Modeling Organizational Alignment

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Abstract. In the world of business, even small advantages make a difference. As such, establishing strategic goals becomes a very important practice. However, the big challenge is in the designing of processes aligned with the goals. Modeling goals and processes in an integrated way improves the traceability among strategic and operational layers, easing up the alignment problem.

Keywords: Business process modeling; Goal modeling, BPM, KPI, i*, BPMN.

1 Introduction

Organizational alignment, a concept explored in organizational theory, has different patterns according to the viewpoint from which it is defined or from the standpoint of who define it [13]. According to Sender [14]: “Organizational alignment is the degree to which an organization’s design, strategy, and culture are cooperating to achieve the same desired goals”. It is a measurement of the agreement or relative distance between several ideal and real elements of organizational life. In the field of information systems, alignment has been researched in a more focused pattern, where the object of alignment is not the organization, but the relationship of IT processes with the organization needs [5]. Our work aims to fill a gap, that is; providing proper support for organizational alignment by means of conceptual models, since the work driven by the IT perspective, put more emphasis on the operational aspects. Studies [9], [12] believe that the lack of proper tools and notations to represent other layers, than the operational one, is a culprit on this limited approach. It could be also due to the inheritance of a historical workflow view and the consequent practice of, preferentially, working only at the "practical" details and analysis of the operational layer.

It is important to clarify that organization theory usually understand organizations in three decision levels: strategic, tactical and operational. As such, languages that focus just on processes leads to models focusing mainly on the operational decision level, whereas languages with more abstract concepts such as goals, are more apt to have models that deals with the other levels. Given this context, we frame organizational alignment as a way to have all three levels of decisions aligned, which of course may involve different patterns. As such, if models are used to help managing the organization alignment they need to have proper representations to different levels of decision. The invention of goal-oriented requirements engineering brought new

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capabilities for representing issues at the strategic and tactical level. Our contribution is the proposition of a conceptual model that seamless merges i* [18], Business Process Modeling Notation (BPMN) [10] and Key Performance Indicators (KPI) [2] as to produce a modeling language that addresses strategic, tactical and operational layers with explicit tracing among the levels. The merge of languages first addresses the lack of notations that support both process and goal modeling; second, maintains a more detailed traceability between the layers by using relationships in places where the languages intercept each other; and third, i* is used as the interconnection of the three layers, departing from the viewpoint of intentional actors. Actors, who may be agents, roles and positions, according to the i* ontology [18], are central since they link decision levels to organization structure. On top of that, we propose a new systematic way of using KPIs that helps evaluate business models alignment before performing them, and inserts an implicit link of traceability that helps identify crucial elements in the process. Providing a language with built in traces among different organizational decision levels contributes, we believe, towards organizational alignment.

2 GPI: A Result of Merging Different Languages

Sousa [17] departing from the works of [9], [12], and [16], surveyed and selected two languages (one from business process modeling and other for goal modeling) that offer better support to the process and goal modeling. In order to increase the capability of alignment analysis, the KPI element was integrated into the language with a proper representation. GPI (Goals, Processes and Indicators) is a proposal that merges, by explicit links, concepts of i*, BPMN, and KPI. The GPI proposal was implemented by reusing the Oryx [11], an open source tool. Oryx is an academic framework that permits the definition of new notations by using the Oryx language.

The main goal of the merger is to allow the construction of models, which explicitly answers the 5W2H questioning regarding organizations. Then, actors, pools (who/where), hardgoals, softgoals (why), resources, data object (what), process flow (when), tasks, activities (how), indicators (how much) are represented together with different associations among them, trough the implementation of traceability, leading to a built in alignment of indicators, processes and goals elements. We have approached the merger as follows: a) identify mappings between BPMN and i*, b) merge BPMN and i*, c) merging KPI into the union of i* and BPMN, forming GPI.

2.1 Mappings

In order to integrate the languages, we have mapped its elements. Other papers had already done some similar work, for example, [1] proposed a bi-directional mapping between i* and BPMN. However, it is hard to perform a perfect transformation between the proposals because of their significant differences. One difference we can mention is conceptual: i* offers a different vision, focusing on strategy and the relations of dependency between actors. BPMN present the sequence of activities

(operational view) through a sophisticated workflow notation. Other important difference is that i* does not consider temporality, disabling the verification of **when** things happen, as such it is completely different from BPMN. Then each language has its specific contributions, making then strong when combined. Sousa [17] presents more details about i* and BPMN mappings considered in our proposal, and the changes applied in the notation in order to integrate them.

