affect the services? 14. Does the organization need new services? 15. Do these changes affect the types of market of this organization (health care, government, education, etc.)? 16. How do these new strategies affect the target public? 17. How do these new strategies affect the branches of this organization spread throughout the world? 18. How do these new strategies affect the space in where they are going to be operational? <p>Workload Analysis</p> <p>Impacts of new/changed structure on strategies</p> <ol style="list-style-type: none"> 1. How does this new structure affect the organizational strategies? 2. Are the organizational goals impacted? 3. Are the organizational income impacted? 4. Are the organizational regulations impacted? 5. Are the organizational policies impacted? 6. Does this new structure need a new organizational measures? 7. Does this new structure bring new initiatives? 8. What new measures can be used to people assessment? 9. Are people resources adequate to people evaluation? 10. What are the new reward policies? 11. Are the reward policies in compliance with employees' structure? <p>EXTERNAL ENVIRONMENT</p> <p><u>Customer Assessment</u></p> <p>Impacts of new/changed operations on stakeholders</p> <ol style="list-style-type: none"> 1. How do the changes affect customers? 2. Are the operations satisfying customers' expectations?
<ol style="list-style-type: none"> 3. How is the communication with customers new? 4. Are the operations safe for the customers? 5. How do the changes affect the relationship between employees and customers? 6. Are the operations in compliance with stakeholders' interests? 7. How do the changes affect the relationship with shareholders? 8. Does the organizational need of the previous suppliers? 9. Does the organization need other suppliers? 10. How does the alteration of suppliers affect the organization? 11. How the changes affect the relationship with suppliers? 12. Are employees clear to the change involving the right roles? 13. What skills are needed from the employees clear to the change? 14. Are the operations of employees being satisfied? 15. Is there opportunity to gather opinions? <p>Internal Changes</p> <p>Impacts of new/changed stakeholders' management on operations</p> <ol style="list-style-type: none"> 1. What operational adjustments are needed to satisfy customers' expectations? 2. What operational adjustments are needed to satisfy employees' goals? 3. What operational adjustments are needed to satisfy shareholders' interests? 4. What operational adjustments are needed to support new suppliers? 5. What operational adjustments are needed to satisfy the services? <p>Public</p> <p>Impacts of new/changed operations on market</p> <ol style="list-style-type: none"> 1. Are the needs of the target market being satisfied by the organization? <p>Market Analysis</p> <p>Impacts of new/changed market on operations /PESTLE Analysis/</p> <ol style="list-style-type: none"> 1. What is the political situation of the country and how can it affect this organization? <ol style="list-style-type: none"> a. Trading partners b. Government changes c. Shareholder and their demands d. Funding e. Governmental leadership f. Lobbying g. Foreign pressure h. Conflicts in the political arena 2. What are the potential economic factors for this organization? <ol style="list-style-type: none"> a. Disposable income 	<ol style="list-style-type: none"> a. Unemployment level b. Foreign exchange rates c. Interest rates d. Trade tariffs e. Inflation rate f. Foreign investment trends g. General location issues h. Technological changes specific to products/services i. Local economic situation and trends <ol style="list-style-type: none"> 3. How much importance does culture has in the market and what are its determinants? <ol style="list-style-type: none"> a. Ethnic/religious factors b. Advertising scenarios c. Fiscal issues d. Consumer buying patterns e. Major world events f. Buying power g. Shifts in population h. Demographic i. Health j. Consumer opinions and attitudes k. Views of the media l. Law changes affecting social factors m. Change in lifestyle n. Brand preferences o. Working attitude of people p. Education q. Trends r. History 4. What technological innovations are likely to pop-up and affect the market structure? <ol style="list-style-type: none"> a. Technological developments b. Research and development c. Trends in global technological advancements d. Associated technologies e. Legislations in technological fields f. Patents g. Licensing h. Access into the technological field i. Consumer preferences j. Consumer buying trends k. Intellectual property and its laws l. How mature a certain technology is m. Information technology n. Communication