2.2 Merging i* with BPMN

The merging of i* and BPMN results on an architecture composed by the traditional goal and process layers, together with a new intermediate layer that is inspired in i*. This is the main difference of GPI. During the studies of alignment, we identify that not only elements to link the layers are needed, but also more details about actor's activities and its real correlation with organizational goals. Modeling languages usually resume information when linking different layers, thus lacking more expressive semantics about the links. It also does not offer resources to control the distance inserted by the abstraction applied in the models. Worse yet, our experience on business process modeling shows that organizations model their processes and goals a part, and also after everything is set up and being used. Macro and micro levels are modeled based on information extracted from different stakeholders, with different perspectives of business. Moreover, as bigger the company is, more far are the stakeholders of strategic and operational layers. The concern of alignment only appears at the end, when some answers could not be obtained just looking at the models.

The importance of the intermediate layer starts from the consideration that a process, in most of cases, reaches many sub goals in order to achieve the main one (or more). However, in order to verify alignment, it is necessary to have elements to be analyzed. This layer also permits the extraction of tacit knowledge when using the 5W2H framework as an analysis method. As such, it is possible to identify deviation of comprehension about: the role of the actor, the tasks he is performing, and what are his responsibilities inside the company. The 5W2H works by eliciting information from the viewpoint of actors, making the links between the layers more transparent [8]. GPI enforces a "meet in the middle" approach, considering the information obtained from the actor, it is possible to design a traceability link between the "lowest level goals" and "organizational goals"; and the "lowest level goals" and their "respective set of activities". We named these low-level goals as *Local goals*. Identifying and linking *Local goals* to organizational goals results in a decomposition that comes from low level and is extracted from the actor's viewpoint. These elements **meet in the middle** with high-level elements, improving traceability and helping to analyze the alignment. This is possible because of the detail of the connection **of each operational element** (how) and the respective business goal that **justifies** those actions in the processes (why). These elements, together, contribute to a more transparent model [8] that helps the alignment analysis. Fig. **1** shows the overall merging scheme, with the explicit pointers (as means-end) used for integration.

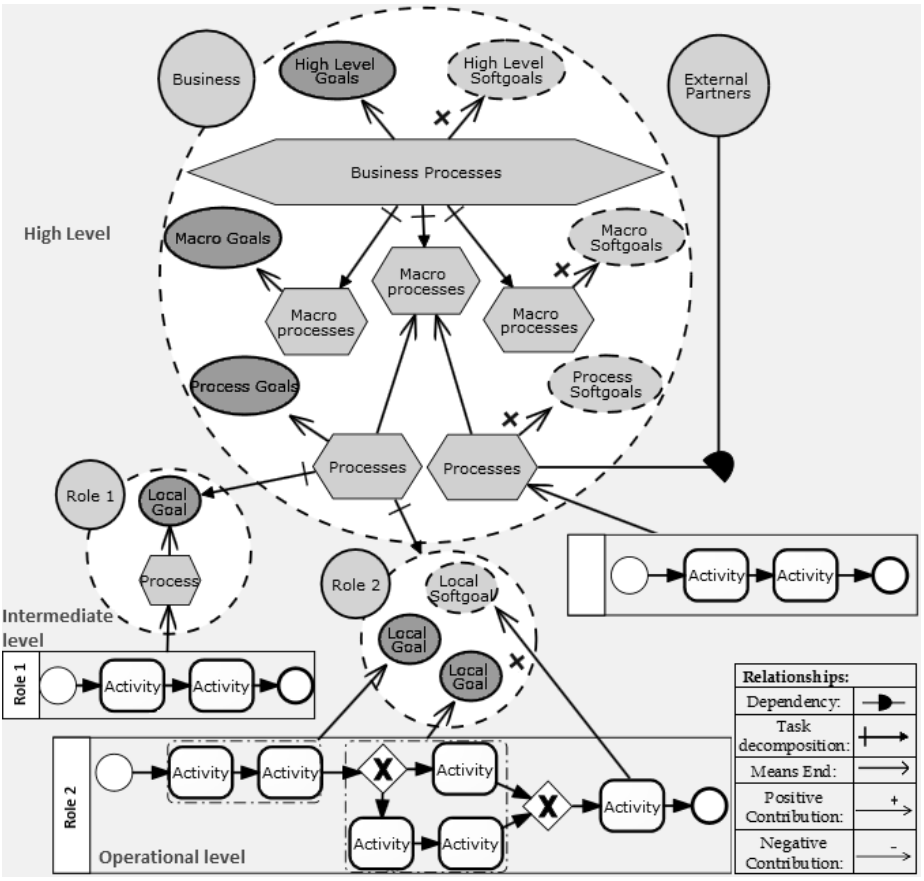

Fig. 1. Merging BPMN with i*

The i* model is "instantiated" in a manner to provide the necessary elements to GPI. In the higher level, i* is instantiated to represent business goals and macro process, considering the business as an actor (business view). Our merging approach maintains the syntax and semantics of both languages, and merges them using three mechanisms: the i* means-end link or contribution link [4], or the BPMN "assignment" (sign "+"), which denotes macro process. The basic merge is done at the i* task level, reflecting the fact that i* is a language suited for more abstract descriptions and that relies on tasks or ends, in a means-end relationship, to provide more concrete descriptions.

Note that the merging is performed over the detail of a given actor boundary, that is, the merging occurs within the i* SR (Strategic Rationale) model. Also note that the GPI language suggests the organization of goals following the levels of decision of an organization: strategic (high-level), tactic (macro), and operational (process goals and goals). The bottom of Fig. 1 shows the detail of the *Local goals* of "Role 1" and "Role 2". The example of "Role1" presents a *Local goal* linked (through means-end link)

to a process that is detailed by an entire workflow (illustrated by two activities). In the case of "Role 2", *Local goals* are merged with BPMN by means-end and contribution links. Note that different set of activities are linked to specific *Local goals*. Worth noting is that this merge allows traceability between "why" and "how" at the operational layer. This is important because it links high level goals, actors and its activities, helping, for example, identifying responsibilities and propagation of impacts caused by problems or changes (impact analysis).

2.3 Merging KPI into the Union of i* and BPMN

Each organization goal requires that a set of conditions be satisfied or satisficed in order to reach goal achievement. The term "conditions" refers, for example, to the development of a product, a state of the process, the production of some information, start of a specific event, and any other thing reached from the performing of process, including quality goals. These conditions expected for one goal are defined by elements named as "Indicators".

The GPI business process layer maps a set of activities that must be performed in order to accomplish a process. It shows how acts are performed to produce the expected conditions in order to achieve the goals related to a given process. As such, indicators are defined according to goals in the goal layers of GPI (high level goals, macro goals, process goals and *Local goals*). It is understood that the indicators are gauged during process execution, showing whether the process has indeed produced the expected, which is defined though the indicators.

Therefore, indicators can be defined through the elements that are developed along the process execution. Assuming that the process produces the necessary information (*Critical resources*) for the indicators to be calculated, we can infer that: a) the indicators can be calculated. b) If the indicators are satisfied, one can assume that the process is effective.

Failing to produce an indicator or an indicator that misses the expected value or range of values, points to problems in goal achievement, **indicating a misalignment in the organization**.

3 An Example of GPI

The GPI proposal was evaluated through a systematic method as shown in [10]. In this work, we present a simpler example in order to facilitate comprehension. Fig. **2** exemplifies the relation of a business process, goals and its indicators in the "Integrated Diagram". The goals are defined from the viewpoint of the main actor (General attendant). The layer of macro goals and process was not considered in this case.