Iterative Process to answer the Research Questions

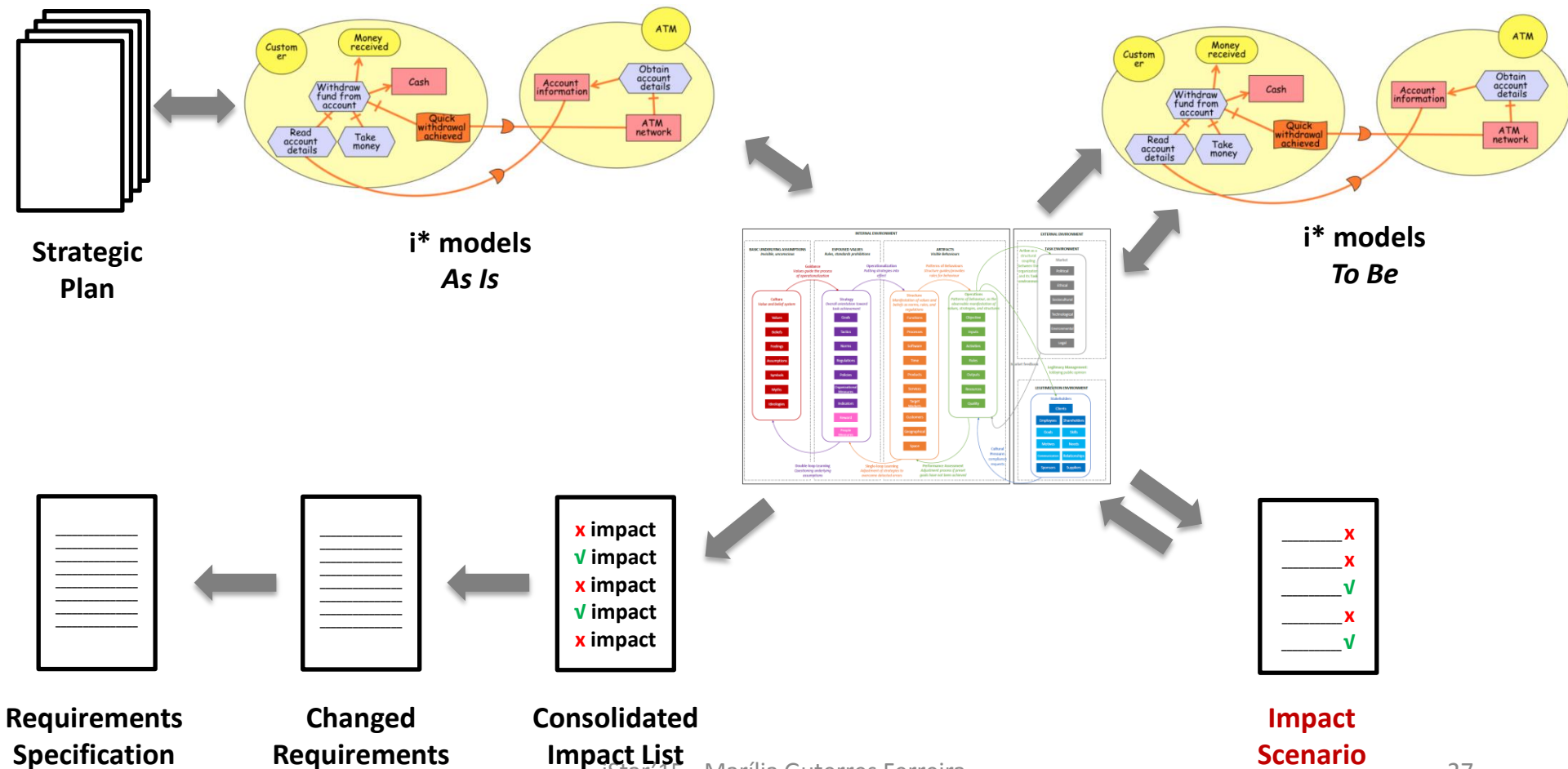
6. Elaborations of impact scenarios in the Post Office case:
 - a. Observation of the environment;
 - b. Interview with a customer;
 - c. Construction of the scenarios;
 - d. Application of the questions;
 - e. Refinement of the model;
 - f. Impacts' elicitation;
 - g. Impacts' analysis.

File: General Impact Scenarios.xlsx

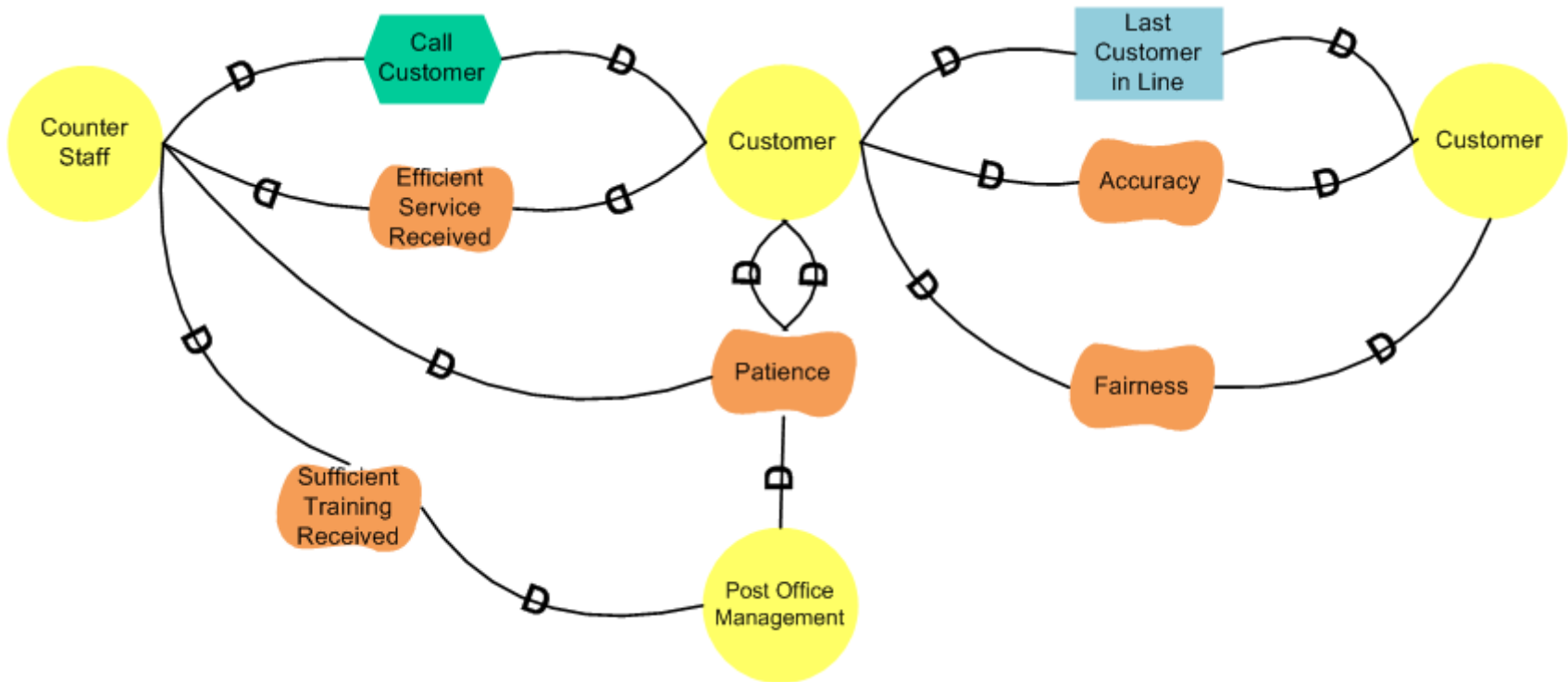
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APPLYING THE PROPOSAL INTO THE POST OFFICE CASE