The General attendant has two goals: one consists on meeting the customers quickly, and other on maintaining the unsuccessful assistances rates less than 10%. The first goal has the indicator "Average response time" that calculates the average time of assistances. If the average is less or equal to the established time as "quickly", this goal is considered satisficed. In this case, the *Critical resource* is the average of time

extracted from the assistance records. To verify the satisfaction of the hardgoal "Unsuccessful assistances be less than 10%" the indicator is "Percentage of unsuccessful attendance". The goal is met if the number of assistances is less or equal to 10% considering all the assistances registered. To satisfy these goals, the General Attendant must perform the task "Assist client". This task is executed by performing the process "Perform presence attendance to external customers" or "Perform telephone assistance to external customers". In the integration of models, the process "Perform presence attendance to external customers" was detailed. In this process, it is possible to identify the production of the *Critical resource* "Assistance recording", needed to calculate the indicator "Average response time", and also one of the resources needed to calculate the indicator "Percentage of unsuccessful attendance". But it is not possible to identify the *Critical resource* "Unsuccessful attendance". Then it is possible to conclude that the process is not able to produce the resources to verify if the goal "Unsuccessful assistances be less than 10%" is reached or not, what demonstrates the misalignment between the process and its goal.

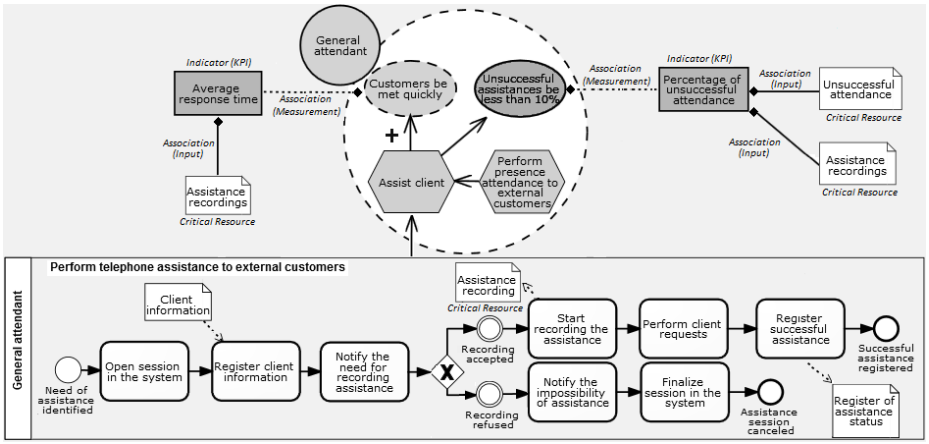

Fig. 2. The *Integrated Diagram* and the use of indicators

4 Related Work

The URN [6] is one of the most important proposals toward the goal and business process alignment. URN is composed by two languages: GRL (to model goals) and UCM (Use Case Map, to model business process). Comparing both proposal in terms of alignment between business process and goals, URN keeps the traceability between the layers through the "Realization link" that interconnect the goal with its respective process. GPI has two similar links (assignment and means-end links) that connect both layers, as show in Fig. **2**. GPI also offers a relationship between a goal and a task, but in this case, representing a process activity. This link occurs at the lowest level, having different meaning from the relationship available in the URN.

The main difference between these languages is the intermediate layer proposed by GPI. This layer is responsible for increasing the traceability between the goal and processes layers by inserting a new activity in the modeling process that consists of investigating, from the actor's viewpoint, what are their goals inside the process they participate. These goals, called *Local goal*, links process and goals layers in a manner to make possible identify, for example, which activities, systems, roles and information are involved in satisfying a given objective in the highest strategic level.

Another important difference is that URN uses UCM to model business process, which was designed to model software scenarios, being adapted to model business process. Its graphical elements are very different from that usually adopted by business process notations, and there is a lack of important business elements like business rules and common artifacts used as input/output of activities. Conversely, BPMN is an international standard for business process modeling notation, widely used.

With respect to indicators, the KPIs proposal of GPI differs from others approaches [3], [7], [15] because it does not evaluate the process efficiency, but helps to evaluate alignment over business models. The use of KPI in GPI aims to demonstrate, in an early analysis (or, as we call, design runtime) what processes are necessary in order to achieve its goals. Our main concern is about defining the "inputs" to calculate the KPIs. These inputs implicitly represent what is expected (products) by the goals to be achieved by the process. The KPIs are not linked to the process, but to the goals, and they detail the goals by expressing what is necessary to satisfy them (or satisfice, in the case of softgoals). The quantification or qualification of how much the process is being performed, how goals and softgoals could be calculated and measured is not the concern of our approach. The analysis proposed does not cover the performance of process instantiation.

Central to our alignment proposal is the element *Critical resources*. They are elements that must be modeled as product of process (even if it is intermediate products). The identification of the absence of these key elements in the processes means that the related goals could not be measured and/or satisficed, what implies in the misalignment, because one element expected in the goal layer is not present in the operational layer. The existence of these elements in both goals and processes makes an implicit relationship that enables traceability between crucial activities, actors, systems and other element involved in the activity. With this, GPI improves the identification of weaknesses as well as the impact of possible changes in strategic goals.

5 Conclusion

Business process modeling is an important resource to the organizations, when it provides support for organizational analysis. One of such fundamental analysis is checking for organizational alignment. Our contribution is providing a language, where it is possible to model the strategic, tactic and operational levels in an integrated manner. The integration uses different levels of abstraction for goals upon which a strong tracing is provided. On top of that, the use of indicators makes it possible to check if desired results are being achieved in the design.

It is important to remember that the requirements engineering process may use business models as information sources in requirements elicitation [4], improving information system alignment. However, the organizational misalignment, if exists, will be propagated to the software. Therefore, it is proper to have early models aligned from the perspective of the organization.

Future work should trail three camps: evaluations of the GPI language/editor; application of GPI models in organizations, as to evaluate the use of GPI in modeling alignment problems (at the design time); and evaluation addressing monitoring of implemented processes according to the GPI design.

References

1. Alves, R., Silva, C.T.L.L., Castro, J.: A bi-directional integration between i* and BPMN models in the context of business process management: A position paper. ER@BR (2013)
2. Fitz-Gibbon, C.T.: Performance Indicators. Bera Dialogues, vol. 2, p. 111. Paperback (1990) ISBN-13: 978-1-85359-092-4
3. del-Río-Ortega, A., Resinas, M., Cabanillas, C., Cortés, A.R.: On the definition and design-time analysis of process performance indicators. Inf. Syst. 38(4), 470–490 (2013)
4. Fiorini, S.T., Leite, J.C.S.P., Macedo-Soares, T.L.V.A.: Integrating business processes with requirements elicitation. In: WETICE, pp. 226–231 (1996)
5. Haes, S.D., Grembergen, W.V.: Analyzing the Relationship Between IT Governance and Business/IT Alignment Maturity. In: International Conference on System Sciences (2008)
6. ITU-T, Recommendation Z.151, User Requirements Notation (URN) – Language Definition (November 2008), http://www.itu.int/rec/T-REC-Z.151/en (2012)
7. Kaplan, R., Norton, D.: The balanced scorecard-measures that drive performance. Harvard Business Review 70 (1992)
8. Leal, A.L.C., Sousa, H.P., Leite, J.C.S.P., Braga, J.L.: "Transparência Aplicada a Modelos de Negócio". In: Workshop em Engenharia de Requisitos, Brasil, pp. 321–332 (2011)
9. List, B., Korherr, B.: An evaluation of conceptual business process modelling languages. In: 21st ACM Symposium on Applied Computing, Dijon, France, pp. 1532–1539 (2006)
10. OMG, Business Process Model and Notation (BPMN), version 2.0 (2011)
11. Oryx, Site oficial Oryx, http://Oryx-project.org/research
12. Pourshahid, A., Amyot, D., Peyton, L., Ghanavati, S., Chen, P., Weiss, M., Forster, A.J.: Business process management with the user requirements notation (2009)
13. Powell, T.C.: Organizational Alignment as Competitive Advantage. Strategic Management Journal 13(2), 119–134 (1992)
14. Sender, S.W.: Systematic agreement: A theory of organizational alignment. Human Resource Development Quarterly 8, 23–40 (1997), doi:10.1002/hrdq.3920080105
15. Shamsaei, A., Pourshahid, A., Amyot, D.: Business Process Compliance Tracking Using Key Performance Indicators. In: International Workshop on Business Process Design (2010)
16. Sikandar-gani, S.B.: User Requirement Notation (URN). Graduate Student, Department of Electrical and Computer Engineering, Mississippi State University, MS, USA (2003)
17. Sousa, H.P.: Integrating Intentional Modeling to Business Modeling., Master's Dissertation, Departamento de Informática, PUC-Rio (2012) (in Portuguese)
18. Yu, E.: Modeling Strategic Relationships for Process Reengineering., Phd Thesis, Graduate Department of Computer Science, University of Toronto, Canada, pp.124 (1995)