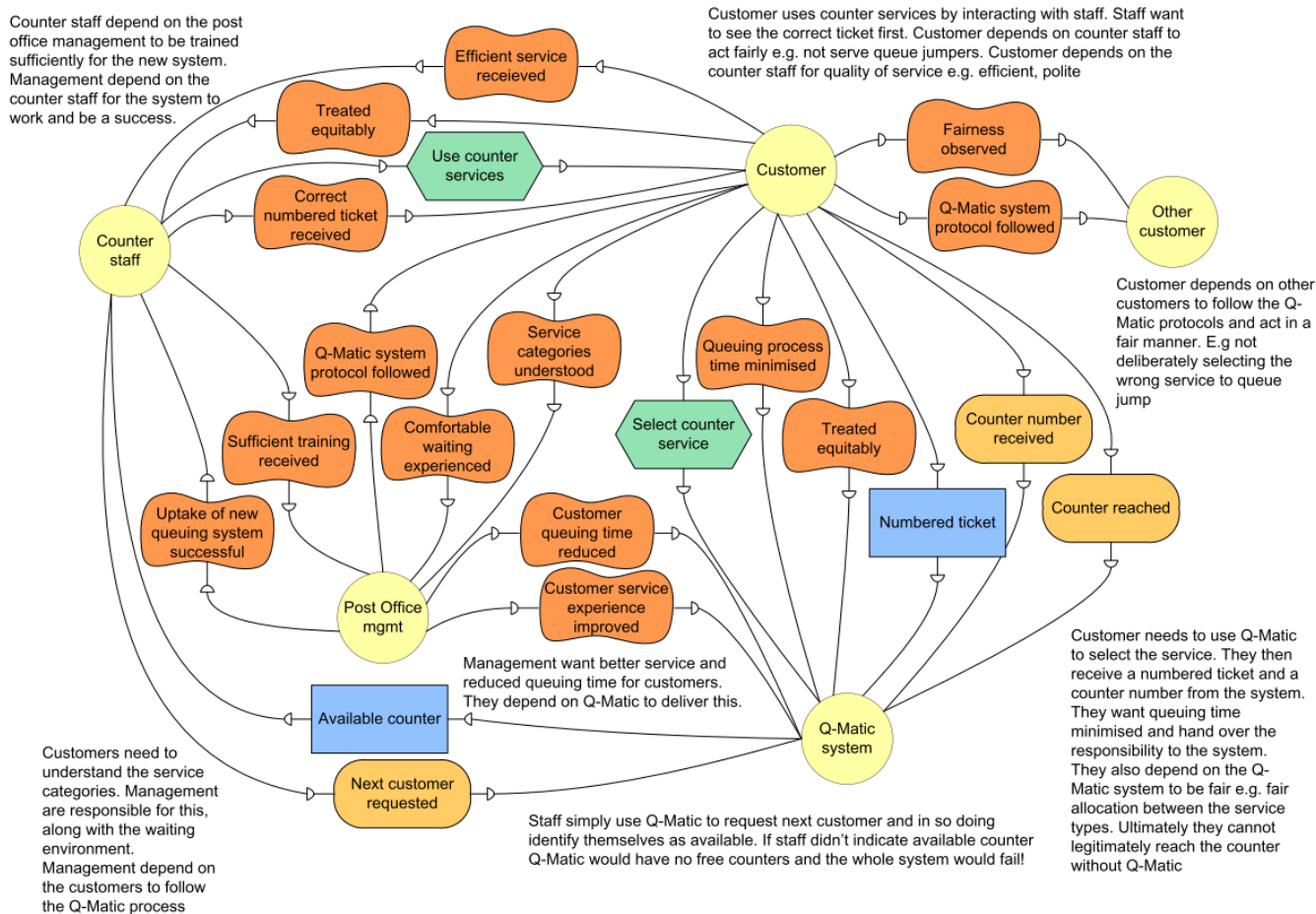
Application



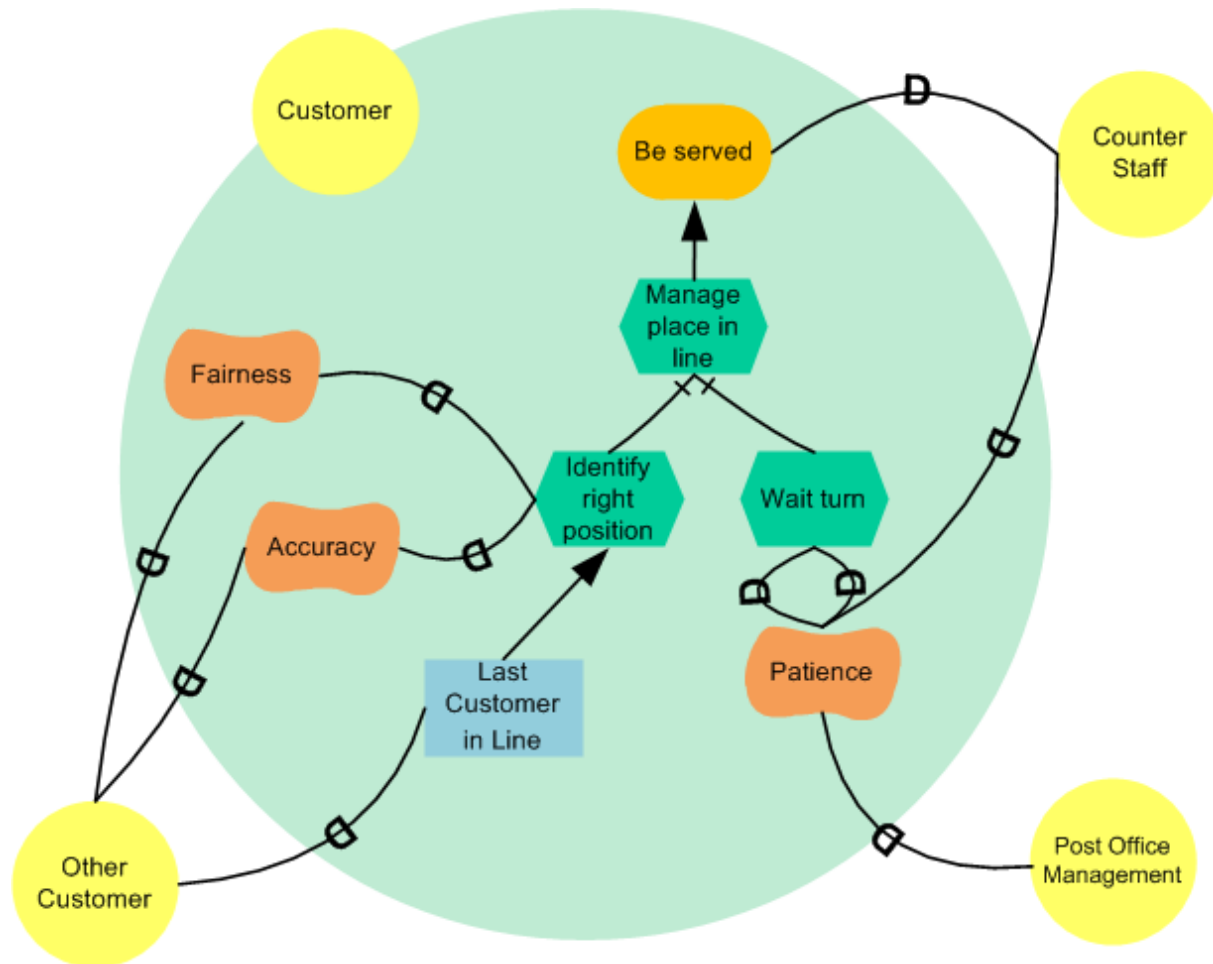
Post Office SD Model - As Is



Post Office SD Model - *To Be*



Post Office SR Model – *As Is*



Post Office SR Model – *To Be*

Notes for clarity:

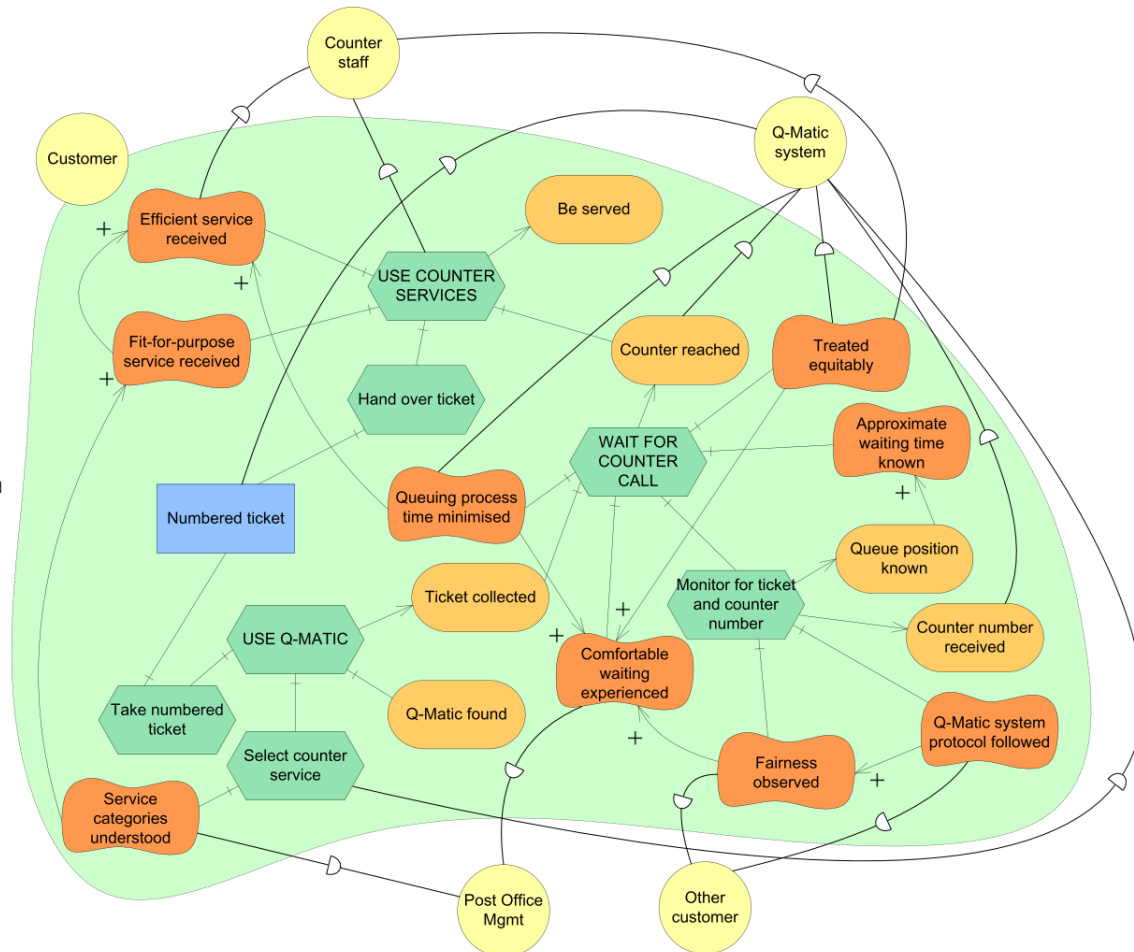
Customer wants a fit-for-purpose service which is helped by understanding the categories.

They want to know an approximate waiting time which is helped by knowing their queue position.

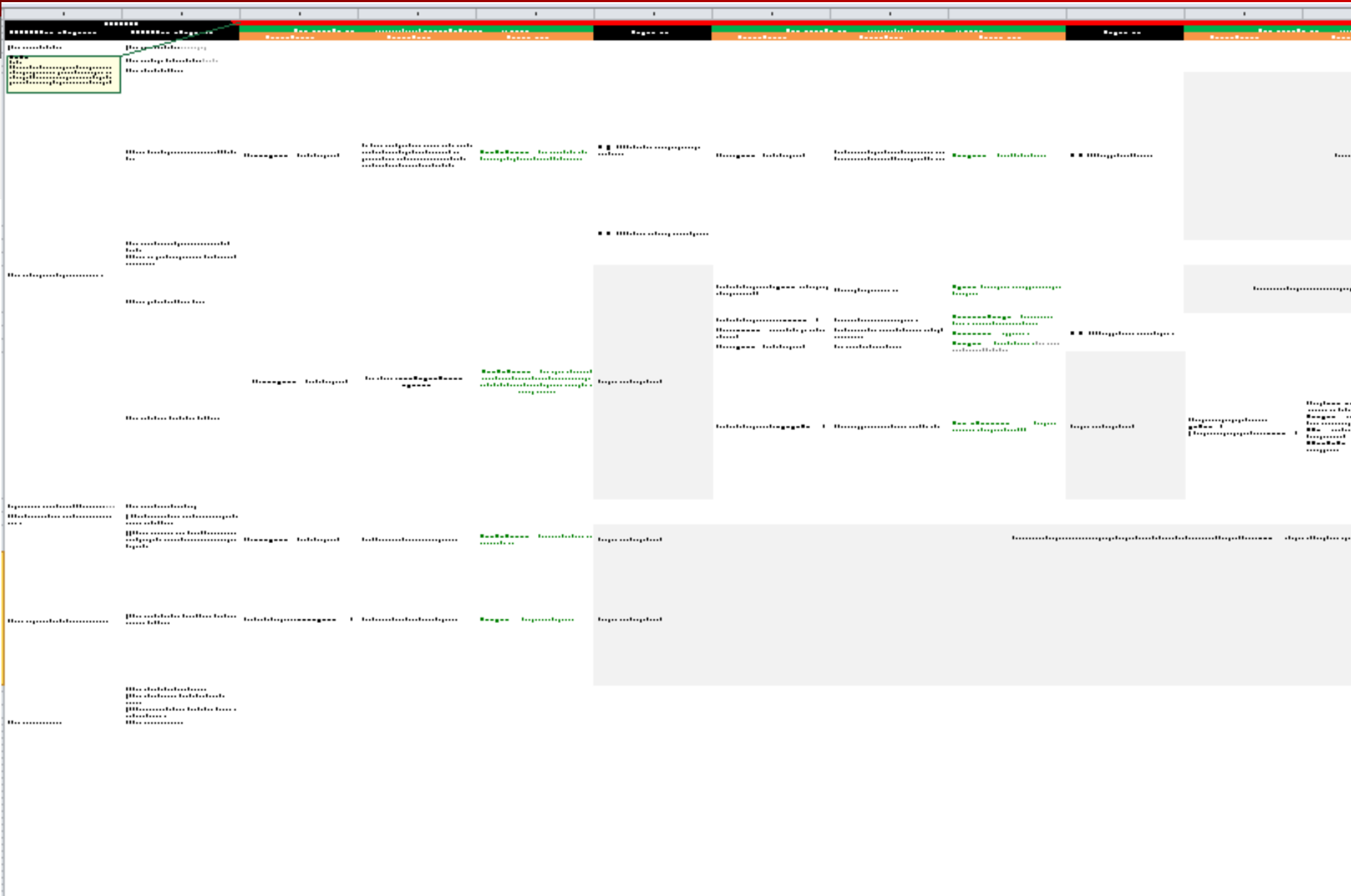
They want to be treated equitably, which is helped if other customers follow the rules and behave fairly!

A big part of receiving an overall efficient service is having queuing time minimised.

Reduced waiting time helps the waiting experience, as does knowing it's equitable



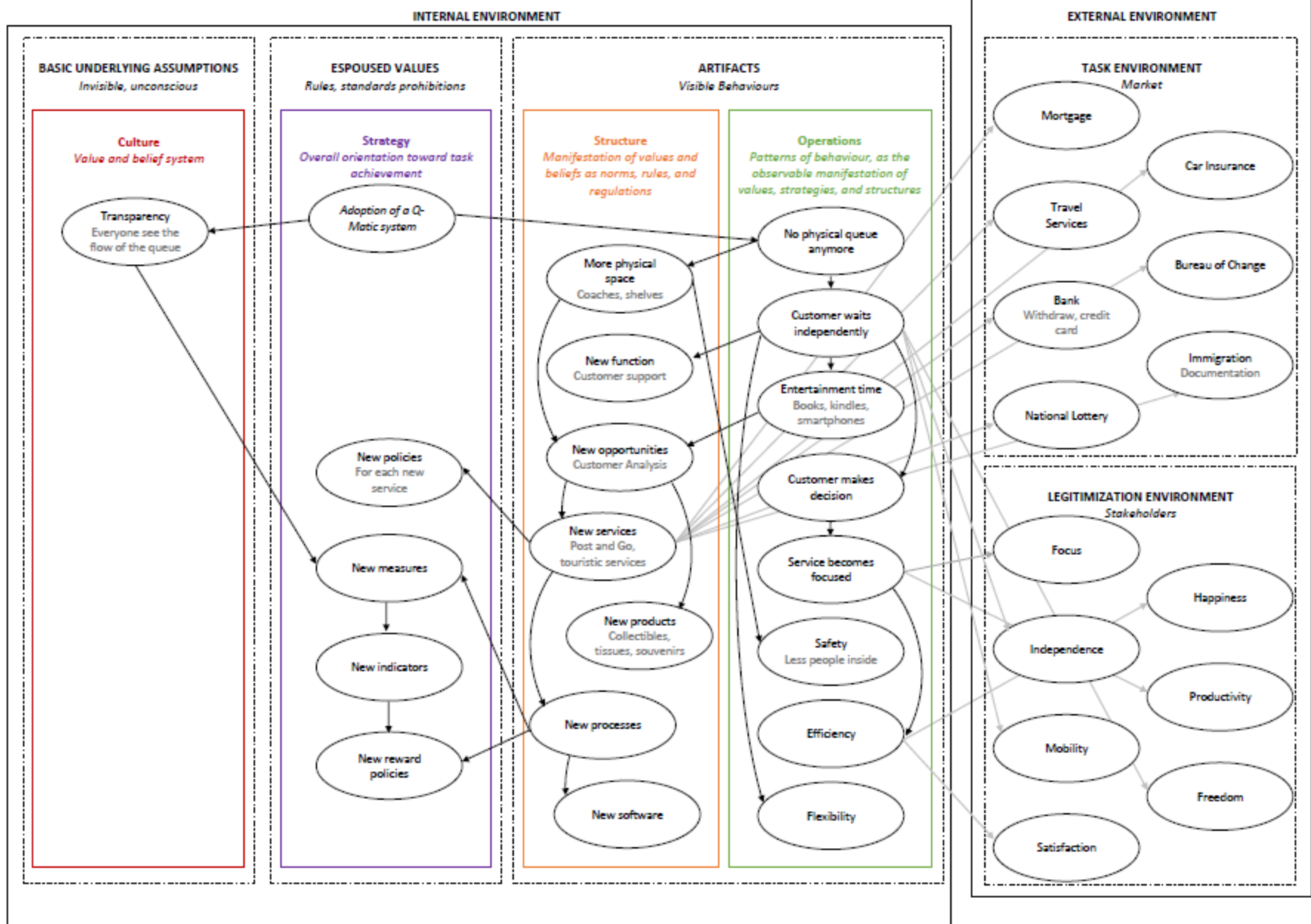
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RESULTS, MAIN CONTRIBUTIONS AND FUTURE WORK

Results

- 6 different flows of impacts,
- 18 main organizational changes,
- 51 possible organizational impacts and consequent
- 40 STS' requirements changes, which if implemented correctly, will **minimise undesirable effects of the impacts**. The abstraction level of the requirements varied, for example, we found a need for entire software to support new services, as “Post and Go”, and we pointed 10 different specific indicators to be extracted from data gathered by the STS.
- As the DOF is based on the participant's reasoning, the results and flows of impacts diverse from participant to participant, since it is an **unique representation of the perceptions of the person to whom the DOF is being applied**.



Main Contributions

- Requirements **quality** and **accuracy**;
- **Better understanding** of organizational dimensions, elements and impacts of organizational changes;
- Contributions to **organizational learning**; and consequently
- Enables the development of **more powerful STS**.

Future Work

- **Validation** of this proposal in other cases;
- Make a **thorough comparison** with related re-searches [6];
- Extend the model to address impacts on **external organizations**;
- Develop a **tool** to support the DOF;
- Study **creative techniques** to boost thinking about impacts;
- **Apply** the DOF to analyse the relationship between Software Transparency and Power Dynamics in Organizations.

Acknowledgments

- Thank you all for your contributions!



Acknowledgments

- Science without Borders for the financial support.





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mariliagf@gmail.com